OCTOBER 1906.]

[Price 10s.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

118TH SESSION.

FROM NOVEMBER 1905 TO JUNE 1906.

LONDON:
PRINTED FOR THE LINNEAN SOCIETY,
BURLINGTON HOUSE, PICCADILLY, W.,
BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

115TH SESSION.

FROM NOVEMBER 1902 TO JUNE 1903.

LONDON:

PRINTED FOR THE LINNEAN SOCIETY,

BURLINGTON HOUSE, PICCADILLY, W.

1903.

PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

CONTENTS.

Publications of the Society issued during the period, 1st July, 1902, to 31st July, 1903 :—

Journal (Botany),	Nos. 179–180,	21st Oct., 1902.
	No. 246,	30th July, 1903.
	„ 249,	1st January, 1903.
	„ 250,	1st April, 1903.
	„ 251,	30th June, 1903.
„ (Zoology),	No. 186,	1st May, 1903.
	„ 187,	30th July, 1903.

Transactions (2nd Ser. Botany),	Vol. VI. Part	iv., Jan. 1903.
	„	v., Jan. 1903.
	„	vi., May 1903.
„ (2nd Ser. Zoology),	Vol. VIII. Part	ix., Oct. 1902.
	„	x., Feb. 1903.
	„	xi., Feb. 1903.
	„	xii., July 1903.
	Vol. IX. „	i., July 1903.
	„	ii., July 1903.

Proceedings, 114th Session, 1901–1902, October 1902.

List of [Fellows, Associates, and Foreign Members], 1902–1903.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND FIFTEENTH SESSION, 1902–1903.)

November 6th, 1902.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. William Southworth was elected a Fellow of the Society.

The following paper was read:—

"Notes on a Natural History Journey in Chile." By Henry J. Elwes, F.R.S., F.L.S.

November 20th, 1902.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Prof. Alfred William Alcock was elected, and Mr. Edward Augustus Bowles was admitted a Fellow of the Society.

Mr. R. Morton Middleton, F.L.S., gave an account of the dissertation by Linnæus on *Siren lacertina*, annotated by the author, which he had found in a dealer's possession, and since then had been presented to the Society by the Treasurer.

Mr. W. C. Worsdell, F.L.S., showed a series of anomalous virescent flowers of *Helenium autumnale*, six strong plants in the garden at Friar Park, Henley, the residence of the Treasurer, being thus affected.

Mr. H. E. H. Smedley, F.L.S., F.G.S., exhibited large wax models of the fossil seeds of *Stephanospermum akenioides* and *Lagenostoma*, the latter occurring in the Lower Coal-Measures of Lancashire; he also showed a model of a recent Cycad for comparison.

The following papers were read :—

1. "On Digestion in Plants." By Prof. Sydney H. Vines, F.R.S., Pres. Linn. Soc. (See p. 42.)
2. "On the Relation of Histogenesis to Tissue Morphology." By Arthur G. Tansley, F.L.S. (See p. 43.)
3. "On the Stelar Structure of *Schizæa* and other Ferns." By Leonard A. Boodle, F.L.S. (See p. 44.)

December 4th, 1902.

Mr. William Carruthers, F.R.S., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The Rev. Thomas Verrier Alkin, Mr. Leslie Gordon Corrie, Mr. Arthur Disbrowe Cotton, Mr. Robert Laurence Heinig, Mr. Hugh Martin Leake, Mr. Harold Hart Mann, and Mr. Alfred William Oke were elected, and Mr. John Parkin, Prof. Alfred William Alcock, and Mr. Ernest John Lewis were admitted Fellows of the Society.

The Rev. John Gerard, S.J., exhibited specimens of a *Polygala* from Grassington, in the West Riding of Yorkshire, collected by Mr. Lister Rotheray from the locality discovered by Mr. John Cryer in May last; the plant has been named *P. amarella*, Crantz, by Professor R. Chodat of Geneva. He also showed a monstrous form of *Geum rivale*, Linn., from between Long Preston and Settle, detected by Mr. Rotheray; the terminal flower was apparently normal, but about one inch and a half below the calyx there appeared a whorl of about twenty petaloid members, on extremely long "claws," and surrounded by a series of leaf-like bracts.

The discussion was carried on by Messrs. B. Daydon Jackson, W. C. Worsdell, Henry Groves, and A. Bennett.

Mr. R. Morton Middleton showed an extremely well-developed fasciated stem of Asparagus; and remarks on it were made by Dr. D. S. Scott and Mr. W. C. Worsdell.

Dr. George Henderson called attention to a passage in the Georgics of Virgil (I. 73 *seqq.*), in which the poet, after recommending a system of fallowing, proposes as an alternative means of restoring the fertility of the soil, that before taking a second grain crop, the soil should be refertilized, by planting it with a leguminous crop. (See p. 45.)

The following papers were read :—

1. "On some New and Rare Corals from Funafuti." By Gilbert C. Bourne, F.L.S.
2. "The Morphology of the Flowers and Fruits of the *Xylosteum* Section of *Lonicera*." By E. A. Newell Arber, F.G.S. (Communicated by Albert C. Seward, F.L.S.)
3. "Note on *Carex Tolmiei*, Boott." By C. Baron Clarke, F.R.S., F.L.S.
4. "On the Indian Phalangidæ contained in the Indian Museum at Calcutta." By Herr C. With of Copenhagen. (Communicated by Dr. H. J. Hansen, F.M.L.S.)

December 18th, 1902.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Frederick Ernest Grant and Mr. John Graham Kerr were elected, and Mr. Arthur Disbrowe Cotton and Mr. Alfred William Oke were admitted Fellows of the Society.

Mr. John Pinches sent for exhibition a sketch-book containing about 90 highly finished coloured drawings of British larvæ, drawn by Mr. J. Standish.

The following papers were read :—

1. "Notes on some Copepoda from the Faroe Channel." By Thomas Scott, F.L.S.
2. "The Amphipoda of the 'Southern Cross' Antarctic Expedition, with remarks on Bipolarity." By Alfred O. Walker, F.L.S.
3. "The Deep-Sea Isopod *Anuropus branchiatus*, Bedd., and some remarks on *Bathynomus giganteus*, A. M.-Edw." By Dr. H. J. Hansen, F.M.L.S.

Notice was given from the Chair that the next Meeting, to be held on Thursday, January 15th, 1903, at 8 p.m., would be made a Special General Meeting to consider the advisability of applying for a Supplementary Charter.

January 15th, 1903.

Mr. Frank Crisp, LL.B., B.A., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Arthur Grove was elected a Fellow and Mr. Andrew Scott an Associate, and Mr. William Southworth and Mr. Hugh de Beauvoir de Havilland were admitted Fellows of the Society.

The Meeting having been made Special for the consideration of certain proposals, as announced from the Chair on the 18th December last, and communicated to the Fellows by Circular Letter of the 31st December, the Chairman explained that the President was prevented from presiding by illness, and briefly recapitulated the steps which had led to the proposals to be submitted for the consideration of the Fellows, which had been printed, and were in the hands of those present [and here reprinted].

The Rev. T. R. R. Stebbing, F.R.S., then moved :—"That this Meeting approving of the alterations in the constitution of the Linnean Society of London, as shown in the printed statement circulated, hereby authorizes the Council to take the necessary steps to obtain a Supplementary Charter embodying the said alterations, and thereafter to prepare revised Bye-Laws in accordance with the provisions of the new Charter."

This was seconded by Dr. J. Reynolds Green, and further discussed by Dr. J. Murie, Mr. Francis Darwin, Mr. H. J. Elwes, Mr. A. K. Coomáraswámy, Mr. W. Carruthers, Mr. A. G. Tansley, and Mr. W. M. Webb.

The first alteration, adding the words "*without distinction of sex*" to the existing paragraph on page 5 of the Charter as printed, was put from the Chair, and the result of the Ballot was declared as follows :—In favour, 54 : not in favour, 17 ; and the motion was thereupon declared to be carried.

The other alterations were explained by the Chairman, and discussed. Mr. James Groves suggested that the remaining alterations should be adjourned, on the ground of insufficient notice. The discussion was continued by Mr. W. Bruce Bannerman, Prof. G. F. Boulger, Mr. V. I. Chamberlain, Mr. F. J. Hanbury, Dr. J. Murie, Prof. H. G. Seeley, Mr. E. M. Holmes, Mr. W. F. Kirby, Rev. T. R. R. Stebbing, and Mr. R. M. Middleton.

Mr. James Groves's amendment not being seconded, was not put. The motion in favour of the adoption of the remaining alterations, as shown in the printed statement in the hands of the Fellows, was then put to the Ballot, the votes being :—In favour, 43 : not in favour, 3. Whereupon the Chairman declared the remaining alterations carried.

Changes suggested in the Supplemental Charter.

(Additions or omissions are shown by *Italic* type.)

Present Charter.	Suggested Changes.
P. 5.	
"... and such others as shall from Time to Time ..."	"... and such others *without distinction of sex* as shall from Time to Time ..."
P. 6.	
"[*that there shall be an indefinite Number of Fellows of the said Society; and*]".	Omit.
"... Treasurer and Secretary ..."	"... Treasurer, and *at least one* Secretary ..."
P. 7.	
"... Council shall consist of *Fifteen* Members ..."	"... Council shall consist of *Twenty* Members ..."
"... on the Twenty-fourth Day of May in every succeeding Year, unless the same shall happen to be on a Sunday, and then on the Day following, assemble together at the then last, or other usual Place of meeting of the said Society, and proceed, by Method of Ballot, to [*put out and amove any*] Five of the Members who shall have composed the Council of the preceding Year; and shall and may in like Manner, by Method of Ballot, elect Five other discreet Persons from amongst the Fellows of the said Society, to supply the Places and Offices of such Five [*as may have been so put out and amoved*]; it being Our Royal Will and Pleasure, that One-[*third*] of the Members of the said Council, and no more, shall [*be*] annually [*changed and removed by the Fellows of the said Society*]; And, also, that they the said Fellows, or any Twenty-one or more of them, shall and may, at the Time and Place, and in Manner aforesaid, by Method of Ballot, elect, from among the Members of the said Council, when formed and elected, in Manner aforesaid, Three fit and proper Persons, one of such Persons to be President, another of such Persons to be Treasurer, and the other of such Persons to be Secretary of the said Society ..."	"... on the Twenty-fourth Day of May in every succeeding Year, unless the same shall happen to be on a Sunday, *or Bank Holiday*, and then on the Day following, *or such other Day within the same week as the President shall fix*, assemble together at the then last, or other usual Place of meeting of the said Society, and proceed, by Method of Ballot, to *determine which* Five of the Members who shall have composed the Council of the preceding Year *shall retire*; and shall and may in like Manner, by Method of Ballot, elect Five other discreet Persons from amongst the Fellows of the said Society, to supply the Places and Offices of such Five *retiring Members*; it being Our Royal Will and Pleasure, that One-*fourth* of the Members of the said Council, and no more, shall annually *retire*; And, also, that they the said Fellows, or any Twenty-one or more of them, shall and may, at the Time and Place, and in Manner aforesaid, by Method of Ballot, elect, from among the Members of the said Council, when formed and elected, in Manner aforesaid, Three *or more* fit and proper Persons, one of such Persons to be President, another of such Persons to be Treasurer, and the other *or others* of such Persons to be Secretary *or Secretaries* of the said Society ..."
P. 8.	
"... Death of any of the Members of the Council, or of the President, Treasurer, or Secretary, for the time being, within the space of *Three* Months ..."	"... Death of any of the Members of the Council, or of the President, Treasurer, or *any* Secretary, for the time being, within the space of *Six* Months ..."
"... to elect such persons to be Fellows ..."	"... to elect such persons *without distinction of sex* to be Fellows ..."
"... determining the Times and Places of Meeting ..."	"determining *the Number of Fellows to be annually elected*, and the Times and Places of Meeting ..."

February 5th, 1903.

Prof. SYDNEY H. VINES, F.R.S., President, in the Chair.

The Minutes of the General and Special Meetings held on the 15th January were read and confirmed.

Referring to an exhibition on 4th December, 1902, by Rev. John Gerard, of a monstrous form of *Geum rivale*, Mr. B. DAYDON JACKSON exhibited specimens in further illustration of median proliferation, from the herbarium of Sir James Edward Smith, and the British collection in the possession of the Society. He also stated that the proliferous form was mentioned by C. Merrett, in his 'Pinax,' 1667, p. 22, as occurring "at Brearcliff, in a wood of Mr. Brearcliff, below his house," and by John Ray, in his 'Synopsis,' 1690, p. 89, as *Caryophyllatam flore amplo purpureo quadruplici aut quintuplici serie petalorum* observavit D. Lawson prope Strickland magnum in Com. Westmorland." This locality is mentioned by J. Petiver in his 'English Plants,' tab. 40. fig. 4, in 1713, when figuring the plant as "Childing Avens." Later authors, as Relhan in his 'Flora Cantabrigiensis,' 1785, p. 200; ed. 3, 1820, p. 207; and Withering's 'Arrangement,' ed. 2, 1787, p. 538; ed. 3, 1796, vol. ii. p. 478, refer to this form; the latter author also states that "when cultivated in a dry soil, the flowers are apt to become double or proliferous," *op. cit.* p. 478.

Mr. C. H. WRIGHT, A.L.S., on behalf of Sir W. T. Thiselton-Dyer, K.C.M.G., exhibited amphicarpic fruit in specimens of (1) *Cardamine chenopodifolia*, Pers.; (2) *Trifolium polymorphum*, Poir.; and (3) *Vicia amphicarpa*, Dorth.

The President and Professor J. B. Farmer added some remarks, to which Mr. Wright replied.

Mr. H. E. H. SMEDLEY, F.L.S., exhibited twelve wax models of longitudinal and transverse sections of the following seeds:—*Stephanospermum akenioides*, *Pachytesta* from the French Permo-Carboniferous Formation, *Lagenostoma* from the English Coal-Measures, with the recent *Torreya* and *Zamia*, in illustration of Prof. Oliver's paper.

The following paper was read:—

"On *Stephanospermum*, Brongn., a Genus of Fossil Gymnospermatous Seeds." By Prof. F. W. Oliver, F.L.S.

February 19th, 1903.

Prof. SYDNEY H. VINES, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. JOHN CLAYTON, of Bradford, presented a set of thirty-two photographs to illustrate the celebrated Cowthorpe Oak, near

Wetherby, Yorkshire. From the time of John Evelyn this oak has been described, measured, and its age guessed at. Mr. Clayton, in a printed summary of 22 pages, gives an account of the various observers who have mentioned the oak in question, and many of the photographs are designed for comparison with other remarkable trees, amongst them the Crowhurst Yew in Sussex, the great Chestnut at Tortworth, and the Greendale Oak in Welbeck Park. In 1893 careful measurements and photographs were made of the tree, on four different visits in January, April, June, and October. The author's deduction from these data is, that the age of the tree has been greatly over-estimated; his own belief being that 500 years is the extreme limit of its age, from sapling to its present decrepitude and decay.

Copies of the photographs and text have been limited to ten; this copy being presented to the Society through Mr. William West, F.L.S. The donor was voted the special thanks of the Society for his gift.

Dr. George Henderson, F.L.S., offered "Some Remarks on the possible uses of Essential Oils in the Economy of Plant-life." (See p. 46.)

A discussion followed in which Mr. T. Christy, Mr. W. C. Worsdell, Mr. G. Massee, Mr. A. P. Young, Prof. J. Percival, and the President took part, and Dr. Henderson replied.

The following papers were read:—

1. "On the Electric Pulsation accompanying Automatic Movements in *Desmodium gyrans*." By Prof. Jagadis Chunder Bose, C.I.E. (Communicated by the President.)

2. "On *Cerataphis Latanicæ*, a peculiar Aphid." By Miss Alice L. Embleton, B.Sc. (Communicated by Prof. G. B. Howes, Sec. L.S.)

3. "On Specialization of Parasitism in the Erysiphaceæ." By Mr. Ernest S. Salmon, F.L.S.

March 5th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Joseph Burtt Davy, Dr. Felix Eugen Fritsch, Mr. Robert Hall, and Mr. George Whitfield Smith were elected, and Mr. Arthur Grove was admitted a Fellow.

Rev. T. R. R. Stebbing, F.R.S., exhibited a collection of Spiders and Wasps from Singapore, made by Mr. C. J. Saunders.

(1) Spiders found in 11 clay cells built between the boards of a thin book standing upright on a book-shelf; the space $\frac{1}{4}$ inch broad by $\frac{1}{3}$ inch high, and $4\frac{1}{2}$ to 5 inches long. Mr. Saunders

reckoned that each cell contained 10 or 11 spiders and a single grub. He says:—"I did not see the actual insect that made these cells, though its noise attracted me. I know the beast, however, and believe it to be of the same kind (? identical one) as the bee [wasp] in the tube. This bee flew on to my table near the shelf, and kindly investigated a cigarette-holder which I promptly closed up with my finger; I was able then to blow it into the tube. Many of the spiders, especially the larger ones, were alive, they could move their legs but not walk; at least one little one let itself down into the tube by a thread." He found a small fly in one cell, and others later in a different set of cells. He remarks that the Chinese must have noticed the spider-trapping habit, since they say of certain bees that they "adopt" spiders and bring them up as young bees.

(2) Contents of another set of cells, built in a corner of the verandah, in two vertical rows, about 13 cells in all. The spiders were all of one kind, 56 in number, with three half-eaten and two skins. They were all in the upper cells. In the lowest four cells there were four hard grub-cases. In the two next above these there were two soft grub-cases. In all these no spiders, but some silk. Then came a grub with no spider, but a great deal of silk in its cell. Next a grub with part of a spider and a good deal of silk, and finally cells with plenty of spiders and one grub to each cell, smaller and smaller to the top. In other cells there were several specimens of the small fly and fly-pupæ. Some sets of cells differed from the rest by each having a distinct cover to the opening.

(3) Contents of a set of cells, the topmost of which was closed while Mr. Saunders was examining other sets. The day before had been wet, but even the topmost cell, which was not yet dry, contained a grub.

In the lowest cell he found 1 grub eating a spider, with 9 other spiders.

In the 2nd cell, 1 small grub and 7 spiders.

In the 3rd cell, 1 small grub eating a large spider, and 6 other spiders.

In the 4th cell, 1 tiny grub eating a large spider, and 8 other spiders.

In the 5th (scarcely dry), 1 tiny grub eating a spider, and 10 other spiders (including 2 pale spiders with greenish hairy legs).

In the 6th (still wet), 1 tiny grub eating a pale spider, and 7 other spiders of the usual kind.

The exhibitor also remarked, that in the family Crabronidæ or Sphegidæ *Ammophila hirsuta*, a British species of Sand-wasp, is said to provision its nest with spiders. The same habit has long been known in *Pelopœus spirifex* (Linn.), belonging to the same family. Also in the family Pompilidæ, species of *Pompilus* are known to attack large spiders and make them a provision for their young ones.

Latreille, in 1802, quotes a letter from Cossigny to Réaumur, describing the behaviour of *Pelopœus spirifex* to spiders in the Isle de France. Latreille named the genus *Pelopœus*, the mud-worker, or potter.

The following papers were read :—

1. "On some Points in the Visceral Anatomy of the Characinidæ, with an Enquiry into the Relations of the '*Ductus pneumaticus*' in the Physostomi generally." By W. S. Rowntree, F.L.S.
2. "On the Anatomy of the Pig-footed Bandicoot (*Chœropus castanotis*)." By F. Gymer Parsons, F.L.S.
3. "Further Notes on the Lemurs, with especial reference to the Brain." By Dr. G. Elliot Smith. (Communicated by Prof. G. B. Howes, Sec. L.S.)

March 19th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Joseph Burtt Davy was admitted a Fellow of the Society.

Mr. Clement Reid exhibited drawings by Mrs. Reid of fruits and seeds of British Preglacial and Interglacial plants (Thalamifloræ). In each case the specimens illustrated were the earliest known representatives of the species. Most of the plants are still living in Britain; but among the Thalamifloræ from the Cromer Forest-bed occur seeds of *Hypecoum*, a genus specially characteristic of the Mediterranean region, and no longer found living nearer than Southern France. The fossil seeds correspond closely with the living *Hypecoum pendulum* of Southern France, and either belong to that species or to a closely-allied extinct form.

The seeds of all the species of *Hypecoum* are covered by a curious close mosaic of cubic crystals, apparently calcium oxalate, which fill square pits in the surface of the testa. Traces of these pits are still found on some of the fossil seeds.

Mr. E. G. Baker, Dr. A. B. Rendle, and Prof. J. B. Farmer joined in a discussion on the exhibition, and Mr. Reid replied.

The following papers were read :—

1. "On *Poa laxa* and *Poa stricta* of our British Floras." By George Claridge Druce, F.L.S.
2. "The Botany of the Ceylon Patanas, Part II.—Anatomical Investigations of the Leaves of the Plants occurring in the Patanas." By J. Parkin, M.A., F.L.S., and H. H. W. Pearson, M.A., F.L.S.

April 2nd, 1903.

Prof. SYDNEY H. VINES, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The General Secretary alluded to the account of the Linnean Collections, given on the hundredth Aniversary of the Society, 24th May, 1888, and the statement that an interchange of specimens from the herbarium of Linnæus, about 1785, for Banksian material, incorporated in the Smithian herbarium, had taken place (Proc. 1887–88, p. 28), but that the actual exchanges could not be traced.

During the autumn of 1902, when examining some unbound letters and other MSS. which belonged to Sir J. E. Smith, a small octavo note-book was found [shown to the Meeting] headed "Desiderata Banksiana, Jan. 1785," and consisting of seventeen leaves, with names of plants in double columns, and on the last leaf a note in pencil thus: "circa 2000; Feb. 9th, communicata ex H. L. patris 81." Certain entries were obliquely marked down in red ink, and these being counted proved to be equal in number with those stated in the last-mentioned note, which were communicated "ex H[erbario] L[innæi] patris." A few of these have been compared with the Linnean herbarium, to make certain that only duplicates were parted with by Smith in this exchange, by which, as has been previously stated, ". . . the herbaria of Banks and Smith were enriched at the expense of the Linnean herbarium" (Proc. 1887–88, p. 28, footnote).

Mr. E. M. Holmes and Mr. F. N. Williams made some remarks, and Mr. B. Daydon Jackson replied.

The following papers were read:—

1. "A List of Marine Algæ collected by Mr. J. Stanley Gardiner at the Maldive and Laccadive Islands." By Mrs. A. Gepp (Ethel S. Barton). (Communicated by Mr. A. Gepp, M.A., F.L.S.)

2. "The Comparative Anatomy of Cyatheaceæ and other Ferns." By D. T. Gwynne Vaughan. (Communicated by Dr. D. H. Scott, Sec.L.S.) (See p. 47.)

April 16th, 1903.

Rev. THOMAS R. R. STEBBING, F.R.S., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Laurence Lewton-Brain was elected a Fellow of the Society.

Dr. GEORGE HENDERSON exhibited a coloured sketch of a withered leaf of *Quercus incana*, Roxb., and of slugs which are found amongst the dead leaves. He stated that he had brought the drawing of the mollusc and leaf to show their strange resemblance both in colour and outline. He found these slugs common at Dalhousie in the Punjab, on ground which is always covered with the withered leaves of this oak. A few black slugs were to be found with the light-brown specimens, and whilst the latter seemed to escape the notice of birds, the former were taken. He adduced some instances of animals changing colour in accordance with their environments.

The following papers were read :—

1. "On some Points in connection with the Ordinary Development of *Vaucheria* Resting-Spores." By Dr. H. Charlton Bastian, F.R.S., F.L.S.
2. "The Labial and Maxillary Palpi in Diptera." By Walter Wesché, F.R.M.S. (Communicated by Mr. George Massee, F.L.S.)
3. "Observations on Freshwater Rhizopods, with some Remarks on their Classification." By Prof. G. S. West, F.L.S.

May 7th, 1903.

Prof. SYDNEY H. VINES, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. William Dennis, Mr. James Stuart Thomson, and Mr. Monague Frank Hopson were elected Fellows of the Society.

In view of the approaching Anniversary Meeting the Rev. Thomas R. R. Stebbing and Mr. George Sharp Saunders were elected by show of hands Auditors on behalf of the Council, and Mr. Horace W. Monckton and Mr. Charles Baron Clarke on the part of the Fellows.

Mr. G. S. SAUNDERS exhibited living specimens of the Carnivorous Slug, *Testacella haliotidea*, which he had received the previous day from Torquay.

The following papers were read :—

1. "The Ingolfiellidæ, fam. nov.: a new type of Amphipoda." By Dr. H. J. Hansen, F.M.L.S.

2. The Evolution of the Australian Marsupialia; with Remarks on the Relationships of the Marsupials in general." By Mr. B. Arthur Bensley. (Communicated by Prof. G. B. Howes, Sec. L.S.)

3. "*Copepoda Calanoida* from the Faroe Channel and other parts of the North Atlantic." By the Rev. Canon Norman, F.R.S., F.L.S.

May 25th, 1903.

Anniversary Meeting.

Prof. SYDNEY H. VINES, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Dr. Felix Eugen Fritsch and Mr. Thomas George Hill were admitted Fellows of the Society.

The Rev. T. R. R. STEBBING on behalf of the Auditors presented the accounts of the past financial year ending on the 30th April (see p. 13).

Mr. HENRY GROVES expressed a hope that Dr. Prior's legacy of £100 would be applied to the permanent benefit of the Society, and asked for information as to an apparent increase in the Salaries.

The General Secretary pointed out that the usual employment of legacies was by the purchase of books for the Library, each volume bearing a label of its origin from the testator in question; he also stated that the apparent increase was due to a gift of £50 to Mr. Harting on his removal from the residential rooms belonging to the Society.

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

Since the last Anniversary Meeting 12 Fellows had died or their deaths been ascertained:—

Mr. Edwin Bostock.
Mr. William Bull.
Mr. J. William Groves.
Mr. Charles C. P. Hobkirk.
Mr. Alfred Vaughan Jennings.
Mr. W. J. Hume McCorquodale.
Mr. Charles Maries.
Rev. John James Muir.
Dr. R. C. Alexander Prior.
Sir Charles Shelley.
Mr. Charles Marcus Wakefield.
Rev. Thomas Wiltshire.

Receipts and Payments of the Linnean Society from May 1st, 1902, to April 30th, 1903.

Receipts.	£	s.	d.
Balance at Bankers on the 1st May, 1902	188	3	9
Interest on Investments	184	15	3
Admission Fees	174	0	0
Annual Contributions	1401	6	0
Compositions	357	0	0
Sales of Publications:—			
Transactions £96 10 10			
Journals 89 2 8			
Proceedings and Catalogues 1 1 0			
	186	14	6
Miscellaneous Receipts	153	1	8
	£2645	1	2

Payments.	£	s.	d.
Taxes and Insurance	13	8	9
Repairs and Furniture	77	15	3
Coals and Gas	60	7	10
Salaries	793	7	6
Library:—			
Books £340 4 10			
Binding 97 6 2			
	437	11	0
Expenses of Publications:—			
Printing £526 11 3			
Illustrations 246 6 5			
Distribution 9 8 0			
	782	5	8
Miscellaneous Printing and Stationery	60	2	5
Petty Expenses (including Tea and Postage)	121	6	3
Balance in hand 30th April, 1903	298	16	6
	£2645	1	2

Investments on the 30th April, 1903.

	£	s.	d.		£	s.	d.
Consols, 2½ per cent.	3828	10	7	@ 92	3522	4	11
Metropolitan 3½ per cent. Stock	1079	11	3	@ 108	1165	18	6
Great Indian Peninsula Railway, Annuity Class B	42	1	5	@ 22	925	11	2
Forth Bridge Railway 4 per cent. Stock	450	0	0	@ 126	567	0	0
Consols (Westwood Bequest), 2½ per cent.	249	3	8	@ 92	229	4	11
					£6409	19	6

FRANK CRISP, *Treasurer.*

Audited, and found correct. 21st May, 1903. { SYDNEY H. VINES, THOS. R. R. STEBBING } GEORGE SHARP SAUNDERS, CHARLES BARON CLARKE, HORACE W. MONCKTON, B. DAYDON JACKSON. } *Auditors.*

ASSOCIATE.

Mr. John Bain.

FOREIGN MEMBERS.

Dr. Julius Victor Carus. | Monsieur François Crépin.

The following sixteen Fellows have resigned :—

Mr. William Bruce Bannerman.
Mr. Frederick William Burbidge.
Mr. Edgar Franklin Cooper.
Prof. Robert O. Cunningham.
Mr. George Johnson Fookes.
Mr. George Arthur Grierson.
Mr. Kenneth Hurlstone Jones.
Mr. Henry Laver.
Mr. Charles Alphonse Le Doux.
Dr. John Lowe.
Rev. Edmund McClure.
Major John F. A. McNair.
Mr. Albert Molineux.
Dr. David Thomson Playfair.
Mr. William Thomas Rabbits.
Mr. Charles Topp.

Twenty-eight Fellows (of whom 23 have qualified) have been elected.

The Librarian's report was read as follows :—

"During the past year 68 volumes and 162 pamphlets have been received as Donations from Private Individuals.

"From the various Universities, Academies, and Scientific Societies, 274 volumes and 94 detached parts have been received in exchange and otherwise, besides 73 volumes and 42 parts obtained by exchange and as donations from the Editors and Proprietors of independent Periodicals.

"The Council had sanctioned the purchase of 171 volumes, and 96 parts of important works.

"The total additions to the Library are therefore 586 volumes and 294 separate parts.

"The number of books bound during the year is as follows :— In half-morocco 292 volumes, in half-calf 3 volumes, in full cloth 195 volumes, in vellum 21 volumes, in buckram 18 volumes, in boards or half-cloth 15 volumes. Relabelled (half-morocco and cloth backs) 32 volumes. Total 576 volumes."

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

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

The ballot for the Council having been closed, the President appointed Mr. J. G. Baker, Dr. A. B. Rendle, and Mr. R. Morton

Middleton, Scrutineers, and the votes having been counted by them they reported to the President, who thereupon declared the results as follows :—Mr. WILLIAM CARRUTHERS, Mr. HERBERT DRUCE, Mr. W. B. HEMSLEY, Rev. T. R. R. STEBBING, and Mr. A. G. TANSLEY removed from the Council, and the following elected in their room :—Rev. R. A. BULLEN, Mr. CHARLES BARON CLARKE, Prof. J. B. FARMER, Dr. W. G. RIDEWOOD, and Mr. A. C. SEWARD.

The Ballot for the Officers having been closed, the President appointed the same Scrutineers, and the votes having been counted by them, they reported to the President, who thereupon declared the following to be the Officers elected for the ensuing year :—

President, Prof. SYDNEY HOWARD VINES.

Treasurer, Mr. FRANK CRISP.

Secretaries { Prof. GEORGE BOND HOWES.
Dr. DUKINFIELD HENRY SCOTT.

The President then delivered his Annual Address.

PRESIDENTIAL ADDRESS, 1903.

In addressing the Fellows of the Society at their Anniversary Meeting for the third time, I feel that the occasion is one of more than usual interest, not untouched with pathos; for this is doubtless the last Anniversary on which the assembled Fellows will all be of the same sex. The question as to the admission of Women to our Fellowship had already been raised when we met here a year ago, and, as I explained in my Address, the Council had taken steps to ensure that every Fellow should have an opportunity of expressing his opinion upon so important a matter. In due course a Special General Meeting was summoned for January 15 of this year, to discuss and vote upon the question, with the result that the proposal was carried by a large majority. The Society having thus committed itself to the new policy, the Council lost no time in taking the necessary steps to obtain the supplemental Charter and to adapt the Bye-laws to the altered circumstances. I regret that I am not in a position to announce to you today that we already possess the power to exert these new rights and privileges, nor can I tell you when that moment will arrive. That it is somewhat impatiently anticipated in certain quarters is shown by the fact that nominations of Lady-candidates have already been sent in. The process of obtaining a Supplemental Charter is evidently one that cannot be hurried; but I have little doubt that, should you again honour me with your confidence, it will fall to my lot to admit the first Lady-fellow. In this respect, at any rate, my tenure of office will be memorable. Regarding the matter, as I am bound to do, from the point of view of the welfare of the Society, I must confess that I am not altogether free from apprehension as to the future. We are making a somewhat heroic experiment, with no precedent, no working hypothesis, to suggest to us what the results are likely to be. If purity of motive can deserve success, then it should certainly be ours: for this revolution in our constitution is the expression of a sense of justice, of a desire to extend an equal recognition to all, whether men or women, who work in or for biological science. However, we must not shut our eyes to the fact that the Society is passing through a serious crisis, and that it claims more strongly than ever all the support that the loyalty of its Fellows can give.

The Session that is now closing has been of importance in the history of the Society, not only as regards this fundamental question, but also in the scarcely less important matter of administration. You will remember that a year ago we made changes in the Executive, placing Mr. B. Daydon Jackson at the head of it with the title of General Secretary. Like other great public institutions, the Society had realised the need for higher

efficiency, and reorganised accordingly: it has, I think, been more fortunate than some of them in attaining its object. An almost incredible amount of work has had to be done for the purpose of rendering more accessible the books and collections of the Society, to the great convenience of Fellows making use of them. Moreover, it has been of considerable advantage to the transaction of the business of the Society to have secured the regular attendance of a responsible officer who is also a member of Council and is therefore in a position to act with authority.

The scientific work of the Society has shown increasing activity; the supply of interesting and important papers calling for publication having been such as to tax our financial resources to the utmost. In addition to the ordinary publications, the Society is issuing (with the assistance of a grant from the Royal Society) the concluding parts of Messrs. Forbes and Hemsley's "Enumeration of Chinese Plants," forming Vol. 36 of our Botanical Journal: the completion of this important work, which has been so long delayed, is a matter of congratulation to all concerned.

During the latter half of the Session the Society has most unfortunately been deprived of the valuable services of its Zoological Secretary, Professor Howes, who has been compelled by ill-health to give up work for a time. I know that I am only echoing the sentiments of all present today, when I express the sympathy which I feel for him, and the hope that he may soon be restored to his former health and usefulness. In Professor Howes's absence, the other officers of the Society have done their best to carry on his work, and in this they have been most kindly assisted by some of the Fellows.

I take this opportunity of formally announcing that the Linnean Medal this year has been awarded by the Council to Dr. M. C. Cooke, who has been an Associate of the Society for over twenty-five years, and is so well known as a high authority in the department of Mycology.

There must always be an element of sadness in our Anniversary Meetings, for it is then that we are reminded of the losses that the Society has sustained. This year the hand of death has fallen but lightly upon us, and yet we have much to regret. In Dr. Prior we have lost a Fellow of more than fifty years' standing, whose name will always be associated with this period of British Botany. He showed his unabated interest in the welfare of the Society by a bequest of £100. He has fortunately left behind him an autobiographical sketch which reveals how active and interesting a life his was. Other old Fellows who have gone from us are Sir Charles Shelley, the Rev. T. Wiltshire, who was so long the Secretary of the Ray Society, and William Bull, so well known as a horticulturist: of more recent date were Charles P. Hobkirk, the eminent bryologist, and Charles Maries, the successful plant-collector.

Until a short time ago, I had hoped that I might be able to announce at this meeting that all our Foreign Members

had been spared to us. But this hope was dispelled by the intimation of the death, on March 10, of Julius Victor Carus, Professor of Zoology in the University of Leipzig. He was elected a Foreign Member in 1885, and was especially well known as the historian of Zoology, as the translator into German of several of Darwin's works, and as one of the few foreign Professors who have been engaged in scientific work in British Universities.

Within a few weeks the sad intelligence arrived of the death of yet another of our Foreign Members, M. François Crépin, the distinguished Director of the Royal Botanic Garden in Brussels. M. Crépin had attained a deservedly high reputation as a systematic botanist, and was a leading authority on certain groups of plants, notably the genus *Rosa*. His election as a Foreign Member took place but two years ago; every botanist here today feels, I am sure, as I do, a profound satisfaction that we did not fail to take advantage of that opportunity of showing our esteem and respect for the man and his work whilst he was yet with us.

So recently have these two gaps been made in our list of Foreign Members, that it has not yet been possible to take the necessary steps to fill them. I have therefore no election of Foreign Members to announce to you.

Turning to finance, you have learned that the Treasurer has barely succeeded in making the two ends meet. It is more true even than it was last year, that the income of the Society is not nearly large enough to meet all the demands that might justifiably be made upon it. So abundant is the supply of really good papers that, had we the funds available, the bulk of our annual publications might well be considerably increased. A larger expenditure upon the Library, and a margin for the up-keep of the Society's apartments, are both urgently needed. It is, I think, a healthy state of affairs in a Society like ours when the demands for really useful expenditure somewhat exceed the available funds: it is a sign of growing activity, and it enforces economy. But when the discrepancy becomes too great, then efficiency suffers. I do not say that we are yet in this predicament, but we must make every effort to avoid it.

I think that I have now brought before the Fellows all the chief events in the history of the Society for the past year, and have given them some idea of our present state and future prospects. But it is still a considerable time before the Ballot can close and we shall be statutably at liberty to separate. Of what can I profitably discourse to you, so that I may relieve the tedium of waiting? I can think of nothing better than that I should tell you about a subject at which I have been working for some time past, and upon which I have already made communications to the Society. The subject is the digestion of proteids by plants. But I shall not by any means confine myself to plants: it will be absolutely necessary to say something about

the remarkable facts recently brought to light with regard to proteid-digestion in animals.

Let me, to begin with, very briefly trace the history of discovery concerning the digestion of proteids by plants. The first definite evidence of its occurrence was obtained as the result of the investigation of insectivorous plants by Mr. Darwin, Sir Joseph Hooker, and Prof. Lawson Tait: in fact, the publication of Mr. Darwin's book on 'Insectivorous Plants,' in 1875, may be taken as the starting-point. Almost simultaneously a digestive ferment or enzyme was discovered by von Gorup-Besanez in the germinating seeds of various plants. This was followed, in 1879, by Wurtz's demonstration of the digestive activity of the juice of the Papaw, which was confirmed and extended by Dr. Martin a few years later. About this time, Hansen investigated the digestive property of the latex of the Fig-tree, which had been first observed by Bouchut in 1880. Shortly afterwards the digestive processes in germinating seeds were further investigated by Prof. Reynolds Green. In 1891, Professor Chittenden published his important researches into the very remarkable digestive action of Pineapple-juice upon proteids; and in the following year, Prof. Green discovered that a similar property was possessed by the juice of a species of Gourd (*Cucumis utilissimus*).

In 1896, I took up afresh the study of the digestive action of the liquid of the well-known insectivorous pitcher-plant *Nepenthes*, because the accuracy of the earlier observations on the subject had been called in question. It had been stated by Prof. Dubois, amongst others, that the apparent digestive activity in this case was due, not to any enzyme secreted by the plant itself, but to the intervention of Bacteria. I made a number of experiments under antiseptic conditions, with the pitcher-liquid of *Nepenthes*, which seem to me to refute the theory of Bacterial action and to uphold the conclusions of the original observers. Having become once more interested in the subject, I proceeded to investigate in greater detail the digestive processes in *Nepenthes* and in other plants in which they were then known to take place, the results of which I shall presently give some account. But what is perhaps more important, I was led on to examine many plants and parts of plants in which such processes were not suspected, to see if any trace of them could be detected, and I succeeded in doing so in almost every case. I have obtained positive results with such fruits and parts of fruits as the Melon, the Grape, Orange-peel, the Banana: with the foliage-leaves of the Dahlia, the Lettuce, the Cabbage, the Spinach, and many others: with the bulbs of the Tulip and the Hyacinth: the tubers of the Potato and the Jerusalem Artichoke: the tuberous roots of the Beet, the Dahlia, and the Turnip; as also with Yeast, and with the Mushroom among Fungi. I may in fact venture to assert that the presence of a protease, or proteid-

digesting enzyme or ferment, in the various parts of the plant-body is the rule rather than the exception.

I must not omit to mention that my results had been—although quite unknown to me—somewhat anticipated by the researches of Buscalioni and Fermi which were published in 1898. The method adopted by these authors for detecting digestive power consisted in observing whether or not the juices of various plants, or portions of their tissue, did or did not effect the liquefaction of gelatine, of course under strictly antiseptic conditions. Whilst their results and mine differ in many points of detail, they are entirely concordant as regards the main conclusion, the wide distribution of proteases in plants.

The method employed by me was altogether different from that of Buscalioni and Fermi, and was devised in connection with the attempt to determine the nature and mode of action of the proteases of plants. At the time when investigation in this direction first began, our knowledge of proteid-digestion in animals amounted roughly to this, that there were two enzymes concerned in the process—the pepsin of the stomach, the trypsin of the pancreas: that the former acted only in an acid medium, the latter most actively in an alkaline medium; that the former merely converted the more complex proteids into simpler substances of the same group, that is effected peptonisation; whilst the latter not only peptonised but also decomposed the simpler proteids into non-proteid substances, that is effected proteolysis.

It was from this point of view that Darwin and other observers of his time interpreted their discoveries as to the digestion of proteids by insectivorous plants. Inasmuch as the liquids of insectivorous plants were found to be active only when acid, it was naturally assumed that the enzyme which they contain must be closely allied to the pepsin of animals; an assumption that was also made by von Gorup-Besanez with regard to the enzyme which he extracted from germinating seeds. The first divergent opinion was expressed by Wurtz, who found that the substance which he extracted from the Papaw, and called papaïn, was active not only in acid but also in neutral and alkaline media; and he consequently suggested that it was allied rather with trypsin than with pepsin. This opinion was not conclusive, because Wurtz had not sufficiently examined the products of papaïn-digestion. The missing evidence was supplied by the researches of Martin, who found leucin and tyrosin among the products of digestion, substances which are characteristic of digestion by trypsin. Within a few years Prof. Reynolds Green observed in the Lupin and the Castor-oil plant, that the protease of seeds is proteolytic like trypsin; and he followed up this discovery by ascertaining that this is true also of the protease of the Kachri Gourd. In the meantime, Prof. Chittenden had demonstrated that the protease of the Pineapple possesses similar properties. Since then I have found, in *Nepenthes*, Yeast, the Mushroom, in fact in every one without exception, of the very

numerous experiments made with various plants and parts of plants in which I have detected digestive action, that the enzymes act proteolytically. In view of this accumulating evidence, the only possible conclusion to be drawn is that the proteases of plants are essentially proteolytic: there is, in fact, no record of the existence in any plant of a merely or mainly peptonising enzyme.

This conclusion has not been arrived at without contradiction. In the case of the pitcher-plant *Nepenthes*, the late Dr. Clautriau contested the accuracy of my results, asserting that here was an instance of simple peptonisation. However, I have never failed to obtain evidence of proteolysis in digestive experiments with the pitcher-liquid, and can only suggest that the conditions of Dr. Clautriau's experiments were in some way unsuitable, probably because the necessary acid was not supplied. More recently Dr. Mendel has asserted that papaïn can peptonise but not proteolyse the higher proteids. In a paper which is shortly to be published, I have shown, I think conclusively, that the cause of the divergence between Dr. Mendel's results and my own is that the antiseptic which he used in his experiments interfered with the action of the enzyme.

I may now very briefly describe the methods which I have adopted for the purpose, (1) of detecting the presence of a protease, and (2) of determining the nature of its action.

In the first instance, the method employed was the usual one of submitting some blood-fibrin to the action of the liquid, with due antiseptic precautions, and observing the more or less complete solution of it in the course of the experiment. It was in this way that the digestive activity of *Nepenthes*-liquid, Papaw, of Pineapple-juice, and of solutions of papaïn, had been first discovered; and it was in this way that I detected it in the Yeast, the Mushroom, the Melon, and other plants. But in many cases the result was altogether negative, and for the moment I followed the usual course of accepting this as evidence for the total absence of digestive power in these cases.

Confining my attention to the positive results, I endeavoured to ascertain, by an examination of the products of digestion, what had been the action of the protease in each case, whether merely peptonising or completely proteolytic. In devising a simple method for doing this, I remembered that one of the constant products of pancreatic digestion is a substance termed *tryptophane*, which gives a pink or violet colour on the addition of chlorine-water. As the presence of tryptophane is accepted as evidence of proteolysis effected by trypsin, it would also be evidence of proteolysis by vegetable proteases. I accordingly tested the liquids resulting from fibrin-digestions with the various plant-materials just mentioned, and in every case there was unmistakable evidence of the presence of tryptophane. The conclusion is therefore inevitable, that in all these cases the enzyme is, like trypsin, capable not only of peptonisation but also of proteolysis.

I now returned to the consideration of the cases in which I had failed to observe the digestion of fibrin; and on applying to them the tryptophane-test, I was somewhat surprised to find that it frequently gave a distinct and even strong reaction, especially when the material used consisted of pieces of the root, leaf, bulb, etc. under examination. It was clear that a protease was present which, though it did not act upon fibrin, digested the proteids contained in the juice or tissue of the plant itself. Seeing that these proteases, though possessing but slight peptonising power, were strongly proteolytic, I varied the mode of experiment by submitting to their action such simple proteids as albumoses and peptones, with most satisfactory results.

I thus reached the further conclusion that whilst in certain plants (*e. g.* Pineapple, Papaw, *Nepenthes*, Yeast, etc.) there are proteases which closely resemble trypsin in their mode of action, in the majority of cases there are proteases which differ from trypsin in that they cannot peptonise fibrin though they resemble trypsin in proteolysing albumoses and peptones. These proteases seemed to belong to an altogether new type of enzyme; a consideration that led me to feel some misgiving as to my observations. Fortunately I happened, at this juncture, to hear of Cohnheim's recent discovery in the intestine of animals, of an enzyme possessing somewhat similar properties. This enzyme, to which he has given the name *Erepsin*, proteolyses albumoses and peptones, but cannot peptonise a more complex proteid than casein. I thus obtained confirmation of the surmise that the proteases which I had discovered were not tryptic, although they were proteolytic.

I must not overburden with detail this slight sketch of the growth of knowledge with regard to the distribution and nature of proteases in both plants and animals. I will, however, venture upon a few remarks of a general nature. With regard to the distribution of the proteases in the body, they have been found, as I have said, in all parts of the plant—leaves, stems, roots, bulbs, tubers, fruits, seeds; and the inference might be drawn that herein the plant differs from the animal organism, in which these enzymes are confined to the digestive tract. But this inference would be only partially true even of the higher animals. No doubt the enzymes are especially secreted by the digestive organs; but recent researches, more especially those of Hedin, have shown that they are widely distributed throughout the tissues of the animal body.

Then as to the relation to each other of the three known types of proteases—the peptic, the tryptic, the ereptic. The relation between trypsin and erepsin has already been sufficiently indicated. With regard to pepsin, it has long been generally held, though with some dissentients, that pepsin is an enzyme which can only peptonise but cannot further decompose proteids. But of late years there has been an accumulation of evidence tending to show that this view is too arbitrary: to show that pepsin can, as a

matter of fact, effect proteolysis, though much less actively than trypsin. If this be established, the result will be that all these proteases will have been found to differ not in kind, but only in degree. They will form a series in which trypsin, active alike in peptonisation and in proteolysis, will occupy a central position: on the one hand will be pepsin, with its active peptonisation and slight proteolysis; and on the other will be erepsin, with its active proteolysis and slight peptonisation.

It may well be asked, what is the use to plants of the proteases distributed in their tissues? The importance of these substances to insectivorous plants is sufficiently obvious; and it is easy to imagine how they may be of service to plants like the Fungi which are parasitic or saprophytic in habit. In both these cases, so far as is known, they serve to supply the plant with organic nitrogenous food from without. But what is the physiological significance of these substances in the case of an ordinary plant which does not require to be supplied with organic nitrogen? The reply to this question is briefly as follows. Normal green plants in their nutritive processes build up, from the simple materials of their food, organic nitrogenous substance which is stored in their tissues in the form of proteid matter that is often insoluble, and in any case is not readily diffusible. Consequently, when these stores of proteid are to be drawn upon for the purpose of growth, it is necessary that there should be some means by which they can be converted into substances which are both soluble and diffusible. This conversion is effected by the proteolytic enzymes. Their importance is strikingly illustrated in a germinating seed, where the reserve materials, whether deposited in the cotyledons or in the endosperm, have to be made available for the nutrition of the growing embryo. It is also clear in a germinating bulb or tuber, where the growth of the new shoots is dependent upon the reserves which these organs contain. But it is not limited to such cases as these. It is quite as great under the ordinary circumstances of the plant: for it is at all times necessary that the elaborated organic nitrogenous substance should be readily distributed throughout the body. Just as diastase, first discovered in seeds, has been found to occur in all parts of the plant-body where starch has to be converted into sugar, so the proteases are to be found wherever insoluble or indiffusible proteid has to be converted into the soluble and diffusible amidic acids, such as leucin, tyrosin, and asparagin.

When the digestive activity of certain of the insectivorous plants, such as *Nepenthes* and *Drosera*, was first discovered, it was difficult to imagine how these plants should have developed the peculiar faculty of secreting proteases. But in the light of the subsequent discoveries of which I have endeavoured to give you some account, the explanation is simple. If leaves generally, or at any rate commonly produce a protease, it ceases to be remarkable that this should take place in the leaves of insectivorous plants. The peculiarity of these plants is now limited to

this—that their protease should be poured out at the surface so as to digest proteids supplied from without by the captured insects: whereas in ordinary plants the protease is retained within the tissues to digest, and so to render mobile, the proteids that are formed and stored there.

Another consideration of general interest is the relation between the proteases of plants and the digestive processes of the animals that consume the plants. In our own case, the matter may not be of much importance, since most of our vegetable food has been cooked before we eat it, and consequently the proteases have been destroyed. But in the herbivorous animals, more particularly the Ruminants, the case is altogether different. Here the vegetable food that has been eaten is placed under conditions that are altogether favorable to the action of the proteases which it contains, so that there is reason to believe that digestion in these animals is, in no small degree, a process of autolysis, the food providing at once the nutriment and the means of digesting it.

To pass now to another part of the subject. Quite recently a very remarkable discovery has been made by Pawlow concerning the origin of one of the animal proteases, namely trypsin. It was known that perfectly fresh and pure pancreatic juice had little or no digestive power, but the cause of this had not been traced. Pawlow's experiments brought to light the fact that the addition of a small quantity of the intestinal secretion (*succus entericus*) to inert pancreatic juice immediateiy renders it active. The explanation of these facts is that in the pure pancreatic secretion, free trypsin is not present, but its mother-substance, trypsinogen, from which it has to be liberated. On the addition of intestinal juice, this liberation is effected by means of a substance which it contains, which Pawlow has termed *Kinase*, and has aptly described it as a "ferment of ferments."

Curiously enough, my thoughts had been turned in the same direction in the course of my work on the proteases of plants. It had been known since the time of Schönbein that the juices and tissues of various plants possess the property of causing tincture of guaiacum to turn blue either with or without the addition of peroxide of hydrogen. The reaction is one of oxidation; and it has been ascertained of late years by Bertrand and others, that it is effected by certain definite substances termed oxidases and peroxidases. Various opinions have been hazarded as to the probable significance of these substances in the economy of the plant, but no coherent theory on the subject has yet been established. Incidentally I observed that whenever a juice or a tissue gave a good guaiacum-reaction, it also proved itself to be proteolytic. This observation was not altogether new: indeed at one time it had been thought that all enzymes reacted with guaiacum, which is not the case. But it led me to inquire into the meaning of this association of oxidase and enzyme in the plant. Is it a coincidence or a correlation?—this is the problem

that I am now endeavouring to solve. I cannot yet say that I have succeeded, but I will so far take you into my confidence as to tell you what is my working hypothesis. I assume that we have here to do with a real correlation, and of this kind, that the substance giving the guaiacum-reaction is of the nature of a 'Kinase'; that it is closely associated with the proteases because it liberates them from their zymogens; and that it effects this liberation by a process that is essentially one of oxidation. It may not appear a difficult matter to put this hypothesis to the proof; but it is not quite so easy as it appears, for the reason that in the plant-body, where the physiological division of labour is far from complete, enzymes and oxidases are secreted by the same tissues and even by the same cells. Should I have the privilege of again addressing you a year hence, I may perhaps be able to tell you what the verdict of experiment has been, and I hope that it may have been recorded in my favour. But whether that be so or not, I may at least expect to be able to report that substantial progress has been made in the investigation of these substances which play so important a part in the metabolism of both plants and animals.

Dr. M. T. Masters then moved:—"That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated amongst the Fellows," which was seconded by Mr. F. N. Williams, and carried.

The President then addressed Dr. M. C. Cooke, and in presenting the Linnean Medal to him, specified the services which had moved the Council to make this award.

The President said:—

"Dr. Cooke,—The encouragement of the study of Systematic Botany has always been one of the chief objects of this Society; and the list of the recipients of the Linnean Medal affords sufficient proof that eminence in this department of botanical research meets with the highest recognition that it is in our power to accord. But whilst I find there many distinguished Phanerogamists,—Hooker, DeCandolle, Oliver, Baker, and King, and two Algologists, Bornet and Agardh—there is but one, Ferdinand Julius Cohn, who has any special claim to the title of Mycologist. It is a most fortunate circumstance that an opportunity should have occurred to add to it a second Mycologist, seeing that the domain of Mycology is more extensive than that of any other of the provinces of the Vegetable Kingdom, or indeed than that of all of them taken together, and in view of the increasing scientific interest and economic importance of that branch of Botany.

"Had the institution of the Linnean Medal taken place a few years earlier, no doubt one of the first awards would have fallen to Mycology in the person of Berkeley. But since his name does

not adorn our list, nothing can be more appropriate than that it should include that of one who was his collaborator and has proved himself to be his legitimate successor. To say this is to give high praise indeed: but it is justly merited. For more than forty years you have been unceasingly engaged in describing, depicting, naming, and classifying the enormous mass of material that has been submitted to you from all parts of the world; and it is not too much to say, that few have contributed so materially as yourself to the reduction of the mycological chaos. You have enriched the literature of the science with many important works, among which the 'Mycographia' and the 'Illustrations of the British Fungi' deserve special mention. But your crowning achievement is, I take it, the formation of your great mycological herbarium, copiously illustrated with drawings and notes, which is now, I am glad to say, a national possession safely deposited at Kew.

"It is on these grounds that I have ventured to speak of you as Berkeley's legitimate successor; and they also fully justify the action of the Council in awarding to you the Linnean Medal, which I now have the honour to present, with sincere congratulations and every good wish."

Dr. Cooke made a suitable reply in acknowledgment, stating that his election as an Associate of the Society in 1877 was a great encouragement to him in his scientific career, and this award was deeply gratifying to him.

The General Secretary then laid the Obituary Notices of the past year before the Meeting, as follows, and the proceedings terminated.

John Bain, an Associate since 2nd April, 1863, was born in Ireland on 9th May, 1815, of Scotch parents, his father, a gardener and land-steward, having settled there some time before. He followed his father's calling, and served under William Anderson, in the old Physick Garden at Chelsea, which place he left to work at Trinity College Botanical Gardens, James Townsend Mackay being at that time curator. Mackay, author of 'Flora Hibernica' (Dublin, 1836), had laid out these gardens in 1806 for the Dublin University, and he attracted many of the best men of the day to serve under him. David Moore, afterwards of Glasnevin, and his younger brother Charles, afterwards at Sydney, were pupils of Mackay. Bain became foreman, and afterwards assistant-curator to Mackay, acting as amanuensis for the 'Flora Hibernica.' On the death of Mackay in 1862, Bain succeeded him, and under his energetic sway the gardens "took on a second lease of usefulness and popularity." Amongst those who bore testimony to his skill were Dr. G. J. Allman, Prof. W. H. Harvey, Sir W. J. Hooker, and Dr. G. Gardner, the latter sending him original plants of

Cattleya labiata and *Zygopetalum Mackayi* with other orchids found by him in Brazil.

Besides his garden duties, Bain kept up his love for native plants, and even late in life he would walk many miles to point the station of a rare plant, such as *Gentiana Pneumonanthe*, *Listera cordata*, *Malaxis paludosa*, and *Trichomanes radicans*. He was the first to find *Malva rotundifolia* and *Hordeum sylvaticum* in the neighbourhood of Dublin.

After more than fifty years' connection with the gardens of Trinity College, Dublin, he retired in 1878 or 1879; he never married, but in his retirement lived with a niece at Holyhead, where he died on Tuesday, 28th April, in the early afternoon, and was buried at Mount Jerome Cemetery, Dublin, on 1st May, 1903, beside his brothers Robert and William, Dr. Mackay, and other friends.

A portrait was published in Vol. 35 of 'The Garden,' in July 1889, the volume being dedicated to him.

William Bull, the well-known nurseryman, King's Road, Chelsea, died on 1st June, 1902, after an illness of three days. He was born in 1828, and in his early life he was a traveller for the then famous firm of Rollison, at Tooting, and in that capacity became known as an exceptionally able man. In 1861 he took over the premises and nursery stock of Weeks & Co.; this was the beginning of his enterprising career. Ornamental plants, tender flowering plants, and orchids were his favourites; but he also zealously took up any group of plants which attracted the attention of his customers. Thus, *Aucuba japonica* was exhibited by him in our rooms, in fruit, with the male and hermaphrodite flowers, on 20th February, 1868, and at the same time he pointed out the length of time during which the pollen retains its fertilizing power. In June 1876 he also exhibited living plants of Liberian coffee, *Coffea liberica*, Hiern, which he introduced, and has since been widely brought into cultivation for estates on which *C. arabica* is subject to disease. In 1880 he despatched Messrs. Shuttleworth and Corder to Colombia for Orchids; later he turned his attention to orchid hybridizing, and his annual orchid exhibitions were excellently managed.

In the 'Gardeners' Chronicle' for 7th June, 1902, which has an excellent portrait with an obituary, it is related that, wishing to show a special Aroid, he brought it with him in his brougham, till its horrible stench drove him to take a place on the box-seat by his coachman, and in this state the Aroid arrived at the editor's office.

He was elected Fellow of this Society 15th February, 1866, and in former years was a frequent attendant at our meetings; he also belonged to the Royal Geographical and Zoological Societies. The distinction he prized most was that of a Victoria Medal of Honour, from the Royal Horticultural Society in 1897.

As a man of business he was energetic and hard-working, a

good employer, and eager in procuring new plants for cultivation: altogether a remarkable man, whose death has caused regret among a large circle of correspondents.

Julius Victor Carus, Foreign Member since 7th May, 1885, has recently passed away, in his eightieth year, for nearly a third of which period he was editor of the 'Zoologischer Anzeiger.' He was born at Leipzig on 25th August, 1823, and from 1841 onwards pursued his medical and other studies at that University. Thence he went to study comparative anatomy at Freiburg in Baden, and in 1849 he was at Oxford, were he acted as conservator of the Museum of Comparative Anatomy, and thus acquired a command of our language. He returned to Leipzig in 1851 as Docent, and there he remained practically during the remainder of his life, making a break in 1873–74 while acting as *locum tenens* in Edinburgh for Prof. Wyville Thomson, then with the 'Challenger.'

He was a man of great industry, but devoted his energies to the history of his science, translations, bibliographies, and the like, rather than to original research. He was a tool-maker, rather than a tool-user, a type of worker apt to be ignored, though made use of by others, whose gratitude, if existent, is apt to be evanescent. He translated many of Darwin's works into German, from 1866 onward, and communicated oversights in the original to the author, thus securing for the German versions a greater accuracy than in the original issue.

Some of his more noteworthy productions may be mentioned, as his 'Zur nähern Kenntniss des Generationswechsels,' 1849; 'System der thierischen Morphologie,' 1853; 'Wertbestimmung der zoologischen Merkmale,' 1854; 'Prodromus Faunæ Mediterraneæ,' 1884–1893, and 'Geschichte der Zoologie,' 1872: with Gerstaecker, 'Handbuch der Zoologie,' 1875, and with Engelmann, his 'Bibliotheca Zoologica,' 1862.

Britain was not unmindful of his merit: he was D.C.L. of Oxford, and M.D. of Edinburgh University; his election as one of our Foreign Members took place eighteen years ago, and of the Zoological Society of London in 1897. He died on the 20th March, 1903, leaving a widow, a son and three daughters.

François Crépin.—By the death, at Brussels, on the 20th of April, 1903, of François Crépin, Belgium has lost her *doyen* botanist. He was born at Rochefort, in the province of Namur, on Oct. 30th, 1830. Rochefort is a small country-town near the southern boundary of Belgium, situated in the valley of the Lesse, a tributary of the Meuse, surrounded by limestone hills. Here Crépin devoted himself at an early age to the study of botany and laid the foundation of his large collection of Roses. His first publication, which appeared in 1859 in the Memoirs of the Royal Academy of Belgium, was entitled "Notes sur quelques plantes rares ou critiques de Belgique." This was followed by four others with the same title, extending down to 1865. In 1860

appeared the first edition of his 'Manuel de la Flore Belgique.' This is a small octavo volume of 236 pages, and contains, over and above descriptions of genera and species, directions for forming a herbarium, a bibliography of Belgian botany, an account of the geographical regions and their characteristic plants, a discussion on the nature of species, and a glossary of terms. It is an eminently useful and practical book, and did much to revive a love for botany in Belgium, which for many years had been almost entirely neglected. The 'Manuel' passed through several editions (the 5th in 1884), and the flora of Belgium being similar to that of England, has been found very useful in this country. In the second edition the descriptive part is considerably enlarged, and a good deal of the subsidiary matter omitted. The number of indigenous Belgian flowering plants and vascular cryptogams is, in this second edition, estimated at 1240. Crépin always took a moderate view of species, neither uniting nor dividing excessively. In 1861 he was appointed a professor at the State School of Horticulture at Ghent, a position which he held up to 1870. In 1862 the reviving love for botany led to the formation of the 'Société royale botanique de Belgique,' under the presidency of the veteran Dumortier. Crépin was at the beginning a member of the council, and after his removal to Brussels filled for nearly thirty years the office of secretary. The publications of this society now amount to forty volumes; to these Crépin was one of the most prolific contributors, his papers ranging over a wide field, including, in addition to original papers, which very often deal with Roses, reviews and reports of excursions. The more important of his papers on Roses were reprinted in a separate form under the title of 'Primitiæ Monographiæ Rosarum.' Of these the second part, which contains careful original descriptions of the Asiatic Roses, is the most valuable.

In 1871 Crépin was appointed Curator of the Herbarium of the Botanic Garden at Brussels, and from that date to his death he lived in the metropolis. During his summer holidays he usually visited Switzerland, devoting his attention principally to the rich Rose-flora of the lower part of the Rhone valley. He was elected a Correspondent of the Brussels Academy in 1872, a Member in 1878, and a director of the scientific division in 1888. About 1873–75 he paid much attention to palæontology, and contributed several papers on the subject to the Memoirs of the Academy. Many of the fossil plants in the Brussels Museum bear labels in his neat legible handwriting. In 1876 he became Director of the Brussels Garden, and under his management both the living and dried collections were greatly increased. He paid two visits to England during his term of office, and annotated copiously the Roses at Kew and the British Museum. In 1879 Dumortier died, and Crépin wrote his *éloge* for the Memoirs of the Academy, as he did afterwards that of Decaisne in 1881, and Édouard Morren in 1887. He set his heart upon publishing a general monograph of Roses, and for this he accumulated a very

large collection and made careful studies in all directions. But although the book was advertised, failing health prevented him from publishing it, and compelled him, a short time before his death, to give up the directorship of the Botanic Gardens and the secretaryship of the Botanical Society. The best sketch of his general ideas on the classification of Roses will be found in a paper which he contributed to the London Rose Conference of 1889, which is printed in the eleventh volume of the new series of the 'Journal of the Royal Horticultural Society' (page 217). His final views on the delimitation and definition of the innumerable European species—which should rank as species, which as mere varieties, and which as hybrids—are now, we fear, irretrievably lost. [J. G. Baker.]

Charles Codrington Prissick Hobkirk, a prominent Yorkshire naturalist, was born on 13th January, 1837, at Huddersfield, the only son of his father, David T. Hobkirk, who was engaged in the woollen trade. He entered the West Riding Union Bank in 1852, when 15 years of age, and rose to the position of Manager of the Dewsbury Branch of that bank in January 1884; in 1892 he quitted this position, but two years later he came back to Dewsbury as manager for the Dewsbury branch of the Huddersfield Banking Company; in 1897 he retired from business-life, and lived at first at Horsforth and finally at Ilkley, where he died on 29th July, 1902, after a long and painful illness.

It was in his own time, in the intervals of business, that he acquired his extensive knowledge of the natural history of his native county. In 1859 he brought out a volume, 'Huddersfield: its History and Natural History,' embodying in it a wealth of information on the fauna and flora of the district; it reached a second and amplified edition in 1868. From 1864 to 1867 a series of 'The Naturalist' came out at Huddersfield, having papers on British mosses from his pen; in it he also described the forms of *Crataegus oxyacantha*, and translated a paper by Déséglise on the *Tomentosae* section of *Rosa*. This venture ceased in the year last mentioned, but was revived in 1875, Hobkirk being one of the editors till 1884, when the Yorkshire Naturalists' Union took over the magazine. During part of this period he was President of the Huddersfield Naturalists' Society, and actively pushed the interest of more than one other local association. In the Yorkshire Naturalists' Union Mr. Hobkirk was especially active and untiring in the cause he had at heart, and he was its President in 1892.

Although he thus showed his catholicity of taste, he was essentially a bryologist. The volume by which he is best known, is his book 'Synopsis of British Mosses,' which came out in 1873, reaching a second edition in 1884; this was a most useful book to the British student, for whom Wilson's 'Bryologia' was unobtainable, and Dr. Braithwaite's 'Moss Flora' was not even begun. He was responsible, with Henry Boswell, for the 'London Catalogue of British Mosses,' published for the then active Botanical Locality Record Club; the second issue of this came out in 1881.

His wife and his youngest son predeceased him, the latter a few weeks before his own death. His election into our Society took place on 7th March, 1878. A portrait of him is given in the April number of 'The Naturalist,' with an appreciative memoir supplying many additional touches, from the pen of an old friend, whose identity is scarcely concealed by the use of the simple initial, R.

Alfred Vaughan Jennings was born at Hampstead, educated at St. Paul's School, and what is now known as the Royal College of Science, South Kensington, studying under Prof. Huxley, and was *proxime accessit* for the Forbes Medal. Next he obtained an appointment in the Geological Department of his College, and also as teacher of Biology to the evening classes at the Birkbeck Institution, which owed much to his enthusiastic labours. His health breaking down, he took a voyage to New Zealand, and, on his return, he was attached for a brief period to the Royal College of Science, Dublin, as Demonstrator of Botany and Geology. Four papers by him appear in our Journal, as noted below. His bodily health continued to fail, and at last the end came at Christiania, on 11th January, 1902. He was elected Fellow of this Society, 3rd May, 1888.

An intimate friend writes that he "was an untiring collector in Zoology, Botany, and Geology, and the author of several original papers in each of these three branches of Natural Science. The illustrations to his papers, and his drawings in the Whitechapel Museum show considerable artistic ability. In disposition he was modest and retiring, and very kindly and generous; no student ever came to him for help and was refused. Had his brilliant brain been supported by proportionate bodily health, he would have achieved much, possibly as much as he was always hoping to be able to accomplish. For the last ten years his existence had been but a fight for life, and his best friends can only be thankful that the fight is now ended."

Most of the preceding information has been obtained from a sympathetic notice in the 'New Phytologist' for January last.

Mr. Grenville A. J. Cole has been kind enough to transmit a list of our deceased Fellow's papers:—

1. The Orbitoidal Limestone in North Borneo. Geol. Mag., Dec. 1888.

2. On a Variety of *Alectona Millari* (Carter). Journ. Linn. Soc., Zool. xxiii. (1891), pp. 531–539, pl. 13.

3. Cave-men of Mentone. Natural Science, June 1892.

4. On the true nature of "*Mobiusspongia parasitica*," Duncan. Journ. Linn. Soc., Zool. xxv. (1896) pp. 317–319.

5. On a new genus of Foraminifera of the Family Astrorhizidæ. *Ib.* pp. 320–321, pl. 10.

6. On the Structure of the Isopod genus *Ourozeuktes*, Milne-Edwards. *Ib.* pp. 329–338, pls. 13, 14.

7. On the Structure of the Davos Valley. Quart. Journ. Geol. Soc., Aug. 1898.

8. The Geology of the Davos District. Quart. Journ. Geol. Soc., Aug. 1899.

9. The Geology of Bad Nauheim and its Thermal Salt-springs. Geol. Mag., Aug. 1900.

In conjunction with Mr. Grenville A. J. Cole :—

10. The Northern Slopes of Cader Idris. Quart. Journ. Geol. Soc., April 1889.

With Miss K. M. Hall :—

11. Notes on the structure of *Tmesipteris*. Proc. Royal Irish Academy, 27 April, 1891.

With Mr. Griffith J. Williams :—

12. On the Geology of Manod and the Moelwyns, North Wales. Quart. Journ. Geol. Soc., Aug. 1891.

Alexander Kowalevsky, the eminent Russian biologist, was born in 1840. He belonged to a family of which two other members attained scientific distinction : his brother Vladimir as a palæontologist, and his cousin Sophie as a mathematician.

In his seventeenth year, after a brief period of study in the St. Petersburg University, Alexander Kowalevsky went abroad, first working at chemistry in Bunsen's laboratory in Heidelberg, and then studying zoology under Leydig at Tübingen. In 1864 he went to Naples, where he worked with such ardour and success that, at the early age of twenty-six, his name became well-known among biologists.

Russian biologists were among the first to recognize the great significance of the Evolution theory in the domain of Embryology, and the chief advance made in this science during the sixties was due to Kowalevsky and Metschnikoff.

In 1866, Kowalevsky published two closely allied series of researches on the development of *Amphioxus* and on that of the Ascidians, works which are remarkable not only for the novelty of the results obtained but for great clearness and accuracy. Kowalevsky demonstrated the presence of the notochord in Ascidian embryos and caused quite a sensation by showing that these animals, until then supposed to be invertebrates, belong to the vertebrate phylum.

In 1868, Kowalevsky was appointed professor at the Kazan University ; he remained there only one year, during which he published his "Embryological Studies on the Worms and the Arthropoda," a work which testifies to marvellous energy and resolute conquest of difficulties, at a time when microtomes were hardly known and when carmine was the only stain. These embryological studies were epoch-making ; they established the uniformity of the first processes of development in all multilaminar animals and overthrew many views then prevalent. In Worms and Arthropods, as in Vertebrates, Kowalevsky demonstrated the laying down of the organs in the form of germinal layers, these latter containing the rudiments of the whole complex of organs.

It was Kowalevsky who discovered in *Phoronis*, the Ctenophora, *Sagitta*, *Lumbricus*, and the Brachiopoda the embryonic stage since

well known as the *Gastrula* stage. Haeckel utilized his observations when he propounded his *Gastræa* theory. Kowalevsky himself, who only drew conclusions from strictly verified facts, refrained, as a rule, from theorizing. Another well-known theory, the cœlomic theory, was founded on Kowalevsky's discovery that, in *Amphioxus*, *Sagitta*, and the Brachiopoda, the mesoderm develops in the form of protruding sacs from the ectoderm. He himself recognized the significance of this discovery, but considered the establishment of a hypothesis premature.

In 1869, Kowalevsky accepted a professorship at Kieff, where he was an active member of a new Society of Naturalists, to which he contributed many of his discoveries, among others that of the connection which exists between the alimentary and the spinal canals in the embryos of Sharks. This observation led to the revelation of a similar connection in all Vertebrate embryos. To this Society also, Kowalevsky communicated his discovery of the planaria-like female of *Bonellia*, which differs so greatly from the male form; also the observations on the budding of *Perophora*, which have formed the basis of all more recent investigations into the budding of the Ascidians. Other papers threw important light upon the connection between the asexual processes of multiplication and the metagenesis of the Salpidæ.

It was during Kowalevsky's sojourn at Kieff that the Brachiopoda, which were then classed as Molluscs, were carefully investigated by him. With this object, he visited the Red Sea and Algiers, ardently pursuing his researches under great difficulties, spending days and nights in the boats of coral-fishers, sharing their poor fare and exposing himself to the burning sun and other discomforts. The brilliant results he obtained still place him in the first rank among investigators of this group of animals, which were considered by him to be closely related to the worms.

In 1873 Kowalevsky accepted a chair in the Odessa University, and while there studied many marine forms, investigating the ontogeny of the Hydroids, the Acephala and the Actinia, the Alcyonaria and the Lucernaria, and many Molluscs.

From 1884 and onward, Kowalevsky worked on a somewhat different plan. Without renouncing morphological work, for he produced after this date excellent monographs on the metamorphoses of the Diptera and the development of the Scorpions and the Solpugidæ, he took up questions bordering on physiology and anatomy. He published many treatises elucidating obscure organs in various Invertebrates, using the method of injecting colouring-matter into the living organism, and thus revealing whole series of organs until then unknown, but of great significance for the life of the animals in their conflict with micro-organisms. These he called the blood-cleansing organs.

In 1890 Kowalevsky settled in St. Petersburg at the Academy of Sciences, and while there laboured indefatigably in collecting funds for and organizing the Marine Biological Station at Sebastopol, which he believed would be of great value as a centre

for the investigation of the fauna of the Black Sea and of the Sea of Marmora. In 1893 he gave up lecturing and devoted himself entirely to research, spending nearly all his time in his laboratory and continually adding to his interesting discoveries. Some of the last months of his life were spent on Prince's Island in the Sea of Marmora, investigating the development of such forms as *Hedyle*, *Chætoderma* and *Pseudovermes*, his observations on which were published only after his unexpected death in November 1901.

Absolute devotion to Science and untiring energy in her service were the chief characteristics of Alexander Kowalevsky. He was an ardent evolutionist, and devoted himself to following out by the aid of the Evolution theory the many and complex problems of animal life. He modestly disclaimed praise for the enormous amount of work he accomplished, saying that he no more deserved praise than a sportsman, since science afforded him the same pleasure as sport affords the sportsman. All who knew him personally were impressed with his simplicity and modesty; he was conciliatory and polite to all, except perhaps some few whom he regarded as the opponents of Science, and seemed to ignore the fact that he was himself a great scientific authority.

The original character and great value of his work made his name celebrated in all countries of Europe, the scientific societies of which vied with one another in conferring honours upon him. He was elected Foreign Member of the Linnean Society, 1st May, 1884, and died at Odessa on 22nd November, 1901.

[M. Bernard.]

Charles Maries was born at Stratford-on-Avon, and went to school at Hampton Lucy from 1861 to 1865, at the grammar-school under Prof. George Henslow, after which he went to be with his brother at Lytham, remaining seven years in those nurseries. Mr. Maries spent some time in Messrs. Veitch's establishment at Chelsea, where his employer, Mr. H. J. Veitch, selected him to explore certain parts of China and Japan, known to be rich in flowering shrubs and trees, many not yet introduced into cultivation in Europe. Besides these, he sent home herbaceous plants and conifers; the latter were described by Dr. Masters in our Journal (Botany, xviii. 1880, pp. 473–524).

In this journey, leaving England in February 1877, he reached Shanghai, and went on to Japan, where he inspected the nurseries at Yokohama and Yedo, and began conifer-hunting at Nikko, rediscovering *Abies Veitchi*; he lost over 20,000 specimens by wreck, ultimately reaching Yokohama, and sailing for Hong Kong on Christmas-day. He attempted to collect in Formosa, but was not successful. The following summer found him at Chin Kiang and Kiu Kiang; at the latter place he was incapacitated by sunstroke for two months; he again visited Japan, and reached Hankow in December. He spent the next season on the Yantgze, and in the Ichang gorges; amongst the 500 living plants sent home, was that curiosity the square bamboo, besides a large quantity of seeds of Conifers, Maples, Oaks, and other trees.

At the time of his death he was Superintendent of the gardens of the Maharajah of Gwalior, having previously been in charge of those at Durbhungah, India; passing away on 11th October, 1902, and leaving a widow and two children.

He was elected Fellow on 3rd March, 1877. He also received the distinguished award of a Victoria Medal of Honour from the Royal Horticultural Society. His published papers were confined to gardening papers and the Journal of the Royal Horticultural Society; but his title to lasting remembrance lies in his success as a plant-collector.

The death of Dr. Richard Chandler Alexander Prior, who died at his residence, Regent's Park, on 5th December, 1902, removes one of the most constant attendants at our meetings until increasing weakness confined him to his house and room.

The following account is based upon memoranda drawn up in 1899, when ninety years of age, by the subject of this notice. He was born on 6th March, 1809, at Corsham in Wiltshire, his parents' surname being Alexander; his horoscope was drawn on the day of his birth by Wm. Sainsbury, M.D., and carefully preserved. When eight years old, he was sent to the Rev. J. T. Lawes's school at Marlborough, and five years later to the Charterhouse, when the Rev. J. Russell, D.D., was headmaster. At the age of 17 he went up to Wadham College, Oxford, Dr. Symons being then subwarden, and took his degree in 1830.

The same year, having decided to study medicine, he came to London, and began his studies at Mayo's Anatomy School, Great Windmill-street, and also attended Faraday's chemical lectures. The next year, 1831, he entered St. George's Hospital, but his health broke down: he had typhus fever the first winter, and continuing unwell, the following year went to Belgium for change of air, and then proceeded to Weimar, where he spent the summer. The next medical season was spent at Berlin, and then, in 1833, he resumed his studies at St. George's Hospital. At this time he attended Dr. Robert Dickson's lectures on botany, "to which I have to trace the greatest happiness of my subsequent life" being his own testimony. After one season at Edinburgh. Mr. Prior took his M.B. degree at Oxford, and settled in practice at Bath in 1836. But here, fate was against him: he was ill all the time he was in residence there, fifteen months. "A most malignant fever broke out in the street where I had lived, Edward Street, shortly after I left, and attacked the inmates of nearly every house on one side, many of whom died. It was then discovered that the main sewer was choked up, the cause, no doubt, of my constant indisposition while I lived there, and especially of the sore throats to which I was subject." He removed to Chippenham, became Fellow of the Royal College of Physicians in 1840, and in the spring of 1841, when he gave up the practice of medicine, he went to Gratz in Austria for three years. It was during his stay here that he contributed two papers, describing his excursions into

Upper and Lower Styria, to the Botanical Society of Edinburgh, accompanied by a parcel of the plants mentioned. These papers were printed in the 'Annals and Magazine of Natural History,' vols. xvii. & xviii. for 1846. In the course of his rambles, he says:—"At an inn at the foot of the mountain [the Lantsch] the people spoke a jargon that I had great difficulty in understanding, and they had as much, I suppose, in comprehending me. The innkeeper told me, begging my pardon, that I did not speak German very well, and should stay a month or two with him in the Breitenau to learn the language. I asked him if he did not think I had better opportunities in Gratz. 'Oh no,' he said, 'they talk there according to book—Nach der Schrift.'" On the same page is a description of Vest, "the most untidy botanist ever known," and an account which Dr. Maly gave of his herbarium.

The next year was devoted to botanising in Dalmatia, and its southern vegetation. Passing through France, he paid a flying visit to England in 1844, and in the autumn of the same year went to Italy. He spent the winter in Naples and visited Sicily the following spring, collecting largely and getting personally acquainted with Gussone and other botanists. He remarks that he was "very much struck during his excursions in the south with the circumstance that neither in the Kingdom of Naples, nor in Sicily, is there anything like the scattered hamlets and cottages that we find everywhere in England and Germany—a result of the comparative insecurity of life and property, and a cause of the preference of southern people for the pleasure of a town life. Hence the little attention paid to natural history by them, both in ancient times and modern."

In April 1846 he sailed for the Cape, and lived thirteen months in Capetown; in 1847 going to Georgetown and Uitenhage. He was at the former place during the heavy rains of that spring, the heaviest for 22 years, causing inundations: "after which I went a journey over the Carroo in an ox-waggon, the effect of which I felt for several years in the singular habit of connecting all noises that I heard in my sleep with the cries of the wild animals of that desert. This seems the more strange, as I am not conscious that I ever dreamed of being aboard ship, although the circumstances of a sea-voyage are more striking to a landsman than are those attending a land-journey." He made large collections of plants, and came home in 1848.

The love of travel prompted him the next year to sail in April for the United States, where he botanised till November; then proceeded to Jamaica, and stayed till August. While in Jamaica he resided at Moneague, in the mountains of St. Ann's, and ascended the Blue Mountain Peak. He returned by way of New York and Canada in the autumn of 1850, and reached England in November. He then took a house at Hammersmith, which remained his home for eight years, though he made occasional continental trips, visiting Germany, France, Denmark, Norway, and Italy.

"In the spring of 1859 my maternal uncle died, leaving me his landed property, requesting me to take his name, which I did, and thenceforth subscribed myself 'Prior.' Since my return from America in 1850 I have devoted myself more to literature than botany, finding, like many others, that after a rambling life in quest of plants it is very irksome to work them up in the cabinet."

In 1859 he published translations of 'Ancient Danish Ballads' in three volumes, and in 1863 his 'Popular Names of British Plants,' which is now in its third edition. "For forty years I have spent the summer half of the year at Halse, near Bishops Lydeard, seven miles west of Taunton, and the six winter months at York Terrace, London, occupying myself with literary pursuits, while the summer months were devoted to croquet" [he prided himself on his lawn at Halse House] "and antiquarian researches. A translation of 'Ancient Danish Ballads' required a perusal of all the ballad literature that I could obtain. A small work upon the 'Popular Names of British Plants' afforded me much amusement and no little labour in reading up old herbals. In these studies forty years have sped away very rapidly, and I am now (in 1899) ninety years of age, very feeble, but in the enjoyment of good general health. I find that I have out-lived all but one of my contemporaries [Nelson Goddard, Esq.], school-fellows, and college friends." These are the closing words of his autobiographic sketch. For some years past his increasing weakness had kept him away from the Society, but until he was long past eighty he used to attend the meetings regularly, and by virtue of his position as senior member of the Club took the Chair at the meetings of the Linnean Club in the absence of the President. He was never married, but greatly admired the other sex, and was fond of paying them an old-world attention and deference, which recalled past manners. More than once he served on the Council; and it is to him that the Society owes its optical lantern, a gift made in 1890 in acknowledgment of a long enjoyment of the Fellowship of the Society, which dated from 6th May, 1851. An attack of influenza was the actual cause of Dr. Prior's death, which took place as recorded in the first paragraph. By will he left a legacy of £100 to this Society, and his herbarium to the Royal Botanic Gardens, Kew. His estate passes to Sir Prior Goldney, Bart.

Botanically our late Fellow is commemorated in the genus *Prioria*, dedicated to him by Grisebach (Flora British West Indies, p. 215) on account of his support of West Indian botany. *Prioria copaifera* was further investigated by Mr. Bentham, and figured in our 'Transactions,' xxiii. (1861) pl. 40.

The Rev. Thomas Wiltshire, who died at his house, Granville Park, Lewisham, 27th October, 1902, was born in London on 21st April, 1826, the son of Sampson Coysgarne Wiltshire and Sarah (*née* Goodchild). His father was a man of business in the City and a Freeman of the Clothworkers' Company, who possessed much facility with pencil and brush, an aptitude which reappeared

in our late Fellow. His father died while the son was young, and his mother married again. Mr. Wiltshire never went to school, but was prepared by a tutor for the university. He entered King's College in 1845, and obtained the mathematical prize in the following year; then going to Cambridge. He graduated in 1850 from Trinity College, placed among the Senior Optimes in the Mathematical Tripos; and in June of the same year was ordained deacon by Dr. Murray, Bishop of Rochester, and priest in December 1853 by Dr. Blomfield, Bishop of London, the year of his proceeding M.A.

He had married in 1850; and he threw himself into his parochial duties, first as curate at Riddings in Derbyshire, next at Brompton, and then at St. Nicholas Olave, Bread-Street Hill, as Rector. When the site of this Rectory was wanted for the District Railway in 1868, he removed to Lewisham, where he spent the rest of his life, which remained connected with St. Clement's Eastcheap (Evening Lectures) and St. Nicholas Cole Abbey (Curate).

The scientific side of Mr. Wiltshire's life may be stated as beginning with his election into the Geological Society in 1856. In 1869 he unsuccessfully stood as candidate for Professor of Geology at King's College, London; but in 1872 he became Lecturer in Geology there, Assistant Professor in 1881, and full Professor of Geology and Mineralogy in 1890: he became Fellow of that College in 1889, and retired from his Chair in 1896. His first pamphlet, 'The Red Chalk of England,' appeared in 1859, followed in 1862 by 'The Ancient Flint Implements of Yorkshire'; in 1869 he brought out his 'Chief Groups of the Cephalopoda' and 'The Red Chalk of Hunstanton.' From 1863 to 1901 he was Secretary to the Palæontographical Society, and held similar position in the Ray Society from 1872 to the day of his death. He was active also in technical education, and was a member of the Council of the City and Guilds of London Institute, representing the Clothworkers' Company, of which he had become Freeman and subsequently Master.

He was elected Fellow of our Society, 21st December, 1865; and was also Fellow of the Royal Microscopical (1857), the Royal Astronomical (1860), the Royal Geographical (1866); a Life Member of the Society of Arts (1888), and of the Geological Society of France (1870). He was one of the founders of the Geologists' Association, and President, 1859-60. The British Association also claimed him as a member.

The "Wiltshire Collection" of fossils was presented by him in 1893 to the University of Cambridge, and placed in the Woodwardian Museum; this collection consisted of many thousand specimens, and was especially rich from the Lower Greensand, Gault, Upper Greensand, and Chalk. The "Wiltshire Collection" of minerals was presented in 1897, and is now in the Mineralogical Museum, Free School Lane; it numbers 2800 specimens. In 1899, following these gifts, he received the Degree of Sc.D. from his old University. Finally may be mentioned, a gift was made to

the University to found a Prize for proficiency in Geology and Mineralogy, eligible to those who have passed Part I. of the Natural Science Tripos and not of more than ten Terms' standing.

On Christmas Eve, 1901, he fell when returning home, suffering a compound fracture of the right thumb; but the end was approaching, though he died practically in harness to the last. He preached on Sunday evening, 26th October, 1902, at St. Clements, and came home in apparent good health; between one and two in the morning he complained of severe pain in the chest, but was relieved by some simple remedies, and he lay down to sleep again, during which he quietly passed away, without again waking, from angina pectoris.

The writer has to thank Mr. E. W. Wiltshire, son of our deceased Fellow, for much of the foregoing information.

June 4th, 1903.

Mr. George Sharp Saunders in the Chair.

The Minutes of the Anniversary Meeting, 25th May, were read and confirmed.

Messrs. Edward Alexander Newell Arber, George Wallace Eustace, and Robert Alexander Robertson were elected, and Mr. Montague Frank Hopson was admitted a Fellow of the Society.

The Chairman announced that the President had appointed the following to be Vice-Presidents for the ensuing year:—Mr. Frank Crisp, Mr. C. B. Clarke, Prof. J. B. Farmer, and Mr. A. O. Walker.

Dr. Hocken, F.L.S., of Dunedin, New Zealand, reminded the Society that the next biennial meeting of the Australasian Association for the Advancement of Science will be held at Dunedin, in January 1904; and that the Members would welcome any Fellows of the Linnean Society who might be able to pay a visit to New Zealand on that occasion; every facility for travelling at special rates to visit the celebrated scenery will be afforded by the New Zealand Government, and Dr. Hocken will be happy to give detailed information to prospective visitors.

Mr. R. Morton Middleton, F.L.S., exhibited a holograph letter from Linnæus to Philip Miller, dated Upsala, 3 August, 1763, and read a translation of the same. A few remarks were added by the General Secretary.

Mr. F. N. Williams, F.L.S., showed a series of 100 drawings of British Compositæ, 20 being *Hieracia*, drawn in pen-and-ink by Mr. E. W. Hunnybun, of Huntingdon, an accomplished artist and British field-botanist.

Sir Dietrich Brandis, K.C.I.E., F.R.S., F.L.S., exhibited specimens of *Gelsemium elegans* which Mr. Smales, Deputy Conservator of Forests, had sent him from Upper Burma. It is known there, as well as in China, as a most deadly poison. Mr. Smales writes: "Very deadly creeper; decoction of roots kills instantly, leaves also fatal." The alkaloid seems to be similar to strychnine and gelsemine, the product of species of *Strychnos* and of the North-American shrub, *Gelsemium sempervirens*, both of the Order Loganiaceæ.

He also exhibited a most remarkable specimen received from the Tharaundi Forests in Lower Burma: a hollow cylinder, about 12 inches high and just under 3 inches in diameter, of a soft but tough white leathery substance, which had grown as the lining of a Bamboo-joint. This was identified by Mr. G. Massee, F.L.S., from the presence of characteristic conidia on the inner surface of the cylinder, with *Polyporus anthelminticus*, Berk., which forms thick irregularly-shaped masses on old Bamboo culms near the ground. An analogous case, to which Mr. Massee drew attention, is that of the *Polyporus* which grows on *Sambucus nigra*, the mycelium of which is often found in the white pith of the Elder, sometimes entirely displacing the pith.

Colonel George Colomb sent for exhibition a fragment of a branch of a Thorn, which had been given to him by Mr. Thoms, gardener in Hyde Park. This branch shows the mischief done to thorns near London by larvæ which had been identified as those of the Wood Leopard Moth, *Zeuzera Æsculi*, Linn. The House-Sparrow was stated to destroy numbers of the perfect insect on their emergence. Further remarks were contributed by Dr. D. Sharp, the Chairman, and Mr. E. M. Holmes.

The following papers were read:—

1. "The Anatomy and Development of *Comys infelix*, Embleton, a Hymenopterous Parasite of *Lecanium hemisphæricum*." By Alice L. Embleton. (Communicated by Dr. D. Sharp, F.R.S., F.L.S.)
2. "Notes on the Transition of Opposite Leaves into the Alternate Arrangement: a new Factor in Morphologic Observation." By Dr. Percy Groom, F.L.S. (See p. 48.)

June 18th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Messrs. Albert William Bartlett, John Clayton, and David Thomas were elected, and Messrs. E. A. Newell Arber and George Wallace Eustace were admitted Fellows of the Society.

A volume of portraits of eminent men of science, compiled by Dr. R. C. A. Prior, about 1854, was presented to the Society by

his executor, Sir Prior Goldney, Bart., and for this a special vote of thanks was passed.

The Rev. T. R. R. Stebbing, F.R.S., F.L.S., on behalf of Mrs. Sladen, presented a portrait in oils, kitcat size, by the late H. T. Wells, R.A., of the late Mr. Walter Percy Sladen, who from 1885 to 1895 was Zoological Secretary. The President, in accepting the gift on behalf of the Society, submitted the following Resolution, which was carried by acclamation :—

"That the portrait of the late Walter Percy Sladen, for ten years Secretary of the Linnean Society, now offered on behalf of Mrs. Sladen, be accepted, and that the grateful thanks of the Society be conveyed to the Donor."

Mr. C. H. Wright, A.L.S., exhibited seeds of a new species of *Æschynanthus*, described in a paper subsequently read.

Mr. C. B. Clarke, F.R.S., F.L.S., showed specimens of a variety of the Primrose, *Primula vulgaris*, Huds., with remarkably small flowers, to which he proposed to give the varietal name *Chloe*. (He subsequently considered that it was probably a hybrid between the Primrose and the form of the Cowslip which is found on the Hampshire downs.)

A photograph sent by Mr. J. Waby was shown, and an extract from his letter received with it was read, stating that two specimens of *Corypha elata* in the Georgetown Botanic Gardens, of similar age and planting, were photographed: one had followed the normal course, flowered, fruited and died; the other, instead of flowering, had developed a secondary crown of leaves.

Mr. Frederick D. Ogilvie, of Harrogate, sent for exhibition a water-colour drawing of the Cowthorpe Oak, taken in 1902, thus bringing down the record one year later than the photographs shown by Mr. J. Clayton, on 19th February last, at the General Meeting held on that day.

The Rev. John Gerard, S.J., F.L.S., showed a fresh specimen of the proliferous form of *Geum rivale*, which he had received from Stonyhurst, Lancashire, a few days before.

The following papers were read :—

1. "Descriptions of New Chinese Plants." By Stephen T. Dunn, F.L.S., with an introductory note by C. H. Wright, A.L.S.

2. "On the Germination of the Seeds of *Davidia involucrata*." By W. Botting Hemsley, F.R.S., F.L.S.

3. "On the Occurrence of Rudimentary Horns in the Horse." By Dr. G. W. Eustace, F.L.S. (See p. 48.)

4. "On the Scottish Freshwater Plankton." By W. West, F.L.S., and Prof. G. S. West, F.L.S.

5. "On the Anatomy of the Leaves of British Grasses." By L. Lewton-Brain, F.L.S.

ABSTRACTS.

November 20th, 1902.

The PRESIDENT reminded the Society that exactly a year ago he had the honour of giving an account of some observations upon the action of the enzyme contained in the secretion of *Nepenthes*. That enzyme, he then explained, not only possesses the property of peptonising the higher proteids (*e. g.* fibrin), but is also proteolytic, decomposing the proteid molecule into non-proteid nitrogenous substances such as leucin and tryptophane. The proof of this is afforded by the fact that liquids containing proteids that have undergone digestion give the tryptophane-reaction; that is, a pink or violet colour on the addition of chlorine-water.

Since that time many other plants have been investigated with the object of ascertaining (1) whether or not a digestive enzyme were present, and (2) of determining the nature of its action. In almost all cases the presence of a proteolytic enzyme has been demonstrated. In the first instance plants which were known to possess a peptonising enzyme were made the subject of experiment, with the result that the enzyme was in all cases found to be proteolytic. This is true of the juice of the Pineapple (*Ananas sativus*, Schult. f.), of the latex of the Papaw (*Carica Papaya*, L.), of the Fig (*Ficus Carica*, L.), of the milk of the Coco-nut (*Cocos nucifera*, L.), of the seeds of *Vicia Faba*, L., and of *Hordeum vulgare*, L., of Yeast (*Saccharomyces Cerevisiæ*, Meyen), and of the Bacteria of putrefaction (see 'Annals of Botany,' vol. xvi. 1902, p. 1).

The investigation was then extended to different parts of widely differing plants. In view of the fact that the proteids occurring naturally in plants are such (*e. g.* globulins and albumoses) as are readily digested, whereas those generally used (*e. g.* egg-albumin, fibrin) are much more resistant, the material to be digested was supplied in the form of the commercial product known as Witte-peptone, a mixture of albumoses and peptones. It was found that, with few exceptions, an enzyme was present which, as proved by the tryptophane-reaction, proteolysed these substances in 4–20 hours. Only those experiments are relied on in which the period of digestion was too brief to admit of putrefaction; or in which an antiseptic (H C N, or chloroform-water) was employed. The digestive power is destroyed by boiling.

The plants and parts of plants investigated are the following:—

Fruits: Melon; Cucumber; Tomato: Vegetable Marrow; Black and White hothouse Grapes; Pear (Beurré Hardi); the Orange, where the peel, but not the juice, was found to digest; Banana.

Lacticiferous plants: *Euphorbia Characias* (shoots); leaves of the Lettuce.

Seeds: Green Peas; Wheat-Germ.

Stems: Vegetable Marrow; *Dahlia variabilis*; *Mirabilis Jalapa*; *Helianthus tuberosus*.

Bulbs: Onion; Tulip; Hyacinth.
Tubers: Jerusalem Artichoke; Potato.
Leaves: Cabbage; *Tropæolum majus*; *Dahlia variabilis*; *Mirabilis Jalapa*; *Spinacia oleracea*; *Holcus mollis*; *Phalaris canariensis*: *Prunus Lauro-cerasus*; *Helianthus tuberosus*; *Ricinus communis*; *Apium graveolens* (both green and etiolated); *Pelargonium zonale*; the Fern *Scolopendrium vulgare*, but here digestion was slow.
Roots: Turnip; Tomato; Vegetable Marrow; *Phaseolus multiflorus*; *Mirabilis Jalapa*; *Daucus Carota*.
Fungi: the Mushroom.

Having established the presence of a proteolytic enzyme, the next step was to ascertain whether the tissues or juices of the plants under investigation were capable (like the Pineapple, the Fig, the Papaw, etc.) of peptonising the higher proteids. Evidence of the peptonisation of fibrin and of the caseinogen of milk was obtained in the case of the juice of the Melon, of the watery extract of the Lettuce, and of the tissue of the Mushroom. The results in other cases were either doubtful or negative. There was frequently evidence that the proteids naturally existing in the vegetable substances themselves had been digested.

The experiments definitely establish the fact that an enzyme which actively proteolyses the simpler forms of proteid is present in all parts of the plant-body. But the question as to the precise nature of this enzyme still remains to be answered. Where proteolysis is accompanied by peptonisation, it may be inferred that the enzyme is allied to the trypsin of the animal body. Where no peptonisation, but only proteolysis, can be detected, it seems probable that the enzyme is allied to the erepsin recently discovered by Cohnheim in the small intestine. Possibly more than one enzyme may be active in certain cases.

The conclusions arrived at depend entirely upon the reliability of the tryptophane-reaction as evidence of proteolysis. From what is known as to its chemical composition and as to the conditions of its formation in digestion, there can be no doubt that tryptophane is a product of the disruption of the proteid molecule. The point that had more particularly to be determined was whether the substance giving the colour-reaction with chlorine in these experiments is really tryptophane. The isolation of tryptophane is a difficult process, and was not attempted. The chemical identity of the substance is, however, established by the fact that its chlorine-compound was found to give the same absorption-spectrum as does that of tryptophane, namely, a band in the green on the yellow side of the thallium-line.

Mr. A. G. Tansley, F.L.S., in his paper, illustrated by lantern-slides, "The Relation of Histogenesis to Tissue-Morphology," dealt with a few points bearing on the relation of histogenesis at the apex of the stem in the Pteridophyta to the morphology of the tissue-regions in the adult stem.

In the first place, the variability of the position marked by the first tangential wall in the different great groups of Pteridophyta was pointed out; and Van Tieghem's statement that it coincided, in the Filicineæ, with the outer limit of the monostele or (in the polystelic forms) of the ring of steles, was held to rest on far too narrow a basis of evidence. This outer limit is said to correspond in most cases with the external limit of the protophloëm, the sheath-layers (pericycle and endodermis) of the monostele being supposed to be derived from "cortex." However, the histogenetic origin of these sheath-layers is extremely variable; they are derived from "cortex," or from a separate layer (coleogen), or sometimes partly from the young stele itself. The most striking deviation at present known in Ferns is found in *Schizæa malaccana*, where each primary segment of the apical cell divides into an anticlinal series of three cells, of which the middle one is an initial of the vascular ring and the sheath-layers. If these histogenetic differences were to be seriously taken as a clue to morphological (phylogenetic) distinctions, the most patent absurdities would result, *e. g.* the outer endodermis would not be homologous in different Ferns, a practically impossible conclusion. The consideration of the homologies of tissues must be based primarily on a common-sense comparative consideration of adult structures.

The question of "pith" in Ferns was then touched upon, and it was concluded that while the pith of *Schizæa* is intrastelar, histologically part of the amylom, and developed in place of the central tracheids of a primitive protostele, remains of which are found in some species of the genus, the large-celled pith enclosed by an internal endodermis, which begins to make its appearance in *Schizæa* and is normal in solenostelic Ferns, *is a new tissue*, phylogenetically the descendant of the intrastelar pith, or in other cases of the central phloem, though in connection with, and often histologically identical with the cortex. In considering this question, a contemplation of the actual histogenesis of the central tissue prevents our using the phrases "internal cortex" and "intrusion of cortex."

Mr. L. A. Boodle, F.L.S., followed with a paper entitled "Stelar Structure of *Schizæa* and other Ferns," illustrated by lantern-slides. In the rhizome of *Schizæa dichotoma* the stele has normally a ring of xylem enclosing a central pith, which is usually largely sclerotic. A group of tracheids sometimes occurs in the pith, and is either isolated or connected with the normal ring of xylem. Endodermal pockets are present in connection with some of the leaf-traces, and may pass obliquely inwards to near the centre of the pith. Besides these an isolated inner endodermis is occasionally found in the pith. The central tracheids and the isolated inner endodermis appear to be vestigial; the former are probably remnants of the central part of the xylem of a protostelic form, such as is seen in *Lygodium*, though it is possible that they may represent a centrally placed protoxylem embedded in

parenchyma, as found in *Hymenophyllum scabrum*. The isolated inner endodermis is probably a relic of a previously better-developed system of endodermal pockets, or of the latter connected with a central tube of endodermis, but without internal phloem (*i. e.*, in the latter case, the ectophloic siphonostelic type of Jeffrey). The third possibility, that the structure of *Schizæa* may have been reduced from the solenostelic type (*i. e.* with internal phloem and endodermis), such as is found in some species of *Anemia*, is not excluded, though no evidence can at present be brought forward in support of this view.

December 4th, 1902.

Leguminous Plants recommended by Virgil to restore Exhausted Soil. By Dr. George Henderson, F.L.S.

A few days ago it was pointed out to me by my friend Sir Annesley De Renzy that in Virgil's first Georgic, line 73, the poet, after recommending a system of fallowing, proposes as an alternative, and a means of restoring the fertility of the soil, that before taking a second grain-crop, the soil should be re-fertilized, by planting it with a leguminous crop. The Romans, it would seem, believed that these plants actually enriched the soil, especially if the roots were ploughed in.

Virgil, Georgics I., lines 71–78.

Alternis idem tonsas cessare novales,
Et segnem patiere situ durescere campum ;
Aut ibi flava seres mutato sidere farra,
Unde prius lætum siliqua quassante legumen,
Aut tenuis fœtus viciæ, tristisque lupini
Sustuleris fragiles calamos, silvamque sonantem.
Urit enim lini campum seges, urit avenæ,
Urunt Lethæo perfusa papavera somno.

[*Translation.*]

You will also permit your fields from which you reap your harvest to lie idle each alternate year and the indolent ground to be strengthened by rest.

Or the season being changed you shall sow the golden barley whence formerly you had borne away the luxuriant pulse, in their rattling pods or the slender produce of the Vetch, or the bitter Lupin's fragile stalks and rustling straw.

For a crop of flax burns up the soil and so does one of oats, and so do the poppies steeped in the slumbers of Lethe.

It seems remarkable that the late discoveries about the nitrification of soil by means of the roots of the Leguminosæ should have been foreshadowed so long ago by a people who could have known nothing of chemistry or vegetable physiology. It also seems strange that it took so long to ascertain anything definite as to

how the leguminous plants restored the soil, and no doubt there is still much to be discovered regarding it.

Virgil mentions the lupin as a field-crop, we only know it as a flower grown for ornament; but to the present day in Germany lupins are grown very extensively on very poor soil every third or fourth year, simply to be ploughed in to enrich the soil; the lupin is so bitter that no animal will eat it, but sometimes it is used in Germany as bedding for the cattle. The lupin [*Lupinus luteus*, Linn.] thus grown has a yellow flower.

February 19th, 1903.

Some Remarks on the possible Uses of Essential Oils in the Economy of Plant-life. By Dr. GEORGE HENDERSON, F.L.S.

Everybody knows that moisture in the air tends to prevent frost at night, but it is not always realized that the moist air, even when clear and when there are no clouds, still acts in the same way, and stops radiation from the surface of the ground.

Professor Tyndall, thirty-two years ago, experimenting on this subject (see his 'Fragments of Science'), found that infinitesimal quantities of essential oils in the air enormously increased its power of absorbing heat-rays of low tension.

I am not aware that anyone has applied this fact as serving any useful purpose in plant-life, but it seems to me that in this way these oils may often prevent injury from frost at one of the most critical periods of the plant's life, namely, when it is setting its fruit.

In the low hills of the Punjab Himalaya, from 1000 to 4000 feet above the sea and 10 to 20 miles across, in the end of March and in April, when most of the plants are coming into flower, the blossoms are apt to be blighted by late frosts, at least one would expect this; but at that season the air is filled with the odours of essential oils from these blossoms to such an extent as to be at times (and especially on a still night, when frost most often occurs) quite overpowering.

My theory is that these essential oils help to prevent radiation at night, and thus preserve the blossoms and allow the fruit to set; after all, it is usually only a matter of four or five degrees' fall of temperature just at sunrise which does all the damage.

I mention the Punjab Himalayas because it was there the matter first attracted my attention, and probably nowhere else is there more risk of damage from late frosts.

Tyndall states that, taking the absorptive power of dry air at 1, moisture added to the air increases this power to 72; but an infinitesimal trace of

Oil of Rosemary	gives	74
Oil of Laurel	,,	80
Camomile flowers	,,	87
Cassia	,,	109
Spikenard	,,	355
Aniseed	,,	372

I do not know if Tyndall's experiments have been followed up by any botanist, but if not, I think this will form an interesting subject for further investigation.

April 2nd, 1903.

Dr. D. T. Gwynne-Vaughan gave a lantern-demonstration of his paper, "On the Comparative Anatomy of the Cyatheaceæ and other Ferns." He stated that the vascular system at the very base of the stem of a young plant of *Alsophila excelsa*, R. Br., is found to be protostelic, and as it advances towards the more complicated structure of the mature stem it passes through a series of transitional stages which in certain other Ferns are retained as the permanent structure of the full-grown plant.

The first departure in the young plant from the protostelic type of structure is due to the appearance of a core of phloem within the substance of the xylem of the protostele. This gives rise to a type of vascular structure which may be found in *Davallia repens*, Desv., as the permanent structure of the mature stem. Then, in the young plant, the endodermis and ground-tissue lying on the adaxial side of the departing leaf-traces are prolonged downwards into the internal core of phloem. These decurrent strands of ground-tissue at first end blindly in the internal core of phloem before reaching the node below, giving rise, in this manner, to a type of stele which is also to be found in the mature stem of *Davallia pinnata*, Cav. When the decurrent ground-tissue becomes continuous from one node of the young plant to the other, a solenostelic structure is reached entirely similar to that found in the mature stems of a large number of different Ferns.

It is suggested that this series of vascular types illustrates the actual manner in which the transition from protostely to dictyostely took place in the Cyatheaceæ and Polypodiaceæ. That is to say, the ancestral protostele of these two orders never contained a definite pith, and its conversion into a solenostele was initiated by the replacement of some of its xylem elements by phloem, later on by endodermis and ground-tissue. This suggestion is not in any way affected by the question as to the cortical or stelar nature of the internal ground-tissue.

The xylem in the steles of Fern-stems seems to be differentiated in two different ways. Either the protoxylem elements are more or less evenly distributed all round the periphery of the xylem mass, or else they are localized in definite endarch or mesarch strands. In the latter case the protoxylem strands of the stem are always related directly or indirectly with those in the leaf-trace.

In the more primitive Pteridophyta in which the influence of the leaf-trace upon the stem-stele is practically negligible, the protoxylem is nearly always exarch, and it would seem that endarchy originated in the leaf-trace and that, in general, it appeared in the stem only when the influence of the leaf-trace had begun to dominate the structure of the latter.

June 4th, 1903.

Dr. Percy Groom, F.L.S., read a paper entitled "Notes on the Transition of Opposite Leaves into the Alternate Arrangement: a new factor in morphologic observation." The author stated that his observations began on *Atriplex rosea*, and to make a graphic representation of results, he plotted the length of the internodes in a given manner, which produced a zigzag curve: when this principle was applied to *Chenopodium* and *Salsola* an entirely similar result came out, and a zigzag course was plotted, due to the long and short internodes alternating. At first he suspected this might be due to its nearness to salt water, but inland specimens told the same tale, and neither the influence of day and night nor of salinity could account for it. His belief was that the true solution lay in an upward displacement of one of the two leaves at each node from a primitive opposite phyllotaxis. Such a displacement by fusion is admitted in the opposite-leaved *Salicornia*, in which both leaves are fused with the main stem up to the succeeding node. Continuing his observations, the author examined *Scrophularia nodosa*, which exhibited a transition from an opposite phyllotaxis to an alternate arrangement in the inflorescence. *Symphytum officinale* showed a regular displacement-curve in its raised and fused axillary branches. *Rhinanthus Crista-galli* occasionally presented a curious anomaly: the leaves were commonly opposite, but sometimes became suddenly alternate, but in such instances the individuals showed some of the solitary leaves bilobed or succeeded at the next higher node by two asymmetrical laterally approximated leaves. *Lysimachia vulgaris* first showed opposite leaves, then by the process last described, splitting at the apex and becoming distinct, a whorl of four leaves finally appeared. The author laid stress on the fact that he had taken his species at random, as they came to his hand, and were not specially selected. Although this was only a preliminary statement of the facts observed, it embodied a long series of observations.

June 18th, 1903.

Dr. Eustace read a paper upon "Rudimentary Horns in Horses," in which he recorded the occurrence of bilateral osseous prominences on the frontal bones in two thoroughbreds, "Domain," aged 5, belonging to Mr. H. Bonas, and "The Swamper," aged 3. Both horses at the time of writing were under the care of Mr. Alfred Day, of Westergate. In the younger horse the bosses did not appear until the animal was six months old; in both the left boss was larger than the right.

The author stated that Mr. William Day remembered the same peculiarities being exhibited by "Mounseer," the property of Lord Rivers, and the winner of the Chester Cup in 1850.

It is of interest that "Mounseer," "Domain," and "The Swamper" are all descended from "Eclipse," which itself was the

great-great-grandson of "Darley Arabian," a horse purchased at Aleppo and shipped to England in 1705.

The author drew attention to a passage in Darwin's 'Variation of Animals and Plants under Domestication' (ed. 2, vol. i. p. 52), to the effect that "in various countries horn-like projections have been observed on the frontal bones of the horse: in one case described by Mr. Percival they arose about 2 inches above the orbital processes, and were 'very like those in a calf from five to six months' old,' being from half to three-quarters of an inch in length. Azara has described two cases in South America, in which the projections were between 3 or 4 inches in length; other instances have occurred in Spain." "The French translator of Azara refers to other cases mentioned by Huzard as having occurred in Spain."

Dr. Eustace considers that, although both of the two horses that formed the subject of his paper were of a delicate constitution, and Lord Rivers's horse died when only four years' old, the prominences cannot be looked upon as exostoses due to disease. He considers the cases to be true instances of "reversion," the reappearance in a rudimentary condition of structures which once existed in a functionally perfect condition. Dr. Eustace is consequently led to question the accuracy of the view held by the late Mr. Romanes and others that true bilateral horns are peculiar to, and an evidence of later specialization among the Ruminants; and he regards it as probable that the possession of horns was a feature of the ancestral stock of the Ungulates prior to the differentiation of the Ruminants and the non-Ruminants.

ADDITIONS AND DONATIONS

TO THE

LIBRARY.

1902–1903.

Aberdeen.

Aberdeen Working Mens' Natural History and Scientific Society. No. 1. 8vo. *Aberdeen*, 1903.

Ade (Alfred). Flora des bayerischen Bodenseegebietes. Uebersicht über die im bayerischen Bodenseegebiet bis jetzt beobachteten wildwachsenden Phanerogamen und Gefässkryptogamen. Pp. 127. (Ber. Bayer. Bot. Ges. viii.) 8vo. *München*, 1901.

Agassiz (Louis). An Essay on Classification. Pp. viii, 381. 8vo. *London*, 1859. **J. C. Galton.**

Albert Honoré Charles (*Prince de Monaco*). Résultats des Campagnes Scientifiques accomplies sur son Yachts [l'*Hirondelle* et la *Princesse-Alice*]. Fascicules 21, 22. 4to. *Monaco*, 1902.

XXI. Holothuries (*Princesse-Alice*). By Edgard Hérouard. (1902.)
XXII. Échantillons d'eaux et de fonds provenant des campagnes de la *Princesse-Alice*. (1901.) By J. Thoulet. (1902.)

—— Notes de Géographie Biologique Marine. Pp. 11. (Verh. d. VII. Intern. Geogr.-Kongress, Berlin, 1899.) 8vo. *Berlin*, 1900.

—— Sur la troisième campagne de la *Princesse-Alice*. II. Pp. 4. (Compt. Rend. cxxxiv.) 4to. *Paris*, 1902.

—— Sur une nouvelle bouteille destinée à recueillir l'eau de mer à des profondeurs quelconques. Pp. 3. (Compt. Rend. cxxxiv.) 4to. *Paris*, 1902.

—— Sur la quatrième campagne de la *Princesse-Alice*. II. Pp. 5. (Compt. Rend. cxxxvi.) 4to. *Paris*, 1903. **Author.**

Alcock (Alfred William). Report on the Deep-Sea Madreporaria of the Siboga Expedition. *See* **Siboga-Expeditie.**

Allen (Henry A.). Catalogue of Types and Figured Specimens of British Fossil Phyllocarida preserved in the Museum of Practical Geology, London. Pp. 4. (Append. A. Summary Progress Geol. Surv. 1901.) 8vo. *London*, 1902.

—— Catalogue of Types and Figured Specimens of British Palæozoic Echinodermata preserved in the Museum of Practical Geology, London. Pp. 8. (Append. B. Summary Progress Geol. Surv. 1901.) 8vo. *London*, 1902. **Author.**

Ameghino (Florentino). Le *Pyrotherium* n'est pas parent du *Diprotodon*. Pp. 2. (An. Mus. Nac. Buenos Aires, viii.) 8vo. *Buenos Aires*, 1902.

Ameghino (Florentino). Notas sobre algunos Mamíferos Fósiles nuevos ó poco conocidos del Valle de Tarija. Pp. 37; plates 7. (An. Mus. Nac. Buenos Aires, viii.) 8vo. *Buenos Aires*, 1902.

—— Sur la Géologie de Patagonie. Pp. 7. (An. Mus. Nac. Buenos Aires, viii.) 8vo. *Buenos Aires*, 1902.

—— Cuadro Sinoptico de las formaciones Sedimentarias, Terciarias y Cretáceas de la Argentina en relación con el desarrollo y descendencia de los Mamíferos. Pp. 12. (An. Mus. Nac. Buenos Aires, viii.) 8vo. *Buenos Aires*, 1902.

—— Linea filogenética de los Proboscídeos. Pp. 42; figs. 38. (An. Mus. Nac. Buenos Aires, viii.) 8vo. *Buenos Aires*, 1902. **Author.**

Arber (Edward Alexander Newell). Les *Nipadites* des Couches Eocènes de la Belgique. *See* **Seward (Albert Charles).**

Archer (Thomas Croxen). Popular Economic Botany. Pp. xv, 359; plates 20. (Lovell Reeve's Series.) 8vo. *London*, 1853. **J. C. Galton.**

Ascherson (Paul) and Graebner (Paul). Synopsis der Mitteleuropäischen Flora. Lieferung 1–28. 8vo. *Leipzig*, 1896–1903.

Azara (*Don* Felix de). The Natural History of the Quadrupeds of Paraguay and the River la Plata: translated from the Spanish of Don Felix de Azara, with a memoir of the Author, a physical sketch of the Country, and numerous notes; by W. Perceval Hunter. Vol. I. (*All published.*) 8vo. *Edinburgh*, 1838. **J. C. Galton.**

Baer (Wilhelm). Der Vorgeschichtliche Mensch. Ursprung und Entwicklung des Menschengeschlechtes. Zweite, völlig umgearbeitete Auflage von Friedrich von Hellwald. Pp. x, 708; mit 500 Illustrationen und 6 Tonbildern. 8vo. *Leipzig*, 1880. **J. C. Galton.**

Bailey (Charles). On the Adventitious Vegetation of the Sandhills of St. Anne's-on-the-Sea, North Lancashire (Vice County 60). (Mem. Manch. Lit. & Phil. Soc. vol. 47.) 8vo. *Manchester*, 1902.

—— The Oxlip, and its relations with the Cowslip and Primrose in England. An Address delivered at the Inaugural Meeting and Conversazione of the Manchester Field Club, at the Athenæum, Manchester, 27th April, 1899. (Reprinted, with additions, from Proc. Manch. Field Club, vol. i. pp. 26–35.) Pp. 22, and 1 plate. 8vo. *Manchester*, 1903. **Author.**

Bailey (Frederick Manson). The Queensland Flora. Pp. 2015; plates 88. 8vo. *Brisbane*, 1899–1902.

Part I. Ranunculaceæ to Anacardiaceæ. Pp. i–xxxii, 1–325; Index i–xii; plates 1–12. (1899.)

„ II. Conaraceæ to Cornaceæ. Pp. 326–737; Index i–xii; plates 13–25. (1900.)

„ III. Caprifoliaceæ to Gentianeæ. Pp. 738–1030; Index i–x; plates 26–43. (1900.)

„ IV. Hygrophyllaceæ to Elæagnaceæ. Pp. 1031–1372; Index i–xi; plates 44–61. (1901.)

„ V. Loranthaceæ to Lemnaceæ. Pp. 1373–1700; Index i–xi; plates 62–76. (1902.)

„ VI. Alismaceæ to Filices. Pp. 1701–2015; Index i–xii; plates 77–88. (1902.)

Baker (Marcus). Geographic Dictionary of Alaska. Pp. 446. (Bull. U.S. Geol. Surv. no. 187.) 8vo. *Washington*, 1902.

Baker (Richard Thomas) and **Smith (Henry G.).** A Research on the Eucalypts, especially in regard to their Essential Oils. (Technolog. Mus. New S. Wales, Educ. Ser. no. 13.) Pp. xi, 295; plates 44. 4to. *Sydney*, 1902. **Authors.**

Barboza du Bocage (José Vicente). Publicações Scientificas de J. V. Barboza du Bocage (1857–1901). Pp. 39. 8vo. *Lisboa*, 1901.

—— Aves e Reptis de Cabo Verde. Pp. 5. (Jorn. Sci. Math., Phys. e Nat., 2 ser. vi. no. 24.) 8vo. *Lisboa*, 1902.

—— Les Antilopes d'Angola. Pp. 9. (Jorn. Sci. Math., Phys. e Nat., 2 ser. vi. no. 24.) 8vo. *Lisboa*, 1902. **Author.**

Barton (Ethel Sarel). The Genus *Halimeda*. *See* **Siboga-Expeditie.**

Bather (Francis Arthur). Echinoderma. *See* **Lankester (E. Ray).** Treatise on Zoology, Part iii.

Beccari (Odoardo). Systematic Enumeration of the Species of *Calamus* and *Dæmonorops*, with Descriptions of New Ones. Pp. 34. (Rec. Bot. Surv. India, vol. ii. no. 3.) 8vo. *Calcutta*, 1902.

Becker (Wilhelm). Vorarbeiten zu einer Flora Bayerns. Familie der Violaceen. (Ber. Bayer. Bot. Ges. viii.) 8vo. *München*, 1901. **J. C. Galton.**

Beddard (Frank Evers). A Text-book of Zoogeography. [Cambridge Nat. Sci. Manuals.] 8vo. *Cambridge*, 1895. **J. C. Galton.**

Bell (Francis Jeffrey). Guide to the Coral Gallery (Protozoa, Porifera or Sponges, Hydrozoa, and Anthozoa), in the Department of Zoology, British Museum (Natural History). Pp. 73. *See* **British Museum**—Guide-books.

Benham (William Blaxland). Platyhelmia, Mesozoa, and Nemertini. *See* **Lankester (E. Ray).** Treatise on Zoology, Part iii.

Berlin.

Das Tierreich. Herausgegeben von der Deutschen Zoologischen Gesellschaft. Generalredakteur: Franz Eilhard Schulze. Liefg. 1–19. 8vo. *Berlin*, 1897–1903.

Liefg. 18. Aves. Paridæ, Sittidæ und Certhiidæ, von C. E. Hellmayr. 1903.

„ 19. Porifera. Tetraxonia, von Robert von Lendenfeld. 1903.

Bibliotheca Botanica (*continued*).

Heft 58. Günthart (A.). Beiträge zur Blüthenbiologie der Cruciferen, Crassulaceen, und der Gattung *Saxifraga*. Pp. ix, 97; mit 11 Tafeln. 1902.

„ 59. Kroemer (Karl). Wurzelhaut, Hypodermis und Endodermis der Angiospermenwurzel. Pp. 151; mit 6 Tafeln. 1903.

Bibliotheca Zoologica (*continued*).

Band XV. Heft 36. Liefg. 1 & 2. Stromer von Reichenbach (Ernst). Die Wirbel der Land-Raubtiere, ihre Morphologie und Systematische Bedeutung. Pp. viii, 276; mit 5 Tafeln. 1902.

Bibliotheca Zoologica (*continued*).

Band XV. Heft 38. Illig (Karl Gottwalt). Duftorgane der männlichen Schmetterlinge. Pp. 34; mit 5 Tafeln. 1902.

„ XVI. Heft 39. Schauinsland (Hugo Hermann). Beiträge zur Entwicklungsgeschichte und Anatomie der Wirbelthiere. Pp. 168; mit 56 Tafeln. 1903.

Bicheno (James Ebenezer). On Systems and Methods in Natural History. Pp. 20. (Trans. Linn. Soc. xv.) 4to. *London*, 1827.

Birds. The Birds of Glamorgan. Compiled by a Committee of the Cardiff Naturalists' Society. Pp. xxv, 163; plates 5. 4to. *Cardiff*, 1900.

Birmingham.

Watson Botanical Exchange Club.

Report 18. 8vo. *Birmingham*, 1902. **H. S. Thompson.**

Boehmig (Ludwig). Turbellarien: Rhabdocoeliden und Tricladiden. *See* **Hamburger Magalhaensische Sammelreise.**

Bonnet (Émile). Catalogue de la Bibliothèque de l'Académie des Sciences et Lettres de Montpellier. I–. 8vo. *Montpellier*, 1901–.

Boulger (George Simonds). Flowers of the Field. 29th Edition. *See* **Johns (Charles Alexander).** **J. C. Galton.**

—— The Country Month by Month. *See* **Owen (Jean A.).** **J. C. Galton.**

Bourne (Gilbert C.). Porifera and Cœlentera. *See* **Lankester (E. Ray).** Treatise on Zoology, Part ii.

Braithwaite (Robert). The British Moss-Flora. Part 22. 8vo. *London*, 1903. **Author.**

Brisbane.

North Queensland Ethnography. Bulletin No. 4. Fol. *Brisbane*, 1902.

No. 4. Roth (Walter E.). Games, Sports and Amusements. 1902.

British Association for the Advancement of Science.

Report (Belfast), 1902. 8vo. *London*, 1903. **Council Brit. Assoc.**

British Museum (*continued*).

Report on the Collections of Natural History made in the Antarctic Regions during the Voyage of the "Southern Cross." Pp. ix, 344; plates 53. 8vo. *London*, 1902.

Birds.

Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History). Vol. II. Carinatæ (Charadriiformes—Strigiformes). By Eugene William Oates. Pp. xx, 400; plates 1–15. 8vo. *London*, 1902.

Guide-books.

Guide to the Coral Gallery (Protozoa, Porifera or Sponges, Hydrozoa, and Anthozoa), in the Department of Zoology, British Museum (Natural History); with numerous Illustrations. By Randolph Kirkpatrick and Francis Jeffrey Bell. Pp. 73. 8vo. *London*, 1902.

British Museum (*continued.*)

HANDBOOKS.

Handbook of Instructions for Collectors, issued by the British Museum (Natural History); with Illustrations. Pp. iv, 137. 8vo. *London*, 1902.

Buckhurst Hill.

Museum Handbooks, Nos. 2–5.

8vo. *Chingford & Stratford*, 1895–1901.

The Coming of Age of the Essex Field Club. A Record of Local Scientific Work, 1880–1901. The Presidential Address delivered at the 22nd Annual General Meeting of the Club on March 22nd, 1902. [Reprinted (with separate pagination) from the Essex Nat. xii., April 1902.].

8vo. *Stratford*, 1902.

Bullen (Robert Ashington). Harlyn Bay and the Discoveries of its Prehistoric Remains. 2nd Edition. Pp. 96; plates 19; figs. *a–j*. 8vo. *London*, 1902. **Author.**

Burgess (Edward Sandford). Studies in the History and Variations of Asters. Part I. History of Pre-Clusian Botany in its Relation to Aster. Pp. 447. (Mem. Torrey Bot. Club. x.)

8vo. *New York*, 1902.

Burne (Richard Higgins). *See* **London** — Royal College of Surgeons. Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy. Vol. II. 2nd ed. 1902.

Burri (Robert). Ueber einige zum Zwecke der Artcharakterisirung anzuwendende bacteriologische Untersuchungsmethoden nebst Beschreibung von Zwei neuen aus Rheinwasser isolirten Bacterien. Pp. 43. 8vo. *München*, 1893. **Hans Schinz.**

Butler (Arthur Gardiner). Lepidoptera Rhopalocera of Christmas Island. *See* **British Museum**—Monogr. of Christmas Island.

Calcutta.

Indian Museum.

An Account of the Indian Triaxonia collected by the Royal Indian Marine Survey Ship *Investigator*. By FRANZ EILHARD SCHULZE. The German original translated into English by ROBERT VON LENDENFELD. Pp. 113; plates 23. 4to. *Calcutta*, 1902.

Cambridge Natural Science Manuals. Biological Series. General Editor—ARTHUR E. SHIPLEY. 8vo. *Cambridge*, 1895–

Zoogeography. By FRANK E. BEDDARD. Pp. viii, 246, & 5 Maps (1895).

J. C. Galton.

Canada.

Geological Survey.

Geological Map of Dominion of Canada. (Western Sheet, No. 783.) Scale: 50 miles = 1 inch. 1902.

Catalogue of Canadian Plants. Part VII. Lichenes and Hepaticæ. By JOHN MACOUN. Pp. v, 318; Index xix. 8vo. *Ottawa*, 1902.

Canada (*continued*.)
Geological Survey (*continued*).
Contributions to Canadian Palæontology.
Vol. III. Part 2. 4to. *Ottawa*, 1902.

On Vertebrata of the Mid-Cretaceous of the North-West Territory. By HENRY FAIRFIELD OSBORN and LAWRENCE M. LAMBE. 1902.
1. Distinctive Characters of the Mid-Cretaceous Fauna. By HENRY FAIRFIELD OSBORN. 1902.
2. New Genera and Species from the Belly River Series (Mid-Cretaceous). By LAWRENCE M. LAMBE. 1902.

Cardiff.
Cardiff Naturalists' Society.
The Birds of Glamorgan. Compiled by a Committee of the Cardiff Naturalists' Society. Pp. xxv, 163; plates 5.
4to. *Cardiff*, 1900.

Chesnut (Victor King). Plants used by the Indians of Mendocino County, California. (U.S. Dep. Agric., Contrib. from U.S. Nat. Herb. vol. vii. no. 3.) 8vo. *Washington*, 1902.

Chicago.
Chicago Academy of Sciences.
Bulletin. Vol. II. No. 3. 8vo. *Chicago*, 1900.
Bulletin of the Natural History Survey. (In Progress.)

No. III. Part I. BAKER (FRANK COLLINS). The Mollusca of the Chicago Area. The Pelecypoda. 1898.
No. IV. Part I. WELLER (STUART). The Paleontology of the Niagaran Limestone in the Chicago Area. The Crinoidea. 1900.

Chodat (Robert). Plantæ Hasslerianæ soit énumération des plantes récoltées au Paraguay par le Dr. ÉMILE HASSLER, d'Aarau (Suisse) de 1885–1895 et de 1898–1900. Partie I. (Bull. l'Herb. Boissier, vi. Append. i., 2 ser. i., ii.)
8vo. *Genève*, 1898–1902. **Author.**

Chun (Carl). Aus den Tiefen des Weltmeeres: Schilderungen von der Deutschen Tiefsee-Expedition. Zweite umgearbeitete und stark vermehrte Auflage. Mit 6 Chromolithographien, 8 Heliogravüren, 32 als Tafeln gedruckten Vollbildern, 3 Karten und 482 Abbildungen im Text. 4to. *Jena*, 1903.
J. C. Galton.

Cieslar (Adolph). ROBERT HARTIG. Ein Nachruf von A. CIESLAR. Pp. 9. (Centralbl. f. d. ges. Forstwesen 1902.)
8vo. *Mariabrunn*, 1902. **Carl Freiherr von Tubeuf.**

Clayton (John). The Cowthorpe Oak. Pp. 22 and 32 photographs. 4to. *Bradford*, 1899. **Author.**

Coghlan (T. A.). The Wealth and Progress of New South Wales. 1900–01. Thirteenth issue. 8vo. *Sydney*, 1902.
Agent-General for New South Wales.

Coimbra.
Sociedade Broteriana.
Boletim. Vols. 15–18. 8vo. *Coimbra*, 1898–1902.
Prof. J. A. Henriques.

Cole (William). The Essex Museum of Natural History (Established by the Corporation of West Ham and the Essex Field Club in the) Passmore Edwards Museum. A short Statement of the Constitution, Aims, and Methods of the Museum. Pp. 15 and Portrait. (Essex Field Club Mus. Handb. No. 3.)
8vo. *Stratford*, 1900.

Collett (*The late Sir* Henry). Flora Simlensis. A Handbook of the Flowering Plants of Simla and the Neighbourhood. With an Introduction by W. Botting Hemsley. Pp. lxviii, 652, and 200 Illustrations in the Text drawn by Miss M. Smith, and a Map. 8vo. *Calcutta, Simla, & London*, 1902.
B. Daydon Jackson.

Cooke (Theodore). The Flora of the Presidency of Bombay. Part III. 8vo. *London*, 1903. **Author.**

Cope (Edward Drinker). The Origin of the Fittest. Essays on Evolution. Pp. xix, 467; plates 14, figs. 81.
8vo. *London*, 1887. **J. C. Galton.**

Crossland (Charles). The Fungus-Flora of Yorkshire. *See* **Massee (George).**

Cunningham (Joseph Thomas). Sexual Dimorphism in the Animal Kingdom; a theory of the evolution of Secondary Sexual Characters. Pp. xi, 317; with 32 illustrations.
8vo. *London*, 1900. **J. C. Galton.**

—— Organic Evolution as the Result of the Inheritance of Acquired Characters, &c. *See* **Eimer (Gustav Heinrich Theodor).** **J. C. Galton.**

Cuvier (Georges Léopold Charles Frédéric Dagobert). Tableau Général des Classes des Animaux.
8vo. *Paris*, an viii. (1800). **J. C. Galton.**

[Published in Vol. I. of the 1st. ed. of Leçons d'Anat. Comp.]

—— Leçons d'Anatomie comparée: recueillies et publiées sous ses yeux par C. Duméril. 5 vols.
8vo. *Paris*, an viii–xiv. (1800–05). **J. C. Galton.**

Dalla Torre (Karl Wilhelm von). Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. Vols. I.–X. 8vo. *Lipsiæ*, 1892–1902.

I. Tenthredinidæ, incl. Uroceridæ (Phyllophaga and Xylophaga). 1894. Pp. viii, 459.
II. Cynipidæ. 1893. Pp. viii, 140.
III. Trigonalidæ, Megalyridæ, Stephanidæ, Ichneumonidæ, Agriotypidæ, Evaniidæ, Pelecinidæ. 1901–1902. Pp. viii, 1141.
IV. Braconidæ. 1898. Pp. viii, 323.
V. Chalcididæ et Proctotrupidæ. 1898. Pp. viii, 598.
VI. Chrysididæ (Tubulifera). 1892. Pp. viii, 118.
VII. Formicidæ (Heterogyna). 1890. Pp. viii, 289.
VIII. Fossores (Sphegidæ). 1897. Pp. viii, 749.
IX. Vespidæ (Diploptera). 1894. Pp. viii, 181.
X. Apidæ (Anthophila). 1896. Pp. viii, 643.

Dalla Torre (Karl Wilhelm von) and **Harms (Hermann).** Genera Siphonogamarum ad Systema Englerianum Conscripta. Fasciculi 1–5. 4to. *Lipsiæ*, 1899–1902.

Dalton (William Herbert). A Brief Sketch of the Crag Formation of East Anglia, &c. Pp. 8. (Essex Field Club Mus. Handb. No. 4.) 8vo. *Stratford*, 1900.

Danish Ingolf-Expedition in 1895–96, under Command of Commodore C. F. Wandel. Vols. I.–VI. pt. 1. 4to. *Copenhagen*, 1899–1903.

Echinoidea. By Theodor Mortensen. 1903.

Darwin (Charles). *See* **Nature Series.** Memorial of Charles Darwin.

Darwinism, The Primrose and, by a Field Naturalist. Pp. xiii, 233; figs. 23. 8vo. *London*, 1902. **J. C. Galton.**

Davenport (Charles Benedict). Experimental Morphology.

Part I. Effect of Chemical and Physical Agents upon Protoplasm. 1897. (Pp. i-xiv, 1–280; figs. 1–74.)

„ II. Effect of Chemical and Physical Agents upon Growth. 1899. (Pp. xv-xviii, 281–509; figs. 75–140.)

8vo. *New York & London*, 1897–99. **J. C. Galton.**

Davis (J. R. Ainsworth). *Patella* (The Common Limpet). Pp. viii, 76; plates 4. *See* **Liverpool Marine Biology Committee,** Memoir x.

Dawkins (William Boyd). The Red Sandstone-Rocks of Peel (Isle of Man). *See* **Manchester**—Owens College.

—— The Carboniferous, Permian, and Triassic Rocks under the Glacial Drift in the North of the Isle of Man. *See* **Manchester**—Owens College.

—— On Bigbury Camp and the Pilgrims' Way. *See* **Manchester**—Owens College.

Debray (Ferdinand). Catalogue des Algues du Maroc, d'Algérie et de Tunisie. *See* **Battandier (Jules Aimé)** and **Trabut (Louis).** Flore de l'Algérie.

Dixon (Ralph) and **Watson (John William).** A Descriptive Manual of British Land and Fresh-Water Shells, containing descriptions and figures of all the Species. Pp. x, 88; plates 8. 8vo. *Darlington*, 1858. **J. C. Galton.**

Doppler (Christian). Ueber das farbige Licht der Doppelsterne und einiger anderer Gestirne des Himmels. Versuch einer das Bradley'sche Aberrations-Theorem als integrirenden Theil in sich schliessenden allgemeineren Theorie. Zur Feier seines hundertsten Geburtstages als erste Veröffentlichung des nach ihm bekannten Physikalischen Princips. Neu herausgegeben von Dr. F. J. Studnička. Pp. 25, mit 1 Tafel und Porträt. 8vo. *Prag*, 1903.

Drude (Oscar). Der Hercynische Florenbezirk. Grundzüge der Pflanzenverbreitung im mitteldeutschen Berg- und Hügellande vom Harz bis zur Rhön, bis zur Lausitz und dem Böhmer Walde. Pp. xix, 671; mit 5 Vollbildern, 16 Textfiguren, und 1 Karte. (Engler Drude, Vegetation der Erde, vi.) 8vo. *Leipzig*, 1902.

Duckworth (W. L. H.). *See* **London**—Royal College of Surgeons. Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy. Vol. II. 2nd Edition. 1902.

Ducret (Eugène). Contribution a l'Étude du Développement des membres pairs et impairs des Poissons téléostéens type *Trutta lacustris.* Pp. 32; plates 2. (Dissertation.)
8vo. *Lausanne*, 1894.

Duméril (C.). Leçons d'Anatomie comparée. *See* **Cuvier (G. L. C. F. D.).**

Durham (H. E.). Report of the Yellow Fever Expedition to Pará in September, 1901, of the Liverpool School of Tropical Medicine and Medical Parasitology. Pp. 79; plate 1. (Liverp. School of Tropical Medicine, Mem. vii.)
4to. *Liverpool*, 1902.

Durme (Paul van). Quelques Notes sur les Embryons de *Strongyloïdes intestinalis* et leur pénétration par la Peau. Pp. 4; plate 1. (Liverp. School of Tropical Medicine, vol. iv. pt. 2.)
4to. *Liverpool*, 1902.

Dutton (J. Everett). Preliminary note upon a Trypanosome occurring in the Blood of Man. Pp. 14: plates 2, and 4 charts. (Liverp. School of Tropical Medicine, vol. iv. pt. 2.)
4to. *Liverpool*, 1902.

Dyer (Bernard). Results of Investigations on the Rothamsted Soils, being the Lectures delivered under the Provisions of the Lawes Agricultural Trust. Pp. 180. (U. S. Dep. Agric., Office Exper. Stations, Bull. no. 106.) 8vo. *Washington*, 1902.
Author.

Dyer (*Sir* William Turner Thiselton-). In Memoriam (the late Sir Henry Collett). *See* **Collett (*the late Sir* Henry).** Flora Simlensis.

Eimer (Gustav Heinrich Theodor). Organic Evolution as the Result of the Inheritance of acquired Characters according to the Laws of Organic Growth. Translated by J. T. Cunningham. Pp. xxviii, 435; figs. 6. 8vo. *London*, 1890. **J. C. Galton.**

Ellacombe (Henry N.). The Plant-Lore and Garden-Craft of Shakespeare. New Edition. Illustrated. Pp. xvi, 383.
8vo. *London & New York*, 1896. **J. C. Galton.**

Elliot (George Francis Scott). Nature Studies (Plant Life). Pp. vii, 352; figs. 43. 8vo. *London*, 1903. **Author.**

Engler (Adolf) and **Drude (Oscar).** Die Vegetation der Erde. I.–VI. 8vo. *Leipzig*, 1896–1902.

VI. Der Hercynische Florenbezirk. Grundzüge der Pflanzenverbreitung im mitteldeutschen Berg- und Hügellande vom Harz bis zur Rhön, bis zur Lausitz und dem Böhmer Walde. Pp. xix, 671; mit 5 Vollbildern, 16 Textfiguren, und 1 Karte. 1902.

Ewart (Alfred James). First Stage Botany. As illustrated by Flowering Plants. For the Elementary Stage of the South Kensington Board of Education Examinations. 2nd Edition. Pp. viii, 288; figs. 243. (The Organized Science Series. General Editor—William Briggs.) 8vo. *London*, 1902.
Author.

Ewart (Alfred James). On the Physics and Physiology of Protoplasmic Streaming in Plants. Pp. viii, 131 ; figs. 17. 8vo. *Oxford*, 1903. **Author.**

Falkenberg (Paul). Die Rhodomelaceen des Golfes von Neapel, &c. Pp. xvi, 754, mit 10 Textfiguren und 24 Tafeln. *See* **Naples—Zoological Station.** Monog. xxvi.

Feltgen (Johann). Vorstudien zu einer Pilz-Flora des Grossherzogthums Luxemburg. (Mém. Soc. Bot. Luxemb. xiv., xv.) 8vo. *Luxemburg*, 1899–1902.

Field Naturalist. The Primrose and Darwinism, by a. Pp. xiii, 233 ; figs. 23. 8vo. *London*, 1902. **J. C. Galton.**

Field (The). Naturalist's Quarterly. A Journal devoted to Zoology in all its Branches, Botany, Archæology, Folk-Lore, and all subjects worked by Field-Naturalist and Kindred Societies. Edited by Gerald Leighton. Vol. I.→ 8vo. *Edinburgh & London*, 1902. **B. Daydon Jackson.**

Fischer (Max). Deutscher Roggen und russischer Roggen. Antrittsvorlesung : Die Bedeutung einer Verbinding von Ackerbau und Viehzucht im hentigen Landwirthschafts betriebe. Pp. 20. 8vo. *Halle-a.-S.*, 1895.

Flagey (C.). Catalogue des Lichens de l'Algérie. *See* **Battandier (Jules Aimé)** and **Trabut (Louis).** Flore de l'Algérie.

Fletcher (James). Canada Department of Agriculture, Central Experimental Farm. Report of the Entomologist and Botanist for 1899. Pp. 46 ; figs. 23. (Ann. Rept. Exper. Farms for 1899.) 8vo. *Ottawa*, 1900. **Author.**

—— Insects, Fungous Diseases—Treatments. Evidence of Jas. Fletcher, Entomologist and Botanist, before the Select Standing Committee on Agriculture and Colonization, 1902. Pp. 56. (As advance sheets of the Committee's Final Report.) 8vo. *Ottawa*, 1902. **Author.**

Fleure (H. J.). *Patella* (The Common Limpet). Pp. viii, 76 ; plates 4. *See* **Liverpool Marine Biology Committee**, Memoir x.

Fowler (G. Herbert). Porifera and Cœlentera. *See* **Lankester (E. Ray).** Treatise on Zoology, Part ii.

Fowler (William Warde). A Year with the Birds. 2nd Edition. Pp. xii, 179, & 1 plate. 8vo. *Oxford*, 1886. **J. C. Galton.**

—— A Year with the Birds. 3rd Edition. Pp. xv, 265. 8vo. *London*, 1889. **J. C. Galton.**

Frankfurt-a.-Main.

Senckenbergische naturforschende Gesellschaft.

Thorn (J. P.). Die Periodischen Schriften der Senckenbergischen Bibliothek zu Frankfurt-am-Main. Pp. viii, 202. 1903.

Friedmann (Sigismund). Die Ostasiatische Inselwelt. Land und Leute von Niederländisch-Indien : den Sunda-Inseln, den Molukken sowie Neu-Guinea. 2 vols.

Vol. I. pp. x, 266 ; mit 120 Illustrationen, 5 Tonbildern und 1 Karte.
Vol. II. pp. vii, 252 ; mit 120 Illustrationen, 5 Tonbildern und 1 Karte.
8vo. *Leipzig*, 1868. **J. C. Galton.**

Froggatt (Walter Wilson). Australian Psyllidæ. Parts I., II. (Proc. Linn. Soc. N.S.W. xxv. pp. 250–302, pls. 11–14; xxvi. pp. 242–298, pls. 14–16.) 8vo. *Sydney*, 1900–1901.

—— The Pear and Cherry Slug (*Eriocampa limacina*, Retz), generally known as *Selandria cerasi*, with Notes on Australian Sawflies. Pp. 11; plates 4. (Agric. Gazette N.S.W. xii.) 8vo. *Sydney*, 1901.

—— Typical Insects of Central Australia. Pp. 10; plate 1. (Agric. Gazette N.S.W. xii.) 8vo. *Sydney*, 1901.

—— Notes on Australian Hemiptera (Plant Bugs). Pts. I., II. Pp. 10, plate 1; pp. 7, plate 1. (Agric. Gazette N.S.W. xii., xiii.) 8vo. *Sydney*, 1901–1902.

—— The Collection and Preservation of Insects. Pp. 26; figs. 5. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— Insects of the Wattle Trees. Pp. 20; plates 3. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— Australian Ladybird-Beetles. Pp. 17; plate 1. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— The Indian Wax Scale as an Orchard Pest, and its Control (*Ceroplastes ceriferus*, Anderson). Pp. 4; plate 1. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— The Limitations of Parasites in the Destruction of Scale Insects. Pp. 7. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— Some Garden Pests. Pp. 7; plates 2. (Agric. Gazette N.S.W. xiii.) 8vo. *Sydney*, 1902.

—— Notes on Australian Neuroptera and their Life-Histories. Pp. 12. (Proc. Linn. Soc. N.S.W. xxvii.) 8vo. *Sydney*, 1902.

—— Woolly Aphis, an American Blight (*Schizoneura lanigera*, Hausman). Pp. 8; plate 1. (Agric. Gazette N.S.W. xiv.) 8vo. *Sydney*, 1903. **Author.**

Gamble (James Sykes). A Manual of Indian Timbers: an Account of the Growth, Distribution and Uses of the Trees and Shrubs of India and Ceylon, with Descriptions of their Wood-Structure. New and Revised Edition. Pp. xxvi, 856; plates 16. 8vo. *London*, 1902. **Author.**

Gammie (George Alexander). A Note on the Plants used for Food during Famines and Seasons of Scarcity in the Bombay Presidency. Pp. 26. (Records Bot. Surv. India, vol. ii. no. 2.) 8vo. *Calcutta*, 1902.

Gannett (Henry). A Gazetteer of Porto Rico. Pp. 51. (Bull. U.S. Geol. Surv. no. 183.) 8vo. *Washington*, 1901.

—— A Gazetteer of Cuba. Pp. 113 & 8 plates. (Bull. U.S. Geol. Surv. no. 192.) 8vo. *Washington*, 1902.

—— A Gazetteer of Texas. Pp. 162 & 8 plates. (Bull. U.S. Geol. Surv. no. 190.) 8vo. *Washington*, 1902.

Garden (The). Vols. 61, 62. 4to. *London*, 1902. **Proprietor.**

Gardeners' Chronicle. 3rd ser. Vols. 31, 32. fol. *London*, 1902. **Editor.**

Gerassimow (Johann J.). Die Abhängigkeit der Grösse der Zelle von der Menge ihrer Kernmasse. Pp. 39. (Zeitschr. f. allgem. Physiol., Band i.) 8vo. *Jena*, 1902. **Author.**

Glamorgan, The Birds of. Compiled by a Committee of the Cardiff Naturalists' Society. Pp. xxv, 163; plates 5. 4to. *Cardiff*, 1900.

Goldfuss (Fridericus). Symbolæ ad Orthopterorum quorundam œconomiam. Pp. vi, 24, & 1 plate. 4to. *Bonnæ*, 1843. **J. C. Galton.**

Goodrich (Edwin Stephen). Echinoderma. *See* **Lankester (E. Ray).** Treatise on Zoology, Part iii.

Gould (I. Chalkley). Notes upon the Romano-British Settlement at Chigwell, Essex, with a Description of the Articles exhibited in the Loan Collection in the Epping Forest Museum. Pp. 16. (Essex Field Club Mus. Handb. no. 2.) 8vo. *Chingford*, 1895.

Graebner (Paul). Synopsis der Mitteleuropäischen Flora. *See* **Ascherson (Paul).**

Green (Conrad Theodore). The Flora of the Liverpool District. Illustrated by Drawings and Photographs. Pp. xii, 207; figs. 804; plates 11 & map. 8vo. *Liverpool*, 1902. **C. Theodore Green.**

Gregory (John Walter). Echinoderma. *See* **Lankester (E. Ray).** Treatise on Zoology, Part iii.

Grintzesco (Jean). Recherches expérimentales sur la Morphologie et la Physiologie de *Scenedesmus acutus*, Meyen. Pp. 74 & 5 plates. (Bull. l'Herb. Boissier, 2nd ser. ii.) 8vo. *Genève*, 1902. **R. Chodat.**

Günthart (A.). Beiträge zur Blüthenbiologie der Cruciferen, Crassulaceen und der Gattung *Saxifraga*. Pp. ix, 97; mit 11 Tafeln. (Bibl. Bot. Heft 58.) 4to. *Stuttgart*, 1902.

Gundlach (Josef). Ueber die Verwendung von Hühnereiweiss zu Nährböden für backteriologische Untersuchungen. Inaugural-Dissertation. Pp. 35. 8vo. *Erlangen*, 1894. **J. C. Galton.**

Haeckel (Ernst Heinrich). Kunst-Formen der Natur. Lieferung 8; Tafeln 71–80. Fol. *Leipzig & Wien*, 1903. **Author.**

Hall (Robert). A Key to the Birds of Australia and Tasmania, with their Geographical Distribution in Australia. Pp. x, 116; plate 1 & map. 8vo. *Melbourne & London*, 1899.

—— The Insectivorous Birds of Victoria, with Chapters on Birds more or less Useful. Pp. 256; figs. 55 & map. 8vo. *Melbourne*, 1900. **Author.**

Hamburg.

Hamburger Magalhaensische Sammelreise.

Ergebnisse. Lieferung 6. 8vo. *Hamburg*, 1902.

Hamilton (Augustus). The Art Workmanship of the Maori Race in New Zealand. In 5 parts. 4to. *Wellington*, 1896–1901.

Handbook of Instructions for Collectors, issued by the British Museum (Natural History). Pp. iv, 137. *See* **British Museum —Handbooks.**

Hausgirg (Antonin). Phyllobiologie nebst Uebersicht der Biologischen Blatt-Typen von Einundsechzig Siphonogamen-Familien. Pp. xiv, 486; mit 40 Abbildungen im Text.
8vo. *Leipzig*, 1903.

Hartig (Robert). Ein Nachruf von Adolf Cieslar. *See* **Cieslar (Adolph).**

—— Ein Nachruf von E. P. Meinecke und Rudolf Weber. *See* **Meinecke (E. P.).**

Harms (Hermann). Genera Siphonogamarum etc. *See* **Dalla Torre (Karl Wilhelm von).**

Hartman (Carl Johan). Handbok i Skandinaviens Flora, innefattande Sveriges och Norges växter till och med mossorna 10te Upplagan, utgifven med rättelser och tillägg af Carl Hartman. Sednare Delen: Mossor. Pp. xxviii, 179.
8vo. *Stockholm*, 1871.

—— —— 11te, Helt och hället omarbetade Upplagan, utgifven af Carl Hartman. Förra Delen: Fanerogamer och ormbunkar. Pp. lxxxiii, 616. 8vo. *Stockholm*, 1879.

Hassler (Émile). Plantæ Hasslerianæ, soit Énumération des Plantes récoltées au Paraguay par le Dr. Émile Hassler, d'Aarau (Suisse) et déterminées par le Prof. Dr. R. Chodat. (Bull. L'Herb. Boissier, vi. Append i. 2nd ser. i. ii.) 8vo. *Genève*, 1897–1902.

Hay (Oliver Perry). Bibliography and Catalogue of the Fossil Vertebrata of North America. Pp. 868. (Bull. U.S. Geol. Surv. no. 179.) 8vo. *Washington*, 1902.

Hazen (Tracy Elliot). The Ulothricaceæ and Chætophoraceæ of the United States. (Mem. Torrey Bot. Club, xi. no. 2.)
8vo. *New York*, 1902.

Heincke (Friedrich). Naturgeschichte des Herings. (Abh. Deutschen Seefischerei-Verein, Band ii.)
Text, Teil I, pp. cxxxvi, 128.
,, ,, I 2, pp. xi, 223, mit 26 Tafeln und 198 Tabellen.
4to. *Berlin*, 1898.

Hellmayr (C. E.). *See* **Berlin**—Das Tierreich: Aves. Paridæ, Sittidæ und Certhiidæ.

Hellwald (Friedrich von). Der Vorgeschichtliche Mensch. *See* **Baer (Wilhelm).** **J. C. Galton.**

Hemsley (William Botting). Flora Similensis. *See* **Collett** (*The late Sir* **Henry**).

Hérouard (Edgard). Holothuries (*Princesse-Alice*). *See* **Albert.**

Hickson (Sydney John). A Naturalist in North Celebes: a Narrative of Travels in Minahassa, the Sangir and Talaut Islands, with Notices of the Fauna, Flora, and Ethnology of the District visited. Pp. xv, 392; figs. 35 & 2 maps.
8vo. *London*, 1889. **J. C. Galton.**

—— Descriptive Catalogue of the Embryological Models. Pp. 109. *See* **Manchester**—Owens College.

Hillman (Fred. H.). The Seeds of Fescue Grass and Chess. Pp. 4, figs. 3. (Bureau of Plant Industry, Bull. no. 25.)
8vo. *Washington*, 1902.

Hoeven (Jan van der). Philosophia Zoologica. Pp. 401. 8vo. *Lugduni Batavorum*, 1864. **J. C. Galton.**

Hope (William Henry St. John). Excavations on the Site of the Roman City at Silchester, Hants, in 1901. With a note on the Plant-remains of Roman Silchester. Pp. 20. (Archæologia, Soc. Antiqu. lviii.) 4to. *London*, 1902. **Clement Reid.**

Hoyle (William Evans). British Cephalopoda: their Nomenclature and Identification. Pp. 10. (Reprinted from the Journ. Conchol. vol. x.) *See* **Manchester**—Owens College.

—— The Use of Museums in Teaching. *See* **Manchester**—Owens College.

—— Notes on the Type Specimen of *Loligo eblanæ*, Ball. *See* **Manchester**—Owens College.

Hudson (William Henry). Birds in a Village. Pp. 232. 8vo. *London*, 1893. **J. C. Galton.**

—— Nature in Downland, with Illustrations. Pp. xii, 307. 8vo. *London*, 1900. **J. C. Galton.**

Hugues (Lachiche). Un seul Champignon sur le Globe. Pp. 24. 8vo. *Port-Louis, Maurice*, 1902. **Author.**

Hulme (Frederick Edward). Familiar Wild Flowers. Vols. (Series) 1–5. 8vo. *London*, 1892. **J. C. Galton.**

Hunter (W. Perceval). The Natural History of the Quadrupeds of Paraguay and the River la Plata. *See* **Azara (*Don* Felix de).**

Hutton (Frederick Wollaston). Evolution and its Teaching. Presidential Address. Hobart, Wednesday, January 8, 1902. Pp. 30. (Rept. Austral. Assoc. ix.) 8vo. *Hobart*, 1902. **Author.**

Icones Floræ Japonicæ. Compiled by the College of Science, Imperial University of Tōkyō. Vol. I. Parts 1, 2. fol. *Tōkyō, Japan*, 1900–1902.

Illig (Karl Gottwalt). Duftorgane der männlichen Schmetterlinge. Pp. 35, mit 5 col. Tafeln. (Bibl. Zool. Bd. xv. Heft 38.) 4to. *Stuttgart*, 1902.

India.

Botanical Survey.

Reports of the Director of the Botanical Survey of India for the Years 1899–1902. fol. *Calcutta*, 1899–1902.

Johns (Charles Alexander). Flowers of the Field. 5th Edition. Pp. lix, 664. 8vo. *London* [1862 ?]. **J. C. Galton.**

—— 29th Edition. Entirely rewritten and revised by G. S. Boulger. Pp. lii, 926. 8vo. *London*, 1899. **J. C. Galton.**

Johnson (Charles Pierpoint). British Wild Flowers. *See* **Sowerby (John Edward).**

Johow (Friedrich). Estudios sobre la Flora de las Islas de Juan Fernandez. Con una introduccion sobre las condiciones jeográficas i jeolójicas del Archipiélago por el Roberto Pöhlmann. Pp. 287; figs. 8; plates 18, & maps 2. Edicion Hecha a Espensas del Gobierno. 4to. *Santiago de Chile*, 1896. **Elkan N. Adler.**

Jouck (Karl). Beiträge zur Kenntnis der Bläusäure abspaltenden Glycoside. Inaugural-Dissertation. Pp. 54.
8vo. *Strassburg-i.-Elsass*, 1902. **Eduard Schaer.**

Journal of Botany. Vol. 40. 8vo. *London*. 1902. **Jas. Britten.**

Kanazawa (S.). A Catalogue of the Romanized Geographical Names of Korea. *See* **Kotô (Bundjirô).**

Kearney (Thomas H.). Reports on a Botanical Survey of the Dismal Swamp Region. (U.S. Dep. Agric., Contrib. from U.S. Nat. Herb. vol. v. no. 6.) 8vo. *Washington*, 1901.

Kew—Royal Gardens.
Bulletin of Miscellaneous Information. App. 1–3.
8vo. *London*, 1903. **Director.**

Kiel.
Kommission zur wissenschaftlichen Untersuchung der deutschen Meere in Kiel.
Ergebnisse. Jahrgang 1873→ 4to. *Berlin*.
Jahresbericht. „ i.–xxi. fol. *Berlin*, 1873–1893.
Neue Folge. Wissenschaftliche Meeresuntersuchungen herausgegeben von der Kommission zur wissenschaftlichen Untersuchung der deutschen Meere in Kiel und der Biologischen Anstalt auf Helgoland.
Band. I.–II. fol. *Kiel & Leipzig*, 1894–1897.
Abteilung Kiel, III.–VI. „ „ 1898–1902.
Helgoland, III.–V. „ „ 1899–1901.

King (*Sir* George). Materials for a Flora of the Malayan Peninsula.
Thalamifloræ (nos. 1–5 of the Series), 1889–1893.
Discifloræ (nos. 6–8 of the Series), 1893–1896.
Calycifloræ (nos. 9–13 of the Series), 1902.
8vo. *Calcutta*, 1889–1902. **Author.**

Kingston (Jamaica).
Board of Agriculture and Department of Public Gardens and Plantations.
Report for 1901–1902. fol. *Kingston*, 1903.

Kirby (William Forsell). Evolution and Natural Theology. Pp. xvi, 208. 8vo. *London*, 1883. **J. C. Galton.**

Kirkpatrick (Randolph). Guide to the Coral Gallery (Protozoa, Porifera or Sponges, Hydrozoa, and Anthozoa) in the Department of Zoology, British Museum (Natural History). Pp. 73. *See* **British Museum**—Guide-books.

Koelliker (Rudolph Albert von). Ueber die oberflächlichen Nervenkerne im Marke der Vögel und Reptilien. Pp. 54, mit 5 Doppeltafeln. (Zeitschr. wiss. Zool. Band 72.)
8vo. *Leipzig*, 1902. **Author.**

Kotô (Bundjirô) and **Kanazawa (S.).** A Catalogue of the Romanized Geographical Names of Korea. Pp. vi, 88.
8vo. *Tōkyō*, 1903. **Author.**

Krause (*Dr.* Ernst Ludwig). Werden und Vergehen. *See* **Sterne (Carus: *nom de plume*).** **J. C. Galton.**

Krause (Hermann). Beiträge zur Anatomie der Vegetations-Organe von *Lathræa Squamaria*, L. Inaugural-Dissertation. Pp. 36. 8vo. *Breslau*, 1879. **J. C. Galton.**

Kroemer (Karl). Wurzelhaut, Hypodermis und Endodermis der Angiospermenwurzel. Pp. 151, mit 6 Tafeln. (Bibl. Bot. Heft 59.) 4to. *Stuttgart*, 1903.

Lambe (Lawrence M.). On Vertebrata of the Mid-Cretaceous of the North-West Territory. New Genera and Species from the Belly River Series (Mid-Cretaceous). (Geol. Surv. Canada, Contrib. to Canad. Palæont., vol. iii. part 2.) 4to. *Ottawa*, 1902.

Lange (Johan Martin Christian). Haandbog i den Danske Flora. Pp. clxxxviii, 925. 8vo. *Kjöbenhavn*, 1886–88.

Lankester (Edwin Ray). A Treatise on Zoology. Edited by E. Ray Lankester. Parts II.–IV. 8vo. *London*, 1900–1901.

Part I. Not yet published.

„ II. Porifera and Cœlentera. By E. A. Minchin, G. H. Fowler, and G. C. Bourne. 1900.

„ III. Echinoderma. By F. A. Bather; assisted by J. W. Gregory and E. S. Goodrich. 1900.

„ IV. Platyhelmia, Mesozoa, and Nemertini. By W. B. Benham.

J. C. Galton.

Laurent (Émile). Plantæ Laurentianæ, &c. *See* **Wildeman (Émile de).**

Leighton (Gerald). *See* **'Field' (The): Naturalists' Quarterly.**

Leighton (William Allport). Monograph of the British Graphideæ. (Ann. Mag. Nat. Hist. 2 ser. xiii.) 8vo. *London*, 1854. **J. C. Galton.**

Lendenfeld (Robert von). *See* **Berlin:** Das Tierreich. Liefg. 19. Porifera: Tetraxonia.

Lett (Henry William). A List, with Descriptive Notes, of all the Species of Hepatics hitherto found in the British Islands. Pp. viii, 199. 8vo. *Eastbourne & Loughbrickland*, 1902. **B. Daydon Jackson.**

Leverett (Frank). Glacial Formations and Drainage Features of the Erie and Ohio Basins. Pp. 802; plates 26. (U.S. Geol. Surv., Monogr. 41.) 4to. *Washington*, 1902.

Lewis (Frederick). A Descriptive Catalogue of the more useful Trees and Flowering Plants of the Western and Sabaragamuwa Provinces of Ceylon, with Notes of recorded Distribution of Species. Pp. 168 & 4 Maps. (Reprinted from Journ. Roy. As. Soc., Ceylon Branch, vol. xvii. no. 53.) 8vo. *Colombo*, 1902. **Author.**

Lindley (John). School Botany, and Vegetable Physiology; or the Rudiments of Botanical Science. New edition. Pp. viii, 182; figs. 251. 8vo. *London*, 1858. **J. C. Galton.**

List (Theodor). Die Mytiliden des Golfes von Neapel und der angrenzenden Meeres. Abschnitte. Theil I. Pp. x, 312, mit 17 Textfiguren und 22 Tafeln. *See* **Naples**—Zoological Station. Monogr. xxvii.

Liverpool.

Biological Station of Port Erin (Isle of Man).

Annual Report 16. 8vo. *Liverpool*, 1902. **W. A. Herdman.**

Liverpool Marine Biology Committee.

Memoirs on Typical British Marine Plants and Animals. Edited by W. A. Herdman. I.–X. 8vo. *Liverpool*, 1899–1903.

X. *Patella* (the Common Limpet). By J. R. Ainsworth Davis and H. J. Fleure. Pp. viii, 76; plates 4. 1903.

Liverpool School of Tropical Medicine.

Memoir. VII. 4to. *Liverpool*, 1902.

VII. Durham (H. E.). Report of the Yellow Fever Expedition to Pará. Pp. 79, plate 1. 1902.

Dutton (J. Everett). Preliminary Note upon a *Trypanosome* occurring in the Blood of Man. Pp. 14, plates 2, & 4 Charts. 1902.

Durme (Paul van). Quelques Notes sur les Embryons de *Strongyloïdes intestinalis*, et leur pénétration par la Peau. Pp. 4, plate 1. 1902.

London.

Chemical Society.

Catalogue of the Library. 5th Edition. 8vo. *London*, 1886.

—— 6th Edition. 8vo. *London*, 1903. **Society.**

Royal College of Surgeons of England.

Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy. Vols. I. & II. 2nd Edition. 8vo. *London*, 1900–1902.

II. Nervous System of Invertebrata (exclusive of Sense-Organs) and of the Brain and Spinal Cord, with their membranes and blood-vessels, of the Vertebrata. (1902.)

Longe (Francis D.). The Fiction of the Ice-Age or Glacial Period. Pp. 77. 8vo. *Lowestoft*, 1902. **Author.**

—— Supplement to the Fiction of the Ice-Age or Glacial Period. Pp. 35. 8vo. *Lowestoft*, 1903. **Author.**

Lord (John Keast). The Naturalist in Vancouver Island and British Columbia. 2 vols. I. Pp. xiv, 358. II. Pp. vii, 375. 8vo. *London*, 1866.

[Contains an Appendix with a List of Mammals, Birds, Insects, Reptiles, Fishes, Shells, and Annelids.] **J. C. Galton.**

Lüstner (Gustav). Beiträge zur Biologie der Sporen. Inaugural-Dissertation. Pp. 30. 8vo. *Wiesbaden*, 1898.

Lydekker (Richard). A Manual of Palæontology. 3rd Edition. *See* **Nicholson (Henry Alleyne).**

Maas (Otto). Die Scyphomedusen der Siboga-Expedition. *See* **Siboga-Expeditie**, Monogr. xi.

Macoun (John). Catalogue of Canadian Plants. Part VII. Lichenes and Hepaticæ. (Geol. Surv. Canada.) Pp. v, 318; Index, xix. 8vo. *Ottawa*, 1902.

Maiden (Joseph Henry). Useful Australian Plants. (Agric. Gaz. N. S. Wales, xiii.) 8vo. *Sydney*, 1902.

—— On *Eucalyptus tereticornis*, Smith, and *Eucalyptus rostrata*, Schlechtendahl. Pp. 14. (Bull. l'Herb. Boissier. 2 ser. ii.) 8vo. *Genève*, 1902.

Maiden (Joseph Henry). Is *Eucalyptus* variable? Pp. 26. (Proc. Roy. Soc. N.S.W. xxxvi.) 8vo. *Sydney*, 1903.

—— On *Eucalyptus bicolor*, A. Cunn. Pp. 11. (Proc. Linn. Soc. N.S.W. xxvii.) 8vo. *Sydney*, 1903.

—— On *Eucalyptus polyanthemos*, Schauer. Pp. 9 & 1 plate. (Proc. Linn. Soc. N.S.W. xxvii.) 8vo. *Sydney*, 1903.

—— A Critical Revision of the Genus *Eucalyptus*. Parts 1–3. 4to. *Sydney*, 1903. **Author.**

Manchester.

Manchester Field Club. (Founded 10th March, 1899.) Proceedings. Vol. I. Part 1. 8vo. *London*, 1903.

Owens College. Manchester Museum Handbooks (*cont.*).

Descriptive Catalogue of the Embryological Models. 2nd Edition. By Sidney J. Hickson. Pp. 109. (Publication 40.) 1902.

Owens College. Manchester Museum, Notes from.

No. 9. British Cephalopoda: their Nomenclature and Identification. By William E. Hoyle. Pp. 10. (Reprinted from Journ. Conchol. vol. x.) 1902.

10. The Red Sandstone-Rocks of Peel (Isle of Man). By William Boyd Dawkins. Public. 41. (Reprinted from the Q. Journ. Geol. Soc. vol. lviii.) 1902.

11. The Carboniferous, Permian, and Triassic Rocks under the Glacial Drift, in the North of the Isle of Man. By William Boyd Dawkins. Public. 42. (Reprinted from the Q. Journ. Geol. Soc. vol. lviii.) 1902.

12. On Bigbury Camp and the Pilgrims' Way. By William Boyd Dawkins. Public. 43. (Reprinted from the Archæological Journ., Sept. 1902.) 1903.

13. The Use of Museums in Teaching. By William E. Hoyle. Public. 44. (Reprinted from the Museum Journ., Feb. 1903, pp. 229–236.) 1903.

14. Notes on the Type Specimen of *Loligo eblanæ*, Ball. By William E. Hoyle. Public. 45. (Reprinted from the Mem. Proc. Manch. Lit. & Phil. Soc. vol. xlvii.) 1903.

8vo. *Manchester*, 1902–1903.

Massee (George) and **Crossland (Charles).** The Fungus-Flora of Yorkshire: a complete Account of the known Fungi of the County. Pp. 52. (Trans. Yorksh. Nat. Union, part 28.) 8vo. *Leeds*, 1902. **Chas. Crossland.**

Meinecke (E. P.) und **Weber (Rudolf).** Robert Hartig. Ein Nachruf von E. P. Meinecke und R. Weber. Pp. 4. (Allgem. Forst- & Jagd-Zeitg. April 1902.) 4to. *Frankfurt-a.-Main*, 1902. **Carl, Freiherr von Tubeuf.**

Meldola (Raphael). The Coming of Age of the Essex Field Club. A Record of Local Scientific Work, 1880–1901. The Presidential Address delivered at the 22nd Annual General Meeting of the Club on March 22nd, 1902. [Reprinted (with separate pagination) from the Essex Nat. vol. xii. April 1902.] 8vo. *Stratford*, 1902.

Miall (Louis Compton). Round the Year: a Series of Short Nature-Studies. Pp. viii, 290; figs. 72. 8vo. *London*, 1896. **J. C. Galton.**

Milne-Edwards (Henri). Cours élémentaire d'Histoire Naturelle. Zoologie. 7me édition. 8vo. *Paris*, 1855. **J. C. Galton.**

Minchin (Edward Alfred). Porifera and Cœlentera. *See* **Lankester (E. Ray).** Treatise on Zoology, Pt. ii. **J. C. Galton.**

Montpellier.
Académie des Sciences et Lettres.
Catalogue de la Bibliothèque etc., par Émile Bonnet. Partie I→ 8vo. *Montpellier*, 1901→

Mortensen (Theodor). Echinoidea. *See* **Danish Ingolf-Expedition**, Vol. iv. Part 1.

Moser (Fanny). Die Ctenophoren der Siboga-Expedition. *See* **Siboga-Expeditie**, Monogr. xii.

Mouton (Henri). Recherches sur la Digestion chez les Amibes et sur leur Diastase intracellulaire. Pp. 60 & 1 plate. (Ann. Inst. Pasteur, xvi.) 8vo. *Sceaux*, 1902.

Mrázek (Alois). Süsswasser - Copepoden. *See* **Hamburger Magalhaensische Sammelreise.**

Müller (Johannes) [*Liebenwalde*]. Beiträge zur Anatomie holziger und succulenter Compositen. Inaugural-Dissertation. Pp. 42, mit 4 Tafeln. 8vo. *Berlin*, 1893.

Munich.
Königlich-bayerische Akademie der Wissenschaften.
Max von Pettenkofer zum Gedächtniss. Rede im Auftrag der mathematisch-physikalischen Classe der Kgl.-bayer. Akademie der Wissenschaften in München in der öffentlichen Sitzung am 16 November 1901, gehalten von Carl v. Voit. Pp. 160. 4to. *München*, 1902.

Nantes.
Société des Sciences Naturelles de l'Ouest de la France.
Table des Matière. Première Série. Tomes I.–X. (1891–1900). 8vo. *Nantes*, 1901.

Naples.
Zoologische Station zu Neapel.
Fauna und Flora des Golfes von Neapel. Monographs xxvi., xxvii. 4to. *Berlin*, 1901–1902.
XXVI. Die Rhodomelaceen. Von P. Falkenberg. 1901. Pp. xvi, 754; mit 10 Textfiguren und 24 Tafeln.
XXVII. Die Mytiliden. Von Theodor List. I. 1902. Pp. x, 312; mit 17 Textfiguren und 22 Tafeln.

Nature Series. 8vo. *London*, 1882.
Memorial Notices of Charles Darwin. Pp. xiii, 82 (1882).
The Scientific Evidences of Organic Evolution. By George J. Romanes. Pp. vi, 88 (1882). **J. C. Galton.**

Nicholson (Henry Alleyne). A Manual of Palæontology for the Use of Students, with a General Introduction on the Principles of Palæontology. 2 vols.
Vol. I. Pp. xvi, 511; figs. 381.
„ II. Pp. ix, 531; figs. 381–722.
8vo. *Edinburgh & London*, 1879. **J. C. Galton.**

Nicholson (Henry Alleyne). A Manual of Palæontology &c. 3rd Edition, by H. A. Nicholson and Richard Lydekker. 2 vols.

Vol. I. Pp. xviii, 885; figs. 812.
„ II. Pp. xi, 886–1624; figs. 813–1419.
8vo. *Edinburgh & London*, 1889. **J. C. Galton.**

Nierstrasz (H. F.). The Solenogastres of the Siboga-Expedition. *See* **Siboga-Expeditie.**

Oates (Eugene William). Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History). Vol. II. Carinatæ (Charadriiformes—Strigiformes). Pp. xx, 400; plates 1–15. *See* **British Museum**—Birds.

Oliver (Daniel). Flora of Tropical Africa. Vols. I.–III.
[*Continued as*] 8vo. *London*, 1868–77.
Flora of Tropical Africa. By various Botanists. Edited by Sir William Turner Thiselton-Dyer. Vol. IV. Parts 1–3.
8vo. *London*, 1902–03. **Sir W. T. Thiselton-Dyer.**

Osborn (Henry Fairfield). On Vertebrata of the Mid-Cretaceous of the North-West Territory. Distinctive Characters of the Mid-Cretaceous Fauna. (Geol. Surv. Canada, Contrib. to Canad. Palæontol. vol. iii. part 2.) 4to. *Ottawa*, 1902.

Otté (E. C.). The Rambles of a Naturalist on the Coasts of France, Spain, and Sicily. *See* **Quatrefages (Armand de).**

Owen (Jean A.) [Mrs. Visger] and **Boulger (George Simonds).** The Country Month by Month. 9 Parts (March 1894—October 1894, and Jan. 1895). 8vo. *London*, 1894–95. **J. C. Galton.**

Pace (Stephen). Contributions to the Study of the Columbellidæ. No. 1. (Proc. Malacol. Soc. vol. v.) 8vo. *London*, 1902. **Author.**

Packard (Alpheus Spring). Guide to the Study of Insects, and a Treatise on those injurious and beneficial to Crops, for the use of Colleges, Farm-schools, and Agriculturists. 7th Edition. Pp. xii, 715; figs. 668 and 15 plates. 8vo. *New York*, 1880. **J. C. Galton.**

Pax (Ferdinand). Beitrag zur Kenntniss des Ovulums von *Primula elatior*, Jacq. und *officinalis*, Jacq. Inaugural-Dissertation. Pp. 41. 8vo. *Breslau*, 1882.

Percival (John). Agricultural Botany. Theoretical and Practical. Pp. xii, 806; figs. 265. 2nd Edition. 8vo. *London*, 1902. **Author.**

Pettenkofer (Max von). Zum Gedächtniss. *See* **Voit (Carl von).**

Petit (Paul Charles Michel). Catalogue des Diatomacées du Maroc, D'Algérie et de Tunisie. *See* **Battandier (Jules Aimé)** and **Trabut (Louis).** Flore de l'Algérie.

Philippi (Rudolph Amandus). Suplemento a los Batraquios Chilenos descritos en la Historia Fisica i Politica de Chile de don Claudio Gay. Pp. xi, 161. 8vo. *Santiago de Chile*, 1902. **Author.**

Pillai (T. Ponnambalam). The Mine of Wealth in the State Forests of Travancore: and what young Travancore can do to create Industries. A Lecture delivered under the Auspices of the Travancore Government Lecture Committee. Pp. 19. 8vo. *Trivandrum*, 1902. **Author.**

Pittock (George Mayris). Flora of Thanet: A Catalogue of the Plants indigenous to the Island with a few rare Aliens. Pp. 14. 8vo. *Margate*, 1903. **W. Watson.**

Pöhlmann (Robert). Estudios sobre la Flora de las Islas de Juan Fernandez. *See* **Johow (Friedrich).**

Porsch (Otto). Die Oesterreichischen Galeopsisarten der Untergattung *Tetrahit* Reichb. Versuch eines natürlichen Systems auf neuer Grundlage. Pp. 126, mit 3 Tafeln. (Abh. k.-k. zool.-bot. Ges. Wien, Bd. ii. Heft 2.) Roy. 8vo. *Wien*, 1903.

Poulton (Edward Bagnall). Hope Reports. (A Series of Reprints and Extracts from various Journals, reissued for private circulation.) Vol. II. (1897–1900.) 8vo. *Oxford.* **Prof. E. B. Poulton.**

Prain (David). Memoirs and Memoranda, chiefly Botanical. Reprints from Periodicals, 1887–1893. 8vo. *Calcutta*, 1894.

—— Botanical Notes and Papers. Reprints from Periodicals, 1894–1901. 8vo. *Calcutta*, 1901. **Author.**

—— Flora of the Sundribuns. Pp. 140, and 1 map. (Rec. Bot. Surv. India, vol. ii. no. 4.) 8vo. *Calcutta*, 1903.

Primrose (A.). The Anatomy of the Orang Utang. *See* **Toronto University Studies**, No. 1.

Primrose (The) and Darwinism, by A Field Naturalist. Pp. xiii, 233, figs. 23. 8vo. *London*, 1902. **J. C. Galton.**

Pütter (August). Die Augen der Wassersäugethiere. Pp. 304; mit 3 Tafeln und 41 Abbildungen im Text. (Spengel, Zool. Jahrb., Abth. Anat. xvii. Heft 1 & 2.) 8vo. *Jena*, 1902.

Quatrefages (Armand de). The Rambles of a Naturalist on the Coasts of France, Spain, and Sicily. Translated by E. C. Otté. 2 vols. 8vo. *London*, 1857. **J. C. Galton.**
Vol. I. Pp. xix, 355. Vol. II. Pp. vii, 375.

Reader (F. W.). A Handbook to the Collection of Prehistoric Objects in the Essex Museum of Natural History. Pp. 32; figs. 27. 8vo. *Stratford*, 1901.

Reid (Clement). A Note on the Plant-Remains of Roman Silchester. (Archæologia, Soc. Antiqu. lviii.) 4to. *London*, 1902. **Author.**

Rendle (Alfred Barton). Notes on Myricaceæ. Pp. 5. (Journ. Bot. vol. 41.) 8vo. *London*, 1903. **Author.**

Richard (Jules). Modification du filet bathypélagique de Giesbrecht. Pp. 5. (Bull. Soc. Zool. France, xxi.) 8vo. *Paris*, 1896.

—— Sur le Muséum Océanographique de Monaco. Pp. 3. (Verh. vii. Intern. Geogr. Kongress, Berlin, 1899.) 8vo. *Berlin*, 1900.

—— Campagne Scientifique de la *Princesse-Alice* en 1901. Pp. 24. (Bull. Soc. Zool. France, xxvii.) 8vo. *Paris*, 1902. **Author.**

Robinson (William). The English Flower-Garden, Style, Position, and Arrangement: followed by a description of all the best plants for it, their culture and arrangement. 3rd Edition. Pp. xxii, 751. 8vo. *London*, 1893. **J. C. Galton.**

—— —— 4th Edition. 8vo. *London*, 1895. **J. C. Galton.**

Rolleston (George). Scientific Papers and Addresses of. Arranged and Edited by William Turner, with a Biographical Sketch by Edward B. Tylor. 2 vols. Pp. lxxvi, 947; portrait, plates 5, and several woodcuts. 8vo. *Oxford*, 1884. **J. C. Galton.**

Romanes (George John). The Scientific Evidences of Organic Evolution. (Nature Series.) Pp. vi, 88. 8vo. *London*, 1882. **J. C. Galton.**

—— An Examination of Weismannism. Pp. ix, 221; with portrait. 8vo. *London*, 1893. **J. C. Galton.**

Ronna (Antoine). Rothamsted. Un demi-siècle d'Expériences Agronomiques de MM. Lawes et Gilbert. Pp. vi, 607; figs. 26. (Ann. Sci. Agronom., 2 ser. vi. Année, Tomes i., ii.) 8vo. *Paris*, 1900.

Roth (Walter E.). Games, Sports, and Amusements. . *See* **Brisbane**—North Queensland Ethnography. Bulletin, No. 4.

Rübsaamen (Ewald H.). Pteromaliden. *See* **Hamburger Magalhaensische Sammelreise.**

Ruete (C. G. T.). Ueber die Einheit des Princips im Bau der Augen bei den verschiedenen Thierklassen und besonders über das Sehen der Insekten mit polyedrischen Augen. Pp. 22; figs. 6. 4to. *Leipzig*, 1861. **J. C. Galton.**

Salter (John William). British Wild Flowers. *See* **Sowerby (John Edward).** **J. C. Galton.**

Schauinsland (Hugo Hermann). Beiträge zur Entwicklungsgeschichte und Anatomie der Wirbelthiere. Pp. 168, mit 56 Tafeln. (Bibl. Zool. Bd. xvi. Heft 39.) 4to. *Stuttgart*, 1903.

Schinz (Hans). Der botanische Garten und das botanische Museum der Universität, Zürich, im Jahre 1901, 1902. 8vo. *Zürich*, 1902–1903.

—— Versuch einer monographischen Uebersicht der Gattung *Sebæa* R. Br.—I. Die Sektion *Eusebæa* Griseb. Pp. 55. (Mitteil. Geogr. Ges. Lübeck, Heft 17, 1903.) 8vo. *Lübeck*, 1903. **Author.**

Schütze (E.). Verzeichnis der mineralogischen, geologischen, urgeschichtlichen und hydrologischen Litteratur von Württemberg, Hohenzollern, und den angrenzenden Gebieten.

I. Die Litteratur von 1901, nebst Nachträgen und Zusätzen zu Eck's Litteraturverzeichnis. Pp. 38. (Beilage z. Jahresh. Ver. Vaterl. Naturk. Württemb. Jahrg. 58.) 8vo. *Stuttgart*, 1902.

Schulze (Franz Eilhard). An Account of the Indian Triaxonia collected by the Royal Indian Marine Survey Ship *Investigator*. *See* **Calcutta**: Indian Museum

Sclater (William Lutley). The Birds of South Africa. *See* **Stark (Arthur Cowell).**

Scott (Andrew). Decapod and Sessile-eyed Crustaceans from Abd-el-Kuri. *See* **Walker (Alfred O.).**

Seward (Albert Charles) and Arber (Edward Alexander Newell). Les *Nipadites* des Couches Éocènes de la Belgique. Pp. 16; plates 2. (Mém. Mus. Roy. d'Hist. Nat. Belg. ii.) 4to. *Bruxelles*, 1903. **Author.**

Shelley (George Ernest). The Birds of Africa, comprising all the Species which occur in the Ethiopian Region. 8vo. *London*, 1896–1902. **J. E. Harting.**

Vol. I. Pp. viii, 196.
,, II. Pp. vii, 348; plates 1–14.
,, III. Pp. vii, 276; plates 15–28.

Siboga-Expeditie. Uitkomsten op zoologisch, botanisch, oceanographisch en geologisch gebied verzameld, in Nederlandsch Oost-Indië 1899–1900, aan boord H.M. *Siboga* onder commando van Luitenant ter zee 1e kl. G. F. Tydeman; uitgegeven door Dr. Max Weber. Livr. I.–IX. 4to. *Leiden*, 1901–1902. **Dr. Max Weber.**

Silloway (P. M.). Summer Birds of Flathead Lake. Pp. 83; plates 16. (Bull. Univ. Montana, Biol. ser. i.) 8vo. *Missoula*, 1901.

Sim (George). Is *Raia radula* of Couch, Thompson, and Yarrell a good Species? Pp. 5 and 2 plates. (Ann. Scott. Nat. Hist., Oct. 1902.) 8vo. *Edinburgh*, 1902. **Author.**

Simon (Eugène). Arachnoideen, excl. Acariden und Gonyleptiden. *See* **Hamburger Magalhaensische Sammelreise.**

Sluiter (C. Ph.). Die Holothurien der Siboga-Expedition. *See* **Siboga-Expeditie.**

—— Die Sipunculiden und Echiuriden der Siboga-Expedition, nebst Zusammenstellung der ueberdies aus dem Indischen Archipel bekannten Arten. *See* **Siboga-Expeditie.**

Smee (Alfred). The Potatoe Plant, its Uses and Properties: together with the cause of the present malady. The Extension of that disease to other plants, the question of famine arising therefrom, and the best means of averting that calamity. Pp. xvi, 174; plates 10. 8vo. *London*, 1846. **J. C. Galton.**

Smith (Grafton Elliot). *See* **London**—Royal College of Surgeons. Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy. Vol. II. Second Edition.

Smith (Henry G.). A Research on the Eucalypts, especially in regard to their Essential Oils. *See* **Baker (Richard Thomas).**

Smith (*Miss* M.). Flora Simlensis. *See* **Collett (*the late Sir* Henry).**

Sörensen (William). Gonyleptiden. *See* **Hamburger Magalhaensische Sammelreise.**

'Southern Cross.' Report on the Collections of Natural History made in the Antarctic Regions during the Voyage of the *Southern Cross*. Pp. ix, 344; plates 53. 8vo. *London*, 1902.

Sowerby (James). The British Miscellany; or coloured figures of new, rare, or little-known animal subjects; many not before ascertained to be inhabitants of the British Isles. 2 vols. in 1. [Published in 12 numbers.] 8vo. *London*, 1804-6. **J. C. Galton.**

Sowerby (John Edward). British Wild Flowers. Described, with an Introduction and a Key to the Natural Orders, by Charles Pierpoint Johnson. Re-issue: to which is now added a Supplement containing 180 Figures of lately discovered Flowering Plants, by John W. Salter; and the Ferns, Horsetails, and Club-Mosses, by John E. Sowerby. Pp. 1, 186; plates 89. 8vo. *London*, 1876. **J. C. Galton.**

Spinner (Henri). L'Anatomie foliaire des *Carex* Suisses. Dissertation Inaugurale. Pp. 120; plates 5. (Mitt. Bot. Mus. Univ. Zürich, xvii.) 8vo. *Neuchâtel*, 1903. **Dr. H. Schinz.**

Stark (Arthur Cowell). The Birds of South Africa. 8vo. *London*, 1900–1901. **J. E. Harting.**

Vol. I. Pp. xxx, 321; with 81 Illustrations.
„ II. Pp. xiv, 323; with a Portrait; Map; and 83 Illustrations.
[Vol. II. completed by W. L. Sclater.]

Sterne (Carus) (Krause, *Dr.* Ernst Ludwig). Werden und Vergehen. Eine Entwicklungsgeschichte des Naturganzen in gemeinverständlicher Fassung. Dritte, verbesserte und vermehrte Auflage. Pp. xiv, 783, mit 450 Holzschnitten und 25 Tafeln. 8vo. *Berlin*, 1886. **J. C. Galton.**

Strasburger (Eduard). Die Angiospermen und die Gymnospermen. Pp. viii, 173; Tafeln 22. 8vo. *Jena*, 1879. **J. C. Galton.**

—— Das Botanische Practicum. Ed. 4. Pp. 1, 771; mit 230 Holzschnitten. 8vo. *Jena*, 1902.

Strasburger (Eduard), Noll (Fritz), Schenck (Heinrich), Schimper (A. F. W.). Lehrbuch der Botanik für Hochschulen. 5e verbesserte Auflage. Pp. viii, 563; mit 686 zum theil farbigen Abbildungen. 8vo. *Jena*, 1902.

Strecker (Herman). Index of Species to Kirby's Synonymic Catalogue of Lepidoptera Heterocera. Vol. I. Sphinges and Bombyces. 8vo. *Reading, Pa.*, 1899.

—— Lepidoptera, Rhopaloceres and Heteroceres, indigenous and exotic. Supplement No. 3. 4to. *Reading, Pa.*, 1900.

Stromer von Reichenbach (Ernst). Die Wirbel der Land-Raubtiere, ihre Morphologie und Systematische Bedeutung. Pp. viii, 276; mit 5 Tafeln. (Bibl. Zool. Heft 36.) 4to. *Stuttgart*, 1902.

Studnička (František J.). Ueber das farbige Licht der Doppelsterne und einiger anderer Gestirne des Himmels, &c. *See* **Doppler (Christian).**

Stuttgart.

Verein für Vaterländische Naturkunde in Württemberg. Beilage zu Jahrg. 58. 8vo. *Stuttgart*, 1902.

I. Schütze (E.). Verzeichnis der mineralogischen, geologischen, urgeschichtlichen und hydrologischen Litteratur von Württemberg, Hohenzollern, und den angrenzenden Gebieten. I. 1902.

Sydney.
Technological Museum, New South Wales.
Education Series, No. 13. 4to. *Sydney*, 1902.
No. 13. Baker (Richard Thomas) and Smith (Henry G.). A Research on the Eucalypts, especially in regard to their Essential Oils. Pp. xi, 295; plates 44. 1902.

Talbot (William Alexander). The Trees, Shrubs, and Woody Climbers of the Bombay Presidency. 2nd Edition. Pp. xxv, 385. 8vo. *Bombay*, 1902. **Author.**

Tepper (J. Gottlieb Otto). Notes and Remarks on the described Genera and Species of the Australian and Polynesian Phasmidæ or "Spectre Insects." Pp. 5. (Victorian Nat. xix.) 8vo. *Melbourne*, 1903.

—— List of the described Genera and Species of the Australian and Polynesian Phasmidæ (Spectre Insects). Based on Stål's System of Classification. Pp. 10. (Trans. Roy. Soc. S. Austral. xxvi.) 8vo. *Adelaide*, 1903. **Author.**

Thorn (J. P.). Die Periodischen Schriften der Senckenbergischen Bibliothek zu Frankfurt-a.-Main. Herausgegeben von der Senckenbergischen Naturforschenden Gesellschaft. Pp. viii, 202. 8vo. *Frankfurt-a.-Main*, 1903.

Thoulet (J.). Échantillons d'eaux et de fonds provenant des campagnes de la *Princesse-Alice*. (1901). *See* **Albert.**

Tokio.
College of Science, Imperial University of Japan.
A Catalogue of the Romanized Geographical Names of Korea. By Bundjirô Kotô and S. Kanazawa. Pp. vi, 88. 8vo. *Tôkyô*, 1903.

Trail (James William Helenus). The Flora of Buchan. Pp. 94. & Map. (Reprinted from the Trans. Buchan Field Club, vol. vi. pp. 69–162.) 8vo. *Peterhead*, 1902. **Author.**

Turner (*Sir* William). *See* **Rolleston (George).** Scientific Papers.

Tutt (James William). A Natural History of the British Lepidoptera: a Text-book for Students and Collectors. Vols. I.–III. 8vo. *London*, 1899–1902.

Tydeman (G. F.). Description of the Ship '*Siboga*' and Appliances used for Scientific Exploration. *See* **Siboga-Expeditie.**

Tyler (Edward Burnett). *See* **Rolleston (George).** Scientific Papers.

United States Department of Agriculture (*cont.*).
Division of Botany.
Contributions from the U.S. National Herbarium. Vol. V. Nos. 4, 6. VII. Nos. 1–3. 8vo. *Washington*, 1899–1902. **B. Daydon Jackson.**

Bureau of Plant Industry.
Bulletin, No. 25. 8vo. *Washington*, 1902.
No. 25. Hillman (Fred. H.). The Seeds of Fescue Grass and Chess. Pp. 4, figs. 3. 1902.
B. Daydon Jackson.

United States Department of Agriculture (*cont.*).
Office of Experiment Stations.
Bulletin, No. 106. 8vo. *Washington*, 1902.
No. 106. DYER (BERNARD). Results of Investigation on the Rothamsted Soils; being the Lectures delivered under the Provisions of the Lawes Agricultural Trust. Pp. 180.
Yearbook for 1902. 8vo. *Washington*, 1903.
Secretary of Agriculture.

United States Geological Survey (*cont.*).
Monographs, Vol. 41. 4to. *Washington*, 1902.
Vol. 41. Glacial Formations and Drainage Features of the Erie and Ohio Basins. By FRANK LEVERETT. Pp. 802, plates 26. 1902.

Urban (Ignatz). Symbolæ Antillanæ seu Fundamenta Floræ Indiæ Occidentalis. Vol. III. Fasc. 3. 8vo. *Lipsiæ*, 1903.

Vernhout (J. H.) and **Vosmaer (G. C. J.).** The Porifera of the Siboga Expedition. I. The Genus *Placospongia*. *See* **Siboga-Expeditie.**

Vernon (Horace Middleton). Variation in Animals and Plants. (Intern. Sci. Series, vol. 88.) Pp. ix, 415; figs. 30.
8vo. *London*, 1903.

Verrill (Addison E.). The Bermuda Islands: their Scenery, Climate, Productions, Physiography, Natural History, and Geology; with Sketches of their Early History and the Changes due to Man. (Trans. Connecticut Acad. xi.)
8vo. *New Haven*, 1901–1902.

—— Additions to the Fauna of the Bermudas from the Yale Expedition of 1901; with Notes on other species. (Trans. Connecticut Acad. xi.) 8vo. *New Haven*, 1901–1903.

Versluys (Jan). Die Gorgoniden der Siboga-Expedition. I. Die Chrysogorgiidæ. *See* **Siboga-Expeditie.**

Visger, *Mrs.* *See* **Owen (Jean A.).**

Voit (Carl von). MAX VON PETTENKOFER zum Gedächtniss. Rede im Auftrag der mathematisch-physikalischen Classe der Kgl.-bayer. Akademie der Wissenschaften in München in der öffentlichen Sitzung am 16 November 1901, gehalten. Pp. 160.
4to. *München*, 1902.

Vosmaer (G. C. J.) and **Vernhout (J. H.).** The Porifera of the Siboga-Expedition. I. The Genus *Placospongia*. *See* **Siboga-Expeditie.**

Walker (Alfred O.) and **Scott (Andrew).** Decapod and Sessile-eyed Crustaceans from Abd-el-Kuri. Pp. 17 & 2 plates. (Liverp. Mus. Rep. Sokotra Exped. pp. 216–239, pls. xiv.A, xiv.B.) 8vo. *Liverpool*, 1903. **Authors.**

Wallace (Alfred Russel). A Narrative of Travels on the Amazon and Rio Negro, with an Account of the Native Tribes, and Observations on the Climate, Geology, and Natural History of the Amazon Valley. With a Biographical Introduction by the Editor. Pp. xiv, 363; plates 16. (Minerva Library of Famous Books.) 8vo. *London*, 1889. **J. C. Galton.**

Warman (Philip Creveling). Catalogue and Index of the Publications of the United States Geological Survey, 1880 to 1901. Pp. 858. (Bull. U. S. Geol. Surv. no. 177.)
8vo. *Washington*, 1902.

Waterton (Charles). Wanderings in South America, the Northwest of the United States, and the Antilles, in the years 1812, 1816, 1820, and 1824; with original Instructions for the perfect Preservation of Birds, etc., for Cabinets of Natural History. New Edition, edited, with Biographical Introduction and Explanatory Index, by the Rev. J. G. Wood. Pp. xvi, 520; with 100 Illustrations. 8vo. *London*, 1893.
J. C. Galton.

Watson (Ralph). A descriptive Manual of British Land and Fresh-Water Shells. *See* **Dixon (John William).** **J. C. Galton.**

Weber (Max). Introduction et description de "Siboga" l'Expedition. *See* **Siboga-Expeditie.**

Weber (Rudolf). Robert Hartig. Ein Nachruf. *See* **Meinecke (E. P.).**

Weeks (Fred Boughton). Bibliography of North American Geology, Paleontology, Petrology, and Mineralogy for the years 1892–1900 inclusive. Pp. 717. (Bull. U.S. Geol. Surv. No. 188.) 8vo. *Washington*, 1902.

—— Index to North American Geology, Palæontology, Petrology, and Mineralogy for the years 1892–1900 inclusive. Pp. 337. (Bull. U.S. Geol. Surv. No. 189.)
8vo. *Washington*, 1902.

West (George Stephen). A Contribution to the Freshwater Algæ of the North of Ireland. *See* **West (William).**

West (William) and West (George Stephen). A Contribution to the Freshwater Algæ of the North of Ireland. Pp. 190; plates 3. (Tr. Roy. Irish Acad. xxxii. Sect. B, Part 1.)
4to. *Dublin*, 1902.

Whyte (Alexander). Report on his Recent Travels along the Seacoast Belt of the British East Africa Protectorate. Pp. 18; plates 4. (Presented to both Houses of Parliament by Command of His Majesty. May 1903.) Fol. *London*, 1903.
B. Daydon Jackson.

Wiesner (Julius). Untersuchungen über den Lichtgenuss der Pflanzen, mit Rücksicht auf die Vegetation von Wien, Cairo, und Buitenzorg (Java). (Photometrische Untersuchungen auf pflanzenphysiologischem Gebiete.) (Zweite Abhandlung.) Pp. 107; mit 4 Tafeln. (S.B. Kaiserl. Akad. Wiss. Wien, mathem.-naturw. Classe, Bd. 104, Abth. i.)
8vo. *Wien*, 1895.

—— Untersuchungen über das Photochemische Klima von Wien, Cairo, und Buitenzorg (Java). Pp. 94; mit 10 Textfiguren. (Denkschr. mathemat.-naturw. Classe, Kaiserl. Akad. Wiss. Wien, Bd. 64.) 4to. *Wien*, 1896.

Wiesner (Julius). Untersuchungen über die mechanische Wirkung des Regens auf die Pflanze, nebst Beobachtungen und Bemerkungen über secundare Regenwirkungen. Pp. 77. (Ann. Jardin Bot. Buitenzorg, xiv.) 8vo. *Leide*, 1897.

—— Die Beziehungen der Pflanzenphysiologie zu den anderen Wissenschaften. Inaugurationsrede gehalten am 24. October. 1898. Pp. 48. 8vo. *Wien*, 1898.

—— Beiträge zur Kenntniss des photochemischen Klimas im Arktischen Gebiete. Pp. 34 : mit 4 Textfiguren. (Denkschr. mathemat.-naturw. Classe, Kaiserl. Akad. Wiss. Wien, Bd. 67.) 4to. *Wien*, 1898.

—— Untersuchungen über den Lichtgenuss der Pflanzen im arktischen Gebiete. (Photometrische Untersuchungen auf pflanzenphysiologischem Gebiete.) (III. Abhandlung.) Pp. 69 : mit 3 Textfiguren. (S.B. Kaiserl. Akad. Wiss. Wien, mathem.-naturwiss. Classe, Bd. 109.) 8vo. *Wien*, 1900. **Author.**

Wildeman (Émile de). Les Algues de la Flore de Buitenzorg. (Essai d'une Flore Algologique de Java.) (Flore de Buitenzorg publiée par le Jardin Botanique de l'État. Part 3.) Pp. xi, 457 ; figs. 149 & 16 plates. 8vo. *Leiden*, 1900. **J. C. Galton.**

—— Plantæ Laurentianæ, ou Énumération des Plantes récoltées au Congo en 1893 et 1895–96 par Émile Laurent. (Publication de l'État indépendant du Congo.) Pp. 57. 8vo. *Bruxelles*, 1903.

Williams (Frederic Newton). Prodromus Floræ Britannicæ. Parts 1–3. 8vo. *Brentford*, 1901–1902. **Author.**

Wiltshire (E. W.). The Life and Work of the Rev. Thos. Wiltshire. Pp. 56. 8vo. *Brighton*, 1903. **Author.**

Wiltshire (*Rev.* Thomas). The Life and Work of. *See* **Wiltshire (E. W.).**

Witchell (Charles A.). The Evolution of Bird-Song, with Observations on the influence of Heredity and Imitation. Pp. x, 253. 8vo. *London*, 1896. **J. C. Galton.**

Wittrock (Veit Brecher), Nordstedt (C. F. Otto), and Lagerheim (G. von). Algæ aquæ dulcis exsiccatæ, præcipue Scandinavicæ, quas adjectis Chlorophyllaceis et Phycochromaceis distribuerunt. Fasc. 30–34 (n : ris 1401–1612). Lundæ 19 10/5 03. Pp. 9. (Bot. Not. 1903.) 8vo. *Lund*, 1903. **C. F. A. Nordstedt.**

Wollaston (Thomas Vernon). On the Variation of Species, with special reference to the Insecta : followed by an inquiry into the Nature of Genera. Pp. vi, 206. 8vo. *London*, 1856. **J. C. Galton.**

Wood (John George). *See* **Waterton (Charles).** Wanderings in South America.

Wood (Julius John). Plants of Chutia Nagpur, including Jaspur and Sirguja. Pp. 170 and 3 maps. (Rec. Bot. Surv. India, vol. ii. no. 1.) 8vo. *Calcutta*, 1902.

Woodward (Bernard Barham). *Vitrea Rogersi*, n. sp. A British form hitherto misidentified with *Helix glabra*, Studer, and *Hyalinia helvetica*, Blum. Pp. 3 and 1 plate. (Journ. Conchol. x.) 8vo. *London*, 1903. **Author.**

Zahlbruckner (Alexander). Studien über brasilianische Flechten. Pp. 76, mit 2 Tafeln. (S.B. K. Akad. Wiss., mathem.-naturw. Classe, Bd. 111, Abth. 1.) 8vo. *Wien*, 1902. **Author.**

Zimmer (Carl). Cumaceen. *See* **Hamburger Magalhaensische Sammelreise.**

Zoological Record. Vol. 38 (1901). 8vo. *London*, 1902.

Zürich.

Botanischer Garten und das botanische Museum der Universität, Zürich.

Die morphologisch-biologische Anlage und das System des botanischen Gartens in Zürich, von Dr. Hans Schinz. 8vo. *Zürich*, 1899.

Der botanische Garten und das botanische Museum der Universität, Zürich, im Jahre 1901, 1902. Von Dr. Hans Schinz. 8vo. *Zürich*, 1902–1903.

DONATION IN AID OF PUBLICATIONS.

1903.		£	s.	d.
Feb. 14.	The Royal Society. Contribution towards Dr. Elliot Smith's Paper: "On the Morphology of the Brain in the Mammals, &c." (Trans. 2nd ser. Zool. vol. viii. pt. 10.) ..	50	0	0

LEGACY.

1903.		£	s.	d.
April 30.	Sir Prior Goldney. Legacy from the late Dr. R. C. A. Prior	100	0	0

INDEX TO THE PROCEEDINGS.

SESSION 1902–1903.

Note.—The following are not indexed:—The name of the Chairman at each meeting; speakers whose remarks are not reported; and passing allusions.

PRINTED BY TAYLOR AND FRANCIS,

RED LION COURT, FLEET STREET.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

116TH SESSION.

FROM NOVEMBER 1903 TO JUNE 1904.

LONDON:

PRINTED FOR THE LINNEAN SOCIETY,

BURLINGTON HOUSE, PICCADILLY, W.,

1904.

PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

CONTENTS.

Publications of the Society issued during the period, 1st July, 1903, to 31st July, 1904:—

Journal (Botany), No. 247, 31st Oct., 1903.
No. 248, 5th May, 1904.
„ 252, 31st Oct., 1903.
„ 253, 31st March, 1904.
„ 254, 25th July, 1904.
„ (Zoology), No. 188, 31st Oct., 1903.
„ 189, 31st March, 1904.

Transactions (2nd Ser. Botany), Vol. VI. Part VII., Feb. 1904.
„ VIII., Mar. 1904.
„ IX., June 1904.
„ (2nd Ser. Zoology), Vol. VIII. Part XIII., Dec. 1903.
Vol. IX. „ III., Dec. 1903.
„ IV., Feb. 1904.
„ V., June 1904.
„ VI., July 1904.

Proceedings, 115th Session, 1902–1903, October 1903.

List of [Fellows, Associates, and Foreign Members], 1903–1904

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND SIXTEENTH SESSION, 1903–1904.)

November 5th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Thomas Archibald Sprague was elected, and Mr. William Dennis and Mr. Bertram Henry Bentley were admitted Fellows of the Society.

Dr. W. G. Ridewood exhibited the frontal bones of a Horse showing rudimentary horns, for the loan of which he was indebted to Mr. Arthur Broad, a veterinary surgeon of Shepherd's Bush. There was no record as to the breed, sex, or age of the horse. The bony protuberances were about 3 inches apart, and were set upon the curved ridges that constituted the anterior margins of the areas of origin of the temporal muscles. In the natural sloping position of the head in the living horse they would have been vertically above the orbits. The bases were broad and spreading, and the left boss was larger than the right; it stood about half an inch above the general surface of the frontal bone, and its flattened extremity was oval and measured $\frac{3}{4}$ inch by $\frac{3}{8}$ inch. There was a general but slight tendency to exostosis over the right temporal area. Dr. Ridewood pointed out that the exceptional cases of horny bosses occurring in horses could hardly be regarded as instances of reversion, as had been done at the previous meeting

of the Society by Dr. Eustace; for the palæontological record of the evolution of the horse is remarkably complete, and no indications of horns are to be found in the extinct congeners of the modern equines. (Mr. Broad has since presented the specimen to the Natural History Museum.)

Professor Weiss exhibited some preparations and photographs of a mycorhiza or mycorhizome from the Coal-measures. The preparations were in part from the Cash Collection at the Owens College, Manchester, and in part from Dr. Scott's private collection. They showed the existence in a small root-like organ of fungal filaments presenting all the appearances of those found in the roots of many orchids and in the rhizome of *Psilotum*. In the outer layers of the cortex the hyphæ run along the inside of the cell-walls and form smaller and larger vesicles in some of the cells, comparable with those found in the mycorhiza of living plants. In the deeper layers of the cortex the contents of the cells are collected into a central dark mass connected with the cell-walls by delicate strands some of which are clearly fungal hyphæ. These masses very closely resemble those described by Shibata in the mycorhiza of Orchids. Small bodies similar to the "sporangioles" described by Janse are also met with occasionally. From the occurrence of these various stages Professor Weiss was inclined to infer that a symbiotic relationship existed between the fungus and the host-plant similar to that of an existing mycorhiza. With regard to the plant in which the fungus occurred, he was inclined to think that it might have been epiphytic, a view which would be supported by the absence of large air-spaces such as are found in the young roots of *Calamites* and in the rootlets of *Stigmaria*.

A discussion followed in which Dr. Percy Groom, Dr. D. H. Scott, Mr. W. C. Worsdell, and Prof. F. W. Oliver took part, Prof. Weiss briefly replying.

Mr. B. H. Bentley exhibited a large series of lantern-slides, designed for teaching purposes, which he had taken, illustrating certain types of floral pollination, and bees and other insects in actual operation.

The following papers were read:—

1. "On the Structure of the Leaves of the Bracken (*Pteris aquilina*) in relation to Environment." By Leonard A. Boodle, F.L.S.

2. "On the Life-history of a New *Monophlebus* from India, with a Note on that of a *Vedalia* predaceous upon it; with remarks on the Monophlebinæ of the Indian Region." By E. P. Stebbing, F.L.S.

November 19th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Thomas Archibald Sprague was admitted a Fellow of the Society.

The Rev. John Gerard, S.J., F.L.S., exhibited a fasciated rose, sent by the Rev. J. Dobson, of St. Ignatius's College, St. Julian, Malta, with this note:—"A freak of a white climbing rose, in which eight or nine blossoms with their stalks have grown together. It was given me by the Director of Education from a rose-tree in his garden. He says there is nothing in the position of the bush to account for the peculiarity."

Dr. M. T. Masters observed that we are in complete ignorance of the causes which produce these peculiar teratologic cases.

The Rev. R. Ashington Bullen, F.L.S., brought for exhibition an albino mole, from a farm near Bagshot: it was wholly of a light fawn colour, and no similar specimen had been seen there for at least twenty years, though many moles have been trapped on the same farm.

Mr. A. D. Michael stated that he had been in the habit of investigating moles' nests for his researches on mites, but nothing of this kind had ever come under his notice.

The following papers were read:—

1. "A General View of the Genus *Pinus*." By Dr. M. T. Masters, F.R.S., F.L.S.

2. "Contributions to the Embryology of the Amentiferæ.—Part II. *Carpinus Betulus*." By Miss Margaret Benson, D.Sc., and Miss Elizabeth Sanday, B.Sc. (Communicated by Prof. F. Wall Oliver.)

December 3rd, 1903.

Prof. J. Bretland Farmer, F.R.S., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. William Norwood Cheeseman, Mr. William Clitheroe, Mr. Ernest Jacob Collins, Mr. Frederick Hamilton Davey, Mr. William Foggitt, Mr. Montague Hill, Mr. John Edmund Shorec Moore, and Mr. Robert Walter Campbell Shelford were elected Fellows of the Society.

The Vice-President in the Chair then declared the Meeting to

be a Special Meeting, in accordance with the announcement sent to every Fellow in the United Kingdom, for electing a Councillor, and Secretary for Zoology, in the room of Professor George Bond Howes, resigned, and stated that the Ballot would remain open till 8.30 p.m. for the Councillor, and till 8.45 p.m. for the Secretary.

The Ballot for the Councillor having been closed, the Vice-President in the Chair appointed Messrs. A. G. Tansley, H. W. Monckton, and V. H. Blackman, Scrutineers; and the Votes having been counted and reported to the Vice-President in the Chair, he declared that the Rev. Thomas Roscoe Rede Stebbing had been elected Councillor by a large Majority.

The Ballot for the Secretary having been closed, the Vice-President in the Chair appointed the same Scrutineers, and the Votes having been counted and reported to the Vice-President in the Chair, he declared that the Rev. T. R. R. Stebbing had been unanimously elected Secretary for Zoology.

The following papers were read:—

1. "On the Anatomy of the Roots of Palms." By Eric Drabble, D.Sc., F.L.S.

2. "On Littoral Polychæta from the Cape of Good Hope." By Dr. Arthur Willey, F.R.S. (Communicated by Dr. W. G. Ridewood, F.L.S.)

3. "Notes on *Myriactis Areschougii* and *Coilodesme californica*." By Miss Mary Rathbone. (Communicated by V. H. Blackman, F.L.S.)

December 17th, 1903.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Frank Cavers was elected, and Mr. William Clitheroe, Mr. Ernest Jacob Collins, and Mr. Norman Maclaren were admitted Fellows of the Society.

The General Secretary exhibited a copy of a 'Lexicon generum phanerogamarum,' by Tom von Post, revised and enlarged by Otto Kuntze, which he had received from the author a few days before. He gave a succinct account of the labours of Dr. Kuntze (from the time he worked up his collections at Kew), in the matter of nomenclature based solely upon priority, and set forth in this volume by his colleague at Upsala. The introductory matter was entirely due to Dr. Kuntze, who was also responsible for the French and English versions; besides the preface, were included a 'Codex brevis maturus,' in which Dr. Kuntze postulated his requirements as to names, spelling, and signs, and his ideas as to the regulations for a Botanical Congress, with the class of persons

permitted to record their votes, but, naturally, without any power to penalise those who decline to accept the suggested trammels.

The Rev. T. R. R. Stebbing, F.R.S., Sec.L.S., exhibited:—(1) a House-spider (*Tegenaria* sp.) with its cylindrical dwelling in the coiled feather of an Indian fan. The fan which the spider adapted to its purposes had been hanging up in a drawing-room at Jerusalem. The spider, forwarded by Miss Fitzjohn to Miss Grace Stebbing, reached England alive. And (2) a solid gnaur or excrescence upon the root of *Cupressus macrocarpa*, sent for exhibition by Mr. F. G. Smart, F.L.S., of Tunbridge Wells; it was eleven inches in circumference.

Prof. Percival remarked that such growths were commonly due to the attack of a Uredine fungus, which resulted in an hypertrophy of the tissues; it was not infrequent in *Pinus*, but more usual on the stem than the root.

A lantern demonstration was given by Prof. J. Bretland Farmer, F.R.S., F.Z.S., entitled "A brief Account of New Researches in Cancer," in which he alluded to current theories of cancerous growth, and then proceeded to state his own discovery that the cytological changes in malignant growth resemble those exhibited by sporogenous or gametogenous tissues in plants and animals, in the occurrence of the form of nuclear division know as heterotype, as distinguished from the more usual homotype division.

An animated discussion followed, the following speakers taking part:—Mr. J. T. Cunningham (visitor), Mr. J. E. S. Moore, Prof. J. B. Farmer, Prof. F. O. Bower (who deprecated the use of certain new terms), Dr. D. H. Scott, Sec.L.S., Rev. T. R. R. Stebbing, Sec.L.S., Mr. Charles E. Walker (visitor), and was summed up by the President.

The following paper was read:—

"On the Docoglossa: an evolutionary study." By Mr. H. J. Fleure, B.Sc. (Communicated by Prof. W. A. Herdman, F.L.S.)

January 21st, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Leslie Beeching Hall and Mr. Charles Edward Walker were elected, and Mr. Edward Percy Stebbing was admitted a Fellow of the Society.

Dr. Eric Drabble, F.L.S., exhibited a lantern-slide showing diagrams of bicarpellary fruits of the French Bean. The specimens

of *Phascolus vulgaris*, Savi, were obtained from a garden on the Middle Coal-measures of North Derbyshire. In the simplest case there is present on the posterior aspect of the normal carpel a second smaller carpel with reversed orientation and without seeds. In other cases the second carpel attains to at least one-half the size of the normal anterior one, and is fused with the latter proximally in such a manner as to give rise to a unilocular fruit with parietal placentation, the carpels being free from one another in their distal portion. In other cases the two carpels are of approximately the same size and both bear seeds. They are completely fused below to form a unilocular ovary, while above they divaricate from one another.

It was pointed out that although the Leguminosæ are typically monocarpellary, certain members of the order are bi- or even polycarpellary; but in these cases the polycarpellary fruit is of an apocarpous nature. It would appear, therefore, that the specimens described in some sense revert to ancestral conditions in so far as their bicarpellary nature is concerned, but that their syncarpous nature is anomalous. Comparison with related orders, *e. g.* the Connaraceæ, confirms this opinion.

The Rev. R. Ashington Bullen, F.L.S., exhibited a finely preserved female specimen of the Northern Stone-Crab, *Lithodes maia* (Linn.), from Aberdeen, and called attention to the various organisms securely settled upon its carapace. A discussion followed on the characters, systematic position, and distribution of this anomalous macruran, in which Professor Poulton, F.R.S., Mr. A. O. Walker, V.P.L.S., and the Zoological Secretary took part.

The following papers were read:—

1. "Biscayan Plankton.—Part I. Methods and Data." By Dr. G. H. Fowler F.Z.S. (Communicated by the Rev. Thomas R. R. Stebbing, Sec.L.Soc.)
2. "Biscayan Plankton.—Part II. Amphipoda and Cladocera." By the Rev. Thomas R. R. Stebbing, F.R.S., Sec.L.Soc.

February 4th, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Leslie Beeching Hall was admitted a Fellow of the Society.

Mr. Charles Edgar Salmon, F.L.S., exhibited two specimens of *Epilobium collinum*, C. C. Gmel., from Scotland, with a series of *E. montanum* and *E. lanceolatum* for comparison, and read the following note:—

The two specimens of *E. collinum* upon the table were found in the Herbarium of the Holmesdale Natural History Club, Reigate. They were presented to the Club, with many other plants, by Dr. J. A. Power, and the specimens are labelled "Scotland," but are undated; they were probably collected by Dr. Power about 60 years ago. *E. collinum* occupies an intermediate position between *E. montanum* and *E. lanceolatum*, and occurs in rocky places, ascending to some height, in many parts of Europe. By some botanists it is considered a variety of *E. montanum*, but Dr. Haussknecht, the monographer of the genus, considers it a good species. The only British species with which it may be compared are *montanum* and *lanceolatum*; from the former it differs by its stalked, mostly alternate, leaves, cuneate at the base, and pale pink flowers; from *lanceolatum* (to which it seems nearest allied) by its broader, ovate leaves and other characters.

E. collinum, as I saw it growing in the Pyrenees last summer, seems to have a distinct *habit* of its own, and can be easily recognized alive from both the above two species.

Rev. E. S. Marshall has seen these Scotch examples, and believes them to be correctly named.

A discussion took place, in which the General Secretary, Mr. James Groves, Mr. R. M. Middleton, and Prof. J. B. Farmer took part, and Mr. C. E. Salmon replied.

The following papers were read:—

1. "Researches into the Physiology of the Yeast-Plant, *Saccharomyces Cerevisiæ*." By the President.
2. "Further Researches on the Specialization of Parasitism in the Erysiphaceæ." By Ernest S. Salmon, F.L.S.

February 18th, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Samuel Alexander Stewart was elected an Associate of the Society.

Mr. L. T. Badams exhibited a folio guard-book containing a large collection of West Australian flowers and vegetable products, grouped for artistic effect, which had been prepared by a friend in that colony.

The following papers were read:—

1. "Mendel's Laws and their application to Wheat-Hybrids." By Mr. R. H. Biffen. (Communicated by the President.)
2. "Heredity and Variation as seen in *Primula sinensis*." By Mr. W. Bateson, F.R.S. (Communicated by the President.)

March 3rd, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. George Herbert Fowler, Rev. Henry Thomas Spufford, and Mr. James Hornell were elected Fellows of the Society.

Mr. L. A. Boodle, F.L.S., exhibited photographic lantern-slides demonstrating the formation of secondary wood in certain regions of the stem of *Psilotum triquetrum*. In parts of the rhizome immediately below the aerial stems, and at the base of the aerial stems themselves, tracheides occur, often in considerable numbers, outside the primary wood. These external tracheides are found to be still in course of development, as shown by the imperfect lignification of their walls, at a time when the primary wood has long been completed; in some cases the external elements of the wood further show a distinct radial arrangement. These stems thus exhibit distinct remains of the secondary vascular tissues characteristic of the Palæozoic Sphenophyllales, with which on various grounds there is reason to believe the Psilotaceæ to be allied.

A discussion followed, in which Dr. D. H. Scott, Mr. C. B. Clarke, and the President joined.

The following papers were read :—

1. "A List of the *Caricos* of Malaya." By Charles Baron Clarke, F.R.S., F.L.S.

2. "On some Species of the Genus *Palæmon*, Fabr., from Tahiti, Shanghai, New Guinea, and West Africa." By Dr. J. G. De Man. (Communicated by the Rev. T. R. R. Stebbing, Sec.L.Soc.)

March 17th, 1904.

Prof. J. Bretland Farmer, F.R.S., Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. John Lewis Bonhote was elected a Fellow of the Society.

The Chairman announced that Mr. William Watson had been duly elected an Associate, on the 18th February last, in accordance with Bye-Laws, Chapter V., Section III., by a simple majority of the Fellows voting.

The Treasurer then read the section in question, pointing out that it was therein declared that only the Second, Third, and Fourth Sections of Chapter I. applied to the election of Associates, and the Fifth Section, requiring a two-thirds majority, was expressly excluded.

The Rev. R. Ashington Bullen exhibited (1) the egg-capsule of a *Mantis* found on a twig of wild Olive, while others occurred in immense numbers on blackberry and various shrubs at Brenes, near Carmona, Spain, February 16th, 1904. Mr. W. F. Kirby refers it to *Mantis religiosa*, Linn.; it is figured in Brunner von Wattenwyl's 'Prodromus der Europäischen Orthopteren,' pl. 2. figs. 14 (A, female; B, egg-capsule; C, section of B). This author, however, states that the species which he describes deposit their capsules on stones; so far as we observed, however, none were in that position, but were placed on shrubs and bushes at the edge of a precipice (*barranca*). The capsules obtained as above are less elongated and more turgid than in the figures cited. Mr. W. L. Distant is of opinion that the capsules vary in shape; the number of eggs contained is about 30.

(2) A photograph of a cat playing with a snake before killing it, and calling to her kittens in a loud and peculiar way to come and share in the sport; it was snapped by Mr. George Bonsor in 1903, in the *patio* of his house in the Necropolis Romana, Carmona.

Mr. A. O. Walker brought a branch of Black Currant from his garden near Maidstone, with the swollen buds indicative of the destructive mite *Eriophyes ribis*. A discussion followed, in which the Chairman, Mr. A. D. Michael, Mr. N. E. Brown, and Mr. E. M. Holmes took part, Mr. Walker replying.

The General Secretary, Mr. B. Daydon Jackson, then gave an exhibition and lantern demonstration of "Botanic Illustration from the 15th to the 20th Centuries," tracing its development from the earliest herbals to the present time, with an account of the various methods employed.

The following paper was read:—

"On Bryozoa from Franz-Josef Land." By Arthur William Waters, F.L.S.

April 7th, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair.

The Minutes of the General Meeting of 17th March having been read, their confirmation was opposed by Mr. George R. M. Murray, on a point of order, that inasmuch as the election of Mr. William Watson as an Associate was not declared at the meeting of the 18th February, it could not be so declared at a

later meeting; this being seconded by Mr. James Groves, led to a prolonged discussion, in which Mr. A. O. Hume, Mr. Henry Groves, Dr. A. Smith Woodward, Rev. T. R. R. Stebbing, Mr. G. S. Boulger, Mr. F. Crisp, Mr. Thomas Christy, Mr. E. M. Holmes, Dr. D. H. Scott, Mr. Gilbert Christy, and Mr. J. Britten, joined. By consent, the voting by show of hands was taken to be for or against confirmation of the Minutes; those in favour of confirmation 14, against 17 (one more being invalid), out of 47 Fellows present. The Minutes were accordingly not signed.

Dr. John Don Fisher Gilchrist, Mr. William Philip James Le Brocq, and Mr. Charles Edward Pearson were elected, and the Rev. Henry Thomas Spufford and Mr. John Lewis Bonhote were admitted Fellows of the Society.

The President, on behalf of Prof. Isaac Bayley Balfour, presented a Gold Medal recently struck in commemoration of his father, Prof. John Hutton Balfour; a special vote of thanks was accorded by acclamation.

Sir Joseph Hooker forwarded for acceptance by the Society a photograph of an etching by Mrs. Dawson Turner, from a drawing by J. S. Cotman, of her husband, who was a Fellow of the Linnean Society for fifty years (from 1797 to 1858). For this gift a special vote of thanks was passed.

Mr. E. P. Stebbing exhibited lantern-slides of the metamorphoses of *Clania Crameri*, a Psychid moth from the Madras Presidency, showing its use of its food-plant, *Casuarina equisetifolia*, in the making of its protective case.

Mr. F. Enock displayed a series of more than fifty slides of Natural Colour Photography of living insects and flowers by the Sanger-Shepherd three-colour process; the President adding a few remarks on the results.

The following paper was read:—

"The Morphology and Anatomy of the Stem of the Genus *Lycopodium*." By Charles Edward Jones, F.L.S.

April 21st, 1904.

Prof. Sydney H. Vines, F.R.S., President, in the Chair

The Minutes of the last Meeting were read and confirmed.

The President then referred to the fact that the Minutes of the Meeting on March 17 had not been approved at the Meeting on

April 7, and read the statement of facts upon which he had, on his own initiative, submitted to the Right Hon. Sir Edward Fry, P.C., F.R.S., F.L.S., for his opinion, the following questions :—

1. Was the Council correct in interpreting the Bye-Laws, Chap. V. Sect. III., to mean that a simple majority, and not a two-thirds vote, is all that is required for the valid election of an Associate ?

2. Assuming that the previous question is so answered as to establish the validity of the election on February 18,—is the validity of that election materially affected by the fact that the election was not declared at that Meeting and does not appear in the Minutes of that Meeting ?

3. Was the declaration of the Election made at the Meeting on March 17 a valid declaration ; and is its validity impaired by the fact that the Minutes of that Meeting, in which the declaration was included, were not approved at the Meeting on April 7 ?

To these questions Sir Edward Fry replied at once to the effect :—1. That in his opinion the Council's reading of the Bye-Laws in relation to the election of an Associate is correct, and that clearly a bare majority only is required ; 2. That the validity of the election on the 18th February was not materially affected by the fact that the election was not declared at that Meeting nor mentioned in the Minutes, nor is a declaration a vital part of the election under Chap. V. ; 3. That as the Charter charges the Council with the direction of the business of the Society, it was competent for that body to act as they did, and for the Chairman with their approval to declare on the 17th March the result of the election on the 18th February, which by an error had not been declared at the proper time, and, under the circumstances, was a proper step to take.

Upon this the PRESIDENT moved that the Minutes of the General Meeting of the 17th March be approved and invited discussion, in which Mr. Henry Groves, Prof. G. S. Boulger, Sir Ernest Clarke, Mr. S. Moore (who moved the previous question, which was not seconded), and the Treasurer took part. On the motion being put by show of hands, of the 64 Fellows present, 43 voted for the motion, and 10 against : the Minutes were accordingly signed. Mr. George Murray having contributed a few remarks, the President moved a vote of thanks to Sir Edward Fry, whose opinion had been of so much assistance in clearing up the legal points involved, which vote was carried by acclamation.

Mr. JOHN HOPKINSON then moved, and Mr. R. MORTON MIDDLETON seconded, a vote of thanks to the President for the care and trouble he had taken in the matter, which was unanimously passed ; and the President having briefly returned thanks, the incident closed.

Mr. Philip Furley Fyson and Mr. Robert Selby Hole were elected, and Dr. George Herbert Fowler, Mr. William Philip James Le Brocq, and Mr. Charles Edward Pearson were admitted Fellows of the Society.

The PRESIDENT then read a letter from H.M. Office of Works stating that the Lords Commissioners of H.M. Treasury had authorised the Board to assign to the Society the rooms shortly to be vacated by the Post Office, on condition that the Society bears the cost of alteration necessary to adapt them to its use. The announcement having been unanimously welcomed, the General Secretary briefly referred to the negotiations during the past four years which had now been crowned with success.

Auditors for the annual audit of the Treasurer's accounts were nominated, Mr. C. B. Clarke and the Rev. R. Ashington Bullen on behalf of the Council, and Mr. Herbert Druce and Mr. E. G. Baker on behalf of the Fellows; by show of hands these were duly elected.

Mr. CLEMENT REID exhibited drawings by Mrs. Reid of Fruits and Seeds of British Preglacial, Interglacial, and Roman Plants: 2nd Series—Calycifloræ.

The most interesting addition to the Interglacial flora is the South-European *Cotoneaster Pyracantha*, which occurs abundantly on the Sussex coast in deposits which yield also *Acer monspessulanum*, *Najas minor*, and *N. graminea*.

The Preglacial Calycifloræ include *Trapa natans*; but the rest of the species yet determined are still living in Britain; many, however, need further examination.

The plants from Roman Silchester include the vine, bullace, damson, and coriander.

Mr. R. MORTON MIDDLETON exhibited a holograph letter from Linnæus to Haller, dated Upsala, 12th May, 1747, conveying the intelligence of Haller being elected a Foreign Member of the Royal Academy of Sciences, Stockholm. The President and the General Secretary contributed some brief remarks. (See p. 41.)

Dr. O. STAPF, on behalf of Mr. W. B. HEMSLEY, exhibited some specimens of *Primula vulgaris*, Huds., which displayed the phenomenon of phyllody of the calyx in an unusual degree.

A paper by Mr. JAMES CASH was postponed to a subsequent meeting.

May 5th, 1904.

Prof. Sydney H. Vines, F.R.S., President in the Chair.

The Minutes of the last Meeting were read and confirmed.

Prof. Eugène Louis Bouvier, Prof. Dr. Carl Chun, and Prof. Dr. Hugo de Vries were elected Foreign Members, and Mr. Philip Furley Fyson was admitted a Fellow of the Society.

The following papers were read:—

1. "On Coloration in Mammals and Birds." By J. L. Bonhote, M.A., F.L.S.

2. "On the Cranial Osteology of the Fishes of the Families Mormyridæ, Notopteridæ, and Hyodontidæ." By Dr. W. G. Ridewood, F.L.S.

May 24th, 1904.

Anniversary Meeting.

Prof. Sydney H. Vines, F.R.S., President in the Chair.

The Minutes of the last Meeting were read and confirmed.

The Treasurer, in presenting the annual statement of Accounts for the financial year ending 30th April, duly audited as on p. 14, compared the various items of receipt and expenditure of this and the previous years. He also laid on the Table the Supplementary Charter, dated 8th April, 1904, the result of the Special General Meeting held on 15th January, 1903.

The Charter having been formally read over, the President moved a special vote of thanks to the Treasurer for the labour expended and his generous gift of the Charter to the Society, which was supported by Mr. W. Carruthers, and carried by acclamation.

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

Since the last Anniversary Meeting 15 Fellows had died or their deaths been ascertained:—

Mr. William Henry Catlett.
Mr. William Duppa Crotch.
Rev. Thomas Foulkes.
Dr. William Francis.
Mr. John Charles Galton.
Dr. Charles Henry Gatty.
Dr. Edward Hamilton.
Dr. W. Berry Kellock.
Mr. Philip Brookes Mason.
Mr. Lewis Powell.
Sir Walter Joseph Sendall.
Mr. Isaac Cooke Thompson.
Mr. Augustus Thorne.
Dr. Charles H. Wade.
Mr. Christopher Ward.

Receipts and Payments of the Linnean Society from May 1st, 1903, to April 30th, 1904.

Receipts.	£	s.	d.
Balance at Bankers on the 1st May, 1903	298	16	6
Interest on Investments	180	11	8
Admission Fees	168	0	0
Annual Contributions	1416	0	0
Compositions	204	0	0
Sales of Publications:—			
Transactions £114 1 8			
Journals 128 12 0			
Proceedings and Catalogues 1 9 8			
	244	3	4
Miscellaneous Receipts	183	4	5
	£2694	15	11

Payments.	£	s.	d.
Taxes and Insurance	10	1	3
Repairs and Furniture	49	7	0
Coals and Gas	39	1	9
Salaries	784	7	6
Library:—			
Books £205 13 8			
Binding 86 3 0			
	291	16	8
Expenses of Publications:—			
Printing £739 7 5			
Illustrations 256 13 11			
Distribution 51 0 9			
	1047	2	1
Miscellaneous Printing and Stationery	85	9	11
Petty Expenses (including Tea and Postage)	119	18	3
Balance at Bankers 30th April, 1904	267	11	6
	£2694	15	11

Investments on the 30th April, 1904.

	£	s.	d.			£	s.	d.
Consols, 2½ per cent.	3828	10	7	@	89¼	3416	19	2
Metropolitan Board of Works 3½ per cent. Stock	1079	11	3	@	104⅝	1128	2	9
Great Indian Peninsula Railway, Annuity Class B	42	1	5	@	21½	904	16	6
Forth Bridge Railway 4 per cent. Stock	450	0	0	@	118½	533	5	0
Consols (Westwood Bequest), 2½ per cent.	249	3	8	@	89¼	222	7	11
					FRANK CRISP, *Treasurer.*	£6205	5	4

Audited, and found correct. 19th May, 1904. { SYDNEY H. VINES, HERBERT DRUCE, THOS. R. R. STEBBING, E. G. BAKER, R. ASHINGTON BULLEN, C. B. CLARKE. } *Auditors.*

ASSOCIATE (1).

Mr. William Penney.

FOREIGN MEMBERS (2).

Prof. Dr. Carl Gegenbaur. | Dr. Michael Woronin.

The following 7 Fellows have resigned :—

Mr. Charles Renfric Chichester.
Mr. John Morley Dennis.
Mr. James Edmund Harting.
Mr. F. M. Krausé.
Mr. Henry Ernest Milner.
Mr. Lewis Ough.
Mr. Henry George Stacey.

Two Fellows have been removed from the list of Fellows by order of the Council.

And 27 Fellows (of whom 24 have qualified), 2 Associates, and 3 Foreign Members have been elected.

The Librarian's report was read as follows :—

During the past year 131 Volumes and 135 Pamphlets have been received as Donations from Private Individuals.

From the various Universities, Academies, and Scientific Societies, 291 volumes and 70 detached parts have been received in exchange and otherwise, besides 57 volumes and 41 parts obtained by exchange and as Donations from the Editors and Proprietors of independent Periodicals.

The Council has sanctioned the purchase of 187 volumes and 83 parts of important works.

The total additions to the Library are therefore 666 volumes and 329 separate parts.

The number of Books bound during the year is as follows :— In half-morocco 333 volumes, in half-calf 15 volumes, in full cloth 186 volumes, in vellum 31 volumes, in buckram 21 volumes, in boards or half-cloth 18 volumes. Relabelled (half-morocco and cloth backs) 49 volumes. Total 653 volumes.

The General 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 nominated Mr. W. Carruthers, Rev. Canon Fowler, and Mr. Henry Groves, Scrutineers; and the Votes having been counted and reported to the President, he declared that the Rev. R. A. BULLEN, Prof. J. REYNOLDS GREEN, Mr. G. MASSEE, Colonel C. SWINHOE, and Mr. A. O. WALKER had been removed from the Council, and that

Mr. V. H. Blackman, Dr. A. Günther, Prof. W. A. Herdman, Mr. F. G. Parsons, and Dr. O. Stapf had been elected into the Council.

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

President, Prof. W. A. Herdman.

Treasurer, Mr. Frank Crisp.

Secretaries { Dr. D. H. Scott.
Rev. T. R. R. Stebbing.

The President delivered his Annual Address (see p. 17).

Mr. John Hopkinson moved, and Mr. J. F. Duthie seconded:

That the President be thanked for his excellent address and that he be requested to allow it to be printed and circulated among the Fellows, which was carried unanimously.

The President then addressed Dr. A. Günther, and presented the Linnean Gold Medal to him; which the recipient suitably acknowledged (see p. 30).

The Secretaries laid the Obituary Notices before the Meeting (see p. 31).

Mr. Carruthers then moved a vote of thanks to the President on his quitting office at the close of four years' tenure, which was seconded by Prof. Percy Groom, and carried by acclamation. The President having acknowledged the compliment, the Meeting ended.

PRESIDENTIAL ADDRESS, 1904.

I BEGIN my Address to-day, as has been my custom on previous Anniversaries, with a brief account of the events of the past year and of the position and prospects of the Society. The longer I have occupied the Presidential Chair, the more impressed have I become with the desirability of placing the fullest information of this kind at the disposal of the Fellows, not only for the purposes of this Meeting, but also for subsequent reference in the Proceedings. It is not necessary for me to insist how important it is that every Fellow should have brought to his notice at frequent intervals what have been the successes and the disappointments of the Society, and what are its aims, its aspirations, its hopes, and its fears: in a word, that every Fellow should be kept as closely as possible in touch with the organic life of this our body. But so strong is my conviction of the importance of this matter, that I venture on this occasion—the last Anniversary Meeting at which I shall have the privilege of addressing you—to make a practical suggestion to ensure its permanent realisation. My suggestion is this—that we should adopt the practice of the Royal Society, and of, I believe, some other learned Societies, in desiring the Council to present an annual report upon the state of the Society's affairs. In this way information that can now only be obtained, if at all, by the searching of minute-books, would be made readily accessible; and, moreover, the series of annual reports would, in the course of time, form an important contribution to the history of the Society. In my present position I can see one weighty objection to the proposal, namely this, that were it carried out it would deprive the President in future of a good deal of material that might be useful for the purposes of his Anniversary Address. But it may be urged, as a compensating advantage, that it would leave the President free to devote the whole of his Address to purely scientific matters.

I began my Address last year with an allusion to the probability that that Anniversary would be the last meeting of the kind "for men only"; and I ventured to anticipate that it would fall to my lot to admit the first Lady-Fellow. At the same time I was cautious enough to hint that the process of obtaining a Supplemental Charter would require time and patience. Owing to the realisation of the last of these three anticipations, the two others remain unfulfilled: so the Fellows are meeting to-day as of yore, and my term of office is not to be rendered memorable by the gracious event to which I have alluded. However I am to-day in a position to announce that the Supplemental Charter has at last been granted. I cannot make this gratifying announcement without adding that the Society is deeply indebted for the successful conduct of this business to the Treasurer, who has borne single-handed the not inconsiderable labour and, with characteristic

generosity, the still less inconsiderable expense that it has involved.

In order that the Supplemental Charter may become operative with as little delay as possible, the Council has been engaged for some time past in preparing a revision of the Bye-laws. This will be submitted in due course to the Fellows for approval; and when that formality has been completed, the new order of things will have been officially inaugurated.

As it may reasonably be expected that when the Supplemental Charter is in operation there will be an appreciable increase in the average number of Fellows, it will be reassuring to know that, should this prove to be the case, the requisite accommodation will be forthcoming. The Society has now at its disposal for this purpose some of the rooms on the upper floor, formerly occupied by the Assistant-Secretary; and quite recently an official intimation has been received to the effect that the rooms in this building at present used by the Post Office will shortly be handed over to us. Not only has our accommodation been increased, but something has been done during the past year in improving what we already possess. Important structural repairs and alterations have been carried out by the Office of Works, and advantage has been taken of this opportunity to redecorate the hall and the staircase, as well as some of the rooms on the upper floor, at a cost to the Society that, thanks to the liberality of the Office of Works, has been little more than nominal. However, a great deal remains to be accomplished in this direction. The adaptation to our requirements of the rooms to be vacated by the Post Office demands immediate attention; only slightly less pressing is the need for the redecoration of the Library and of the Council-room.

The mention of these matters inevitably suggests the question of ways and means. Without intruding into his department, I may venture to say that the Treasurer's statement conclusively shows that the expenditure involved cannot be borne by the present income of the Society, which is hardly sufficient to meet the normal demands upon it. The Treasurer is, I believe, so sanguine as to hope that such an accession of new Fellows may result from the operation of the Supplemental Charter as to substantially increase the revenue of the Society. If that be one of the fortunate results of our new departure, the financial difficulty will be surmounted: otherwise the extraordinary expenditure that I have foreshadowed will have to be met either out of our slowly but surely diminishing capital funds, or, as on more than one previous occasion, by a special appeal to the generosity of the Fellows.

I think I am justified in expressing the opinion that the efficiency of the Society, in all its various departments, has been fully maintained. From the report of the General Secretary you will have gathered that the Society has fairly held its own in point of numbers. The Report of the Librarian will have assured you that that most important department has not been neglected. Nor

can it be said that the scientific activity of the Society shows any falling off. Our publications have maintained their usual high level, covering a wide field of interest, both botanical and zoological. Moreover, as I mentioned last year, we have been issuing the final parts, long overdue, of Messrs. Forbes and Hemsley's 'Enumeration of Chinese Plants,' which ought to be completed within the present year. As regards quantity, we have at any rate published as much as our financial resources have permitted. We have also undertaken to publish—with the assistance of a grant from the Royal Society—a series of papers giving the results of a Plankton Expedition to the Bay of Biscay on H.M.S. 'Research' in the year 1900. These papers, which are eventually to form a separate volume of the Transactions, are being prepared by eminent specialists under the direction of Dr. G. H. Fowler; and two of them—a general account of the expedition by Dr. Fowler, and an account by our Zoological Secretary of the Crustacea collected—have already been communicated to the Society.

It will be remembered that, in previous years, the experiment was tried of marking certain of the meetings as specially botanical or zoological: an experiment that can hardly be said to have been so conspicuously successful as to warrant repetition for another year. Accordingly we have reverted, during the present Session, to the old plan of indiscriminate meetings. However, on reviewing the Session, there can be no doubt that many of the meetings have been of more than usual general interest. I may mention, in illustration, the meeting at which (Dec. 17) Prof. Farmer gave a brief account of his researches on Cancer: the meeting of Feb. 18, which was devoted to a Mendelian discussion, which we owe to Mr. Biffen, Mr. Bateson, and Prof. Weldon; and the meeting of April 7, at which Mr. Enock displayed a remarkable series of slides of insects and flowers in natural colour photography. It is a significant fact that these three important contributions to the success of the Session, involved no publication on the part of the Society. The moral that it points is, I think, this—that the interest of our meetings does not depend solely, or perhaps even mainly, upon the papers that are read with a view to publication. Though such papers are of considerable and permanent scientific value, they are, from the nature of the case, sometimes not calculated to engage the attention of a meeting; they are often more interesting to read than to listen to. Whilst we must do all that we can to encourage the contribution of papers of this calibre, greater effort is, I think, necessary in the direction of stimulating the interest of our meetings by the provision of important exhibitions and subjects for discussion. I venture to assert, without fear of contradiction, that no Society offers greater facilities than our own for the discussion of biological questions as they arise. It is, in fact, my ambition that this aspect of the Society's activity should become more fully recognised: that discussion, altogether tabooed in its early years, should develop, in these latter days, into its

most characteristic feature. It was here that the theory of evolution was first given to the world: why should not this be also the birthplace of the epoch-making biological theories of the future?

Whilst the review of the Session affords ground for satisfaction and for hope, it is by no means devoid of matter for regret. A year ago I expressed the wish that Professor Howes might soon be restored to his useful and indefatigable activity amongst us; and in that anticipation we re-elected him Zoological Secretary. As we all know, to our sorrow, that anticipation has not been fulfilled. At an early period in the Session it became necessary for him to resign his office, which was filled by the election of the Rev. T. R. R. Stebbing, to whom it is impossible to give higher praise than to say that he is emulating the example of his distinguished predecessor. On the occasion of his resignation, the Council transmitted to Prof. Howes a vote of sympathy and of appreciation of his valuable services to the Society, a proceeding that must, I am sure, meet with the heartfelt approval of this meeting.

Our other losses include several valued Fellows, among whom I may specially mention Dr. William Francis, for seven years an Associate and for sixty years a Fellow of the Society, who had long been a member of the well-known firm to whom we entrust the printing of our publications; Isaac Cooke Thompson, the well-known naturalist of Liverpool, who had been Secretary and President of the Liverpool Microscopical Society, and was one of the founders of the Liverpool Biological Society, in connection with which he accomplished most of the scientific work of his later years, devoting himself more especially to certain groups of Crustacea; and Sir Walter Sendall, G.C.M.G., who, in his time, had been Governor of the Windward Islands, of Barbados, and of British Guiana, as well as High Commissioner for Cyprus, and whose death has an especially mournful interest for me in that he was a distinguished member of Christ's College, my own old Cambridge home, where his name was, and will remain, a household word.

We have to deplore the loss, among our Foreign Members, of two eminent biologists:—Dr. Carl Gegenbaur, Professor of Comparative Anatomy in the University of Heidelberg; and Dr. Michael Woronin, of St. Petersburg.

Carl Gegenbaur, one of the most distinguished pupils of Johannes Müller, leaves behind him a record of fifty years' scientific work of the highest character. Some of his earlier years were given up to the study of Invertebrates, but after 1860 he devoted himself entirely to the investigation of the Comparative Anatomy of Vertebrates. Among his many important discoveries in this department of Zoology, perhaps the most fertile was that of the relation between certain of the cranial nerves and the branchial skeleton. An inspiring teacher, as well as a profound researcher, he exercised an exceptional influence upon the development of his subject. It is not too much to say that the present position of

Vertebrate Morphology, as a science, is mainly the result of the labours of Gegenbaur and of his school.

Michael Woronin was a private gentleman of means and position who devoted his time and his energy to botanical research. Inasmuch as he studied under Cienkovski at St. Petersburg, under De Bary at Freiburg-i.-B., and under Thuret at Antibes, it is not surprising that he should have chosen the Fungi and the Algæ as the subjects of his investigations. Having found his congenial work, he pursued it with unswerving tenacity of purpose, producing results that very materially contributed to the remarkable development of knowledge concerning the Thallophyta which characterised the botanical progress of the latter part of the nineteenth century.

We began the Session with two vacancies in our list of Foreign Members, so that there have been four to fill up, though there has only been opportunity to make three elections; one vacancy remains over to next Session. The choice of the Society has fallen upon Dr. Hugo de Vries, Professor of Botany in the University of Amsterdam; upon M. Eugène Louis Bouvier, Professor at the Natural History Museum, Paris; and upon Dr. Carl Chun, Professor of Zoology in the University of Leipsic. Of Prof. De Vries I would say that although he is best known by his recent researches on variation and heredity, based upon the re-introduction of the experimental method, which are being embodied in his great work the 'Mutations-theorie,' he had, at an earlier period, earned a high reputation as a plant-physiologist. Trained in the school of Julius von Sachs, when that great master was in the plenitude of his remarkable powers, Prof. de Vries proved himself to be one of its most distinguished pupils. Beginning with the study of the growth of plants, and more especially of growth-curvatures, he was led on, whilst seeking the explanation of these phenomena, to recognise that they are ultimately due to variations in the turgidity of the growing cells; and then to the investigation of the mechanics of the individual growing cell, a subject that he made peculiarly his own. Prof. Bouvier's well-established reputation as a zoologist, and more particularly as a malacologist, rests upon a series of highly finished systematic memoirs, written to some extent in collaboration with Alphonse Milne-Edwards, a former Foreign Member of this Society, upon material resulting from various deep-sea exploring expeditions, including that of the American vessel the 'Blake' under Agassiz, those of the Prince of Monaco in the yachts 'Hirondelle' and 'Princesse Alice,' and those of the French Government in the 'Travailleur' and the 'Talisman.' Nor must I omit to mention his contributions to our knowledge of that still enigmatical animal known as *Peripatus*. Professor Chun, well-known in connection with the 'Bibliotheca Zoologica,' has made his mark in marine research. The success of his earlier labours in this direction led to his being selected as the leader of the German deep-sea expedition, effectively carried out in the voyage of the 'Valdivia' during the years 1898–9. His main zoological work

has naturally been concerned with the marine organisms, of which he gathered such rich harvests, and more especially with the Tunicata.

This year the Linnean Medal has been awarded by the Council to a distinguished Zoologist and Comparative Anatomist, who is one of ourselves—Dr. Albert Günther. I must not anticipate what I shall have to say when the moment of presentation arrives. I would only remind you that his scientific labours have extended over half a century, and that some memorial of them is to be found in the Royal Society's Catalogue of Scientific Papers, where already as many as 240 contributions from his pen are enumerated, and on the shelves of the Zoological Department of the British Museum, where stand the great collections that he arranged and catalogued during many years of strenuous service. If the Royal Society has been impelled to express its recognition of Dr. Günther's scientific eminence in the concrete form of a Royal Medal, there are still more cogent reasons why the Linnean Society should confer upon him its highest honour.

I fear that I may have been somewhat remiss in the discharge of my duties at previous Anniversaries, in failing to remind the Society that the occasion of our meeting on this day is the commemoration of the birthday of the celebrated Linnæus. It would ill become a President of this Society to allow his term of office to pass by without any mention of the man who, though not indeed our founder, may be regarded as our patron saint; and least of all would such an omission be pardonable in me who am a successor of Dillenius. Seeing how much has been written about Linnæus, how fully his life and his work have been discussed from every point of view and at so many different epochs, it may well be doubted whether anything worth saying still remains to be said. But I am inclined to think that perhaps just because he has been the subject of so much discussion, it is worth while to clarify, from time to time, our somewhat confused conception of him, and to reassure ourselves of the grounds upon which we continue to venerate his memory.

It is a common misfortune of great men to suffer from the injudicious praise of over-enthusiastic admirers, which often attributes or exaggerates qualities or attainments without sufficient reason, whilst overlooking those which are the real source of greatness. In this respect, I venture to think, few have suffered more than Linnæus. Lest I fall into the same error, I propose to place myself altogether on the other side, taking up, for the moment, the position of *advocatus diaboli*, so that my object will be to prove rather what Linnæus was not than what he was.

Some of the points in the case can be almost summarily dealt with. For instance, it may be admitted, with, I believe, perfect equanimity, that Linnæus was not a great Anatomist as regards either animals or plants; in fact I do not know of any botanical work of his that is definitely anatomical in character, unless,

indeed, the interesting dissertation on the buds of trees (Amœn. Acad. ii. p. 163) be regarded as such.

It will not be irrelevant briefly to consider, at this point, the interesting question as to the extent to which Linnæus made use of the microscope. In his early days he seems not to have used it at all, for in the introduction to the 'Systema Naturæ' (1735) he says, almost boastfully, that he had examined nearly all the flowers of plants with the naked eye only, and without any microscope. Somewhat later, during his stay in Leyden (1737–8), he had special opportunities for microscopical work, since one of his friends there was "Lieberkühn, a Prussian, having in his possession incomparable microscopes," who gave microscopical demonstrations. Linnæus relates that, on one such occasion, he was shown the spermatozoa of a dog ('Generatio ambigena,' Amœn. Acad. vi. p. 4; 'Sponsalia Plantarum,' Amœn. Acad. i. p. 79), when he drew conclusions as to their nature antagonistic to those of Leeuwenhoek, the original discoverer. But he did not apparently pursue his microscopical studies with any ardour. Among the dissertations forming the 'Amœnitates Academicæ' there are several dealing with topics that might be supposed to involve the use of the microscope, such as that on the 'Semina Muscorum' (Amœn. Acad. ii. p. 261); but in only one is there a definite statement to that effect. In the dissertation 'Mundus Invisibilis,' in which an account of the course of microscopical discovery is given (Amœn. Acad. vii. p. 399), the author describes his observations on the Smut of Wheat (*Ustilago*) made with a Cuffinian microscope under the direction of Linnæus. This is all the information on the subject that I have been able to discover.

Nor can it be urged that Linnæus has strong claims to distinction as a Physiologist. Though he had as contemporaries such men as Hales, Duhamel, and Bonnet, and was in constant communication with Haller, who was distinguished alike as physiologist and systematist, Linnæus has not, so far as I have been able to ascertain, left on record a single physiological experiment. Nevertheless he proved himself to be an acute observer of physiological phenomena in nature. Thus in the dissertation 'Somnus Plantarum' (Amœn. Acad. iv.) he describes the daily movements of leaves; in the 'Philosophia Botanica' he registers the hours of opening and closing—the Vigils, as he calls them—of flowers, fancifully arranging them so as to constitute a "floral clock." The dissertation 'Calendarium Floræ' (Amœn. Acad. iv.) contains a number of phænological observations as to the dates of leafing, flowering, fruiting, and leaf-fall of plants growing in the Botanic Garden at Upsala. Further, in the 'Philosophia' there is a mass of facts illustrating such important biological features as the distribution of plants in relation to climate and soil, and the various modes of dispersal of seeds, which may be regarded as the foundation of that method of study which, under the name "Œcology," has developed of late into so considerable a superstructure.

Another pertinent question is as to whether or not Linnæus may be considered to have materially contributed to the discovery of sexuality in plants. In his prize essay, the 'Disquisitio de Sexu Plantarum' (1760) he says that it is very difficult to say who first made this discovery. Far from laying any claim to it himself, he mentions Millington, Grew, Ray, Camerarius, and Vaillant as moderns who had more or less clearly stated it. What still remained to be determined was the mode of impregnation. That it is attributable to the pollen was no longer a matter of doubt. Vaillant (1718) had expressed the opinion that it was effected by the transmission to the ovules, not of any material substance, but of a volatile essence exhaled by the pollen-grains. On the other hand, Morland (Phil. Trans. 1704) asserted that the pollen-grains pass bodily down the style into the ovules, there giving rise to embryos. Needham, in his 'Microscopical Discoveries' (1745), pointed out that it is impossible for the pollen-grains to reach the ovary, and asserted that the farina, falling on the heads of the pistil, dissolves in the papillæ, and the subtlest of its parts only penetrates into the tubes leading to the ovary. The chief contribution made by Linnæus is contained in the dissertation 'Sponsalia Plantarum' (1746: Amœn. Acad. i.), where it is clearly laid down that the pollen-grains of plants correspond to the spermatozoa of animals, an inaccurate statement and yet an approach to the truth. Like Needham, Linnæus denied that the pollen-grains descend into the ovary, rightly stating that they remain on the stigma, where, he thought, they burst and set free their contents, which penetrate to and fertilize the ovules (*cf.* 'Generatio ambigena,' Amœn. Acad. vi.). This is an advance, but not a considerable advance. At the same time it must be recognized that by his general treatment of the subject he established the theory of sexuality upon a sounder basis and in a clearer light than did any of his predecessors.

We come now to the consideration of a more debatable matter—the share of Linnæus in the progress of Plant-Morphology, the side of botanical science that regards the parts of plants in the abstract, that considers them from the point of view of their development and mutual relations rather than from that of their functions, that determines their homologies rather than their analogies. Without going far back into ancient history, it may be stated that the foundation of modern plant-morphology was laid by Joachim Jung in his remarkable works, the 'Doxoscopia,' first published in 1662, and the 'Isagoge Phytoscopica,' first published in 1679. In these works are to be found a clear analysis of the plant-body into its constituent members, a description of the members with a precise nomenclature, and a recognition of the essential similarity between the foliage and floral leaves. Although the works of Jung were not much quoted by Linnæus, yet, as we know, they were included in his library, and, moreover, the ideas and terminology of Jung were fully set out in the first volume of Ray's 'Historia Plantarum,' a work with which Linnæus was familiar. In these circumstances there can be little doubt

that the Linnean morphology was based upon that of Jung, which, by the time Linnæus wrote his 'Fundamenta Botanica' (1736), had become common knowledge. That work shews a considerable advance towards a more detailed and comprehensive terminology: but the goal was not reached until the publication, in 1751, of the 'Philosophia Botanica,' which gave to Botany an unrivalled descriptive apparatus, and must always be regarded as one of the greatest of the many great achievements of Linnæus.

As for the theoretical aspect of morphology, the dissertation on 'Metamorphosis' (Amœn. Acad. iv.) and the two on 'Prolepsis' (Amœn. Acad. vi.) are the recognized contributions of Linnæus to this subject. The term 'metamorphosis' has certainly a morphological sound, but it must be borne in mind that it did not mean the same thing when used by Linnæus as it did when used by Goethe. In its modern sense it refers to the adaptation of one and the same member to different functions; it is the expression of the physiological division of labour. Leaves, for instance, may be foliage-leaves, or floral leaves, or pitchered leaves, or tendrils: all essentially the same, yet all functionally diverse. But with Linnæus the word had a much wider application. It referred, in the first place, to the flowering of plants, a process that seemed to him to correspond to the 'metamorphosis' of a chrysalis into a butterfly; and, secondly, to the occurrence of varieties and monstrous forms. Nevertheless he rightly includes, in the second category, such admitted cases of metamorphosis as the doubling of flowers, and the occurrence of two different forms of foliage-leaves on partly submerged plants.

The idea of 'prolepsis' was introduced as an explanation of the phenomenon of flowering. It is briefly this—that each series of organs in a flower, the bracts, the sepals, the petals, the stamens, the carpels, represents the product of a year's development, so that in the expanded flower there is, as it were, an anticipation of five years' growth. The idea is fanciful and not well-founded: yet the dissertations in which it was expounded contain many interesting and acute observations which clearly show that Linnæus recognised the morphological identity of floral and other leaves. But in all this there is no definite advance: there is no more than a restatement in novel form of accepted views. A more effective and more convincing method of attacking morphological problems was at this very time being pursued by Caspar Friedrich Wolff, who in advocating epigenesis as against the prevalent theory of evolutionary development, was investigating the actual facts of development in both animals and plants; and it is to him, more than to Linnæus, that the progress of morphology at this period was due.

There is yet one other controversial point to be raised, and that is the suggestion that some germ of the theory of organic evolution is to be found in the writings of Linnæus. Such study as I have been able to devote to these writings has failed to discover anything of the kind. On the contrary, it has become more and more clear to me that the idea of the constancy of species is a necessary

part of the whole fabric of the Linnean philosophy. Let me illustrate this statement by a brief reference to his theory of reproduction. Regarding the body of the plant as consisting of a cortical and of a medullary substance, he held the latter to be the principal seat of life and of the reproductive capacity in particular. The medulla extends into the flower and there gives rise to the ovary and the seed, and even to the embryo (*corculum*) in the seed ('Philosophia,' p. 87). Hence he concluded that the development or reproduction of plants (*generatio*) is essentially a continuation. This being so, it is not surprising to find him drawing the logical inference, that the production of new species of plants is negatived by this continuity in their reproduction (p. 99); or, as he puts it elsewhere (p. 101), "that species are most constant because their reproduction is a true continuation."

It is difficult to imagine how anyone with this mental attitude could be supposed to harbour an idea of the mutability of species. It is, however, true that Linnæus did admit the possibility of the origin of new species, not indeed by variation, but by hybridisation. In the dissertation 'De Peloria' (Amœn. Acad. i.) it is suggested that the peloric form of *Linaria* may be a new species and possibly a hybrid; and in the dissertation 'Plantæ Hybridæ' (Amœn. Acad. iii.) the idea of the production of new species by hybridisation is further developed. But this is merely a side-issue, that does not directly bear upon the main question. More relevant is the consideration of his views as to the relation between species and varieties, set forth in the 'Philosophia Botanica.' "There are," he says (p. 100), "as many varieties as there are diverse plants produced from the seed of the same species." A variety he defines as "a plant changed by some accidental cause, such as climate, soil, temperature, winds, &c., and may be restored (to its primitive form) by a change of soil." The distinguishing features of varieties are their size, the doubling of their flowers, the crispation of their leaves, their colour, taste, and smell. Further on (p. 225) in the same work he dwells upon the great difficulty and labour involved in the task of distinguishing between species and varieties. Mistakes, he says, are often made on account of the exuberance of nature, of differences of climate and habitat, and of the short term of human life, but they may be avoided by the cultivation of the doubtful plants in various soils and situations, by careful study of the plant itself, especially of its fruit, as well as of allied species, and by remembering that the laws of nature are constant and never make a leap (*nunquam saltus facientes*). That this expression of his ideas as to variation was not satisfactory, even to himself, is apparent from the suggestion subsequently made in the appendix to the dissertation on Hybrid Plants (Amœn. Acad. iii.) to the effect that the varieties of plants do not only depend upon the nature of the soil, nor are they changed by cultivation: "the double Peony or Narcissus," he says, in illustration, "is not changed by the soil into the single form, nor is it on that account a distinct species." This important emendation certainly marks an

advance towards the modern conception of variation; but still there is no hint of the suspicion that a variety may become a species. It must, however, be conceded that, from his keen and constant observation of animals and plants in a state of nature, Linnæus had not failed to recognise what is now termed "the struggle for existence," of which he drew a vivid picture in the dissertation 'Politia Naturæ' (Amœn. Acad. vi.), without, however, attaining to the idea of "the survival of the fittest" and so to the theory of organic evolution.

If so far the claims of Linnæus to high distinction have been scrutinised and disputed with some measure of success, further attempt at objection becomes futile when his merits as an organiser of knowledge are brought forward. The state of Natural History early in the eighteenth century was indeed such as to call for reorganisation. The active exploration of the world, and more particularly of the New World, had brought to light such a wealth of new forms that the existing resources of description, of nomenclature, and of classification were proving altogether inadequate to deal with them. Some idea of the condition of Botany at this period may be given in the words of Linnæus himself. "I praise," says he in the 'Critica Botanica,' "the names given by the old Greeks and Romans, but I shudder at the sight of those given by many recent authors; since they are for the most part nothing but a chaos of confusion, whose mother is barbarism, whose father authority, whose nurse prejudice." In the 'Reformatio Botanices' (Amœn. Acad. vi.) we read: "The genera are false and defective and are daily multiplied by new authors and new systems . . . . . The generic names are for the most part erroneous, barbarous, and Indian names have been given, and the names of other natural objects have been accepted for plants, so that it is not clear whether they indicate a plant or a fish . . . . The generic characters were so expressed that they scarcely sufficed to distinguish the known genera: consequently, when a new genus was discovered the characters of the allied genera had to be altered . . . . . The descriptions of plants are written in so oratorical a style, and in such pompous language, that they filled whole pages."

It must be admitted that Linnæus was singularly qualified to undertake the herculean task of reducing this chaos to order. As he well says in the 'Systema Naturæ,' "the first step in knowledge is to know the things themselves"; and this equipment he certainly possessed. No man of his time has shown so comprehensive an acquaintance with animals and plants—to say nothing of minerals—or was more deeply versed in the lore accumulated by his predecessors in the study of Natural History. He combined a wonderfully lucid and methodical mind with indefatigable industry and inexhaustible energy; and the results that he achieved were commensurate with these exceptional endowments. What these results were is so well known that I need not dwell upon them at any length; I will merely indicate the course that he pursued. The first step was the publication, in 1735, of the

'Systema Naturæ,' which gave the outlines of his method of classifying natural objects, and is of especial interest as containing his artificial "sexual system" of plants based upon the number and position of the reproductive organs of the flower. From this time onward he devoted himself more particularly to the study of plants, so that all his larger subsequent works were mainly or entirely botanical. The 'Systema Naturæ' was followed, within a year, by the 'Fundamenta Botanica,' in which the principles of botanical science are clearly and concisely laid down. The year 1737 was marked by the issue, first, of the 'Critica Botanica,' authoritatively stating rules of nomenclature; and, secondly, of the 'Genera Plantarum,' in which those rules are applied to the generic names of plants. In the following year appeared the 'Classes Plantarum,' in which an account is given of all the systems of classification from Cæsalpinus onwards, both the earlier and the Linnean generic names being included, together with a fragment of a natural system. In 1751 the 'Philosophica Botanica' was published as an expansion of the 'Fundamenta,' a work which, as Pulteney says, "must be considered as the institutions of the Linnean system of botany," or indeed of any system of botany whatsoever. Finally, in 1753, appeared the 'Species Plantarum,' the crowning work of the series, in which definite specific names were for the first time assigned to plants. Thus it was that Botany was provided with a precise descriptive language: with generic names based upon fixed characters; with specific names in the place of involved descriptions; and with a system that facilitated the determination of any given plant: changes that have been fitly designated the "Reformation" of the science.

A few words must be devoted to the discussion of the relation of Linnæus to the development of the natural system of classification. It has been thought, it is sometimes thought even now, that the "sexual system" was devised by Linnæus as an alternative to the "natural system"; that he was, as it were, the apostle of artificial classification. Nothing could be further from his intention. Not only did he himself elaborate a fragment of the natural system, but he expressed over and over again, and in the clearest language, his conviction that the end and object of every genuine botanist should be to contribute to the elucidation of such a system based upon a recognition of the true affinities of plants. "Let those who can," he says, "amend, extend, and perfect this system, but let those who are unequal to the task desist from attempting it: those who succeed are distinguished botanists" ('Classes Plantarum,' p. 487).

Excellent as were the intentions of Linnæus, there can, however, be no doubt that the enthusiastic acceptance of his artificial system tended rather to impede than to stimulate the pursuit of the natural system. Without any fault of his, the scaffolding that he had found it necessary to erect was taken to be the edifice itself. That this was so is demonstrated by the historical fact

that the development of the natural system proceeded more rapidly in France, where the Linnean system gained but little hold, than in Holland, Germany, or England, where it became firmly established. Linnæus fully recognised this, and ascribed it to the greater facility offered by artificial methods for the determination of plants. "Some botanists," he says, "would rather read a book in which the plants are arranged alphabetically, than one in which they are arranged according to their characters." "I almost believe," he adds, "that the mind of the botanist is disposed towards some one system from the outset; hence it is perhaps desirable that the beginner should be made acquainted with all the systems so that this stuff might be got rid of once for all" ('Classes Plantarum,' Præfatio).

The sway, amounting almost to sovereignty, that Linnæus acquired in the realm of Natural History could not, however, have been due to his intellectual qualities alone. Great as these were, they would have failed to effect that Reformation of which I have spoken, had they not been reinforced by a capacity for inspiring to enthusiasm all who came under his influence. That he possessed this crowning gift in a remarkable degree is the only possible interpretation of the outburst of activity in Natural History that followed upon his teaching. Out of the crowds of students who attended his lectures, many became teachers themselves, and not a few travelled far and wide in the Old World and the New in quest of animals and plants. Nor was it exercised only on his pupils; it affected the teaching, the botanical teaching at any rate, throughout Europe, the most distinguished contemporary botanists avowing themselves his disciples.

Such being the man and his work, it is not surprising—quite apart from the special circumstances of the case—that our Society should have been called after his name. And we, the Fellows of to-day, may well be proud, as were the Fellows of 1802, to be thus associated with so great a figure and so momentous an epoch in the history of the sciences that we cultivate.

It is impossible to recall these great days of old without being reminded of the great days within our own experience. If our Society is a living monument to the Reformation brought about by Linnæus, it was also directly concerned in the Revolution wrought a century later by Darwin. This is not the time to draw a parallel between these two great naturalists; it will suffice to say that, however different in other respects, they both laboured, and laboured triumphantly, to the limit of life and strength, in the cause of Natural History, and both alike have the strongest claim upon our veneration and our gratitude.

I have now exhausted my theme, and were this not an especially memorable occasion for me, I might well bring my address at once to a close. As it is, I cannot forbear a few words by way of epilogue. Once more I would express my profound appreciation of the confidence that raised me to this high and responsible office, and has maintained me therein during all these years.

Only more profound than my appreciation is the misgiving lest my discharge of the multifarious and often difficult duties attaching to this Chair may have failed to justify that confidence. It is no extenuation to say that I have endeavoured to discharge those duties to the utmost of my ability, ever having regard to the best traditions and the highest interests of the Society; that is the least that a President can do. Whatever measure of success may have attended my efforts is to be attributed to the ready and effective help of my colleagues in office, whose co-operation and sympathy have always been at my service, and to the loyal support ever extended to me by the Council. If I am to-day in a position to hand on to my successor, unimpaired, the trust committed to my charge, it is because my ambition to do so has been directed aright by experience more extensive and judgment more mature than I could myself command.

The PRESIDENT then addressed Dr. GÜNTHER, and in presenting the Linnean Medal, specified the considerations that had moved the Council to make this award.

The PRESIDENT said:—

"Dr. Günther,—Each succeeding Session of our Society brings with it no event more interesting than the presentation of the Linnean Medal to whomsoever the Society delights to honour. But this year the event is of quite unusual interest, inasmuch as the attendant circumstances are altogether unprecedented. For the first time in our annals a Fellow receives our Medal who has already presented it, and a President presents it to his immediate predecessor in this Chair.

"So well are you personally known, so familiar are your scientific achievements, to the great majority of the Fellows, that any words of introduction or commendation from me might well be regarded as altogether uncalled for, were it not that the regulations insist upon a statement of the grounds upon which the Medal has been awarded. Let me say, then, that our award has been made in recognition of your attainments as a Zoologist, and, more particularly, of your profound and probably unparalleled knowledge of the Lower Vertebrates, as exhibited in such works as the monumental catalogue prepared by you of the Fishes in the collections of the British Museum, in such volumes as those on the Giant Tortoises and on the Reptiles of British India, and in many remarkable memoirs such as those on *Hatteria* and on *Ceratodus*.

"Whilst this is the all-sufficient justification of the action of the Council, I am free to admit that where our admiration for you as a man of science led the way, our regard for you as an old and tried Fellow and former President closely followed. It is with this combination of sentiments that I ask your acceptance of the Linnean Medal that it is my privilege to present."

William Francis, Ph.D. (Giessen, 1842), F.R.A.S. (1851), F.G.S. (1859), became an Associate of the Chemical Society in 1841, a Fellow of that Society in 1842, and a Fellow of the Physical Society in 1876. But of all the learned Societies to which he belonged our own claimed him for the longest portion of his protracted life. The Linnean honoured him with the Associateship on the 21st of February, 1837, and as he was born Feb. 16, 1817, he must have been elected when only a few days over twenty years of age. On Jan. 16, 1844, he was elected to the Fellowship of this Society, which he held for over sixty years, dying on Jan. 19, 1904.

As a student of Chemistry and Entomology, as a translator of scientific writings, as partner in a printing firm famous for its polyglot accuracy, as joint founder, editor, and publisher of learned serials which enjoy a world-wide reputation and a large measure of perennial value, Dr. Francis may be said to have devoted practically his whole life to the service of science. He learned printing under Richard Taylor, who himself adopted the profession of a printer "principally at the suggestion of Sir James Edward Smith, the founder of the Linnean Society, and a very intimate friend of his parents" (Journ. of Proc. L. S. p. xxxvii, 1859). R. Taylor, on the 18th of May, 1803, at the age of twenty-two, established himself in partnership with his father. It was not till 1852 that he took into partnership his former apprentice, W. Francis, who has so recently left our ranks. But between them, without a break, these two eminent scientific printers, Taylor and Francis, have had a business career all but completely synchronising with the corporate life of this Society from its original Charter at the opening of the nineteenth century down to the Supplemental Charter of to-day. Of the serials which they jointly planned and vigorously maintained the one most widely known is probably that which began its course in 1838 as the 'Annals of Natural History.' Charles Darwin, at a time when the state of his health to a great degree debarred him from the study of books, says, in a letter to J. D. Hooker, "I confine my reading to a quarter or half hour per day in skimming through the back volumes of the 'Annals and Magazine of Natural History,' and find much that interests me" (Life and Letters, edited by his son, Francis Darwin, vol. iii. p. 40). Among zoologists, in particular, there can indeed be very few who will not from time to time be almost under a necessity of consulting these volumes, very few who will not, beyond the immediate necessity, find something worth studying and recalling to mind in this long record of research and controversy, embracing in a manner at once liberal and judicious the almost innumerable branches of their subject. It is true that in maintaining the standard of the magazine Dr. Francis was associated with successive groups of co-editors greatly distinguished for their several attainments. He was their worthy colleague.

Dr. Charles Henry Gatty was born in the year 1835, went to Trinity College, at Cambridge University, graduated B.A. in 1859 and M.A. in 1862. He devoted much attention to natural science, especially zoology, and was elected Fellow of our Society on the 15th March, 1860; two years later he joined the Geological Society. In the summer of 1892 he gave an intimation to the University of St. Andrew's of a gift of £1000, which he doubled during the autumn of the same year, for a marine laboratory; in 1895 he voluntarily added another sum of £500 for fitting up tanks, engine, and other furniture, which he afterwards supplemented by a gift of a second sum of £500. Our late Fellow thus gave in all £3000 to the laboratory now known as the Gatty Marine Laboratory, which was formally opened by Lord Reay on the 3rd October, 1896.

Professor McIntosh says: "Previously we had the St. Andrew's Marine Laboratory at the harbour, and Dr. Gatty and I would have wished to erect the new one on the site, so full of old associations, but the wooden building was on a common. We therefore had to go to University ground 500 yards or so south. The Government severed its slender financial connections for the support of the old laboratory under the Fishery Board for Scotland, and the first British laboratory, though it was only from £70 to £90 a year, as soon as we 'flitted' to the new building, and this after 12½ years' work for the Board."

In recognition of this munificent gift the University of St. Andrew's conferred upon him the honorary degree of LL.D.

In his own immediate neighbourhood at East Grinstead he built and fitted up a hospital for the sick. Living all his life unmarried, he became towards the close of it somewhat of a recluse and eccentric in his habits. He died at his Sussex residence, Felbridge Place, East Grinstead, in December 1903, aged 68.

Carl Gegenbaur was born in 1826, August 21, and died last year on the 14th of June. He became a Professor early in life, holding the Chair of Anatomy for a long period at Jena and for a much longer period at Heidelberg. From first to last he was a man of science pure and simple. His autobiographical sketch, 'Erlebtes und Erstrebtes,' by its epigrammatic title promises something different from this, but apparently what he did with his life and what his life did with him were factors of existence in uncommonly little antagonism. His choice of a career was imperilled indeed for a moment by the unprescient worldly wisdom of his father. Sixty years ago it may have been difficult to forecast his chances of making either a great reputation or a modest livelihood out of natural science. Fortunately, however, the parental opposition was diverted, so that the young Carl's education was allowed to follow lines consistent with his tastes and ambition. He speedily justified his own selection of the field in which his energies were to be displayed. It was no narrow one. Among his treatises we find investigations on Pteropoda and

Heteropoda, on Amphibia and Reptilia, on Monotremes, on human anatomy, on the comparative anatomy of vertebrates in general, and, finally, on the comparative anatomy of vertebrates viewed in relation to that of invertebrates. His celebrated text-book, 'Grundzüge der vergleichenden Anatomie,' was translated into French under the direction of Carl Vogt, in 1874, and into English by Professor F. Jeffrey Bell, in 1878. Of the English rendering, one chapter was executed by Professor Ray Lankester, who revised the whole, and also contributed an important preface. In form this introduction can scarcely be called eulogistic. To a large extent it is occupied by criticism of Gegenbaur's work, against some parts of which serious objections are urged. It is no uncommon fate, as we know, for books and the characters of men to be "damned with faint praise," but in this instance, on the contrary, the treatise is avowedly extolled by the very act of fault-finding. For, as the English professor explains, he would never have been at so much pains to make the book accessible to his own pupils had not its particular defects been overborne by extraordinary merit on the whole.

In an acutely discriminative essay on Gegenbaur's life and work, Dr. Adolphe Kemna calls attention to an important service which he rendered to the theory of evolution. One of the most formidable objections that theory has had to encounter consists, as is well known, in the difficulty of conceiving a commencement for organs which, like wit, are futile without finish, and which have, so to speak, no motive for improvement until they have already been improved. In this objection the resourcefulness of nature was undervalued. Structures that have served a forsaken purpose may be re-adapted to a new function. In Dr. Kemna's opinion it was Gegenbaur's special merit to have perceived the fruitfulness of this view, to have shown its application in various instances, and to have pointed out the part played by proximity within the organism when one of its organs is bent on annexing the materials of another.

Gegenbaur's great abilities received abundant recognition in this country, the Linnean Society leading the way by electing him a Foreign Member in 1877. This example was followed by the Zoological Society in 1879, and by the Royal Society in 1884. The Royal Society awarded him the Copley Medal in 1896. That he edited the 'Morphologisches Jahrbuch' continuously from its inception in 1876 to the close of his life is a proof that his devotion to science never flagged.

Dr. Edward Hamilton, who died at his residence, 20 Redcliffe Gardens, South Kensington, on 3rd August, 1903, was one of our senior Fellows, having been elected on 16th January, 1844.

He was born in 1815, educated at Harrow and University College, London, and was one of the first to practise homœopathy in London, being a pupil and friend of Dr. F. F. Quin. His

principal publication was the 'Flora Homœopathica,' in two volumes of 68 coloured plates and text, issued in 1852–53. He was attached to field-sports all his life, and was twenty years a Vice-President of the Zoological Society; he also took a warm interest in artistic matters, his Catalogue of the engraved works of Sir Joshua Reynolds being of standard value. Other publications of his were 'The Riverside Naturalist,' 1890; 'The Wild Cat of Europe,' 1896; 'The Wild Cat of Scotland,' 1897; and he edited his brother's 'Records of Sport in Southern India . . . between 1844 and 1870,' in 1892.

Philip Brooke Mason, M.R.C.S., F.L.S., F.E.S., who died at Burton-on-Trent on November 6th, 1903, aged 61, was a well-known physician in the Midlands, and might have obtained a high position in London but for the fact that, on the death of his father, while he was quite young, he was obliged for family reasons to succeed to his practice in Burton. He gained seven gold and silver medals at University College, London, as well as three exhibitions for pathological anatomy, medicine, and surgery. In the Hospital he was house-surgeon to Mr. Erichsen and Sir Henry Thompson; and in 1866 he was appointed Demonstrator of Anatomy in University College, and held that appointment for three years. From his earliest years he was a collector of objects of natural history; in fact, he used to say himself that he began to collect when four years old. His chief bent, on the whole, was towards the British Coleoptera, but he formed collections of nearly everything belonging to the British Fauna, besides amassing a very fine collection of British plants. In 1889 he made an expedition to Iceland, but no records of his numerous captures appear to have been made, except of the Trichoptera, which were worked out by Mr. MacLachlan. As he grew older, Mr. Mason did very little actual collecting, but he spent large sums in acquiring well-known British collections; among these were Mr. E. C. Rye's Coleoptera, and the Rev. A. Matthew's Trichopterygidæ, and also the Aculeate Hymenoptera of Mr. F. Smith, and the Hemiptera of Mr. Douglas and Mr. Scott; the chief amounts, however, which he expended were on the British Lepidoptera; beside large numbers of specimens which he bought at various sales, he acquired the famous old collection of Edwin Shepherd of Fleet Street, and also the collections of Mr. T. Wilkinson and Mr. Douglas. His collection of British Lepidoptera is probably the finest in existence, and we are very sorry to hear that it is likely to be dispersed.

Mr. Mason was elected a Fellow of the Linnean Society on 6th June, 1872; and he served for some time on the Council of the Entomological Society.

He was by no means a mere collector, for he was a man of wide knowledge and reading, but he published very little; at his own expense he brought out the works on the Corylophidæ and

Sphæriidæ and the supplementary Trichopterygidæ, of which the Rev. A. Matthews had left the unfinished MSS. at the time of his death, but he had no time for original research owing to the exigencies of his very large and widespread professional practice.

Mr. Mason was greatly respected in Burton-on-Trent and will be much missed in many ways. The 'Lancet' of November 13th, 1903, speaks of him as "a man of sterling qualities and excellent intellectual gifts," but only those who knew him intimately can bear testimony to the simple geniality of his character and his true kindliness of heart. [W. W. Fowler.]

William Penney, A.L.S., who died in 1903, first appears in the records of the Society at a very distant date. The minutes of the meeting held March 18, 1856, giving a variant of his name, say: "William Penny of Poole, in the County of Dorset, was proposed as an Associate, and his Certificate signed Thos. Bell, Pres^{t}., James Salter, Robert Bentley, was ordered to be suspended." His election followed on the 3rd of June, but in the long subsequent period during which he held the Associateship we do not find that he ever contributed to the Transactions or the Journal. The Royal Society Catalogue assigns but a single paper to his name, and that an essay of very small extent, published in the Pharmaceutical Journal for 1852, on "Similarity in the Medical Properties of two Species of *Cotyledon*." Mr. Penney observes that "it would be interesting to know whether the leaves of the *Cotyledon umbilicus*, or any other crassulaceous plant in this country, possess the same property of removing corns" as that attributed in Pappe's 'Prodromus' to the South-African *Cotyledon orbiculata*, Linn. We may well suppose that the youthful author's own feet were at the time in too sound a condition to permit of his solving the problem by a personal experiment. The medical virtues of the plant in question are an accepted part of "folk-medicine." Mr. Penney at the close of his life was still of Poole, Dorset, as he had been at the time of his nomination.

Sir Walter Joseph Sendall, G.C.M.G., Hon. LL.D. Edinb., was born at Norwich, on Christmas Eve, 1832, the youngest son of the Rev. S. Sendall; he was educated at Bury St. Edmunds Grammar School, and Christ's College, Cambridge, where he was in residence with Walter Besant and C. S. Calverley (whose sister he married). Sendall obtained a first class in the Classical Tripos and was a Junior Optime in the Mathematical Tripos. He joined the educational branch of the Ceylon Civil Service in 1859; in 1870 he became Director of Public Instruction there; in 1876 General Inspector of the Local Government Board, in London, and two years later its Assistant Secretary. Nominated in 1882 Governor of Natal, the appointment was opposed by the Colony, and Sir Henry Bulwer was appointed in his place. In 1885 he

became Governor of Barbados, in 1892 High Commissioner in Cyprus, and in 1898 Governor of British Guiana, from which he retired in 1901. At the time of his death, on 1st May, 1904, in London, of congestion of the lungs, he was Chairman of the Charity Organization Society. He was elected Fellow of the Linnean Society on 3rd December, 1891.

Isaac Cooke Thompson was born July 27, 1843, became a Fellow of the Linnean Society Dec. 1, 1887; died Nov. 6, 1903. He was a chemist by profession and a naturalist from his boyhood. As a young man he attended classes in science at the Liverpool Royal Infirmary School of Medicine, distinguishing himself by his attainments in botany, and industriously forming a large herbarium of local plants, for which he obtained a special prize. In those days he would walk fifty or sixty miles a day in search of rare specimens, and being a teetotaler he accomplished these long distances without recourse to stimulants. He was a great traveller by land and sea; an ardent hill-climber, ascending Mont Blanc and Monte Rosa in 1868; a vigorous athlete in many exercises, with a special devotion to swimming. "It was his regular custom, when on scientific expeditions at Puffin Island or Port Erin, to begin the day with a plunge and a swim before breakfast, and no weather deterred him." Professor Herdman, from whose memoir most of these facts are taken, "has been routed out of bed and conveyed off to bathe by his friend more than once in December and January, over ground covered with snow." One may perhaps sorrowfully reflect that Thompson trusted too far to an iron constitution, and made demands upon it beyond what even the most rigid temperance in other respects could justify. His mental activity matched his physical powers of endurance. Thirty years ago he was already an accomplished microscopist. He held successively the posts of Secretary and President of the Liverpool Microscopical Society, coming to be recognized, in succession to Dallinger and Drysdale, as the leading local authority on the microscope.

Along with Herdman, A. O. Walker, and others, Thompson was one of the founders of the Liverpool Biological Society and its Marine Biology Committee. "It is in connection with the latter, and during the last twenty years, that most of his original scientific work has been done." In that period he "acquired a wide acquaintance with the Crustacea, and an intimate detailed knowledge of the Copepoda and some allied groups of Entomostraca." His "Copepoda of Madeira and the Canary Islands, with descriptions of new genera and species," was published in our own Journal in 1900 (vol. xx.), but, as was natural, a long series of his papers appeared in the Transactions of the Liverpool Biological Society. From time to time the Journals and Proceedings of other Societies contained essays from his pen, generally on the

same favourite subject of the Copepoda. Just before his death he had completed, in partnership with Mr. Andrew Scott, A.L.S., an important Report upon the Copepoda of the Ceylon Pearl Banks, for Herdman's great work on the Pearl Oyster Fisheries of that island, now in course of publication by the Royal Society.

The impression produced by I. C. Thompson on those who met him only at irregular intervals fully agrees with the opinion expressed by his intimate friend. He seemed to be a man of solid worth, without caprice of temper, uniformly actuated by genuine kindness. His biographer speaks of the large number of men, well qualified to judge, who "had learned to appreciate, not only his scientific knowledge and skill, but also his honest, fearless, upright character and his bright and sympathetic loving nature."

Michael Woronin was born at St. Petersburg on July 21st, 1838; he came of a wealthy family, and was thus in a position to devote himself wholly to scientific research, for which he early showed a strong inclination, without the necessity of seeking any official post. At the University of St. Petersburg he was a pupil of Cienkowski's, whose influence no doubt first attracted him to the study of the lower plants to which his life's work was mainly devoted. When, after taking his degree, he went to Germany, and entered De Bary's laboratory at Freiburg, his career as an investigator began. Woronin was one of the most brilliant of De Bary's disciples, and perhaps followed more closely than any other in the footsteps of his distinguished teacher, both in method and spirit. Although his first botanical publication was on an anatomical subject (the anomalous stem of *Calycanthus*), it was among the Thallophyta that his characteristic work was done. Beginning with an investigation of the Siphoneous Algæ *Acetabularia* and *Espera*, carried out under Thuret at Antibes, Woronin, throughout his life, continued to produce a remarkable series of researches, either alone or in co-operation with others, on Algæ, Fungi, and Mycetozoa. Of his algological investigations, that on *Botrydium granulatum*, published in conjunction with Rostafinski, is perhaps the best known, though not free from error. Among his far more numerous works on Fungi, those on the Chytridineæ (in co-operation with De Bary), on *Ascobolus*, on *Exobasidium*, on the Ustilagineæ (partly in conjunction with De Bary), on *Puccinia*, and on *Sclerotinia*, in which last Nawaschin was a collaborator, may be mentioned as of fundamental importance. His researches on *Ceratium* (in which he was associated with Famintzin) and on *Plasmodiophora* are among the most valuable contributions to the life-history of the Mycetozoa. No one has done more than Woronin, if we except De Bary himself, to advance our knowledge of the groups at which he worked. "Woronin's hypha" is a term familiar even to students, and recent researches have tended to emphasize the importance of this organ in relation to fertilization in Ascomycetes.

Woronin is described by those who knew him as a man of the simplest and most unselfish character, wholly devoted to the science he loved. Apart from original work, he gave his assiduous services for 30 years as Botanical Secretary to the St. Petersburg Society of Naturalists ; and was in many ways an active supporter of the cause of Science in his native country. His death took place at St. Petersburg on February 20th, 1903.

Woronin was elected a Foreign Member of the Linnean Society on 2nd May, 1895.

June 2nd, 1904.

Prof. WILLIAM A. HERDMAN, F.R.S., President, in the Chair.

The PRESIDENT, on taking the Chair, briefly thanked the Society for his election, mentioned that the Linnean Society was the first scientific society he joined, early in life, expressed his continued interest in its welfare, and assured the Members that his earnest endeavour would be to maintain the high standard set by his distinguished predecessors in the Chair.

The Minutes of the Anniversary Meeting of the 24th May were read and confirmed.

The PRESIDENT announced that he had appointed Mr. F. Crisp, Dr. A. Günther, Mr. A. C. Seward, and Prof. S. H. Vines to be Vice-Presidents for the ensuing year.

The following resolution of the Council was read from the Chair, as enjoined by the Bye-Laws, Chapter XIV. Section 5 :—

Resolution of the Council, 2nd June, 1904, and ordered to be communicated to the Fellows, in accordance with the Charter of the 26th March, 1802 :—

That the existing Bye-Laws of the Society be and they are hereby repealed and that the following Bye-Laws be established in lieu thereof.

(Signed) W. A. HERDMAN, *President*,
D. H. SCOTT,
THOMAS R. R. STEBBING, } *Secretaries*;

whereupon the President read the draft revised Bye-Laws from the Chair, the first time, with the exception of Chapters VII. and IX., in which no alteration had been made.

Mr. V. I. CHAMBERLAIN and Mr. T. CHRISTY enquired when discussion would take place ; the President, in reply, stated it would be at a subsequent meeting.

Mr. A. O. Walker exhibited (1) viviparous plants of *Cardamine pratensis*, which phenomenon was unusually manifest this year, probably due to the abnormal rainfall, and (2) a gall on the flower-bud of the same plant, ascribed to *Cecidomyia cardaminis*.

Dr. Scott, in remarking that the state of vivipary was to be found in most years in some degree, alluded to a paper by A. Hansen on the subject more than 20 years ago (Abh. Senckenb. naturf. Ges. xii. 1881).

Prof. T. M. Fries, F.M.L.S., who was present, had given a set of prints of portraits of Linnæus from his recent volumes on the career of his eminent countryman, and, speaking in German, expressed his gratification at the facilities afforded him, during a stay of a few weeks in London, of access to the whole of the Linnean manuscripts.

The General Secretary reminded the Fellows of a paper by Mr. W. Carruthers, which was an amplification of one of his Presidential Addresses, and read on the 4th March, 1897, in which the various portraits had been photographed for reproduction.

Mr. W. T. Hindmarsh exhibited photographs of the following plants :—*Primula deorum*, Velen., which he had succeeded in flowering, he believed for the first time in this country ; *Shortia uniflora*, Maxim., the Japanese representative of the genus, with larger flowers than the original *S. galacifolia*, Torr. & Gray, and showing a tendency to vary in colour according to exposure ; and *Rhodothamnus Chamæcistus*, Reichb., noteworthy for the abundance of its flowers.

The following papers were read :—

1. "On the Species of *Impatiens* in the Wallichian Collection." By Sir Joseph Hooker, F.R.S., F.L.S.
2. "Biscayan Plankton.—Part III. The Chætognatha." By Dr. G. H. Fowler, F.L.S.
3. "On the Flow of Fluids in Plant-stems." By Prof. R. J. Anderson, F.L.S.

June 16th, 1904.

Prof. William A. Herdman, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Major Geo. Henry Evans was elected, and Mr. Richard Thomas Baker was admitted a Fellow of the Society.

The Resolution of Council of the 2nd June relative to the revised Bye-Laws, and the Bye-Laws themselves, were read a second time from the Chair.

Dr. E. Drabble, F.L.S., exhibited lantern-slides of an abnormal root of Dandelion, *Taraxacum officinale*, Weber, which had divided and afterwards reunited. A discussion ensued, in which Mr. F. N. Williams, Rev. T. R. R. Stebbing, and Dr. D. H. Scott took part; and Dr. Drabble replied.

Mr. R. Brooks Popham, F.L.S., sent for exhibition some Calculi from the Horse (see page 42).

Mr. Thomas Christy remarked on the occurrence of these concretions at Shanghai, and the methods employed by the Chinese grooms to rid their charges of them; Mr. F. N. Williams also contributed a few remarks.

Canon F. C. Smith, F.L.S., sent for exhibition a handsome inflorescence of a scrambling shrub from Freetown, Sierra Leone, in habit resembling our native *Clematis Vitalba*. It proved to be *Rhynchosia calycina*, Guill. & Perr., which is widely spread in tropical Africa, reaching Rhodesia.

The following papers were read:—

1. "Variations in the Arrangement of Hair in the Neck of the Horse." By Dr. Walter Kidd. (Communicated by Dr. F. G. Parsons, F.L.S.)
2. "An Account of the Jamaican Species of *Lepanthes*." By Mr. W. Fawcett, F.L.S., and Dr. A. B. Rendle, F.L.S.
3. "On the Blaze-Currents of Vegetable Tissues." By Dr. A. D. Waller, F.R.S. (Communicated by Prof. J. B. Farmer, F.L.S.)
4. "On some New and little-known British Freshwater Rhizopoda." By James Cash. (Communicated by J. Hopkinson, F.L.S.)
5. "The Place of Linnæus in the History of Botany." By P. Olsson Seffer. (Communicated by B. Daydon Jackson, F.L.S.)

ABSTRACTS.

April 21st, 1904.

Mr. R. Morton Middleton, F.L.S., exhibited a holograph letter from Linnæus to Haller, of which the following is a copy:—

Viro Illustri
DD ALB: HALLERO
Medico & Botanico Consumatissimo
S[alutem] pl[urimam] d[icit]
Carolus Linnæus.

Cum ante octiduum Stockholmiæ eram, Academia Regia Scientiarum Stockholmensis Membra extranea denominavit; uti Gesnerum, Jussiaeum, Te, Gmelinum, Sauvagesium, Claytonum, Collinsonum, Swietenium. mihi in mandatis dedit prædicta Societas et Academia, ut Te hisce literis perofficiose vocarem, et invitarem; hocce, levidense licet, animi mei pignus non respuas, qui natus es in Scientiarum reformationem atque restitutionem. Quod si benigne excipias literas mittas ad Academiam Regiam Scientiarum Stockholmiae, ipsique significes Te hasce meas accepisse. Vale.

Dabam Upsaliæ 1747.
D. 12 Maii.

The address is as follows:—

Medico & Botanico Summo
DD ALB: HALLER
Archiatro, Consiliano & Professori
Societ. Scient. Upsal. & Stockholm. Soc. [sic]
Göttingen.

This letter was printed in Latin in 'Epistolarum ab Eruditis Viris ad Alb. Hallerum,' published at Berne in 1773, vol. ii. p. 326. It is also printed in Smith's 'Correspondence of Linnæus,' vol. ii. p. 415. The seal, of red wax, is still sharp; it is engraved in the Memoir of Linnæus published at Upsala and Stockholm in 1823. The device upon this seal is *Linnæa borealis* within a ring round which two snakes are twisted as supporters. Motto, "Dioscorides Secundus." Above the ring is an open book, bearing on the dexter page the motto "Nunquam otiosus," while on the sinister side the sun sheds its rays from the upper corner.

The letter had been of late years in the possession of a clergyman

in the North of England. It is of considerable interest, as having made Linné and Haller friends again after a misunderstanding.

Mr. Middleton also stated that he had recently had an opportunity of examining the fine series of letters from Linnæus in the British Museum, 45 in number, viz.:—

2 early ones to Sir Hans Sloane, 1736, 1737;
1 to da Costa, 1759;
2 to Solander, 1760, 1762;
3 to Carburi, 1763;
37 to Gouan, 1765 to 1771.

45

Of these, one only (that to da Costa) appears to be printed in Smith's 'Correspondence.' One to Gouan (1766) has a pencil drawing of *Siren lacertina*. All are dedicated and signed at the beginning (like the one to Haller above quoted) until December 1768, when the first signature at the end occurs. One (12th December, 1770) is dated at the top, according to modern custom.

June 16th, 1904.

Calculi from the Horse. By R. Brooks Popham, F.L.S.

The stones, presented to the owner by the late Mr. Young, M.R.C.V.S., were obtained *post-mortem*. The two largest are from an animal used in a coal-cart, a smaller specimen broken up (not shown) proved the nucleus to be composed of a small piece of coal, evidently eaten with the food. The animal died of enteritis.

The third stone, with all the loose ones, are from another animal, showing facets well marked, and the nucleus in one broken open. Over a hundred of these smaller ones may be sometimes found in the same horse.

The ordinary intestinal concretion of horses is the triple phosphate, and invariably with a foreign body for a nucleus—a pebble for instance,—and are found in stomach, cæcum, or other part of intestinal canal, the phosphate of magnesia contained in wheat, oats, and hay helping to the production. Another common method of formation is the swallowing of hair from the coat of animals repeatedly licking themselves, forming "hair-balls," which are covered by earthy crust and found in the stomach and alimentary canal of cows, goats, etc. In the Royal Coll. of Surgeons Museum there is one of this description measuring 40 inches in circumference.

ADDITIONS AND DONATIONS

TO THE

LIBRARY.

1903–1904.

Albany Museum. *See* **Grahamstown,** South Africa.

Albert, Honoré Charles (*Prince de Monaco*). Résultats des Campagnes Scientifiques accomplies sur son Yachts [*l'Hirondelle* et la *Princesse-Alice*]. Fascicules 23–26. 4to. *Monaco*, 1903–04.

XXIII. Bryozoaires provenant des Campagnes de l'*Hirondelle* (1886-88). Par Jules Jullien et Louis Calvet. (1903.)

XXIV. Recherches sur l'existence normale de l'arsenic dans l'organisme. Par Gabriel Bertrand. (1903.)

XXV. Spongiaires des Açores (l'*Hirondelle* et la *Princesse-Alice*). Par Emile Topsent. (1904.)

XXVI. Mollusques Hétéropodes provenant des Campagnes des Yachts *Hirondelle* et *Princesse-Alice*. Par A. Vayssière. (1904.)

Ameghino (Florentino). Los Diprotodontes del orden de los Plagiaulacoideos y el origin de los Roedores y de los Polimastodontes. Pp. 111, figs. 121. (Anales Mus. Nac. Buenos Aires, ix. pp. 81–192.) 8vo. *Buenos Aires*, 1903. **Author.**

—— Recherches de Morphologie Phylogénétique sur les Molaires supérieures des Ongulés. Pp. 541, figs. 631. (Anales Mus. Nac. Buenos Aires, ix.) 8vo. *Buenos Aires*, 1904.

André (Edmond) and André (Ernest). Spécies des Hyménoptères d'Europe et d'Algérie.—Vol. VII. *Cynipides*. Par J. J. Kieffer. 8vo. *Paris*, 1897–1900.

Apstein (Carl). *See* **Nordisches Plankton**: Salpen und Cladoceren.

Arkle (J.). A List of Lepidoptera found in the Counties of Cheshire, Flintshire, Denbighshire, Carnarvonshire, and Anglesea. *See* **Chester Society of Nat. Sci. &c.**: Proc. No. 5.

Ashworth (J. H.). *Arenicola* (The Lug-Worm). Pp. viii, 118; plates 8. *See* **Liverpool Marine Biology Committee,** Memoir xi.

Babington (Charles Cardale). Manual of British Botany, by the late C. C. Babington. 9th edition. Edited by Henry and James Groves. Pp. lii, 580. 8vo. *London*, 1904. **H. & J. Groves.**

Bagnall (James Eustace). The Flora of Staffordshire. Pp. 74. (Issued as a Suppl. to Journ. Bot. vol. xxxix.) 8vo. *London*, 1901.

Bailey (Frederick Manson). Contributions to the Queensland Flora. (Queensl. Agric. Journ. 1903, 1904.) 8vo. *Brisbane*, 1903–04. **Author.**

Bailey (F. M.). Contributions to the Flora of British New Guinea. Pp. 3; & plates 3. Fol. *Brisbane*, 1903. **Author.**

Balfour (Isaac Bayley). *See* **Schimper (Andreas Franz Wilhelm).** Plant-Geography upon a Physiological Basis.

Barton (Ethel) (*Mrs. A. Gepp*). The Marine Algæ, with a Note on the Fructification of *Halimeda*. *See* **London Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Bastian (Henry Charlton). Studies in Heterogenesis. Parts 1–4. Pp. ix, 354; plates 19. Append. I.–III. pp. i–xxxvii. 8vo. *London*, 1901–03. **Author.**

Bateson (William). Variation and Differentiation in Parts and Brethren. Pp. 23. 4to. *Cambridge*, 1903. **Author.**

Bauhin (Jean). *See* **Legré (Ludovic).** La Botanique en Provence au XVI^e^ Siècle.

Bayley (William Shirley). The Menominee Iron-bearing District of Michigan. Pp. 513; plates 43. (U.S. Geol. Surv. Monogr. 46.) 4to. *Washington*, 1904.

Beiträge zur Kryptogamenflora der Schweiz (*continued*).

Band I. Heft 3. Chodat (Robert). Algues vertes de la Suisse. Pleurococcoïdes–Chroolépoides. Pp. xiii, 373; figs. 264. 1902.

„ II. Heft 1. Martin (Charles Ed.). Le *Boletus subtomentosus* de la Région Genevoise. Essai de Monographie. Pp. ix, 39; col. plates 18. 1903.

[**Bell** (*Rev.* **Edward**).] The Primrose and Darwinism. Pp. xiii, 233; figs. 23. 8vo. *London*, 1902.

Berlin.

Das Tierreich. Herausgegeben von der Deutschen Zoologischen Gesellschaft. Generalredakteur: Franz Eilhard Schulze. Liefg. 20. 8vo. *Berlin*, 1904.

Liefg. 20. Nemertini, von Otto Bürger. 1904.

Berthold (Gottfried D. W.). Untersuchungen zur Physiologie der pflanzlichen Organisation. Teil II. Hälfte 1. Pp. iv, 257. 8vo. *Leipzig*, 1904.

Bewick (Thomas). Memorial Edition of Thos. Bewick's Works. 5 vols. Roy. 8vo. *London*, 1885–87. **John Hopkinson.**

Vol. I. British Land Birds. Pp. xxxix, xxxvi, 374. (1885.)
„ II. British Water Birds. Pp. xxiii, 406. (1885.)
„ III. Quadrupeds. Pp. xi, 526. (1885.)
„ IV. Æsop's Fables. Pp. xxiv, 376. (1885.)
„ V. Memoir of Thos. Bewick, written by himself. A new Edition, Prefaced and Annotated by Austin Dobson. Pp. xxxiii, 365. (1887.)

Bibliotheca Botanica (*continued*).

Heft 60. Ursprung (Alfred). Die physikalischen Eigenschaften der Laubblätter. Pp. 120, mit 27 Figuren im Texte und 9 Tafeln. 1903.

„ 61. Freidenfelt (T.). Der anatomische Bau der Wurzel in seinem Zusammenhange mit dem Wassergehalt des Bodens. (Studien über die Wurzeln krautiger Pflanzen, II.) Pp. 118, mit 7 Textfiguren und 5 Tafeln. 1904.

Bibliotheca Zoologica (*continued*).

Band XVII. Heft 40. Strassen (Otto L. zur). Geschichte der T-Riesen von *Ascaris megalocephala*. Teil I. Pp. 37, mit 5 Tafeln & 12 Fig. im Texte. 1903.

„ „ 41. Müller (H.). Beitrag zur Embryonalentwickelung der *Ascaris megalocephala*. Pp. 30, mit 5 Tafeln und 12 Textfiguren. 1903.

Biedermann (Wilhelm). Die Schillerfarben bei Insekten und Vögeln. (Denkschr. medic.-naturw. Ges. Jena, xi. Festschrift). fol. *Jena*, 1904.

Bingley (William). Memoirs of British Quadrupeds, illustrative principally of their habits of life, instincts, sagacity, and uses to mankind; arranged according to the system of Linnæus. 8vo. *London*, 1809.

—— A Synopsis of British Quadrupeds. [Published in the Memoirs of British Quadrupeds.] 8vo. *London*, 1809. **F. Justen.**

Blau (Johannes). Vergleichend-anatomische Untersuchung der schweizerischen *Juncus*-Arten. Inaugural-Dissertation. Pp. 82; plates 4. 8vo. *Zürich*, 1904. **Dr. Hans Schinz.**

Bolus (Harry) and **Wolley-Dod (Anthony Hurt)**. A List of the Flowering Plants and Ferns of the Cape Peninsula, with Notes on some of the Critical Species. Pp. 167. (Trans. South Afric. Phil. Soc. xiv., Part 3.) 8vo. *Cape Town*, 1903. **Authors.**

Borgert (Adolf). *See* **Nordisches Plankton**: Dolioliden und Tripyleen.

Boulay (Jean Nicolas). Muscinées de la France. 8vo. *Paris*, 1884–1904.

Part I. Mousses. Pp. clxxiv, 624.
„ II. Hépatiques. Pp. clxviii, 224.

Braus (Hermann). Tatsächliches aus der Entwickelung des Extremitätenskelettes bei den niedersten Formen. Zugleich ein Beitrag zur Entwickelungsgeschichte des Skelettes der Pinnae und der Visceralbögen. (Denkschr. medic.-naturw. Ges. Jena, xi. Festschrift.) fol. *Jena*, 1904.

British Museum (*continued*).

Catalogue of the British Echinoderms in the British Museum (Natural History). By F. Jeffrey Bell. Pp. xvii, 202; plates 16. 8vo. *London*, 1892.

Britten (James) and **Boulger (George Simonds)**. Biographical Index of British and Irish Botanists. (Journ. Bot. vols. 36, 37.) 8vo. *London*, 1899.

Bürger (Otto). *See* **Berlin**—Das Tierreich. Liefg 20. Nemertini.

Bullen (Robert Ashington). A Late Keltic Cemetery at Harlyn Bay. Pp. 16: figs. 8. (Trans. South Eastern Union of Scientific Societies, 1903.) 8vo. *London*, 1903. **Author.**

—— Descriptions of new Species of Non-Marine Shells from Java, and a new Species of *Corbicula* from New South Wales. Pp. 3 & 1 plate. (Proc. Malacol. Soc. vi.) 8vo. *London*, 1904. **Author.**

Bulliard (Pierre). Herbier de la France, ou Collection complette des Plantes indigènes de ce Royaume, &c. 602 pls. col. 13 Ann. [in 6 vols.]. fol. *Paris*, 1780–[93]. **Frank Crisp.**

—— Dictionnaire élémentaire de Botanique &c. Nouvelle édition &c. Pp. xii, 242; pls. 10 col.
fol. *Paris*, An. vi. [1797]. **Frank Crisp.**

—— Histoire des Plantes vénéneuses et suspectes de la France &c. Pp. x, 177. fol. *Paris*, 1784. **Frank Crisp.**

—— Histoire des Champignons de la France, &c.
Vol. I. Pp. xvi, 368, ix.
„ II. Pp. 369–700.
fol. *Paris*, 1791–1812. **Frank Crisp.**

Byrne (W. L.). The British and Irish Gobies. *See* **Holt (Ernest W. L.).**

—— On a Young Stage of the White Sole, *Pleuronectes* (*Glyptocephalus*) *cynoglossus*. *See* **Holt (Ernest W. L.).**

Calkins (Gary N.). The Protozoa. (Columbia Univ. Biol. ser. vi.) Pp. xvi, 347; figs. 153. 8vo. *New York & London*, 1901.

Calvet (Louis). Bryozoaires ('Hirondelle'). *See* **Albert.**

Cambridge Natural Science Manuals. Biological Series. General Editor—Arthur E. Shipley. 8vo. *Cambridge*, 1895–
Classification of Flowering Plants. By Alfred Barton Rendle. Vol. I. Gymnosperms and Monocotyledons. Pp. xiv, 402; figs. 187. (1904.)

Cameron (John). Note on the Introduction, Cultivation, and Propagation of *Agave rigida* var. *sisalana*, in the Lal-Bagh, Bangalore. Pp. 2. fol. *Bangalore*, 1904. **Author.**

Canada.
Geological Survey.
Altitudes in the Dominion of Canada, with a Relief Map of North America. By James White. Pp. x, 266.
8vo. *Ottawa*, 1901.

Candolle (Anne Casimir Pyramus de). L'Herbier de Gaspard Bauhin. Pp. 82 & portrait. (Bull. l'Herb. Boissier, 2me Sér. iv.) 8vo. *Genève*, 1904. **Author.**

Cape of Good Hope.
Department of Agriculture.
Marine Investigations in South Africa. Vol. I.–
8vo. *Cape Town*, 1902–03.

—— Report of the Marine Biologist for the year 1901–1902. By John D. F. Gilchrist. 8vo. *Cape Town*, 1902–03. **J. D. F. Gilchrist.**

Carnegie Intitution. Desert Botanical Laboratory of the. *See* **Washington.**

Casey (George Edward Comerford). Riviera Nature Notes. Pp. xx, 373. 8vo. *Manchester*, 1898.

—— —— Second Edition. Pp. xv, 402, figs. 124.
8vo. *London*, 1903. **Sir Thos. Hanbury.**

Chamberlain (Charles Joseph). *See* **Coulter (John Merle).** Morphology of Angiosperms and Spermatophytes. (Morphology of Spermatophytes, Part II.)

Chapman (Frederick). Foraminifera and Ostracoda from the Cretaceous of East Pondoland, South Africa. Pp. 17, plate 1. (Ann. South African Mus. iv.) 8vo. *Cape Town*, 1904.

—— On some Foraminifera and Ostracoda from Jurassic (Lower Oolite) Strata, near Geraldton, Western Australia. Pp. 22, plates 2. (Proc. Roy. Soc. Victoria, xvi.)
8vo. *Melbourne*, 1904.

—— On a Collection of Upper Palæozoic and Mesozoic Fossils from West Australia and Queensland, in the National Museum, Melbourne. Pp. 30, plates 4. (Proc. Roy. Soc. Victoria, xvi.)
8vo. *Melbourne*, 1904.

—— New or Little-known Victorian Fossils in the National Museum. Part III. Some Palæozoic Pteropoda. Pp. 7, plate 1. (Proc. Roy. Soc. Victoria, xvi.)
8vo. *Melbourne*, 1904. **Author.**

Cherler (Jean Henri). *See* **Legré (Ludovic).** La Botanique en Provence au XVI^e^ Siècle.

Chester.

Chester Society of Natural Science, &c.

Proceedings, No. 5. A List of Lepidoptera found in the Counties of Cheshire, Flintshire, Denbighshire, Carnarvonshire, and Anglesea. Compiled and Edited by George O. Day, with the assistance of J. Arkle, Herbert Dobie, and Robert Newstead. 8vo. *Chester*, 1903.
A. O. Walker.

Clements (J. Morgan). The Vermilion Iron-bearing District of Minnesota, with an Atlas. Pp. 463; plates 13, figs. 23. (U.S. Geol. Surv., Monogr. 45.) 4to. *Washington*, 1903.
Atlas fol. *Washington*, 1903.

Collins (G. N.). The Mango in Porto Rico. Pp. 36; plates 15. (U.S. Dept. Agric., Bureau Plant Industry, Bull. No. 28.)
8vo. *Washington*, 1903.

Colombo (The) Museum, Ceylon. *See* **Spolia Zeylanica.**

Cooke (Theodore). The Flora of the Presidency of Bombay. Vol. II. Part I. Compositæ to Boraginaceæ. Pp. 216.
8vo. *London*, 1904.

Coulter (John Merle) and **Chamberlain (Charles Joseph).** Morphology of Angiosperms. (Morphology of Spermatophytes, Part II.) Pp. x, 348; figs. 113.
8vo. *New York & London*, 1903.

—— —— Morphology of Spermatophytes. Pp. x, 188; figs. 106. 8vo. *New York & London*, 1903.

Coville (Frederick Vernon). *See* **Washington.** Carnegie Institution.

Cowan (Thomas William). The Honey Bee: its Natural History, Anatomy, and Physiology. 2nd Edition. Pp. xii, 220. Illustrated with 73 Figures and 138 Illustrations.
8vo. *London*, 1904. **Author.**

Crossland (Charles). The Fungus Flora of the Parish of Halifax. Pp. viii, 70, & 2 pls. col. (Reprint from the 'Flora of Halifax' by W. B. Crump and C. Crossland. Pp. 237–306.)
8vo. *Halifax*, 1904. **Author.**

Cussans (Margaret). *Gammarus.* Pp. viii, 47; plates 4. *See* **Liverpool Marine Biology Committee**, Memoir xii.

Darwinism, Doubts about, by a Semi-Darwinian. *See* **Morrison (Charles).**

David (Alexander J.). *See* **Dyer (Bernard).** Fertilisers and Feeding Stuffs, their Properties and Uses.

Day (George O.). A List of Lepidoptera found in the Counties of Cheshire, Flintshire, Denbighshire, Carnarvonshire, and Anglesea. *See* **Chester Soc. of Nat. Sci.** &c., Proc. No. 5.

Diener (Carl). Permian Fossils of the Central Himalayas. (Palæontol. Ind., Ser. xv.: Himalayan Fossils. Vol. i. part 5.)
fol. *Calcutta*, 1903.

Dobie (Herbert). A List of Lepidoptera found in the Counties of Cheshire, Flintshire, Denbighshire, Carnarvonshire, and Anglesea. *See* **Chester Society of Nat. Sci.** &c., Proc. No. 5.

Dobson (Austin). A Memoir of Thomas Bewick, written by himself. A new Edition Prefaced and Annotated. Pp. xxxiii, 393. *See* **Bewick (Thomas)**, Memorial Edition, vol. v.

Dohrn (Anton). Studien zur Urgeschichte des Wirbelthierkörpers. (Mittheil. Zool.-Station Neapel, xvii.) 8vo. *Berlin*, 1904.

Dourez (Valerand). *See* **Legré (Ludovic).** La Botanique en Provence au XVI^e^ Siècle.

Drummond (James). *See* **Hutton (Frederick Wollaston).** The Animals of New Zealand.

Dublin.
Guinness Research Laboratory.
Transactions, Vol. I. Part 1. 8vo. *Dublin*, 1903.
A. Guinness, Son & Co.

Düggeli (Max). Pflanzengeographische und wirtschaftliche Monographie des Sihltales bei Einsiedeln. Pp. 222, 4 plates. (Vierteljahrschr. Naturf. Ges. Zürich, Jahrg. 48.)
8vo. *Zürich*, 1903.

Duthie (John F.). Flora of the Upper Gangetic Plain, and of the Adjacent Siwalik and Sub-Himalayan Tracts. Vol. I. Part. 1. Ranunculaceæ to Cornaceæ. Pp. xvii, 403, & 1 Map.
8vo. *Calcutta*, 1903. **Author.**

Dyer (Bernard). Fertilisers and Feeding Stuffs, their Properties and Uses. With the full text of the Fertilisers and Feeding Stuffs Act, 1893, the Regulations and Forms of the Board of Agriculture and Notes on the Act, by A. J. David. Pp. x, 124.
4th Edition. 8vo. *London*, 1903. **Author.**

Edmondston (Thomas). Flora of Shetland. Second Edition—Natural Classification. Edited and Revised by C. F. Argyll Saxby. Also a Biographical Sketch compiled from his Mother's Life of Thomas Edmondston. Pp. 102; 1 plate and portrait. 8vo. *Edinburgh & London*, 1903. **C. F. Argyll Saxby.**

Edwards (Henri Milne). Cours élémentaire d'Histoire Naturelle. Zoologie. 7me édition. 8vo. *Paris*, 1855.

Eggeling (Heinrich). Zur Morphologie des Manubrium sterni. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Elliot (George Francis Scott). Can the British Empire be made Self-supporting? Pp. 17. (Proc. Roy. Phil. Soc. Glasgow.) 8vo. *Glasgow*, 1903. **Author.**

Engler (Adolf). Ueber die Vegetationsformationen Ost-Afrikas auf Grund einer Reise durch Usambara zum Kilimandscharo. Vortrag gehalten am 7. März 1903. (Zeitschr. f. Erdkunde, Berlin, Jahrg. 1903, Nos. 4, 6.) 8vo. *Berlin*, 1903. **Author.**

Essex and Kent Sea Fisheries Committee. *See* **Sea Fisheries.**

Farran (G. P.). Record of the Copepoda taken on the Mackerel Fishing Grounds off Cleggan in 1901. Pp. 18; plates 2. (Rep. Sea and Inland Fisheries of Ireland for 1901.) 8vo. *Dublin*, 1903.

—— The Nudibranchiate Molluscs of Ballynakill and Bofin Harbours, Co. Galway. Pp. 10; plates 2. (Rep. Sea and Inland Fisheries of Ireland for 1901.) 8vo. *Dublin*, 1903. **Author.**

Fedtschenko (Olga). Trois espèces nouvelles du Genre *Eremurus*. Pp. 4. (Bull. l'Herb. Boissier, 2me sér. iv.) 8vo. *Genève*, 1904. **Author.**

Fenner (C. A.). Beiträge zur Kenntnis der Anatomie, Entwicklungsgeschichte und Biologie der Laubblätter und Drüsen einiger Insektivoren. Inaugural-Dissertation. Pp. 104; plates 16. (Flora, Bd. 93.) 8vo. *München*, 1904. **Dr. Hans Schinz.**

Fischer (Alfred). Untersuchungen über den Bau der Cyanophyceen und Bakterien. Pp. ix, 136; Tafeln 3. 8vo. *Jena*, 1897.

Fisher (William R.). *See* **Schimper (Andreas Franz Wilhelm).** Plant-Geography upon a Physiological Basis.

Fleischer (Max). Die Musci der Flora von Buitenzorg. (Zugleich Laubmoosflora von Java.)

Bd. I. Pp. xxxi, 1-379, figs. 1-71. 1900-1902.
Bd. II. Pp. xviii, 381-643, figs. 72-121. 1902-1904.
(Flore de Buitenzorg, Part 5.)
8vo. *Leiden*, 1900–1904.

Fletcher (James). Canada Department of Agriculture Central Experimental Farm. Report of the Entomologist and Botanist. (Ann. Rep. Exper. Farm, 1893.) Pp. 55; figs. 23. 8vo. *Ottawa*, 1904. **Author.**

Flora of Preston and Neighbourhood. Compiled by the Members of the Botanical Section of the Preston Scientific Society during the Years 1897–1902. 8vo. *Preston*, 1903.

Flore de Buitenzorg, publiée par le Jardin Botanique de l'État. Parts 1–5. 8vo. *Leide*, 1898–1904.

I. Raciborski (Maryan). Die Pteridophyten. Pp. xii, 255. 1898.
II. Penzig (Ottone). Myxomycètes. Pp. 83. 1898.
III. Wildeman (Émile de). Les Algues. Pp. xi, 457; plates 16, figs. 149. 1900.
IV. Schiffner (Victor). Les Hépatiques. Pp. 220. 1900.
V. Fleischer (Max). Les Muscinées. Band I. Sphagnales; Bryales (Arthrodontei [Haplolepideæ]). Pp. xxxi, 379; figs. 1–71. 1900–1902.
V. Fleischer (Max). Les Muscinées. Band II. Bryales (Arthrodontei [Diplolepideæ i. p.]). Pp. xviii, 381–643; figs. 72–121. 1902–1904.

Flückiger-Bibliothek, Katalog der, im Pharmazeutischen Institute der Universität Strassburg. Pp. 159. 8vo. *Strassburg-i.-E.*, 1904.

Ford (Charles). *Cassia lignea* (*Cinnamomum Cassia*, Blume). Pp. 9. fol. *Hongkong*, 1882.

Foslie (M. H.). The Corallinaceæ of the Siboga-Expedition. *See* **Siboga-Expeditie.** Monogr. 61.

Freidenfelt (T.). Der anatomische Bau der Wurzel in seinem Zusammenhange mit dem Wassergehalt des Bodens (Studien über die Wurzeln krautiger Pflanzen, II.). Pp. 118, mit 7 Textfiguren und 5 Tafeln. (Bibl. Bot. Heft 61.) 4to. *Stuttgart*, 1904.

Fries (Theodor Magnus). Linné: Lefnadsteckning. 2 vols. 8vo. *Stockholm*, 1903. **Author.**

Fürbringer (Max). Zur Frage der Abstammung der Säugetiere. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Gage (Andrew Thomas). A Census of the Indian Polygonums. (Rec. Bot. Surv. India, vol. ii. no. 5.) 8vo. *Calcutta*, 1903.

—— The Vegetation of the District of Minbu in Upper Burma. Pp. 141, and Map. (Rec. Bot. Surv. India, vol. iii. no. 1.) 8vo. *Calcutta*, 1904.

Garden (The). Vols. 63, 64. 4to. *London*, 1903. **Editors.**

Gardeners' Chronicle. 3 ser. Vols. 33, 34. fol. *London*, 1903. **Editor.**

Gardiner (John Stanley). South African Corals of the Genus *Flabellum*, with an Account of their Anatomy and Development. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Gerard (John). The Old Riddle and the Newest Answer. Pp. x, 293. 8vo. *London*, 1904. **Author.**

Gerassimow (Johann J.). Zur Physiologie der Zelle. Pp. 134; plate 1. (Bull. Soc. Impér. Nat. Moscou, n.s. xviii.) 8vo. *Moscow*, 1904. **Author.**

Gilbert (*Sir* Joseph Henry). History, and Present Position of the Rothamsted Investigations. Pp. 74. 8vo. *London*, 1891.

Gilbert (*Sir* **Joseph Henry**). Agricultural Investigations at Rothamsted, England, during a Period of Fifty Years. Pp. 316. (Bull. no. 22, U.S. Dept. Agric. Exp. Stat.)
8vo. *Washington*, 1895. **Lawes Agric. Trust.**

—— *See* **Lawes** (*Sir* **John Bennet**). Rothamsted Memoirs, &c.

Gilchrist (**John Don Fisher**). Catalogue of Fishes recorded from South Africa. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Observations on the Temperature and Salinity of the Sea Around the Cape Peninsula. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Descriptions of New South African Fishes. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Development of South African Fishes. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— *See* **Cape of Good Hope: Dept. of Agric.** Report of the Government Biologist.

Glasgow.

Marine Biological Association of the West of Scotland, formerly the Millport Marine Biological Station. Annual Report for 1903. 8vo. *Glasgow*, 1894.

Goeppert (**Ernst**). Der Kehlkopf von *Protopterus annectens* Owen. Anatomische Untersuchung. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Gordon (**Maria M. Ogilvie**). The Geological Structure of Monzoni and Fassa. Pp. x, 179; plates 20. (Trans. Edinb. Geol. Soc. viii.) 8vo. *Edinburgh*, 1903. **Author.**

Graff (**Ludwig von**). Die Turbellarien als Parasiten und Wirte. Herausgegeben als Festschrift der K.-K. Karl-Franzens-Universität in Graz für das Jahr 1902. Pp. vi, 66; mit 1 Textfigur und 3 Tafeln. 4to. *Graz*, 1903.

Grahamstown, South Africa.

Albany Museum.

Records. Vol. I. parts 1, 2. 8vo. *Grahamstown*, 1903–1904.

Groom (**Percy**). *See* **Schimper** (**Andreas Franz Wilhelm**). Plant-Geography upon a Physiological Basis.

Groves (**Henry**). *See* **Babington** (**Charles Cardale**). Manual of British Botany. 9th edition.

Groves (**James**). *See* **Babington** (**Charles Cardale**). Manual of British Botany. 9th edition.

Guinness Research Laboratory. *See* **Dublin.**

Haberlandt (**Gottlieb**). Physiologische-Pflanzenanatomie. Dritte, neubearbeitete und vermehrte Auflage. Pp. xvi, 616; mit 264 Abbildungen im Text. 8vo. *Leipzig*, 1904.

Haeckel (**Ernst Heinrich**). Anthropogenie oder Entwickelungsgeschichte des Menschen, Keimes- und Stammes-Geschichte. Fünfte umgearbeitete und vermehrte Auflage. 2 vols., pp. xxvi, 992; mit 30 Tafeln, 512 Textfiguren und 60 genetischen Tabellen. 8vo. *Leipzig*, 1903.

Haeckel (E. H.). Kunst-Formen der Natur. Hefte 1–11. 4to. *Leipzig & Wien*, 1899–1904. **Author.**

Hampstead.
Hampstead Scientific Society.
Report for 1903. 8vo. *Hampstead*, 1904.

Hansemann (David). Studien über die Spezificität, den Altruismus und die Anaplasie der Zellen mit besonderer Berücksichtigung der Geschwülste. Pp. 96; mit 13 Tafeln und 2 Figuren im Text. 8vo. *Berlin*, 1893.

Hansen (Emil Christian). Grundlinien zur Systematik der Saccharomyceten. Pp. 10. (Centralbl. f. Bakt., Parasit. u. Insektionskr. Abt. ii, Bd. xii.) 8vo. *Berlin*, 1904. **Author.**

Harrison (J. H. S.). Notes on Botanical Types. Pp. 72. 8vo. *London*, 1900.

—— Botany Laboratory Notes. Pp. 70. 8vo. *London*, 1901.

—— Plant Physiology; Practical and Theoretical. Pp. 85; plates 2. 8vo. *London*, 1904. **Author.**

Hemsley (William Botting). On *Itoa*, a new Genus of Bixineæ; with an Introductory Note by Tokutaro Ito. Pp. 2. (Tokyo Bot. Mag. xv.) 8vo. *Tokyo*, 1901. **Tokutaro Ito.**

Henslow (*Rev.* George). South African Plants, for the Use of Beginners, Students and Teachers. Pp. ix, 300; figs. 112. 8vo. *London*, 1903. **Author.**

Herdman (William Abbott). Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Hertwig (Oscar). Ueber eine Methode, Froscheier am Beginn ihrer Entwickelung im Raume so zu orientieren, das sich die Richtung ihrer Teilebenen und ihr Kopf- und Schwanzende bestimmen läst. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Hertwig (Richard). Ueber physiologische Degeneration bei *Actinosphærium Eichhorni*. Nebst Bemerkungen zur Aetiologie der Geschwülste. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Hescheler (Karl). *See* **Lang (Arnold).** Lehrbuch der vergleichenden Anatomie der Wirbellosen Thiere. Lief. I. Mollusca.

Hesse (Oswald). Beitrag zur Kenntnis der Flechten und ihrer charakteristischen Bestandteile. (8te Mitteilung.) Pp. 71. (Journ. f. praktische Chemie, N. F. Bd. 68.) 8vo. *Leipzig*, 1903. **Author.**

Heurck (Henri van). Synopsis des Diatomées de Belgique. 4 vols. 8vo. *Anvers*, 1880–85.

2 vols. Plates 135. (1880-81.)
1 vol. Table Alphabétique. Pp. 120. (1884.)
1 vol. Text. Pp. 235. (1885.)

Hickson (Sydney John). The Alcyonaria and Hydrocorallinæ of the Cape of Good Hope. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Hill (Matthew Davenport) and **Webb (Wilfred Mark)**. Eton Nature-Study and Observational Lessons. With a Foreword by the Rev. EDMOND WARRE. Part I. Pp. xviii, 155; figs. 134. 4to. *London*, 1903. **Publishers.**

Hinde (George Jennings). On the Structure and Affinities of the Genus *Porosphæra*, Steinmann. Pp. 25; plates 2. (Journ. Roy. Microsc. Soc. 2 ser. xxiv.) 8vo. *London*, 1904. **Author.**

Hissink (*Dr.* D. J.). Verslag omtrent de op deli in 1902 genomen bemestingsproeven en omtrent grondanalyses van deligronden. Deel IV. Pp. 64. (Mededeel. 's Lands Plantentuin Buitenzorg, lxx.) 8vo. *Batavia*, 1904.

Holt (Ernest W. L.) and **Byrne (W. L.)**. The British and Irish Gobies. Pp. 30; plates 2. (Rep. Sea and Inland Fisheries of Ireland for 1901.) 8vo. *Dublin*, 1903.

—— On a Young Stage of the White Sole, *Pleuronectes* (*Glyptocephalus*) *cynoglossus*. Pp. 3; plate 1. (Rep. Sea and Inland Fisheries of Ireland for 1901.) 8vo. *Dublin*, 1903. **Author.**

Hooker (*Sir* Joseph Dalton). A Sketch of the Flora of British India. Pp. 55. 8vo. *London*, 1904. **Author.**

Hope Reports. (A Series of reprints and extracts from various Journals, reissued for private Circulation.) Edited by EDWARD B. POULTON. Vols. I.–IV. 1893–1903. 8vo. *Oxford*, 1897–1903. **E. B. Poulton.**

Houard (C.). Recherches anatomiques sur les Galles de Tiges: Pleurocécidies. (Bull. Scient. de la France et Belg. vol. 38.) 8vo. *Paris*, 1904.

Howell (F. J.). Co-operative Forage Experiments in Southern Victoria. Pp. 28; plates 13. (Journ. Agric. Victoria, vol. ii. part 2.) 8vo. *Melbourne*, 1903.

—— Two Years' Field Work of the Chemical Branch. Pp. 22; plate 1. (Journ. Agric. Victoria, vol. ii. part 2.) 8vo. *Melbourne*, 1903. **Author.**

Hügel (Anatole von). Life of CHARLES VON HÜGEL. April 25, 1795—June 2, 1870. Pp. xx, 76; plates 9. 4to. *Cambridge*, 1903. **Author.**

Hügel (Carl Alexander Anselm von). Life of, April 25, 1795—June 2, 1870, by ANATOLE VON HÜGEL. Pp. xx, 76; plates 9. 4to. *Cambridge*, 1903. **Author.**

Humphrey (James Ellis). *See* **Zimmermann (Albrecht)**. Botanical Microtechnique.

Hunger (F. W. T.). Statistick over den regenval van de tabaksondernemingen ter Sumatra's oostkust. Pp. xvi, 246. 8vo. *Batavia*, 1904.

Hutton (Frederick Wollaston) and **Drummond (James)**. The Animals of New Zealand, an Account of the Colony's Air-breathing Vertebrates. Pp. xiv, 381; with 147 illustrations. 8vo. *Christchurch &c.*, 1904. **F. W. Hutton.**

Hyatt (Alpheus). Pseudoceratites of the Cretaceous. Pp. 350; plates 47. (U.S. Geol. Surv. Monogr. 44.) 4to. *Washington*, 1903.

Ihering (Hermann von). Biologie der Honigbienen Brasiliens. Pp. 109, mit 13 Tafeln. (Spengel, Zool. Jahrb. Abt. Syst. xix.) 8vo. *Jena*, 1903.

India.
Geological Survey.
Memoirs (Palæontologia Indica).
Ser. IX. The Jurassic Fauna of Cutch.
Vol. III. Part 2. The Lamellibranchiata; No. 1, Genus *Trigonia*. By Finlay Lorimer Kitchin.
fol. *Calcutta*, 1903.
Ser. XV. Himalayan Fossils.
Vol. I. Part 5. Permian Fossils of the Central Himalayas. By Carl Diener. 1903.
fol. *Calcutta*, 1903.

Ito (Tokutaro). Plantæ Sinenses Yoshianæ. Section I. (Tokyo Bot. Mag. xiv.) 8vo. *Tokyo*, 1900.

—— New Lessons in Elementary Botany [in Japanese]. 8vo. *Tokyo*, 1903. **Author.**

—— *See* **Hemsley (William Botting).** On *Itoa*, a new Genus of Bixineæ.

Jensen (Adolf Severin). The Fishes of East Greenland. Pp. 62; plates 3. (Meddelelser om Grönland, xxix.) 8vo. *Copenhagen*, 1904. **Author.**

Journal of Botany. Vol. 41. 8vo. *London*, 1903. **Jas. Britten.**

Jullien (Jules). Bryozoaires ('Hirondelle'). *See* **Albert.**

Katalog der Flückiger-Bibliothek im Pharmazeutischen Institute der Universität Strassburg. Pp. 159. 8vo. *Strassburg i./E.*, 1904.

Kent and Essex Sea Fisheries Committee. *See* **Sea Fisheries Committee.**

Key (Axel) und Retzius (Gustaf). Studien in der Anatomie des Nervensystems und des Bindegewebes. I., II. fol. *Stockholm*, 1875–76. **Prof. G. Retzius.**

Kidd (Walter Aubrey). The Direction of Hair in Animals and Man. Pp. xii, 154; figs. 33. 8vo. *London*, 1903. **Author.**

Kieffer (Jean Jacques). *See* **André (E.).** Spécies des Hyménoptères d'Europe. Vol. VII.

Kirkpatrick (Randolph). Descriptions of South African Sponges. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Kitchin (Finlay Lorimer). The Jurassic Fauna of Cutch. The Lamellibranchiata; Genus *Trigonia*. (Mem. Geol. Surv., Palæont. Ind. Ser. ix. vol. iii. pt. 1.) fol. *Calcutta*, 1903.

Klebahn (Heinrich). Die wirtswechselnden Rostpilze. Versuch einer Gesamtdarstellung ihrer biologischen Verhältnisse. Pp. xxxvii, 447. 8vo. *Berlin*, 1904.

Klebs (Georg). Ueber das Verhältniss des männlichen und weiblichen Geschlechts in der Natur. Rectoratsrede am 10 Novr. 1893 vorgetragen. Pp. 30. 8vo. *Jena*, 1894.

Knapp (Georg Friedrich). Justus von Liebig nach dem Leben gezeichnet. Festrede gehalten in der öffentlichen Sitzung der K.-B. Akademie der Wissenschaften zu München zur Feier ihres 144 Stiftungstages am 11. März, 1903. Pp. 23.
4to. *München*, 1903.

Knight (Thomas Andrews. *the late*). A Selection from the Physiological and Horticultural Papers published in the Transactions of the Royal and Horticultural Societies; to which is prefixed a Sketch of his Life. Pp. xii, 379; pls. 7 and portrait.
Roy. 8vo. *London*, 1841.

Koehler (René). Ophiures de l'Expédition du Siboga. **Siboga-Expeditie.**

Kölliker (Rudolph Albert von). Die Entwicklung und Bedeutung des Glaskörpers. Pp. 25, mit 4 Tafeln. (Zeitschr. f. wiss. Zool. lxxvi.)
8vo. *Leipzig*, 1904. **Author.**

Kükenthal (Willy). Ueber einige Korallentiere des Roten Meeres. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.)
fol. *Jena*, 1904.

Kuntze (Otto). Nomenclaturae botanicae, codex brevis maturus sensu codicis emendati aux lois de la nomenclature botanique de Paris de 1867, linguis internationalibus: Anglica, Gallica, Germanica quoad nomina latina. Pp. lxiv.
4to. *Stuttgart*, 1903.

Lameere (Auguste). Révision des Prionides Macrotomines. Pp. 216. (Mém. Soc. Ent. Belg. xi.)
8vo. *Bruxelles*, 1903.

Lang (Arnold). Lehrbuch der vergleichenden Anatomie der Wirbellosen Thiere. 2te Auflage. Lief. I., II.
8vo. *Jena*, 1900–1901.

Lief. I. Mollusca. Pp. viii, 509; mit 410 Abbildungen. Bearbeitet von Karl Hescheler. 1900.
„ II. Protozoa. Pp. vi, 311; mit 259 Abbildungen. Bearbeitet von A. Lang. 1901.

—— Ueber Vorversuche zu Untersuchungen über die Varietätenbildung von *Helix hortensis* Müller und *Helix nemoralis* L. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.)
fol. *Jena*, 1904.

Lang (William Henry). *See* **Strasburger (Eduard)** and others. Text-Book of Botany. Second Edition.

Laurent (Marcellin). Recherches sur le Développement des Joncées. Pp. 96, figs. 16, plates 8. (Ann. Sci. Nat., Bot. 8 sér. xix.)
8vo. *Paris*, 1904.

Lawes (*Sir* John Bennet) and **Gilbert (*Sir* Joseph Henry).** The Rothamsted Memoirs on Agricultural Chemistry and Physiology (1847–1898). 7 vols.
8vo. *London*, 1847–1899.

—— —— Rothamsted Memoirs on Agricultural Chemistry and Physiology (from the Philosophical Transactions 1861–1883). 3 vols.
4to. *London*, 1893.

Vol. I. On Vegetation.
„ II. Permanent Grass-Land.
„ III. Animal Composition.

Lawes Agric. Trust.

Leeuwenhoek (Antoni van). Opera. Tomi 1–4.
4to. *Delphis & Lugduni Batavorum*, 1715–1722.

Opera, Tomus I.

—— Arcana Naturæ Detecta. Editio Novissima. (Epistola 92.) Pp. 515. 4to. *Ludguni Batavorum*, 1722.

—— Continuatio Arcanorum Naturæ Detectorum. (Epist. 93–107.) Pp. 192. 4to. *Lugduni Batavorum*, 1722.

Opera, Tomus II.

—— Epistolæ ad Societatem Regiam Anglicam, et alios illustres viros, seu continuatio mirandorum arcanorum naturæ detectorum. (Epist. 108–146.) Pp. 429. 4to. *Lugduni Batavorum*, 1719.

Opera, Tomus III.

—— Opera Omnia, seu Arcana Naturæ, ope exactissimorum microscopiorum detecta, experimentis variis comprobata, Epistolis, ad varios illustres Viros, ut et ad integram, quæ Londini floret, Sapientem Societatem, cujus Membrum est, datis, Comprehensa, & Quatuor Tomis distincta. Editio Novissima, prioribus emendatior, cum indicibus cuique Tomo accommodatis. Pp. 64, 258. 4to. *Lugduni Batavorum*, 1722.

—— Continuatio Epistolarum, datarum ad longe Celeberrimam Regiam Societatem Londinensem. Pp. 124.
4to. *Lugduni Batavorum*, 1715.

Opera, Tomus IV.

—— Epistolæ Physiologicæ super compluribus Naturæ Arcanis, &c. ut sequens pagina docet: hactenus numquam editæ. Cum figuris æneis, & indice locupletissimo. (Epist. 1–46.) Pp. 446. 4to. *Delphis*, 1719. **Misses Busk.**

Legré (Ludovic). La Botanique en Provence au XVI^e^ Siècle. Jean Bauhin, Gaspard Bauhin, Jean Henri Cherler, et Valerand Dourez. 8vo. *Marseille*, 1904. **B. Daydon Jackson.**

Leith (Charles Kenneth). The Mesabi Iron-Bearing District of Minnesota. Pp. 316; plates 33. (U.S. Geol. Surv., Monogr. 43.) 4to. *Washington*, 1903.

Lester-Garland (Lester Vallis). A Flora of the Island of Jersey; with a List of the Plants of the Channel Islands in general, and remarks upon their distribution and geographical affinities. Pp. xv, 205, and Map. 8vo. *London*, 1903.

Lewistown, Montana.
Fergus County Free High School.
Bulletin No. 1. 8vo. *Lewistown*, 1903.

No. 1. Silloway (P. M.). The Birds of Fergus County, Montana. Pp. 77; plates 17. 1903.

Liebig (Justus von). Nach dem Leben gezeichnet. *See* **Knapp (Georg Friedrich).**

Linsbauer (Karl), Linsbauer (Ludwig), and Portheim (Leopold R. von). Wiesner und seine Schule. Ein Beitrag zur Geschichte der Botanik. Festschrift. Mit einem Vorworte von Dr. Hans Molisch. Pp. xviii, 259, mit Portrait.
8vo. *Wien*, 1903. **Author.**

Linsbauer (Ludwig). Wiesner und seine Schule. *See* **Linsbauer (Karl).**

Linton (William Richardson). Flora of Derbyshire: Flowering Plants, Higher Cryptogams, Mosses and Hepatics, Characeæ. Pp. vii, 453, and 2 maps. 8vo. *London*, 1903.

Liverpool.

Liverpool Marine Biology Committee.

Memoirs on Typical British Marine Plants and Animals. Edited by W. A. Herdman. I.–XII.

8vo. *Liverpool*, 1899–1904.

XI. *Arenicola* (the Lug-Worm). By J. H. Ashworth. Pp. viii, 118; plates 8. 1904.

XII. *Gammarus*. By Margaret Cussans. Pp. viii, 47; plates 4. 1904.

Lohmann (Hans). *See* **Nordisches Plankton**: Appendicularien.

Lomas (Joseph). On the Sea-Bottoms and Calcretes. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

London.

Royal Society.

Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar, by W. A. Herdman. With Supplementary Reports upon the Marine Biology of Ceylon. By other Naturalists. Part I.

4to. *London*, 1903. **W. A. Herdman.**

Lupša (Ferdinand). Die Nordpolsphinx oder Frage der modernen Nordpolar-Forschung. Pp. 91.

8vo. *Laibach*, 1903. **Author.**

Macdougal (Daniel Trembly). *See* **Washington**: Carnegie Institution.

Macvicar (Symers M.). A Key to British Hepaticæ. Pp. 16. (Journ. Bot. vol. 39.) 8vo. *London*, 1901.

Maiden (Joseph Henry). A Critical Revision of the Genus *Eucalyptus*. Part IV. 4to. *Sydney*, 1904. **Author.**

—— Where are the largest Trees in the World? (Sydney Morning Herald, Monday, March 21st, 1904, p. 3.)

8vo. *Sydney*, 1904.

Maly (Karl) (*Sarajevo*). Beiträge zur Kenntnis der Flora Bosniens und der Herzegowina. Pp. 109. (Verh. K.-K. zool.-bot. Ges. Wien, liv.) 8vo. *Wien*, 1904.

Manchester.

Botanical Exchange Club of the British Isles.

Report for 1902. 8vo. *Manchester*, 1903. **Chas. Bailey.**

Manila.

Department of the Interior.

Bureau of Government Laboratories. Nos. 6, 8.

8vo. *Manila*, 1903–1904.

No. 6. Merrill (Elmer D.). I. New or Noteworthy Philippine Plants. II. The American Element in the Philippine Flora. Pp. 36. 1904.

„ 8. Merrill (Elmer D.). A Dictionary of the Plant Names of the Philippine Islands. Pp. 193. 1903.

Manila (*con.*).

Department of the Interior (*con.*).

Forestry Bureau.—Bulletin No. 1.

No. 1. MERRILL (ELMER D.). Report on Investigations made in Java in the year 1902. I. Report of the Trip. II. Plantæ Ahernianæ. III. The Method of Work on the Forest Flora of Java. IV. The Botanical Institute at Buitenzorg. Pp. 84; plates 10. 1903.

Marseul (*l'Abbé*) (**Silvin A. de**). Essai Monographique sur la Famille des Histérides. 2 vols. & 2 vols. supplement. (Ann. Soc. Ent. France.) 8vo. *Paris*, 1853–1862. **G. Lewis.**

Martelli (**Ugolino**). *Pandani* asiatici nuovi. Pp. 7. (Bull. Soc. Bot. Ital. 1904.) 8vo. *Firenze*, 1904. **Author.**

Martin (**Charles Ed.**). Le *Boletus subtomentosus* de la Région Genevoise. Essai de Monographie. Pp. ix, 39; col. plates 18. (Beitr. Krypt.-Flora der Schweiz, Bd. ii. Heft 1.) 8vo. *Bern*, 1903.

Massee (**George**). European Fungus Flora.—Agaricaceæ. Pp. vi, 274. 8vo. *London*, 1902.

—— A Text Book of Plant Diseases caused by Cryptogamic Parasites. 2nd Edition. Pp. xii, 472; figs. 95. 8vo. *London*, 1903. **Author.**

Mattirolo (**Oreste**). Le raccolte botaniche della Stella Polare. Pp. 5. (Malpighia, xvi.) 8vo. *Genova*, 1903.

—— I Funghi Ipogei Italiani raccolti da O. BECCARI—L. CALDESI—A. CARESTIA—V. CESATI—P. A. SACCARDO. Pp. 36; plate 1. (Mem. R. Accad. Sci. Torino, 2 ser. liii.) 4to. *Torino*, 1903. **Author.**

Maurer (**Friedrich**). Das Integument eines Embryo von *Ursus Arctos*. Ein Beitrag zur Frage der Haare und Hautdrüsen bei Säugetieren. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Mayer (**Paul**). Caprellidæ. **Siboga-Expeditie.**

Meijere (**Johannes C. H. de**). Die Echinoidea der Siboga-Expedition. **Siboga-Expeditie.**

Merrill (**Elmer D.**). A Dictionary of the Plant Names of the Philippine Islands. Pp. 193. (Dept. of the Interior. Bureau of Government Laboratories. No. 8.) 8vo. *Manila*, 1903.

—— Report on Investigations made in Java in the Year 1902. Pp. 84; plates 10. (Dept. of the Interior, Forestry Bureau, Bull. 1.) 8vo. *Manila*, 1903.

—— I. New or Noteworthy Philippine Plants.
II. The American Element in the Philippine Flora. Pp. 36. (Dept. of Interior, Bureau of Government Laboratories. No. 6.) 8vo. *Manila*, 1904. **Author.**

Möbius (**Karl August**). Die Formen, Farben und Bewegungen der Vögel, ästhetisch betrachtet. Pp. 12. (S.B. K. Preuss. Akad. Wiss. No. 8, 1904.) 8vo. *Berlin*, 1904. **Author.**

Moebius (**Martin**). MATTHIAS JACOB SCHLEIDEN. Zu seinem 100. Geburtstage. Pp. 106; mit einem Bildnis Schleidens und 2 Abbildungen im Text. 8vo. *Leipzig*, 1904.

Molisch (Hans). *See* **Linsbauer (Karl).** Wiesner und seine Schule. Ein Beitrag zur Geschichte der Botanik. Festschrift.

Montagne (Jean François Camille). Mémoire sur la multiplication des *Chara* par Division. (Compt. Rend. vol. 34.) 4to. *Paris*, 1852.

—— Communication respecting his Sylloge generum specierumque plantarum cryptogamarum etc. (Compt. Rend. vol. 41.) 4to. *Paris*, 1855.

—— Réflexions de M. Montagne sur quelques modes de reproduction des Algues, à l'occasion de deux brochures de M. Pringsheim, botaniste de Berlin, et surtout de la dernière, ayant pour titre: "Recherches sur la Fécondation et la Génération alternante des Algues." (Compt. Rend. vol. 43.) 4to. *Paris*, 1856.

Moore (Thomas). A Popular History of the British Ferns and the Allied Plants, comprising the Club-Mosses, Pepperworts, and Horsetails. Third and Revised Edition. Pp. xvi, 394, and 22 plates. (Routledge's Series.) 8vo. *London*, 1859.
B. Daydon Jackson.

Morrison (Charles). Doubts about Darwinism, by a Semi-Darwinian. Pp. vi, 115. 8vo. *London, New York, & Bombay*, 1903. **Frank Crisp.**

Mortensen (Theodor). *See* **Nordisches Plankton.** Echinodermenlarven.

Müller (Gustav Wilhelm). *See* **Nordisches Plankton.** Ostracoden.

Müller (Hermann). Beitrag zur Embryonalentwickelung der *Ascaris megalocephala*. Pp. 30, mit 5 Tafeln und 12 Textfiguren. (Bibl. Zool. xvii. Heft 41.) 4to. *Stuttgart*, 1903.

Munich.

Königlich-bayerische Akademie der Wissenschaften.

Ueber wissenschaftliche Wahrheit. Rede in der öffentlichen Festsitzung der Akademie am 15. November 1902, von Dr. Karl A. von Zittel. Pp. 14. 4to. *München*, 1902.

Justus von Liebig nach dem Leben gezeichnet. Festrede gehalten in der öffentlichen Sitzung der K.-B. Akademie der Wissenschaften zu München zur Feier ihres 144 Stiftungstages am 11. März 1903, von Georg Friedrich Knapp. Pp. 23. 4to. *München*, 1903.

Murie (James). Report on the Sea Fisheries and Fishing Industries of the Thames Estuary. *See* **Sea Fisheries Committee**—Kent and Essex.

Nanninga (Dr. A. W.). Invloed van den bodem op de samenstelling van het Theeblad en de qualiteit der Thee. Deel II. Pp. 56. (Mededeel. 's Lands Plantentuin Buitenzorg, lxxii.) 8vo. *Batavia*, 1904.

Newcastle-upon-Tyne.

Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne.

Transactions, 2 vols. 4to. *Newcastle*, 1830–38.

Newstead (Robert). A List of Lepidoptera found in the Counties of Cheshire, Flintshire, Denbighshire, Carnarvonshire, and Anglesea. *See* **Chester Society of Nat. Sci. &c.** Proc. No. 5.

Nijmegen.

Nederlandsche Botanische Vereeniging.

Prodromus Floræ Batavæ. Editio altera. Vol. I. Pars 3. 8vo. *Nijmegen*, 1904.

Nordisches Plankton. Herausgegeben von K. BRANDT. Lief. 1→ 4to. *Kiel & Leipzig*, 1901→

Dolioliden und Tripyleen. Von A. BORGERT.
Salpen und Cladoceren. Von C. APSTEIN.
Appendicularien. Von H. LOHMANN.
Ostracoden. Von G. W. MÜLLER.
Echinodermenlarven. Von T. MORTENSEN.
Foraminiferen. Von L. RHUMBLER.

Norwegian North Polar Expedition, 1893–1896. Scientific Results. Edited by FRIDTJOF NANSEN. Vol. I. 4to. *Christiania, London, Leipzig*, 1900.

Oettli (Max). Beiträge zur Ökologie der Felsflora. Untersuchungen aus dem Curfirsten- und Sentisgebiet. Inaugural-Dissertation. Pp. 171; plates 4. 8vo. *St. Gallen*, 1904. **Dr. Hans Schinz.**

Osten-Sacken (Charles Robert). Record of my Life Work in Entomology. Pp. viii, 204. 8vo. *Cambridge, Mass.*, 1903. **Author.**

Paykull (Gustav von). Monographia Histeroidum. Pp. iv, 112; Tab. 13. 8vo. *Upsaliæ*, 1811. **G. Lewis.**

Pearson (Joseph). On the Holothurioidea. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries &c. Part I.

Penard (Eugène). Faune Rhizopodique du Bassin du Léman. Pp. 714. 4to. *Genève*, 1902.

—— Les Héliozaires d'Eau Douce. Pp. 341, avec nombreuses figures dans le texte. 4to. *Genève*, 1904.

Penzig (Ottone). Die Myxomyceten der Flora von Buitenzorg. Pp. 83. (Flore de Buitenzorg, Part II.) 8vo. *Leiden*, 1898.

—— and **Saccardo (Pietro Andrea).** Icones Fungorum Javanicorum. Pp. 124; Tab. 80. 8vo. *Leiden*, 1904.

Perkins (J.). Fragmenta Floræ Philippinæ. Contributions to the Flora of the Philippine Islands. Fasciculus 1. 8vo. *Leipzig, Paris, London*, 1904.

Peter (Karl). Normentafel zur Entwicklungsgeschichte der Zauneidechse (*Lacerta agilis*). Pp. 165; mit 4 Tafeln und 14 Figuren im Text. **Normentafeln zur Entwicklungsgeschichte der Wirbeltiere.** Heft 4.

Pfeffer (Wilhelm). The Physiology of Plants: a Treatise upon the Metabolism and Sources of Energy in Plants. Second fully revised Edition. Translated and Edited by ALFRED J. EWART. Vol. II. Growth, Reproduction, and Maintenance. Pp. viii, 296; figs. 31. 8vo. *Oxford*, 1903.

Pick (Heinrich). Beiträge zur Kenntnis des assimilirenden Gewebes armlaubiger Pflanzen. Inaugural-Dissertation. Pp. 32. 8vo. *Bonn*, 1881.

Portheim (Leopold R. von). *See* **Linsbauer (Karl).** Wiesner und seine Schule.

Poulton (Edward Bagnall). *See* **Hope Reports.**

Prain (David). The Species of *Dalbergia* of South-Eastern Asia. Pp. iv, 114; plates 91. (Ann. Roy. Bot. Garden, Calcutta, x. pt. 1.) 4to. *Calcutta*, 1904.

Preston.

Preston Scientific Society.

Flora of Preston and Neighbourhood. Compiled by the Members of the Botanical Section of the Preston Scientific Society during the Years 1897–1902. 8vo. *Preston*, 1903.

Raciborski (Maryan). Die Pteridophyten der Flora von Buitenzorg. Pp. xii, 255. (Flore de Buitenzorg, Part I.) 8vo. *Leiden*, 1898.

Ray Society. *Publications* (cont.).

Michael (Albert D.). British Tyroglyphidæ. Pp. vii, 183; plates 20–39. 8vo. *London*, 1903.

West (William) and West (George Stephen). A Monograph of the British Desmidiaceæ. Vol. I. Pp. xxxvi, 224; plates 32. 8vo. *London*, 1904.

Reid (Clement). *Najas marina* in the Megaceros-Marl of Lough Gur. 1 page. (Irish Nat. xiii.) 8vo. *Dublin*, 1904. **Author.**

Reinach (Albert von). Schildkrötenreste aus dem ägyptischen Tertiär. Pp. 64; Tafeln 17. (Abh. Senckenberg. Nat. Ges. xxix.) 4to. *Frankfurt-a.-Main*, 1903.

Rendle (Alfred Barton). The Classification of Flowering Plants. Vol. I. Gymnosperms and Monocotyledons. Pp. xiv, 403; figs. 187. (Cambridge Nat. Sci. Manuals.) 8vo. *Cambridge*, 1904. **Author.**

Retzius (Anders). Skrifter i skilda amnen jämte några bref af A. R. *See* **Retzius (Gustaf).**

Retzius (Gustaf). Anatomische Untersuchungen. Lieferung I. (*All published.*) 4to. *Stockholm*, 1872.

—— Das Gehörorgan der Wirbelthiere: morphologisch-histologische Studien. fol. *Stockholm*, 1881–84.

I. Das Gehörorgan der Fische und Amphibien. (1881.)
II. Das Gehörorgan der Reptilien, der Vögel und die Säugethiere. (1884.)

—— Biologische Untersuchungen. I., II. 4to. *Stockholm*, 1881–82.

—— —— Neue Folge, I.–X. fol. *Stockholm*, 1890–1902.

—— Das Menschenhirn. Studien in der makroskopischen Morphologie, I., II. fol. *Stockholm*, 1896. **Author.**

—— Skrifter i skilda amnen jämte några bref af Anders Retzius. Pp. xxviii, 288, and portrait. 8vo. *Stockholm*, 1902. **Author.**

—— *See* **Key (Axel).** Studien in der Anatomie des Nervensystems und des Bindegewebes.

Rhumbler (Ludwig). *See* **Nordisches Plankton.** Foraminiferen.

Ridley (Henry Nicholas). New Malayan Plants. Pp. 21. (Journ. Straits Branch Roy. As. Soc. No. 41, 1903.)
8vo. *Singapore*, 1903.

Robinson (William). Alpine Flowers for Gardens, Rock, Wall, Marsh Plants, and Mountain Shrub. 3rd Edition, Revised and illustrated. Pp. xix, 344. 8vo. *London*, 1903. **Frank Crisp.**

Ross (Hermann). Die Gallenbildungen (Cecidien) der Pflanzen, deren Ursachen, Entwickelung, Bau und Gestalt. Ein Kapitel aus der Biologie der Pflanzen. Pp. 39; mit 52 Fig. im Text und auf einer Tafel. 8vo. *Suttgart*, 1904.

Rothamsted.

—— Memoranda of the Origin, Plan, and Results of the Field and other Experiments conducted on the Farm and in the Laboratory of the late Sir John Bennet Lawes, Bart. 58th Year of the Experiments. 4to. *London*, 1901.

—— Rothamsted Experiments. Plans and Summary Tables, arranged for reference in the Field. 1904.
4to. *London*, 1904. **Lawes Agric. Trust.**

—— and its Work. *See* **Lawes (J. B.)** and **Gilbert (J. H.).**

Saccardo (Pietro Andrea). *See* **Penzig (Ottone).** Icones Fungorum Javanicorum.

Sawer (Charles John). Citronella and Lemongrass. Pp. 4; figs. 10. (Reprinted from the Chemist and Druggist, July 30, 1904.) 4to. *London*, 1904. **Author.**

Saxby (C. F. Argyll). *See* **Edmonston (Thomas).** Flora of Shetland.

Schiffner (Victor). Die Hepaticæ der Flora von Buitenzorg. Pp. 220. (Flore de Buitenzorg, Part IV.) 8vo. *Leiden*, 1900.

Schimper (Andreas Franz Wilhelm). Plant-Geography upon a Physiological Basis. The Authorized English Translation by William R. Fisher. Revised and Edited by Percy Groom and Isaac Bayley Balfour. Pp. xxx, 839; figs. 502 and 4 Maps. 8vo. *Oxford*, 1903–1904.

Schleiden (Matthias Jacob). Zu seinem 100. Geburtstage. *See* **Moebius (Martin).**

Schlich (William). Forestry in the United Kingdom. Pp. 72 and 10 plates. 8vo. *London*, 1904. **Author.**

—— Schlich's Manual of Forestry. Vol. II. Third Edition: Revised. 8vo. *London*, 1904. **Author.**

Schlosser (Max). Die fossilen Säugethiere Chinas nebst einer Odontographie der recenten Antilopen. Pp. 221; mit 14 Tafeln und 32 Text-figuren. (Abh. Kgl.-Bayer. Akad. Wiss. Bd. lxxv.) 4to. *München*, 1903.

Schulz (Richard). Monographische Bearbeitung der Gattung *Phyteuma*. Inaug.-Dissertation. Pp. 204 und 3 Karten.
8vo. *Geisenheim-a.-Rhein*, 1904. **Dr. Hans Schinz.**

Schumann (Karl). Gesamtbeschreibung der Kakteen (Monographia Cactacearum). Nachträge 1898 bis 1902. Pp. viii, 171, mit 36 Abbildungen. 8vo. *Neudamm*, 1903.

Schwendener (Simon). Das mechanische Princip im anatomischen Bau der Monocotylen. Mit vergleichenden Ausblicken auf die übrigen Pflanzenklassen. Pp. viii, 179, mit 13 Holzschnitten und 14 Tafeln. 8vo. *Leipzig*, 1874.

Scott (Andrew). On the Copepoda. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Sea Fisheries Committee.—Kent and Essex.
Report on the Sea Fisheries and Fishing Industries of the Thames Estuary. By Dr. JOHN MURIE. Part I. Pp. 250; figs. 29 and 2 maps. 8vo. *London*, 1903.

Semi-Darwinian. Doubts about Darwinism by a. *See* **Morrison (Charles).**

Shipley (Arthur E.). On the Gephyrea. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Silloway (P. M.). The Birds of Fergus County, Montana. Pp. 77; plates 17. (Bull. Fergus County Free High School. No. 1.) 8vo. *Lewistown (Montana)*, 1903.

Sim (George). The Vertebrate Fauna of "Dee." The Ichthyological portion includes the Fishes of the East Coast from Wick to Firth of Forth. Pp. 295. 8vo. *Aberdeen*, 1903. **Author.**

Sluiter (C. Ph.). Die Tunicaten. **Siboga-Expeditie.** Monogr. 17.

Small (John Kunkel). Flora of the South-Eastern United States; being descriptions of the Seed-plants, Ferns and Fern-Allies growing naturally in North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, and the Indian Territory, and in Oklahoma and Texas East of the One-hundredth Meridian. Pp. xii, 1370. 8vo. *New York*, 1903.

Smith (James Perrin). The Carboniferous Ammonoids of America. Pp. 211; plates 29. (U.S. Geol. Surv., Monogr. 42.) 4to. *Washington*, 1903.

Smith (John Donnell). Enumeratio Plantarum Guatemalensium necnon Salvadorensium, Hondurensium, Nicaraguensium, Costaricensium. Pars VI. 8vo. *Oquawka*, 1903. **Author.**

South African Association for the Advancement of Science.
Report 1. 8vo. *Cape Town*, 1903.

Sowerby (George Brettingham), *tertius fil.* Description of a new South African Marine Gasteropod. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Mollusca of South Africa. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Spolia Zeylanica. Issued by the Colombo Museum, Ceylon. Vols. I.→ 8vo. *Colombo*, 1903→

Stahl (Ernst). Die Schutzmittel der Flechten gegen Tierfras. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Stebbing (Edward Percy). Departmental Notes on Insects that affect Forestry. Nos. 1–2. 8vo. *Calcutta*, 1903. **Author.**

Stebbing (*Rev.* **Thomas Roscoe Rede**). South African Crustacea. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Stockholm.

Kongliga Svenska Vetenskaps-Akademie.

Arkiv för Botanik. Band I.→ 8vo. *Stockholm*, 1903→
Arkiv för Zoologi. Band I.→ 8vo. *Stockholm*, 1903→
Årsbok för år 1903. 8vo. *Stockholm*, 1903→

Stone (**Herbert**). The Timbers of Commerce and their Identification. Pp. xxxviii, 311; plates 24. 8vo. *London*, 1904.
Author.

Strasburger (**Eduard**). Anlage des Embryosackes und Prothalliumbildung bei der Eibe nebst anschliessenden Erörterungen. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.)

——, **Noll** (**Fritz**), **Schenck** (**Heinrich**), and **Schimper** (**Andreas Franz Wilhelm**). A Text-Book of Botany. Translated from the German by Hobart C. Porter. Pp. ix, 632, with 594 illustrations. 8vo. *London*, 1898.

—— Second Edition. Revised with the fifth German Edition by William Henry Lang. Pp. ix, 671, with 686 illustrations. 8vo. *London*, 1903.

Strassburg.

Pharmazeutisches Institute der Universität.

Katalog der Flückiger-Bibliothek. 8vo. *Strassburg-i.-E.*, 1904.

Strassen (**Otto L. zur**). Geschichte der T-Riesen von *Ascaris megalocephala*. Teil I. Pp. 27; mit 5 Tafeln und 12 Fig. im Text. (Bibl. Zool. Bd. xvii. Heft 40.) 4to. *Stuttgart*, 1903.

Sydney.

New South Wales Naturalists' Club.

Memoirs No. 1. 8vo. *Sydney*, 1903.
I. Waterhouse (G. A.). A Catalogue of the Rhopalocera of Australia. 1903.

Sykes (**Ernest Ruthven**). On the Polyplacophora. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Tattersall (**Walter M.**). On the Cephalochorda. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part 1.

Tesch (**J. J.**). The Thecosomata and Gymnosomata of the Siboga-Expedition. **Siboga-Expeditie.** Monogr. 52.

Thompson (**Isaac Cooke**). On the Copepoda. *See* **London: Royal Society.** Report to the Government of Ceylon on the Pearl Oyster Fisheries, &c. Part I.

Topsent (**Émile**). Spongiaires des Açores (*l'Hirondelle* et la *Princesse-Alice*). *See* **Albert.**

Tosquinet (**Jules**). Ichneumonides Nouveaux. Pp. xii, 403, and portrait. (Mém. Soc. Ent. Belg. x.) 8vo. *Bruxelles*, 1903.

Turner (**Frederick**). Botany of South-Western New South Wales. Pp. 50. (Proc. Linn. Soc. New South Wales, xxix.)
8vo. *Sydney*, 1904.

Tutt (James William). A Natural History of the British Lepidoptera: a Text-book for Students and Collectors. Vol. IV. 8vo. *London*, 1904.

Tydeman (G. F.). Siboga-Expeditie. Hydrographic Results.

United States Department of Agriculture (*cont.*).

Bureau of Plant Industry.

Bulletin No. 28. 8vo. *Washington*, 1903.

Bull. No. 28. Collins (G. N.). The Mango in Porto Rico. Pp. 36; plates 15. (1903.)

United States Geological Survey (*cont.*).

Monographs, Vols. 42–46. 4to. *Washington*, 1903–1904.

42. The Carboniferous Ammonoids of America. By James Perrin Smith. Pp. 211; plates 29. 1903.
43. The Mesabi Iron-bearing District of Minnesota. By Charles Kenneth Leith. Pp. 316; plates 33. 1903.
44. Pseudoceratites of the Cretaceous. By Alpheus Hyatt. Pp. 350; plates 47. 1903.
45. The Vermilion Iron-bearing District of Minnesota, with an Atlas. By J. Morgan Clements. Pp. 463; plates 13; figs. 23. 1903.
46. The Menominee Iron-bearing District of Michigan. By William Shirley Bayley. Pp. 513; plates 43. 1904.

Water-Supply and Irrigation Paper. Nos. 80–87. 8vo. *Washington*, 1903.

Professional Paper. Nos. 1–10, 13, 14, 15. 4to. *Washington*, 1902–1903.

Ursprung (Alfred). Die physikalischen Eigenschaften der Laubblätter. Pp. 120, mit 27 Figuren im Texte und 9 Tafeln. (Bibl. Bot. Heft 60.) 4to. *Stuttgart*, 1903.

van Heurck (Henri). *See* **Heurck (Henri van).**

Vayssière (Albert). Mollusques Hétéropodes (*Hirondelle* et *Princesse-Alice*). Fasc. 26 (1904). *See* **Albert.**

Verson (Enrico). Evoluzione postembrionale degli arti cefalici e toracali nel filugello. Pp. 39, tab. 3. (Atti R. Ist. Veneto Sci. &c. vol. 63, Part 2.) 8vo. *Venezia*, 1904. **Author.**

Verworn (Max). Die Lokalisation der Atmung in der Zelle. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Vogt (Oskar). Neurobiologische Arbeiten. (Denkschr. medic.-naturw. Ges. Jena, ix.) fol. *Jena*, 1904.

Waddell (Lawrence Austin). Report on the Excavations at Pātaliputra (Patna). The Palibothra of the Greeks. Pp. 85; plates 5, plans 4, and map. 8vo. *Calcutta*, 1903. **Author.**

Wallace (Robert). Report on Argentine Show and Live Stock. Pp. 154, with numerous illustrations. 4to. *Edinburgh*, 1904. **Author.**

Walther (Johannes). Die Fauna der Solnhofener Plattenkalke. Bionomisch betrachtet. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.) fol. *Jena*, 1904.

Warming (Johannes Eugenius Bülow). The History of the Flora of the Færöes. Pp. 22. (Reprinted from 'Botany of the Færöes,' ii. pp. 660–681.) 8vo. *Copenhagen*, 1903. **Author.**

Warre (*Rev.* **Edmond**). *See* **Hill** (**Matthew Davenport**). Eton Nature-Study and Observational Lessons.

Washington.

Carnegie Institution.

Desert Botanical Laboratory. Publication No. 6. 8vo. *Washington*, 1903.

No. 6. COVILLE (FREDERICK VERNON) and MACDOUGAL (DANIEL TREMBLY). Desert Botanical Laboratory of the Carnegie Institution. 1903.

Smithsonian Institution.

Astrophysical Observatory. Annals, Vol. 1. 8vo. *Washington*, 1900.

Waterhouse (**G. A.**). A Catalogue of the Rhopalocera of Australia. (Mem. New South Wales Nat. Club, i.) 8vo. *Sydney*, 1903.

Watson (**John William**). A Descriptive Manual of British Land and Fresh-Water Shells. *See* **Dixon** (**Ralph**). [Proc. 1902–3, p. 57.]

Webb (**Wilfred Mark**). *See* **Hill** (**Matthew Davenport**). Eton Nature-Study and Observational Lessons.

Weber van Bosse (*Mrs.* **A.**) and **Foslie** (**M. H.**). The Corallinaceæ of the Siboga-Expedition. **Siboga-Expeditie.** Monogr. 61.

Wedderburn (*Sir* **William**). Drought-Resisting Fodder Plants. *Atriplex semibaccata* on Alkali Lands. (Indian Famine Union Leaflet, nos. 5, 8.) fol. *London*, 1901–1903. **Author.**

Weiss (**Frederick Ernest**). Observations on the Pollination of the Primrose. Pp. 7. (New Phytol. ii.) 8vo. *London*, 1903. **Author.**

—— Further Observations on the Pollination of the Primrose and of the Cowslip. Pp. 3. (New Phytol. iii.) 8vo. *London*, 1904. **Author.**

—— A probable Parasite of Stigmarian Rootlets. Pp. 6; figs. 2. (New Phytol. iii. 3.) 8vo. *London*, 1904.

—— A Mycorhiza from the Lower Coal-Measures. Pp. 11 and 2 plates. (Ann. Bot. xviii.) 8vo. *London*, 1904. **Author.**

West (**George Stephen**). A Monograph of the British Desmidiaceæ. *See* **West** (**William**).

West (**William**) and **West** (**George Stephen**). A Monograph of the British Desmidiaceæ. Vol. I. Pp. xxxvi, 224; plates 32. (Ray Society.) 8vo. *London*, 1904.

White (**James**). Altitudes in the Dominion of Canada, with a Relief Map of North America. (Geol. Surv. Canada.) Pp. x, 266. 8vo. *Ottawa*, 1901.

Wiesner und seine Schule. Ein Beitrag zur Geschichte der Botanik. Festschrift. Von KARL LINSBAUER, LUDWIG LINSBAUER, LEOPOLD R. VON PORTHEIM. Mit einem Vorworte von Dr. HANS MOLISCH. Pp. xviii, 259, mit Portrait. 8vo. *Wien*, 1903. **Author**

Wigglesworth (Grace). The Cotyledons of *Ginkgo biloba* and *Cycas revoluta*. Pp. 3; fig. 1. (Ann. Bot. xvii.)
8vo. *Leiden*, 1903. **Author.**

Wildeman (Émile de). Les Algues de la Flore de Buitenzorg, &c. Pp. xi, 457; plates 16, figs. 149. (Flore de Buitenzorg, Part III.) 8vo. *Leiden*, 1900.

—— Notices sur des Plantes utiles ou intéressantes de la Flore du Congo. Pp. 221; plates 12. (Publication de l'État Indépendant du Congo, 1903.) 8vo. *Bruxelles*, 1903.

Winge (Herluf). Om Fugle fra Bronzealderen i Danmark. Pp. 6. (Vidensk. Meddel. naturh. Foren. 1904.)
8vo. *Kjöbenhavn*, 1904.

—— Om jordfundne Pattedyr fra Danmark. Pp. 112; plates 7. (Vidensk. Meddel. naturh. Foren. 1904.)
8vo. *Kjöbenhavn*, 1904. **Author.**

Wittrock (Veit Brecher). Catalogus Illustratus Iconothecæ Botanicæ Horti Bergiani Stockholmiensis Anno 1903; Notulis Biographicis adjectis. Pp. 198; cum 46 tabulis. (Acta Horti Bergiani, Band iii. No. 2.) 4to. *Stockholm*, 1903. **Author.**

Wolley-Dod (Anthony Hurt). *See* **Bolus (Harry).** A List of the Flowering Plants and Ferns of the Cape Peninsula, &c.

Wood (John Medley). Natal Plants. Vol. II. Parts 3, 4; Vol. IV. Parts 1, 2. 4to. *Durban*, 1903–1904.

—— Report on Natal Botanic Gardens and Colonial Herbarium, from July 1st, 1902, to June 30th, 1903. 8vo. *Durban*, 1903. **Author.**

York, Eastleigh, and Birmingham.
Watson Botanical Exchange Club.
Reports 19, 20. 8vo. *Birmingham*, 1903–1904.
H. S. Thompson.

Ziegler (Heinrich Ernst). Die ersten Entwickelungsvorgänge des Echinodermeneies, insbesondere die Vorgänge am Zellkörper. (Denkschr. medic.-naturw. Ges. Jena, xi., Festschrift.)
fol. *Jena*, 1904.

Zimmermann (Albrecht). Botanical Microtechnique. A Hand-Book of Methods for the preparation, staining, and microscopical investigation of Vegetable Structures. Translated from the German by James Ellis Humphrey. Pp. xii, 296; figs. 63.
8vo. *London*, 1896. **A. W. Bawtree.**

—— Einige pathologische en physiologische Waarnemingen over Koffie. Pp. 105; plates 4. (Mededeel. uit 's Lands Plantentuin te Buitenzorg, lxvii.) 8vo. *Batavia*, 1904.

Zittel (Karl Alfred von). Ueber wissenschaftliche Wahrheit. Rede in der öffentlichen Festsitzung der Akademie am 15. November, 1902. Pp. 14. 4to. *München*, 1902.

Zoological Record. Vol. 39 (1902). 8vo. *London*, 1903.

DONATIONS IN AID OF PUBLICATIONS.

1903.		£	s.	d.
June 16.	Alfred O. Walker. Contribution in aid of his paper on the Amphipoda of the 'Southern Cross' Antarctic Expedition. (Journ. Zool. vol. xxix. no. 187.)	10	0	0
Dec. 24.	B. Arthur Bensley. Contribution towards publication of his paper: "On the Evolution of Australian Marsupialia, &c." (Trans. 2nd ser. Zool. vol. ix. part 3.) ..	44	0	0
1904.				
Jan. 26.	The Royal Society. Grant in aid of the publication of Vol. III. of the Chinese Flora. (Journ. Bot. vol. xxxvi.).....	120	0	0
May 27.	Walter S. Rowntree. Contribution in aid of publication of his paper: "On some Points in the Visceral Anatomy of the Characinidæ, &c." (Trans. 2nd ser. Zool. vol. ix. part 2.)	6	6	0

INDEX TO THE PROCEEDINGS.

SESSION 1903–1904.

Note.—The following are not indexed:—The name of the Chairman at each meeting; speakers whose remarks are not reported; and passing allusions.

PRINTED BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

FRANK CRISP, Esq.

J.P., LL.B., B.A. Lond.

Treasurer, 1881—1905.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

117TH SESSION.

FROM NOVEMBER 1904 TO JUNE 1905.

LONDON:

PRINTED FOR THE LINNEAN SOCIETY,

BURLINGTON HOUSE, PICCADILLY, W.,

1905.

PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

CONTENTS.

Publications of the Society issued during the period, 31st July, 1904, to 31st July, 1905:—

Journal (Botany), No. 257, 1st Nov., 1904.
„ 258, 1st July, 1905.
„ (Zoology), No. 190, 1st Nov., 1904.
„ 191, 1st April, 1905.
„ 192, 14th July, 1905.

Transactions (2nd Ser. Botany), Vol. VI. Part x., Oct. 1904.
„ xi., Mar. 1905.
VII. „ i., Dec. 1904.
„ ii., Mar. 1905.
„ (2nd Ser. Zoology), Vol. IX. Part viii., Nov. 1904.
„ viii., Dec. 1904.
„ ix., July 1905.
Vol. X. „ i., Oct. 1904.
„ ii., Nov. 1904.
„ iii., Jan. 1905.

Proceedings, 116th Session, 1903–1904, October 1904.

List of [Fellows, Associates, and Foreign Members], 1904–1905.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND SEVENTEENTH SESSION,
1904–1905.)

November 3rd, 1904.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 16th June were read and confirmed.

The President, in greeting the Fellows on the opening of the Session, alluded to the welcome addition to the Society's rooms, by the acquisition of the quarters formerly occupied by the Post Office, and the consequent changes in the Library and Council Room.

Mr. Allan Octavian Hume, C.B., was admitted a Fellow.

Mr. Percy Appleyard, F.C.S., Mr. Richard Hind Cambage, Mr. Thomas Bennett Goodall, and Mr. Richard Norris Wolfenden, M.D. Cantab., were proposed as Fellows.

The Resolution of Council of the 2nd June, "That the existing Bye-Laws of the Society be, and they are hereby, repealed, and that the following Bye-Laws be established in lieu thereof," was then introduced; the President explaining that under the Charters it was incumbent on the Council to present all new or changed Bye-Laws to the Vote of the Fellows by ballot, after being twice read from the Chair; consequently no modification could take

effect unless it passed through the stages indicated; further, that the Council had received certain suggestions which had been carefully considered but thought not essential to the proper working of the proposed Bye-Laws, even though some were verbal improvements; the Council had, in the new Bye-Laws, made as few changes as possible, preserving the original text as far as practicable. He took the feeling of the Meeting to be that the Bye-Laws should be voted upon, as a whole, and on that basis the ballot would be taken. The result was, in favour 72, against 4; whereupon the President declared the new Bye-Laws to be confirmed by a large majority.

Mr. G. Claridge Druce, F.L.S., showed specimens of a new British Grass, *Koeleria valesiaca*, Gaud., which he had found in the Herbarium of Dillenius at Oxford, and recently refound in the original locality at Brean Down, Somersetshire, which was originally given as "Brent" Down. Dr. Stapf and Mr. Henry Groves contributed some remarks.

The Rev. John Gerard, S.J., F.L.S., brought specimens of a proliferous Plantain (*Plantago major*) from the neighbourhood of Clitheroe, Lancashire. He drew attention to the figures of the plant in Lobel and Pena's 'Adversaria' and Dodoen's 'Pemptades,' which latter block reappeared in Lobel's 'Observationes' and 'Icones,' and Johnson's edition of Gerard's 'Herbal' in 1633; the old herbalists spoke of it as the "Besome plantain with spoky tufts." He also drew attention to later figures, in Masters's 'Teratology' and the 'Gardeners' Chronicle,' ser. II. xiii. (1880) p. 364, figs. 65, 66. The point of interest seemed to be that this proliferous tendency was transmitted by seed, for a seedling of the original plant was also shown. A discussion followed in which Mr. G. C. Druce, Mr. E. M. Holmes, Mr. J. Britten, and Prof. H. Marshall Ward engaged, the last remarking that the plant in question offered specially good material for experiments as to mutation.

Mr. Frank Crisp, Treas.L.S., brought for exhibition a flower of *Schubertia graveolens*, Lindl., an Asclepiad, which, deprived of its corolla and a portion of its calyx cut away, viewed from the side, presented the genitalia in the shape of a skull. Prof. E. B. Poulton briefly commented on this exhibition, as an illustration of mimetic resemblance, paralleled by certain Lepidopterous markings.

The following papers were read:—

1. "A Note on some Points in the Structure of the Gill of the Ceylon Pearl-Oyster." By the President.

2. "Some Notes on the 'Sudd' Formation of the Upper Nile." By A. F. Broun. (Communicated by C. H. Wright, A.L.S.)

3. "On Bryozoa from near Cape Horn." By A. W. Waters, F.L.S.

November 17th, 1904.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 3rd November were read and confirmed.

Mr. John Edmund Shorec Moore, and Mr. Henry Deane of Sydney, New South Wales, were admitted Fellows.

Her Grace Mary du Caurroy Russell, Duchess of Bedford, Miss Margaret Benson, D.Sc. Lond., Mr. Stafford Edwin Chandler, B.Sc., Mrs. Catherine Crisp, Miss Alice Laura Embleton, B.Sc., Mrs. Marian Sarah Ogilvie Farquharson, F.R.M.S., of Haughton, Mrs. Grace Coleridge Frankland, F.R.M.S., Mrs. Maria Matilda Ogilvie Gordon, Ph.D. Munich, D.Sc. Lond., Miss Gulielma Lister, Miss Ethel Sargant, Mr. Arthur Everett Shipley, M.A., F.R.S., Miss Sarah Marianne Silver, Mrs. Constance Percy Sladen, Miss Annie Lorrain Smith, Mrs. Mary Anne Stebbing, Miss Emma Louisa Turner, Mr. William James Tutcher, Mrs. Lilian Jane Veley, and Miss Ellen Ann Willmott, were proposed as Fellows.

Mr. H. E. H. Smedley, F.L.S., F.G.S., exhibited forty-one Models of Palæozoic Seeds and Cones, including those of the following:—*Palæostachya*, *Calamostachys*, *Cingularia*, *Cheirostrobus*, *Sigillariostrobus*, *Spencerites*, *Bennettites*, *Lagenostoma*, and others. The models of the seeds show the complexity of their internal structure, whilst those of the synthetically re-constructed Calamitean and other cones display the high organization of the vascular Cryptogams of Palæozoic times.

A discussion followed in which Dr. D. H. Scott, Professor J. B. Farmer, and the President took part.

The following papers were read:—

1. "Note on the Shape of the Stems of Plants." By the Rt. Hon. Lord Avebury, F.R.S., F.L.S.

2. "Observations on some undescribed or little-known Species of Hemiptera-Homoptera of the Family Membracidæ." By G. Bowdler Buckton, F.R.S., F.L.S.

December 1st, 1904.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 17th November were read and confirmed.

Mr. Eardley Wilmot Blomfield Holt and Miss Emilia Frances Noel were proposed as Fellows.

Mr. Percy Appleyard, F.C.S., Mr. Richard Hind Cambage, Mr. Thomas Bennett Goodall, and Mr. Richard Norris Wolfenden, M.D.Cantab., were severally balloted for and elected.

The Meeting having been made Special in pursuance of notice sent to all Fellows in the United Kingdom, the President opened the Ballot for five additional Members of Council, in accordance with the provisions of the Supplemental Charter. The Ballot being closed, the President nominated Mr. Herbert Druce, Mr. Henry Groves, and Mr. A. O. Walker, Scrutineers; and the votes having been examined and reported to the President, he announced that Mr. Richard Assheton, M.A., Rev. Canon W. W. Fowler, M.A., Mr. H. W. Monckton, F.G.S., Prof. F. W. Oliver, D.Sc., and Dr. A. B. Rendle, M.A., had been elected Members of the Council.

Mr. John Clayton, F.L.S., presented a series of photographs with lithographed text, entitled "The Sequoias, with special reference to the section of the Big-Tree 'Mark Twain,'" which tree afforded the sections in the Jesup Collection in New York, and at the British Museum (Natural History); the history and details of these were given. A discussion followed, Mr. H. J. Elwes, Rev. T. R. R. Stebbing, and Mr. H. W. Monckton taking part.

Prof. S. H. Vines, F.R.S., V.P.L.S., then gave a discourse on "Proteid Digestion in Animals and Plants." (See Abstract on p. 59.)

December 15th, 1904.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 1st December were read and confirmed.

Mr. T. B. Goodall, Mr. C. E. Walker, and Dr. R. N. Wolfenden were admitted Fellows.

Miss Lilian Suzette Gibbs, Mrs. Henderina Victoria Scott, Mr. Charles Blades Coverdale Storey, and Prof. Richard Henry Yapp were proposed as Fellows.

Her Grace Mary du Caurroy Russell, Duchess of Bedford, Miss Margaret Benson, D.Sc.Lond., Mr. Stafford Edwin Chandler, B.Sc., Mrs. Catherine Crisp, Miss Alice Laura Embleton, B.Sc., Mrs. Grace Coleridge Frankland, F.R.M.S., Mrs. Maria Matilda Ogilvie Gordon, Ph.D. Munich, D.Sc. Lond., Miss Gulielma Lister, Miss Ethel Sargant, Mr. Arthur Everett Shipley, M.A., F.R.S., Miss Sarah Marianne Silver, Mrs. Constance Percy Sladen, Miss Annie Lorrain Smith, Mrs. Mary Anne Stebbing, Miss Emma Louisa Turner, Mr. William James Tutcher, Mrs. Lilian Jane Veley, and Miss Ellen Ann Willmott, were severally balloted for and elected.

Mr. W. G. Freeman, F.L.S., exhibited the fresh fruit of *Sechium edule*, Sw., from the West Indies, and remarked upon its precocious germination. Mr. H. J. Elwes and Mr. C. B. Clarke contributed some further remarks.

Mr. Thomas Christy, F.L.S., brought two samples for exhibition of the so-called "Root" or "Grass" rubber from the French Congo, believed to be derived from *Landolphia Thollonii*, Dewèvre; Mr. E. M. Holmes added a few observations.

The following papers were read:—

1. "On the Œcology of Woodland Plants in the Neighbourhood of Huddersfield." By Thomas W. Woodhead, F.L.S.
2. "Experimental Studies on Heredity in Rabbits." By Charles Chamberlain Hurst, F.L.S.

January 19th, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 15th December were read and confirmed.

Mrs. Catherine Crisp, Mrs. Constance Percy Sladen, Miss Ellen Ann Willmott, Miss Emma Louisa Turner, Mrs. Mary Anne Stebbing, Miss Sarah Marianne Silver, Mrs. Lilian Jane Veley, Miss Margaret Benson, Miss Annie Lorrain Smith, Miss Gulielma Lister, and Miss Ethel Sargant were admitted Fellows.

Mr. Thomas Vere Hodgson and Miss Viola Annette Latham, M.D., were proposed as Fellows.

Mr. Eardley Wilmot Blomfield Holt and Miss Emilia Frances Noel were elected Fellows.

The Rev. T. R. R. Stebbing exhibited and explained specimens of Crustacea, in various ways remarkable for structure, habits,

habitat, or colouring, collected by Dr. Gilchrist, F.L.S. (South Africa), W. R. Forrest, Esq. (West Indies), Dr. Charles Hose, D.Sc. (Borneo), C. J. Saunders, Esq. (Singapore), P. W. Bassett-Smith, Esq., R.N. (Diego Garcia), W. Boyd, Esq., F.R.S.E., W. Bruce, Esq., E. Mello Saunders, Esq. (Northern and Arctic localities), and G. Eddison, Esq. (Nottinghamshire).

The specimens shown included many representative crabs, delicate or massive, some with tall sponges growing on their backs, some equipped for vigorous motion; a "calling-crab" with one arm abnormally large; an old truculent-looking land-crab; a new stone-crab from the South Atlantic; a West Indian "hermit" of exceptional size; a "mother-lobster" with its gastric apparatus inverted; several craw-fishes; the little red Cape lobster; cray-fishes; a new African river-prawn of a beautiful blue colour; the gigantic South American prawn, *Palæmon jamaicensis*; Squillidæ, Isopods, and Amphipods, with a thread-like Caprellid from Kerguelen among them. The series was intended to illustrate the wonderful diversity of forms developed in the Malacostraca, all traceable by modifications easily intelligible to a very simple original.

Various crustacean parasites of northern and southern whales were also exhibited, and a curious mimetic parasite from the sun-fish.

Lastly, Mr. Stebbing made an appeal for information in regard to the distribution of the river Crayfish in the Midland and Northern counties of England.

A discussion followed, in which the Rev. J. Gerard, S.J., Mr. H. J. Elwes, the Treasurer, the President, and Mr. V. I. Chamberlain took part, the Rev. T. R. R. Stebbing replying.

Dr. Augustine Henry then gave a discourse on "Botanical Collecting," to which Prof. S. H. Vines, Mr. H. J. Elwes, and Dr. Tempest Anderson (a visitor) contributed some remarks. (See Abstract, p. 62.)

The following paper was read:—

"On the Cranial Osteology of the Families Osteoglossidæ, Pantodontidæ, and Phractolæmidæ." By Dr. W. G. Ridewood, F.L.S.

February 2nd, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 19th January were read and confirmed.

Mr. Eardley Wilmot Blomfield Holt, Miss Emilia Frances Noel, Miss Alice Laura Embleton, Mr. William James Tutcher, and Mr. Stafford Edwin Chandler were admitted Fellows.

Miss Emily Mary Berridge, B.Sc.(Lond.), Mr. Frederick Hugh Capron, B.A.(Oxon.), Miss Helen Charlotte Isabella Fraser, B.Sc.(Lond.), and Miss Dorothea Frances Matilda Pertz were proposed as Fellows.

Miss Lilian Suzette Gibbs, Mrs. Henderina Victoria Scott, Mr. Charles Blades Coverdale Storey, and Prof. Richard Henry Yapp, M.A.(Cantab.) were severally balloted for and elected Fellows.

The PRESIDENT having announced that the Council had approached Her Majesty the Queen, with the view of obtaining Her Majesty's consent to become an Honorary Member under the provisions of the Supplemental Charter and New Bye-Laws, read the following letter from the Queen's Private Secretary, all the Fellows present upstanding in their places:—

Buckingham Palace,
27th Jan., 1905.

SIR,

I have had the honour of submitting your letter and Reports to the Queen. I am commanded to inform you that Her Majesty will be pleased to comply with your request to become an Hon. Member of the Linnean Society.

I am, Sir,
Your obedient Servant,
(Signed) SIDNEY GREVILLE.

B. DAYDON JACKSON, Esq.,
Gen. Secretary.

The PRESIDENT then read the letter which he proposed to send in consequence of the foregoing:

LINNEAN SOCIETY,
Burlington House, London, W.
3rd February, 1905.

To the Queen's Most Excellent Majesty.

MADAM,

I have the honour to state that the gracious expression of Your Majesty's wish to become an Honorary Member of this Society was duly communicated to the General Meeting of the Linnean Society of London held yesterday at Burlington House, and was received with acclamation, the Fellows all upstanding in their places.

The Roll of the Society will be submitted for signature at Your Majesty's pleasure.

I remain, Madam, with the deepest respect,
Your Majesty's most dutiful and most obedient Servant,

(Signed) WILLIAM A. HERDMAN,
President,
Linnean Society of London.

The following papers were read:—

1. "Descriptions of New Chinese Plants." By William James Tutcher, F.L.S.

2. "Revision of the European Marine Forms of the *Cirolaninæ*, a Subfamily of Crustacea Isopoda." By Dr. H. J. Hansen, F.M.L.S.

February 16th, 1905.

Prof. S. H. Vines, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 2nd February were read and confirmed.

Mrs. Henderina Victoria Scott and Mr. Charles Blades Coverdale Storey were admitted.

Mr. Johannes Gossweiler and Miss Edith Rebecca Saunders were proposed as Fellows.

Mr. Thomas Vere Hodgson and Miss Viola Annette Latham, M.D., were severally balloted for and elected Fellows.

The Vice-President in the Chair then read the following letter from the Private Secretary of H.M. the Queen, in reply to the President's letter dated 3rd February:—

Buckingham Palace,
3rd Feb., 1905.

Sir,

I have had the honour of presenting your letter on behalf of the Linnean Society to the Queen.

I am commanded to express Her Majesty's thanks.

I am, Sir,
Your obedient Servant,

W. A. Herdman, Esq. (Signed) Sidney Greville.

Four vacancies in the List of Foreign Members were announced from the Chair, due to the deaths of Dr. Michael Woronin, Dr. Rudolph Amandus Philippi, Prof. Eduard von Martens, and Dr. Bernard Renault.

A circular from the Société de Physique et d'Histoire Naturelle de Genève, announcing that the A. P. de Candolle prize of 500 francs will be awarded for the best unpublished monograph of a genus or order of plants, was also laid before the Society.

The following Resolution was put from the Chair, and adopted unanimously:—

> "The Fellows of the Linnean Society in General Meeting assembled, February 16, 1905, express their profound sympathy with Mrs. Howes in her recent bereavement, their admiration for the distinguished career of her late husband, Professor THOMAS GEORGE BOND HOWES, F.R.S., and their gratitude for the long and energetic service which he rendered to the Society as its Zoological Secretary."

Miss E. WILLMOTT, F.L.S., exhibited thirty water-colour drawings of Roses by Alfred Parsons, A.R.A., drawn at Great Warley, for her forthcoming volume on the genus *Rosa*, together with some chromo-lithographs of extreme excellence for the same volume.

Messrs. H. J. Elwes, J. G. Baker, and H. Groves raised a discussion on some points suggested by the drawings, to which Miss Willmott replied.

The following papers were read:—

1. "A Revised Classification of Roses." By John Gilbert Baker, F.R.S., F.L.S.
2. "The Botany of the Anglo-German Uganda Boundary Commission." By Edmund G. Baker, F.L.S., S. L. Moore, F.L.S., and Dr. A. B. Rendle, F.L.S.

March 2nd, 1905.

Prof. W. A. HERDMAN, F.R.S., President in the Chair.

The Minutes of the General Meeting of the 16th February were read and confirmed.

Mr. William Norwood Cheeseman was admitted a Fellow.

Marian, Lady Busk, Miss Lilian Jane Clarke, Miss Gabrielle Louise Caroline Matthaei, Mr. Reginald Innes Pocock, F.Z.S., and Mr. William Wise were proposed as Fellows.

Dr. Paul Friedrich August Ascherson, Berlin; Dr. Gottlieb Haberlandt, Graz: Prof. Ambrosius Arnold Willem Hubrecht, Utrecht; and M. Charles René Zeiller, Paris, were proposed as Foreign Members.

Miss Emily Mary Berridge, B.Sc., Mr. Frederick Hugh Capron, B.A., Miss Helen Charlotte Isabella Fraser, B.Sc., and Miss Dorothea Frances Matilda Pertz were severally balloted for and elected Fellows.

Mr. D. FINLAYSON, F.L.S., exhibited and explained the Ashe-Finlayson "Comparascope," for displaying two objects in the same

magnified field, this being attained by a secondary stage and objective at right-angles to the primary instrument, the rays being transmitted up the body of the microscope through a right-angled prism, and clearness of the two images preserved by means of a diaphragm placed longitudinally in the microscope-tube.

A discussion followed in which Dr. W. G. Ridewood, Dr. D. H. Scott, Rev. T. R. R. Stebbing, and the President joined. Criticism was chiefly directed to the hybrid term for the invention, and "Synoptoscope" or "Synthetoscope" was suggested in its place.

The following papers were read:—

1. "On Zoological Nomenclature: International Rules and others." By the Rev. Thomas R. R. Stebbing, Zool.Sec.L.Soc.
2. "Biscayan Plankton.—Part IV. The Thaliacea." By Dr. George Herbert Fowler, F.L.S.

March 16th, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 2nd March were read and confirmed.

Miss Emily Mary Berridge and Mr. Frederick Hugh Capron were admitted Fellows.

Mr. Arthur James Dicks, B.Sc.Lond., and Mrs. Maude Muff were proposed as Fellows.

Mr. Johannes Gossweiler and Miss Edith Rebecca Saunders were elected Fellows.

The President announced that the Council had appointed a Committee to consider the question of Zoological Nomenclature discussed at the last meeting; also, in view of the interest displayed at a previous meeting on the subject of Œcology, a discussion had been arranged for the 4th May, to be opened by Mr. A. G. Tansley.

Mrs. D. H. Scott, F.L.S., exhibited animated photographs of plants taken by the kammatograph, showing the natural movements of the plants accelerated so as to be readily followed by the eye.

The plates shown were:—

1 & 2. *Sparmannia africana*, showing the opening of the flower-bud, the movements of the stamens, and the closing of the flowers at night.

3. Sensitive plant, *Mimosa pudica*, showing the movements of the leaves on stimulation.

4. *Fuchsia*, showing the opening of two buds into flower during 16 days, the bursting of the stamens and the growth of the style between them.
5. *Maurandia*, showing the circumnutation of the stem and two young petioles twining round a stick.
6. *Crocus*: development of a bud and the opening and closing movements of the flower.
7. *Clivia*: opening of the flower-buds.
8. *Hippeastrum*: growth of stamens and style and development of the stigma.
9. A humble-bee fertilizing a Scabious flower.

A discussion followed, in which Dr. Scott, Rev. T. R. R. Stebbing, Mr. E. M. Holmes, Mr. J. Hopkinson, and the President took part, Mrs. Scott replying to the questions put.

Mr. Rupert Vallentin, F.L.S., showed a series of thirty lantern-slides, from photographs taken by himself, of bird-life in the Falkland Islands:—(1) The Kelp Goose, *Chloephaga antarctica*, with the dissimilar coloration of the two sexes, feeding on *Porphyra vulgaris*, a very abundant seaweed between tide-marks in those regions. (2) *Phalacrocorax magellanicus* and *P. imperialis* basking in the sun, and on their nests. (3) The Mollymauk, *Diomedea chlororhyncha*, which breeds on the outlying islands of the group. (4) The Penguins whose headquarters seem to be these islands, the Gentoo, *Pygoscelis tæniata*, their nests being made on peaty soil, packed with twigs of *Empetrum nigrum* or *Poa cæspitosa*, the Tussock Grass. (5) The Rockhopper Penguin, *Eudyptes chrysocome*, which assembles in the breeding-season by thousands in rookeries. Concerning this species, a series of rock-specimens were shown, some merely polished, others deeply grooved, as if by the claws of the Penguins when walking up the pathways to their rookery.

The President, the Rev. T. R. R. Stebbing, Mr. A. O. Walker, and Mr. A. D. Michael engaged in a discussion, and Mr. Vallentin replied.

The following paper was read:—

"Contributions to the Flora of Liberia." By Dr. Otto Stapf, F.L.S.

April 6th, 1905.

Mr. A. C. Seward, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 16th March were read and confirmed.

Miss Helen Charlotte Isabella Fraser, Miss Dorothea Frances

Matilda Pertz, and Miss Edith Rebecca Saunders were admitted Fellows.

Mr. Edward Russell Burdon, B.A., Miss Kate Marion Hall, and Mr. Frederick William Lucas were proposed as Fellows.

Marian, Lady Busk, Miss Lilian Jane Clarke, Mr. Reginald Innes Pocock, F.Z.S., and Mr. William Wise were elected Fellows.

The Auditors for the Society's Financial Year ending 30th April were nominated, and elected by show of hands, as follows :—

For the Council, Mr. H. W. Monckton and Mr. G. S. Saunders; for the Fellows, Mr. H. Druce and Mr. H. Groves.

Mr. W. Botting Hemsley, F.R.S., F.L.S., exhibited a number of specimens and drawings of pitchers of *Nepenthes*, supplemented by slides, prepared by Mr. L. Farmar, to illustrate the various types of pitchers and their glandular systems. Glands are present on almost all parts of pitcher-plants, from the stems to the flowers, and they vary very much in structure, but there are only two classes, namely attractive and digestive. The former are generally distributed over the plant except the inside of the pitcher, where the digestive glands alone occur. The pitcher is an appendage of the leaf, borne on a prolongation of the midrib, which often acts as a tendril; it consists of a tubular or inflated body with two interior longitudinal ribs, which often develop into elegant fringed wings, and one posterior rib, which usually terminates in a spur, running out just below the hinge of the lid or operculum. The mouth of the pitcher is surrounded by a more or less elaborately constructed collar or peristome.

A new species, *Nepenthes Macfarlanei*, differs from all other known species, except *N. Lowii*, in the underside of the lip being thickly beset with stiff bristles, interspersed with honey-glands. The function of the bristles in this position is not obvious; but would seem to be preventative to flying insects, though ants might creep amongst them and drink the honey. The pitchers of *N. Macfarlanei*, as probably of all other species, are of two kinds, apart from those on the young seedlings. In some, perhaps only the intermediate ones, the whole of the inner surface is covered with digestive glands and the anterior ribs are not winged; in others, the upper part of the inner surface is perfectly smooth, forming what is termed the conductive zone to the glandular or retentive zone; the anterior ribs are developed into fringed wings, and the collar has an upward elongation where the lid is attached. The honey-glands on the underside of the lip are very prominent, oval or circular in outline, surrounded by a raised rim and from $\frac{1}{50}$ to $\frac{1}{12}$ of an inch in diameter. The digestive glands are gradually smaller from the base upwards, and vary from about 2000 to 5000 to the square inch. These glands are many-celled, ovoid or spherical in shape, and, in consequence of the unequal

growth of the tissues in which they are embedded, they are more or less over-arched, the opening of the arch looking downwards. The surface of the tissue is hard and polished, quite smooth to the finger moving in a downward direction, and rough to the finger, from the sharp edges of the arches, moving in an upward direction. *N. Lowii* has much larger, differently shaped pitchers, constricted in the middle, with sunken honey-glands on the lid as much as $\frac{1}{15}$ inch in diameter and a very small pore-opening. The digestive glands in the lower part of the pitcher are pentagonal to heptagonal in shape, with a raised, hard rim all round. The collar is the simplest in the genus, but it has a prominent, single series of perithecoid honey-glands near its inner margin.

N. Rajah, in a wild state at least, has sometimes a total length of leaf and pitcher of between five and six feet, with a very elaborate collar and a comb-like inner margin and solitary honey-glands, reached by a tunnel-like opening between the teeth; the largest pitchers have a capacity of two quarts. In *N. echinostoma* the collar consists of several series of combs, directed inwards and downwards, with a similar honey-gland in each tooth. *N. Edwardsiana* has a relatively narrow pitcher sometimes as much as two feet long, and the collar has thin transverse rings that are very distinctive. The collar of *N. echinostoma* is remarkable in having about four series of flattened spines, projecting inwards and downwards; each spine has an apical pore, the opening to a deeply seated honey-gland. In all other species the glands are between the teeth or spines. The digestive glands in the upper part of the retentive zone of this pitcher are very small, and number about 15,000 to the square inch. *N. Northiana* and *N. Veitchii* have remarkable broad turn-down, plaited, scolloped collars; *N. bicalcarata* is remarkable in having two very sharp spurs springing from near the hinge of the lid and projecting over the mouth of the pitcher; *N. celebica* has a horn-like appendage on the lid at a point opposite the hinge.

The complex arrangements favour the descent of insects and other creatures into the pitchers, and hinder almost all visitors from getting out again; once in, there is little hope of escape. A few hybrids were also shown, notably one named "Sir William Thiselton-Dyer," which has produced the largest pitcher known in cultivation, being a pint and three-quarters in capacity.

The following papers were read:—

1. "On the Axillary Scales of certain Aquatic Monocotyledons." By Prof. R. J. Harvey Gibson, F.L.S.

2. "A further Contribution to the Study of *Pelomyxa palustris* (Greeff)." By Mrs. Lilian J. Veley, F.L.S.

3. "On Mansonieæ, a new Tribe of the Natural Order Sterculiaceæ." By Lt.-Col. David Prain, I.M.S., F.R.S., F.L.S.

May 4th, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 6th April were read and confirmed.

The Rev. William Jenkins Webb Anderson, B.M., B.S., Fatshan Hospital, Canton, and Mr. Hugh Fraser Macmillan, Curator of the Royal Botanic Gardens, Peradeniya, Ceylon, were proposed as Fellows.

Mr. Arthur James Dicks and Mrs. Maude Muff were elected Fellows.

Prof. Paul Friedrich August Ascherson, Prof. Gottlieb Haberlandt, Prof. Ambrosius Arnold Willem Hubrecht, and Prof. Charles René Zeiller were elected Foreign Members.

The following papers were read:—

1. "The Botany of Gough Island.—Part I. Phanerogams and Ferns." By R. N. Rudmose Brown, B.Sc. (Communicated by W. B. Hemsley, F.R.S., F.L.S.)

2. "The Study of Vegetation: its present Condition and probable Development." By Prof. A. G. Tansley, F.L.S.

3. "Biscayan Plankton.—Part V. The Schizopoda." By Messrs. E. W. L. Holt and W. M. Tattersall. (Communicated by Dr. G. Herbert Fowler, F.L.S.)

May 24th, 1905.

Anniversary Meeting.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 4th May were read and confirmed.

Mr. Reginald Innes Pocock, F.Z.S., Mrs. Maude Muff, Miss Lilian Jane Clarke, Mrs. Maria Matilda Ogilvie Gordon, D.Sc. Lond., Ph.D. Munich, Her Grace the Duchess of Bedford, Lady Busk, Mr. William Wise, and the Rev. William Moyle Rogers were admitted Fellows.

The Treasurer then laid his Annual Statement of Accounts before the Fellows, as shown on p. 15, and the President having spoken briefly, Mr. Henry Groves moved, and Prof. F. W. Oliver, F.R.S., seconded, "That the Treasurer's statement be adopted," which was carried.

Receipts and Payments of the Linnean Society from May 1st, 1904, to April 29th, 1905.

Receipts.	£	s.	d.
Balance at Bankers on the 1st May, 1904	267	11	6
Interest on Investments	178	12	6
Admission Fees	258	0	0
Annual Contributions	1458	0	0
Compositions	720	0	0
Sales of Publications:—			
Transactions £114 12 5			
Journals 95 6 7			
Proceedings and Catalogues 2 5 3			
	212	4	3
Miscellaneous Receipts	90	9	5
	£3184	17	8

Payments.	£	s.	d.
Taxes and Insurance	10	1	3
Repairs and Furniture	382	1	2
Coals and Lighting	35	8	3
Salaries	729	10	0
Library:—			
Books £178 12 2			
Binding 100 7 6			
	278	19	8
Expenses of Publications:—			
Printing £609 6 5			
Illustrations 284 19 8			
Distribution 36 3 9			
	930	9	10
Miscellaneous Printing and Stationery	77	14	9
Petty Expenses (including Tea and Postage)	106	13	11
Investment of Compositions	350	0	0
Balance in hand 29th April, 1905	283	18	10
	£3184	17	8

Investments on the 29th April, 1905.

	£	s.	d.			£	s.	d.
Consols, $2\frac{1}{2}$ per cent.	4177	19	11	@	$90\frac{5}{16}$	3773	5	1
Metropolitan Board of Works $3\frac{1}{2}$ per cent. Stock	1079	11	3	@	107	1155	2	8
Great Indian Peninsula Railway, Annuity Class B	42	1	5	@	$22\frac{1}{2}$	946	11	11
Forth Bridge Railway 4 per cent. Stock	450	0	0	@	120	540	0	0
Consols (Westwood Bequest), $2\frac{1}{2}$ per cent.	249	3	8	@	$90\frac{5}{16}$	225	0	10
						£6640	0	6

FRANK CRISP, *Treasurer.*

Audited, and found correct. 11th May, 1905. { HERBERT DRUCE, HENRY GROVES, B. DAYDON JACKSON, GEORGE S. SAUNDERS, HORACE W. MONCKTON. } *Auditors.*

Prof. S. H. Vines, F.R.S., in an appreciative review of the Treasurer's record, then moved the following Resolution :—

> That the best thanks of the Society be given to Mr. Frank Crisp, the retiring Treasurer, for his valued services during nearly a quarter of a century, and his many munificent benefactions during his term of office, amongst which the gift of the cost of the Supplemental Charter is not the least.
>
> Whilst regretting his retirement from the office he has so ably filled, the Society trusts that he may for many years continue to enjoy the leisure from official duties which he has so justly earned.

The General Secretary seconded the motion, remarking that the honour of doing so devolved upon him as being contemporaneously an officer during the whole of Mr. Crisp's Treasurership, and he found additional sources of gratification in that he had for two months before Mr. Crisp's election acted as Treasurer after the death of Mr. Frederick Currey, and in the fact that they had known each other from boyhood.

The President having added his appreciation, the motion was carried unanimously, the Fellows rising in their places.

The General Secretary read his report of deaths, withdrawals, and elections as follows.

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

Mr. John Birkett.
Dr. João Francisco Braga.
Rev. Thomas William Daltry.
Mr. James Epps.
Mr. William Ferguson.
Mr. Wickham Flower.
Mr. Alexander Fry.
Mr. John Horne.
Prof. Thomas George Bond Howes.
Lieut.-Col. Leonard Howard Loyd Irby.
Sir Hugh Low.
Mr. J. George Luehmann.
Mr. Robert McLachlan.
Mr. William Paul.
Rev. Thomas Arthur Preston.
Mr. Alfred Sanders.
Mr. John Charles Sawer.
Mr. Stephen William Silver.
Rev. Francis Augustus Walker.

Foreign Members (4).

Prof. Eduard von Martens.
Prof. Alpheus Spring Packard.
Dr. Rudolph A. Philippi.
Dr. Bernard Renault.

The following 8 Fellows have resigned :—

Mr. Arthur Bennett.
Mr. Arthur Crabtree.
Mr. Charles Curtis.
Dr. Henry Guard Knaggs.
Mr. Robert Morton Middleton.
Mr. Charles Sharp.
Mr. Edward Alfred Webb.
Mr. James Thompson Wilshire.

And 43 Fellows (of whom 41 have qualified) and 4 Foreign Members have been elected.

The Librarian's report was read as follows :—

During the past year 69 Volumes and 103 Pamphlets have been received as Donations from Private Individuals.

From the various Universities, Academies, and Scientific Societies 265 volumes and 127 detached parts have been received in exchange and otherwise, besides 68 volumes and 42 parts obtained by exchange and as Donations from the Editors and Proprietors of independent Periodicals.

The Council has sanctioned the purchase of 175 volumes and 108 parts of important works.

The total additions to the Library are therefore 577 volumes and 380 separate parts.

The number of Books bound during the year is as follows :— In half-morocco 325 volumes, in half-calf 9 volumes, in full cloth 184 volumes, in vellum 28 volumes, in buckram 56 volumes, in boards or half-cloth 21 volumes. Relabelled (half-morocco and cloth backs) 54 volumes. Total 657 volumes.

The General Secretary having read the Bye-Laws governing the Elections, the President opened the business of the day, and the Fellows present proceeded to vote for the Council. The Ballot for the Council having closed, the President appointed Dr. Braithwaite, Col. Beddome, and Mr. Wilfred Mark Webb, Scrutineers, and the numbers having been counted and reported to the President, he declared the result as follows :—

Councillors retired :—Dr. A. C. L. G. Günther, F.R.S., Prof. F. G. Parsons, F.Z.S., Mr. G. S. Saunders, F.E.S., Mr. A. C. Seward, F.R.S., and Prof. S. H. Vines, F.R.S. ; and the following were elected in their room :—Dr. Gilbert C. Bourne, Dr. Horace T. Brown, F.R.S., Mr. Clement Reid, F.R.S., Mr. David Sharp, F.R.S., and Dr. A. Smith Woodward, F.R.S.

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

President : Prof. W. A. Herdman, F.R.S.

Treasurer : Horace W. Monckton, F.G.S.

Secretaries { Dr. D. H. Scott, M.A., F.R.S.
Rev. T. R. R. Stebbing, M.A., F.R.S.
B. Daydon Jackson.

The President then delivered his Address, as follows :—

PRESIDENTIAL ADDRESS, 1905.

Fellows of the Linnean Society,—

It is my first duty—and like most duties when looked at from a common-sense point of view, it is also a great pleasure—to thank you for the honour you have done me and for the confidence you have shown in elevating me to this position. If I hesitated before accepting the nomination by Council it was not that I was in any way insensible to the honour proposed, but rather that I felt it to be beyond my deserts, and, amongst other reasons, because I doubted whether one whose chief work lay 200 miles away could efficiently discharge the duties you would naturally expect from your President. However, the kind assurances of prominent members of the Council overcame my doubts; and I will only add that there was some comfort in the thought that there is possibly one qualification which I was conscious of—namely, a strong desire to be of use and to advance in any way in my power the Linnean Society and the cause of Natural Science.

The Session during which, thanks to your kindness, I have been privileged to occupy this chair has been in several ways a memorable one. At the last Anniversary Meeting, my distinguished predecessor was able to announce in his Presidential Address that the Supplemental Charter of the Society had at last been granted, and he very properly alluded to the labour and expense which the Treasurer with characteristic generosity had borne single-handed—one only of many acts of thoughtful kindness on the part of Mr. Frank Crisp, from which the Society has benefitted. The loss which we sustain in the retirement of Mr. Crisp from the office of Treasurer, which he has held for nearly a quarter of a century, will be brought before the attention of the Society in a separate resolution.

In order to carry out the provisions of the Supplemental Charter it became necessary that the Bye-Laws of the Society should be revised, and one of the first duties I had to perform on taking office last June was to bring before your notice the draft revision carefully prepared by the Council of the previous session. The revised Bye-Laws were duly read from the Chair, as required by the Charter of 1802, at our meetings on June 2nd and June 16th, and were, I am happy to say, formally approved by the Fellows at our meeting on November 3rd, 1904.

These formalities completed, it became possible for us to bring about that great event in the history of our Society which has been predicted and commented on in more than one recent Presidential Address—the admission of Lady-Fellows. From that time forwards the Fellowship of the Linnean Society of London was open to worthy candidates without distinction of sex. The response to

this invitation has been most gratifying. No less than 26 duly qualified scientific women have been elected—a very notable accession to the Society.

In the past, although good scientific work by women, in both Botany and Zoology, has been brought on occasions before our meetings and has been printed in our publications, the Author was ever placed at a disadvantage ; and if she appeared in person to read the paper, it was only possible as an act of grace and by special permission of the Council. Now our women workers can appear in their own right, they join us free from all disabilities, and they enjoy the privileges of fellowship and the duties of office on equal terms with men. Names of both men and women appeared for the first time in the list of candidates on November 17th, and in the ballot on December 15th, 1904, when 18 were elected.

I cannot but feel that in being privileged to receive the first Lady-Fellows I have, to some extent, reaped where I did not sow. It would have been more appropriate, had the necessary constitutional processes allowed, if my predecessor, Professor Vines, before relinquishing the Chair, had conducted in person the inauguration of the new order resulting from the changes brought about during his presidency. That, however, was impossible ; but he enjoyed the distinction of presenting the first Lady-Fellow, and on January 19th, 1905, I had the pleasure of admitting to the Fellowship Mrs. Catherine Crisp, the wife of our Treasurer ; Mrs. Mary Ann Stebbing, the wife of our Zoological Secretary ; Mrs. Percy Sladen, the widow of a former Zoological Secretary ; and such well-known scientific workers as Miss Margaret Benson, Miss Gulielma Lister, Miss Ethel Sargant, Miss Lorrain Smith, Miss Silver, Miss E. L. Turner, Mrs. Veley, and Miss E. Willmott—followed at subsequent meetings during the session by Mrs. H. V. Scott, wife of our Botanical Secretary ; and others. To-day I have had the honour of admitting Her Grace the Duchess of Bedford, who was in the list of first Lady-Fellows elected on December 15th. Such additions can be nothing but a strength and an honour to our Society, and the Treasurer has signalized the historic occasion by a dinner to the new Fellows and by commissioning a picture of the scene at our meeting on January 19th, to be painted by Mr. James Sant, R.A., and presented to the Society for the permanent adornment of our library.

In all 44 new Fellows have been added to the roll this Session—a noteworthy increase as compared with 27 last Session and 22 the average for the last 10 years.

Chapter III. Sect. I. of our Bye-Laws provides that such Members of the Royal Family as may express a wish to belong to the Society become Honorary Members. It has been felt by the Council, as I am sure it will be also by all the Fellows of the Society, to be most appropriate, in the session when the first Lady-Fellows were admitted, that the attention of the Queen

should be directed to this provision in the Bye-Laws, and that Her Majesty should be humbly and dutifully requested to signify her wish to become an Honorary Member. The loyal and happy resolution to this effect was proposed at Council by Prof. Vines on January 19th, and on February 2nd I was enabled to read to the Society the reply intimating that the Queen had graciously acceded to our request.

We turn from the pleasant thought of these accessions to the inevitable losses which we have to regret—the death of 18 Ordinary Fellows and of 4 on the Foreign list, the latter being:—Dr. Rudolph A. Philippi, Prof. Eduard von Martens, M. Bernard Renault, and Prof. Alpheus S. Packard. The obituaries of our late Fellows have been prepared as usual by the Secretaries, and I do not propose to detain you by traversing the same ground; but there is one loss we have sustained which has a personal sadness for most of us and which I cannot pass over on this occasion. In deep sorrow we have to record the death, on February 4th, 1905, of our former Zoological Secretary, Prof. George Bond Howes. Last year Prof. Vines referred sympathetically to the resignation of office which our friend's continued serious illness had necessitated, and now we mourn the premature termination of a useful life and a distinguished career. Prof. Howes's numerous solid contributions to science will be duly recorded in our 'Proceedings.' Tributes to his influence as a teacher and his helpfulness as a colleague have already been published or will shortly appear. We knew him best here as an indefatigable councillor and office-bearer and a true friend of all honest workers. Many young scientific men owe their professional position and advancement in large measure to support and advice from Howes. He had correspondents in all parts of the country whom he helped with information and literature. He had an unusually wide range of knowledge and a marvellously detailed acquaintance with the publications of Zoology; and all that he knew was ever placed freely at the disposal not only of his students and friends, but also of other workers on the subject whom in some cases he had never even met. I do not think it is too much to say that he wore himself out working for others.

We all appreciated highly his scientific work and admired his fine character; those of us who were privileged to know him more intimately loved him as a friend of a singularly sympathetic, unselfish and loyal nature. This Society at the meeting on February 16th passed a resolution of deep regret, sympathy and gratitude for devoted service; and I am now able to announce to you that steps have been taken by the Officers of this Society and of the Zoological Society and a few other former colleagues to establish a Howes Memorial Fund. A committee is now being formed, and a circular letter will shortly be issued to the Fellows of the Society.

The vacant places in our list of Foreign Members have been filled by the election of Dr. Paul Friedrich August Ascherson, of Berlin; Dr. Gottlieb Haberlandt, of Graz; Prof. Ambrosius Arnold Willem Hubrecht, of Utrecht; and M. Charles René Zeiller, of Paris. It is a matter of congratulation to the Society that these distinguished names have been added to our roll.

The Council have awarded the Linnean Medal this year to that great Cytologist and Morphologist, the professor of Botany at Bonn, Geheimrath Dr. Eduard Strasburger. We are honouring ourselves as well as doing homage to the recipient, in conferring this, the highest distinction in our power, upon such an eminent man of science.

During this Session we have continued the practice recently proposed of arranging occasional discussions on subjects of general biological interest introduced to our notice by one or more of our leading experts. Scientific opinion is divided as to the value of set discussions on debatable matters. It is often said that no one who has worked or thought much on such a subject changes his opinion as a result of the discussion. That may well be true of the protagonists; and it may also be true, as is frequently urged, that the best discussions are those that arise spontaneously from the reading of a paper or the exhibition of a specimen. But for most of us, discussions such as we have had here during this Session are both interesting and valuable. Those who play only minor parts in the action and those who are content to listen to the arguments, must benefit from hearing the subjects set out for examination first from one side and then from the other. I am one of those who consider that both in this and in other Societies the exhibitions and the criticisms and discussions, formal and informal, arranged or spontaneous, are usually the most interesting and instructive parts of the proceedings and are well worth the time devoted to them.

Some of the most valuable papers—works that we desire to encourage by all means, and which when printed are important contributions to science and an ornament to our publications—are quite unsuitable for reading to an audience. In such cases, if the author is unable to explain briefly what his paper is about, I should advocate that he be invited to communicate the work by title only, and let the time so gained be devoted to exhibitions and discussions, as I am convinced that these last do more than the reading of papers to keep our members together and add to the vitality of the meetings. I would remind you especially of the interesting discussions we have had in the past session upon "Digestion in Plants," opened by Professor Vines, upon "Ecology," following upon a paper by Mr. Tansley, and upon "Nomenclature," brought before us by Mr. Stebbing.

We have this special advantage in our Society for the discussion of subjects of general biological application, that we are a body of Botanists and Zoologists working and consulting together. Thus

both sides of living nature are represented, and we can throw light upon questions that arise from the standpoints of very varied lines of biological investigation.

As this occasion is not only our annual business meeting, but also our commemoration of the birthday of Linnæus, our thoughts naturally turn to the life and work of the great Swede to whose influence upon the progress of Science botanists and zoologists are equally indebted.

It has occurred to me that you may be interested to hear a few remarks upon a section of his work which is, I believe, little known, but which I have had occasion recently to look into—a subject moreover that has in itself an attraction for most men, and also women—namely, Pearls. Considering the activity of his mind and the wide range of his work, no one will be surprised to hear that Linnæus experimented on the formation of pearls in shell-fish, and that he believed he was able to produce valuable pearls by artificial methods. I do not refer to the manufacture of artificial pearls, but to the artificial stimulation of shell-fish so as to induce them to produce by the natural process real pearls in increased number or at an unusual time or place. With such an object in view, it is necessary to enquire first how pearls are naturally produced in shell-fish. One of the Linnean manuscripts which I shall have to tell you of presently states:—"It is certain that nature produces pearls every day, and if anyone be able to steal from her this knowledge, it can only be he whom she has admitted into her interior and most sacred places." Linnæus had better grounds than anyone else of his time for considering himself as so privileged.

There is an early Hindu belief that at night or during heavy rain the Pearl Oysters ascend to the surface of the sea, open their shells to the air and take in drops of fresh water which become consolidated as pearls.

Pliny and other classical writers record the similar belief that pearls are caused by drops of dew which enter the gaping shell when uncovered with water. A more poetic form is that they are due to the tears of the Nereids, or as Moore has it in 'Peri and the Pearl':—

> "And precious the tear as that rain from the sky
> Which turns into pearls as it falls in the sea."

Colombus, we are told, was convinced he had found the locality for Orient pearls when he reached a spot where the trees grew down into the sea and had their roots covered with oysters gaping ready to receive the dewdrops from the leaves above.

Ælian, on the other hand, thought the pearls were formed by a lightning-flash entering the opening shell; and many other writers since have speculated as to mysterious pathological effusions, as to displaced ova, as to similarity to calculi and to galls, and as to calcification of deposits round sand-grains, algæ,

ova, embryos, and various kinds of parasites or other organic nuclei. I give here, in tabular form, some of the leading names (by no means a complete list) in the history of this enquiry, with, where known, the species of shell-fish on which the observations were made, and an indication of the view held, with more or less justification, as to the nature of the nucleus around which the pearl is formed.

Author.	Shell-fish investigated.	View as to origin of pearl or nature of nucleus.
Pliny	Oriental Pearl Oyster	Drops of dew.
Ælian	Do.	Lightning-flash.
Rondeletius, 1558		Parasites; also concretions.
Redi, 1684		Grain of sand.
Réaumur, 1717		Pathological effusion of shell-matter.
Sir E. Home, 1826	*Anodonta*	Abortive ova.
Filippi, 1852–56	,,	*Distomum* (cercaria) &c.
Küchenmeister, 1856	*Margaritana* and *Anodonta*	Mite (*Limnochares anodontæ*).
Von Hessling, 1858	Do.	Sand, algæ, ova, parasites.
Meckel, 1856		Calculi.
Moebius, 1857	Both marine and fresh-water.	Entozoa.
Kelaart, 1857–59	Ceylon Pearl Oyster	Sand, diatoms, ova, parasites.
Pagenstecher, 1858		Pathological concretions.
Garner, 1871	*Anodonta* and *Mytilus*	*Distomum*.
Harley, 1889		Calculi round inorganic or organic particles.
Comba, 1898	*Margaritifera vulgaris*	Parasites.
Diguet, 1899	*Meleagrina margaritifera*.	Pathological calcification of fluid formed around parasite.
Giard, 1897, 1901	*Donax*, *Tellina*, &c.	Distomids.
Dubois, 1901, 1903	*Mytilus* and *Margaritifera*.	Distomid larvæ.
Jameson, 1902	*Mytilus edulis*	Distomid (Cercaria).
Herdman & Hornell, 1902, 1903.	Ceylon Pearl Oyster (*Margaritifera vulgaris*).	Larval Cestodes.
Seurat & Giard, 1903, 1904.	*Meleagrina margaritifera*.	Larval Cestodes.

Omitting the more fanciful views, there are three main methods which have been advanced as explaining the formation of pearls; and, as is so often the case where there are several competing theories, it cannot be said that one only is correct and of universal application and that the others are quite erroneous. The three I refer to are: (1) the grain-of-sand irritation; (2) the pathological secretion; and (3) the stimulation caused by the presence of a parasitic worm, which acts as a nucleus around which an epithelial sac deposits successive layers of pearly material. Let me say a few words about each of the two last before passing to the first view, the one with which Linnæus was more closely associated.

The view that the pearl is produced as a calculus was originated by Réaumur in 1717, followed by Bohadsch in 1761, was supported by Meckel and by Pagenstecher nearly a century later, and again by Dr. George Harley in 1889. I agree with Giard that a considerable resemblance between the pearl and an animal calculus is compatible with the parasitic theory. Calculi commonly form around a nucleus, and many parasites are known to have calcified cysts deposited over them. Some pearls, not the best, are probably formed as calculus-like growths independently of vermean parasites. Even when the parasite is present, the pearl is produced by the molluscan host, and not by the parasite, and so has been justly compared by more than one writer to an animal gall.

It is commonly thought that the Italian naturalist F. de Filippi originated in 1854 the view that the nucleus of the pearl is really organic, being an encapsuled parasite. But Giard has recently reminded us that Rondeletius propounded the same view in 1558, and that ages before that Androsthenes, who had travelled in the East, is reported by Athenæus to have compared the developing pearls in the oyster to the Cestode larvæ in pork. This, in the absence of microscopic examination, can scarcely be regarded as a scientific demonstration; but it was, at least, a very happy guess, for one of the first facts Mr. Hornell and I were able to determine in connection with the Ceylon pearl oyster in the spring of 1902, was that the Orient pearl in the Gulf of Manaar is deposited around the young larva of a Cestode.

Coming to actual identifications in comparatively recent times, we find that Filippi's pearl-parasite in *Anodonta cygnea* was the Trematode *Distomum duplicatum*, v. Baer. Robert Garner, in our own Journal (Zool. vol. xi. 1871, p. 426) records "Distomes" from both freshwater and marine mussels; and Giard attributes the origin of pearls in *Donax* and *Tellina* to a species of *Brachycœlium*—all cases of Trematoda. Several investigators since (such as Dubois and Jameson) have found the same to be true of the pearl-production in *Mytilus edulis* and in various other Pelecypoda.

Other observations, more recently, have shown Cestoda to be the worms concerned in the production of the Orient pearl; but I do not go further into that matter on the present occasion, as my purpose is to remind you of the historic connection between Linnæus and pearl-production.

Most of the attempts * at artificial margarosis—the production of pearls by stimulation of the mollusc—have been based upon the belief that the nucleus of the natural pearl is an inorganic particle. The "grain-of-sand" theory was supported by Redi and many other early naturalists, and is the view that has been most generally

* There is also the other suggested method—by infection with the parasite—which I hope to discuss on another occasion.

adopted in the text-books and in educated public opinion, as expressed in Sir Edwin Arnold's lines:

> "Know you, perchance, how that poor formless wretch—
> The Oyster—gems his shallow moon-lit chalice?
> Where the shell irks him, or the sea-sand frets,
> This lovely lustre on his grief."

There is no doubt that occasionally a grain of sand does form the nucleus of a free pearl. Mr. Hornell and I found three such, out of hundreds of pearls examined, in the course of our Ceylon investigation. But as a rule any such foreign inorganic matter introduced between the mantle and the shell gives rise only to a pearly or nacreous excrescence attached to the shell. Artificial pearls of an inferior sort are, however, sometimes produced in this way; and the practice in China of forming rows of nacreous beads or images of a Joss, or of Buddha, on the inner surface of the freshwater *Dipsas plicatus*, Leach, depends simply upon the fact that foreign bodies placed outside the mantle will be cemented to the shell by a layer of nacre.

It is generally believed amongst naturalists that Linnæus was for some time engaged in an endeavour to produce artificial pearls; but few, if any, seem to know what his process was, and what it resulted in. The literature of pearl-formation contains various vague references to Linnæus's "secret process," but no description of it, except an article in Swedish by Fåhræus in 1852*. In Pulteney's 'General View of the Writings of Linnæus' (2nd edit., London, 1805, p. 93) it is stated: "We are unacquainted with the means by which he accomplished this extraordinary operation, but may observe that it is probable .... that the method consisted in injuring the shell externally, perhaps by a perforation ...." &c. Such a recent work as Dr. Lyster Jameson's "Origin of Pearls" (Proc. Zool. Soc. 1902) states that "Chemnitz, Beckmann, and others (1791) regarded Linnæus's 'secret process' as merely boring the shells. However, no subsequent boring experiments have yielded anything but blisters, and the popular notion of Linnæus's *modus operandi* is little more than a guess." That being so, you will be interested to hear that our own Linnean library and the collection here has recently afforded me the means of making known to you the truth as to this "guess."

We have amongst the treasures of our library a manuscript volume labelled "Linnæus on Pearls," given to the Linnean Society, in January 1871, by Oscar Dickson of Gothenburg, and attested by Jacob P. Bagge to be a true copy in Swedish [on the left-hand pages] and a faithful translation † into English [on the right-hand pages] of the original documents which were in his possession

* Öfvers. K. Vet.-Akad. Förh., Arg. 16. No. 3, p. 39.

† The translation is not perfect in all respects. I am indebted to my friend Mr. Harald Ehrenborg, Swedish Consul at Liverpool, for help in determining some points in the Swedish.

and had been obtained by his grandfather (Herr Peter Bagge) from Linnæus. The papers consist of the documents received by order of "The Secret Committee" of the State Council of Sweden, in 1761, signed by Judge Olivecreutz, respecting the pearl-fishery and particularly the claim of the Archiater and Knight Carl Linnæus to produce genuine pearls by impregnating mussels.

This interesting series of documents begins with a letter from the Archiater Linnæus to Colonel Baron Funck, dated 6th Feb. 1761, stating that he "possessed the Art" of impregnating mussels, and that he offered to make known the secret for the public benefit and use on condition that the State would give him a suitable reward. A subcommittee was evidently appointed to confer with Linnæus, and on the 27th July 1761, to quote the manuscript, "the said Archiater appeared before the deputies, when he verbally explained his Art." There are in all 15 documents in the book, being records of various meetings, reports of the deputies to the "Secret Committee," lists of Linnæus's claims for recognition by the State, and finally the report of the Secret Committee approving of the "Art" of the Archiater and recommending that a reward of 12,000 dollars * silver money should be given. At one of the meetings Linnæus produced certain mussel-shells which he had operated on by his secret method, and 9 genuine pearls which he had produced "as a token and proof of the truth of the Art." These were taken by the Chairman of the Committee to the crown-jeweller Berg, who, after remonstrating ineffectually on the iniquity of spoiling such gems, cut them in half, and declared, the Chairman tells us, that they were exactly like ordinary pearls.

There is some evidence that Linnæus was ennobled on account of these discoveries in regard to pearl-formation, and the date (1761) certainly coincides, but it does not appear that he was ever awarded the 12,000 silver dollars recommended by the "Secret Committee." On the other hand, the secret was bought for 6000 dollars, in Sept. 1762, as appears from another manuscript volume in our library (labelled "Pearl Fisheries: Linnæus MS."), by a Gothenburg merchant, Peter Bagge, the grandfather of the J. P. Bagge mentioned above. And we learn that the King, Adolph Frederick, gave a patent, dated Sept. 7th, 1762, authorizing Bagge to practise the Art without interference or competition.

Throughout the MS. "true copy" of Linnæus's communications and the reports of the "Secret Committee," whenever we seem to be coming to close quarters with the actual *modus operandi* the text breaks abruptly into rows of dots and an annoying reference to certain other papers labelled A. to H., which are not to be found in the volume. So that although these manuscripts in the first volume afford interesting glimpses of Linnæus's doings and modes of thought, they give absolutely no information as to his

* The Daler in question was equivalent to about 18 pence, so the sum stated would be nearly £1000.

secret method of pearl-formation. This seems to have been exactly the predicament in which Mr. Bagge the grandson found himself when he inherited his grandfather's papers bought from Linnæus, but apparently made no use of. He explains in the second MS. volume to which I have referred, and which contains the missing papers A. to H., how it was that his grandfather and his father were unable to take advantage of the rights they had acquired, and how he himself was not in a position to do so until after the lapse of 60 years from the original purchase.

It is, however, evident that J. P. Bagge eventually contemplated pursuing the industry of pearl-formation by Linnæus's method, as we have in this volume a copy of a letter from the King of Sweden, dated Feb. 27th, 1822, confirming to him the privileges his Grandfather had obtained by purchasing the secret in 1762. It is evident also that he was troubled by the thought that possibly Sir James Smith possessed a copy of the secret amongst his Linnæan papers, or that he or others in England might be able to hit upon the method by an examination of the pearls and shells which it was known had gone to London. In a "Private Memorandum" in our MS. book, J. P. Bagge says:—

"Question A. Shall I write to Sir Jas. E. Smith and ask him for the pearls and mussel-shells which produced them?

"*Remarks.* If he is not inclined to give up all, perhaps he may *the half*, particularly if I offer him the *original merit list* of Linnæus in exchange, a document he may deem interesting either for the *Linnæan Society* or to publish in one of the new editions of Sir James' works. I think I could besides offer the value of the pearls in money according to survey, and as they are not connected with Botany perhaps Sir Jas. thinks them worthless, in a scientific point of view. It would certainly be pleasant, in offering the secret, to be able to produce specimens of *pearls actually produced by Linnæus.* Perhaps he would lend them for some time."

Probably at that time (about 1820) Bagge hoped to induce the State, or some individual or company in Sweden to take the matter up and acquire his rights. He evidently in the end wrote something to Sir J. E. Smith, for we have a copy of the answer, which is as follows:—

(Copy of Sir James E. Smith's letter to J. P. Bagge.)

"Holkham, Norfolk,
Nov. 28, 1821.

"Sir,

I received your packet at Norwich, my usual residence, and I take the opportunity of a little leisure in the country to answer it.

"The only *pearls* I ever expected from the possession of your illustrious countryman's literary treasures are *pearls* of *science*, in which I have not been disappointed. I am contented with these,

and am happy that Sweden appears satisfied with what I have done for the honour of Linnæus and for the science to which I have devoted myself, in humble imitation of that great man.

"I believe I am possessed of manuscripts of his own explaining the secret of producing pearls. I have also in his own cabinet of shells specimens of pearls so produced, and of the muscle-shells, in various states upon which experiments have been made. I have no intention of carrying on the scheme—still less of paying £500 for any further information, nor, in short, of entering at all on the subject, for which I have no leisure.

"I return you my best thanks for the trouble you have already taken, but beg you will take no more on my account.

"I am, Sir,
"Your very obedient servant,
J. E. Smith."

Linnæus wrote, on Feb. 6th, 1761, "I have heard of people existing who pretended to make gold, but never of anyone who could produce pearls,"—and again, "I have with infinite care taken pains to explore the cause of pearls being generated and how nature proceeds to accomplish it."

In thinking that no one else before that time had produced pearls Linnæus was apparently wrong, as we find that in his own country a decade earlier, between 1751 and 1754, a certain Inspector Frederic Hedenberg was paid a salary to inoculate the pearl mussels of Lulea in Lappmark with "pearl-seeds," which he manufactured, and then re-plant the mussels. Certain pearls were produced by the Inspector which it is recorded were sold for some 300 silver dollars.

Linnæus's first experiments with pearls date back, however, to a still earlier period, for in the 2nd vol. of Linnæus's Correspondence, published by Sir J. E. Smith (p. 428), there is a letter from Linnæus to Haller, dated Upsala, 13th Sept. 1748, saying: "At length I have ascertained the manner in which pearls originate and grow in shells; and I am able to produce in any mother-of-pearl shell that can be held in the hand, in the course of 5 or 6 years, a pearl as large as the seed of a common vetch."

To this the Editor appends the remarks:—

"'For this discovery the illustrious author was splendidly rewarded by the States of the Kingdom.'—Haller."

"Specimens of pearls so produced by art in the *Mya margaritifera* are in the Linnæan Cabinet. The shell appears to have been pierced by flexible wires, the ends of which perhaps remain therein."

J. P. Bagge says in regard to the above remark by Sir J. Smith—"This is the nearest I have seen anyone come to truth, but still it will be remarked by reading the Secret that *more* information is required to enable persons to practise the art."

Herr Bagge, in a MS. entitled "Statement," tells how his grandfather, being otherwise occupied, made no use of the

Linnean secret which he had purchased, and how his father could not find the documents, which were supposed for a time to be lost, and how he himself eventually found them when rumaging amongst a mass of family papers in search of a missing account. This was at a time when he was leaving Sweden for England, and his subsequent attempts to get the Swedish Government to buy his rights and to promote pearl-formation as an industry were apparently unsuccessful.

Since then nothing, I believe, has been done with the "secret," although various investigators and operators in different parts of the world, including Mr. Hornell and myself, have tried more or less similar methods of stimulating molluscs to pearl-production—with but indifferent results. But I am by no means certain that artificial margarosis, either by these or some other methods, may not some day become a commercial success.

Linnæus says: "As all the knacks of Nature are very simple, so is this when properly hit upon"; and there was certainly no great complication about his process. We are now able by means of these two manuscript books in our library to make out the details of the "secret process." By fitting the extracts labelled A. to H. in the one set of papers into the lettered gaps in the proceedings of the Secret Committee of 1761 in the other volume, we have the completed description in Linnæus's own words.

The essential points made by Linnæus seem to be:—(1) that in the formation of a pearl there is always some foreign matter ("peregrinum") which is slowly covered by successive lamellæ of calcareous matter deposited by the mollusc; (2) that to induce pearl-formation when and where you wish, you must make a very small hole in the shell and insert a little round fragment of limestone fixed on the end of a fine silver wire; (3) that you must keep these artificial nuclei near the ends of the shell, so as not to interfere unduly with the animal's body; and (4) that the nuclei must, by means of the silver wire, be kept free from the shell so that the resulting pearls may not become adherent to it by a deposit of nacre.

That is all. It is certainly, as its author says, "very simple . . . when properly hit upon." Simpler even than the "knack of Nature," requiring a parasitic worm and several successive hosts, that we now believe is necessary to produce the finest pearls. And yet Linnæus seems to have obtained by the process certain pearls which the crown-jeweller declared to be in every way as good as those produced naturally. Probably they were compared not with the most precious pearls from the pearl-oysters of Eastern seas, but with those of the Swedish fresh-water mussels (*Unio margaritifera*).

Our General Secretary has kindly helped me to find in the Linnean Collections the original shells and pearls made use of by Linnæus in his secret process, evidently the specimens which J. P. Bagge was anxious to get from Sir J. E. Smith. These Linnean specimens are now exhibited on the table.

Linnæus has said—"The Sciences have in all flourishing countries been the tenderest object of Government, as they distinguish civilized nations from barbarians, and make a small European principality shine more than the greatest Oriental empire."

I am not sure that we have all had the same happy experience of the usual objects of a Government's tenderest care. But although our native pearls may not have the same lustre as those from the Orient, we shall all agree with the celebrated Swede that the cultivation of Science may "make a small European principality shine more than the greatest Oriental empire."

The Right Hon. Lord Avebury, P.C., F.R.S., then moved:—That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated among the Fellows.

This having been seconded by Dr. Maxwell T. Masters, F.R.S., was put by Lord Avebury, and carried unanimously.

The President then addressed Sir Dietrich Brandis, K.C.I.E., F.R.S., and in presenting the Linnean Medal to him on behalf of Prof. Eduard Strasburger, F.M.L.S., specified the services which had moved the Council to make this award.

The President said:—

"Sir Dietrich Brandis, The Council of the Linnean Society, desiring to do what honour is in their power to your very distinguished countryman the great botanical histologist and morphologist at Bonn, Geheimrath Professor Eduard Strasburger, have singled him out from the botanists of the world as the recipient this year of the Linnean Gold Medal. Strasburger is known as a leader in science wherever biological teaching and biological investigation are carried on, and the recognition of his great merit is by no means confined to botanists. I well remember the impression he made upon myself and other zoologists by his views upon the changes in the nuclear chromosomes in an address given at the last Oxford meeting of the British Association, and the great value of his cytological work was known to us long before that; while to the student of botany he must have been an example, a guide, and an inspiration for nearly forty years. His 'Lehrbuch der Botanik' (1894) and 'Das botanische Practicum' (1884) are standard works familiar in our universities and fundamental in their effect on laboratory practice. Few, if any, amongst botanical investigators have produced a greater number of works of first-rate importance influencing the teaching in nearly every branch of the subject. Beginning, in 1867, with his researches on the development of the stomata, passing in 1872 to his great work on the Conifers and Gnetaceæ, which we recognize as one of the first morphological investigations from an evolutionary point of view inspired by Darwin,

and then turning in 1879 to his studies on Angiosperms and Gymnosperms, followed since by many later papers, we have a truly remarkable series of works on the scientific anatomy and morphology of the higher plants. His important contributions to physiology, such as those dealing with the ascent of water in trees in 1891, only require mention; he has been an embryologist as well as an anatomist, and he has even touched on palæobotany. It is, however, as a cytologist that Strasburger has probably won the greatest distinction, as in this subject he is, on the botanical side at least, *facile princeps*. His remarkable series of histological memoirs from 1876 onwards, form the foundation and a very large part of the superstructure of modern cytology. In close connection with his cytological work on the nucleus and protoplasm is his investigation of fertilization in plants, where he made the fundamental discovery of the great importance of the fusion of the male and female nuclei. There is no need to say more. His influence on science has been wide-reaching, and his fame is great. Naturally he has received many distinctions both in his own country and here, where we know him as a Foreign Member of the Royal Society (1891) and of our own (1880), and as an Honorary Doctor of Civil Law of Oxford. We in the Linnean Society offer him, through you, our homage, and trust that he may value, as a testimony of our high appreciation, this latest honour, the award of the Linnean Gold Medal.

"Sir Dietrich Brandis, I have great pleasure in asking you, his countryman, and yourself a distinguished botanist, to transmit this medal to Professor Strasburger."

Sir Dietrich Brandis having received the Medal, made a brief verbal acknowledgment on behalf of the recipient. The following letters refer to the award.

Bonn, 12th May, 1905.

DEAR SIR,

I have received the news that the Council of the Linnean Society of London has conferred upon me the Gold Medal. The honour thus bestowed upon me by this illustrious Society fills me with pride. I thank the members most sincerely for this honour as well as for the scientific help and encouragement I have on many occasions received from my English colleagues. It was above all the immortal Charles Darwin, of whom your nation may well be proud, who in my youth filled me with enthusiasm for scientific researches, and turned my studies in the direction I have since followed.

Most unfortunately my duties detain me here to such an extent that it is impossible for me to be in Loudon on May the 24th, and receive the Gold Medal personally. Sir Dietrich Brandis, my honoured friend, has kindly offered to do so in my stead.

I am, Dear Sir,

Yours sincerely,

(Signed) E. STRASBURGER.

To the General Secretary,
of the Linnean Society of London,
B. DAYDON JACKSON, Esq.

Bonn, May 26, 1905.

The President of the Linnean Society of London.

Honoured Sir,

I am in receipt, through Sir Dietrich Brandis, of the Gold Medal with which your Society has in so high a degree honoured me. For this valuable and beautiful token I beg to express to you, and through you to the Members of the Society, my heartfelt gratitude.

Sir Dietrich Brandis has made me cognisant of the very kindly manner in which you, Mr. President, in your address referred to my work. This shall be a new inspiration to me, to the fullest extent to which my powers permit, to devote them with enthusiasm and love to those ideal tasks, the pursuit of which is undertaken in the hope of serving mankind.

I beg you to receive, Sir, the expression of my highest esteem.

Most sincerely yours,

(Signed) E. Strasburger.

The Obituary Notices were formally submitted, and the President having announced the date of the next General Meeting, the proceedings closed.

OBITUARY NOTICES.

John Birkett was elected a Fellow on the 16th June, 1846, and died on 6th July, 1904. He entered Guy's Hospital as a student in 1831, there became Lecturer on Surgery, and in 1846 brought out a translation of A. von Behr's 'Handbook of Human Anatomy,' and in 1850 a treatise on Diseases of the Throat. The address at the opening of the Medical School of Guy's Hospital in 1854 was given by him, and he was also author of articles on Hernia and the Pelvis in Holmes's 'System of Surgery.' [B. D. J.]

The Rev. Thomas William Daltry was the son of a clergyman, and was born at Hull on 7th June, 1832; he was educated at Sedburgh Grammar School and Trinity College, Cambridge, graduating B.A. in 1855, proceeding M.A. four years later. In 1858 he took Holy Orders, his first curacy being at Petworth, Sussex; a twelvemonth later he removed to Hambledon, and in 1861 to Madeley as Curate to his father: eighteen years later, upon his father's death, he was appointed his successor, and retained the living till his death. In 1865 the North Staffordshire Field Naturalists' Club was founded, and Mr. Daltry became one of the two secretaries from the first, drawing up the annual reports for twenty years; in 1879–80 he was President. Many of the papers published by this Society are from his pen, but though ready to study any subject connected with the pursuit of natural history, he was specially devoted to Lepidoptera.

As a Parish Clergyman he was active and hardworking, carrying out his sacred duties in an exemplary manner, and by constant

visitation of his parishioners, he acquired a knowledge of their wants, and their sincere regard, in a marked degree.

He was elected a Fellow 18th March, 1875, and died at Madeley, on 4th June, 1904. A movement is on foot to place a memorial window in the church in which he ministered so long. A portrait is given in the 'Transactions' of the North Staffs. Field Club, 1904–5. [B. D. J.]

James Epps, junr., died at his house, Beulah Hill, Upper Norwood, in March 1905; he had been a Fellow of this Society since 5th March, 1885. In the 'Transactions' of the Croydon Natural History and Scientific Society for 1902–03, he published a paper entitled "A Trip to the West Indies," describing the various objects of natural history noticed by him, but especially investigating the cocoa plants in the various islands, their varieties, diseases, insect-pests and the like. He was naturally drawn to this as the business firm in which he was a partner was largely interested in the manufacture of cocoa. This address was given to the Croydon Society shortly before the end of his Presidency of two years, he having been a member since 1881. On one occasion he had exhibited cocoa-pods grown and ripened at his Norwood residence, for which he was awarded a Silver Banksian Medal by the Royal Horticultural Society. [B. D. J.]

William Ferguson, F.G.S., died at his residence, Kinmundy, Aberdeenshire, in 1904; he had been a Fellow of the Linnean Society since 6th June, 1854, in which year he joined the Geological Society, to whose publications he contributed a paper in 1857 on the "Chalk-flints and Greensand found in Aberdeenshire."

Wickham Flower, F.S.A., was the eldest son of John Wickham Flower, of Park Hill, Croydon, and was born in that town, in 1835, receiving his education at Tonbridge School. A solicitor in large practice, he delighted to give his spare time to his garden and to antiquities. He issued 'Dante, a defence of the ancient text of the Divina Commedia' in 1897, and 'Aquitaine; a Traveller's Tale,' illustrated by J. Pennell, in the same year.

At the time of his death, 19th September, 1904, he was engaged on the history of Great Tangley Manor, his country seat, a very interesting place dating from the time of Henry VII., surrounded by a moat, and having an extensive garden attached. Indoors it contained a splendid collection of pictures, tapestries, glass, and old books. He joined this Society so recently as 20th January, 1898. [B. D. J.]

Alexander Fry was born at Pencraig, Herefordshire, on 10th September, 1821, and educated at Hazelwood near Birmingham, with a year at Neuilly, in the arrondissement of St. Denis, near Paris. In 1835, a boy of little more than fourteen years of age, he was sent out to Rio de Janeiro, where his father was engaged in

business; eight years later he was taken into partnership, visited England, was married, and returned to Rio after only a few months absence. With occasional trips elsewhere, he lived in Brazil till 1858, and his chief pleasure was in devoting his spare time to the study of insects, frequently spending hours at night collecting night-flying species by aid of a lantern.

Returning to England whilst still a young man, he continued to add to his collection, only ceasing when health and sight began to fail. Amongst these accessions were Parry's collection of Longicornia, and large numbers collected by Wallace, Doherty, Whitehead at Kinabalu, and the types described by Bates. These having been examined and named by specialists, have a very high value, though their owner did not publish observations on any part of his possessions. On his return to England he had entered into business with his brother-in-law, the son of our late Fellow, Mr. John Miers, F.R.S., as Fry, Miers & Co., remaining a partner till 1898. He died at Norwood, on 26th February, 1905, aged 83, bequeathing his collections, the largest and finest of their kind in the United Kingdom, to the nation; the number is estimated at 200,000 specimens, especially rich in beetles. His Fellowship dated from 4th February, 1855. [B. D. J.]

John Horne, who died at St. Clements, Jersey, on 16th April, 1905, will be known to many as the author of 'A Year in Fiji; or an enquiry into the botanical, agricultural, and economical resources of the Colony,' London, 1881. He was attached in 1861 to the Department of Works and Forests, Mauritius, of which he became the head, and Director of the Botanic Gardens in that island. In 1877 he accepted an invitation from Sir Arthur Gordon, then governor of Fiji, to visit those islands, and spent a year's leave in exploring them, and making a collection of plants, which were determined at Kew. The volume named above contains, in Appendixes, the author's recommendations as to india-rubber, sandalwood, and general forest matters, with a list of the species known to occur on the islands, many new species with mere names, which were in part afterwards taken up by later writers. The total number of specimens sent by Mr. Horne to the Royal Botanic Gardens, Kew, between 1865 and 1883 amounted to nearly 3000. On retiring from the Colonial Service he settled in Jersey, where he died; his connection with the Linnean Society dated from 4th December, 1873.

Thomas George Bond Howes, born in London on the 7th of September, 1853, was the eldest son of Thomas Johnson Howes, and a grandson of Captain George Augustus Bond, of the Hon. East India Company's Service. After education at a private school he found, at the age of twenty-one, a fair opening for the scientific career which he was destined to follow during nearly thirty years with ever increasing honour, satisfaction, and success.

At this starting point of his life he had the good fortune, the luck that waits on merit, to be engaged as assistant to Professor Huxley in the Biological Division of the Royal School of Mines. In this apprenticeship he won the respect and appreciation of his distinguished chief, to whom he was himself heartily attached. Accordingly in 1881 he was chosen to succeed Thomas Jeffery Parker as Demonstrator in Biology in what was at that time styled the Normal School of Science and Royal School of Mines, and at the same verbosely named institution he became Assistant-Professor in 1885. Though nominally assistant Howes was in reality the acting professor, Huxley's name in the titular professorship being retained partly out of respect to that celebrated man and partly for the glorification of the school itself. Earlier than this Howes had been appointed Lecturer on Anatomy at St. George's Hospital Medical School. In 1895 he succeeded Huxley in the full professorship of zoology in the great establishment which at this date received its more compendious and more dignified designation as the Royal College of Science. He gallantly fulfilled the duties of this office almost without interruption until the breakdown of his health in 1903, finally relinquishing it in 1904, when there was no longer any hope of his permanent recovery. He died on February 4th, 1905, lamented not only by those nearest and dearest to him, but by numerous colleagues in whom his cheerfulness and generous temper had kindled warm attachment, by old pupils deeply indebted to him for instruction and encouragement, and by many learned societies and associations which he had assisted in their business affairs with ever ready help or enlightened on various occasions from the vast stores of his scientific knowledge.

To the staple employment of his time already indicated, Howes added the following activities. He was at one time or another examiner in zoology at the University of London, in the honour school of animal morphology at the University of Oxford, in zoology and comparative anatomy for the Victorian University and for the University of New Zealand, and assistant examiner in elementary physiology, biology, and zoology to the Science and Art Department. Together with these obviously strength-taxing employments he readily accepted others which individually might seem unoppressive, but which by accumulation are quite fitted to produce an excessive strain on any man's endurance. Thus we find him at various dates, member of council and vice-president of the Zoological Society; treasurer of the Anatomical Society (1890–1903); treasurer of the Linnean Club; zoological secretary of the Linnean Society (1895–1903); serving on the zoology committee of the Royal Society; on the executive committee and delegate for the Colony of Victoria at the International Congress of Zoology (1898); delegate in various capacities and a vice-president at the Berlin Congress (1901); an active member of the committee for the reorganization of the Zoological Gardens (1902); president of

the Malacological Society in 1896 and again in 1897; president of the South-Eastern Union of Scientific Societies in 1900; president of the section of zoology of the British Association in 1902. He helped to found the Anatomical Society of Great Britain and Ireland in 1887. He was elected F.Z.S. and also F.L.S. in 1885; F.R.S. in 1897; honoured with the degree of LL.D. by the University of St. Andrews in 1898; with that of D.Sc. by the Victorian University in 1902. He was also a Corresponding Member of the Royal Society of Victoria and of the New York Academy of Sciences; Hon. Member of the Nottingham Natural History Society, of the Yorkshire Philosophical Society, and of the Essex Natural History Field Club.

Among the many pupils who passed through Howes's Laboratory and Lecture-room, and who have since won or are steadily on the way towards winning scientific reputation, may be mentioned:—

Mr. R. H. Burne, present Secretary of the Malacological Society.

Mr. G. W. Butler, B.A., F.Z.S., studying the eggs of fishes.

Dr. J. E. Duerden, Professor of Zoology at Rhodes University, Grahamstown, S. Africa.

Miss Alice Embleton, B.Sc., F.L.S., R. S. Mackinnon Student for 1903.

Mr. Alfred Vaughan Jennings, F.L.S., F.G.S. (see Proc. Linn. Soc. 1903).

Mr. A. Coppen Jones, F.L.S., a bacteriologist.

Mr. W. L. Stevenson-Loat, specialist in fishery research in North Africa.

Mr. J. E. S. Moore, F.L.S., F.Z.S., whose researches in Lake Tanganyika are well known.

Dr. W. G. Ridewood, D.Sc., F.L.S., F.Z.S., F.G.S., Lecturer on Biology, St. Mary's Hospital Medical School.

Dr. H. H. Swinnerton, D.Sc., F.Z.S., Marshall Scholar, the Royal College of Science, now of University College, Nottingham.

Mr. W. T. Harold Wager, F.R.S., F.L.S., Lecturer on Biology, the Yorkshire College.

Prof. G. S. West, Professor of Natural History at the Royal Agricultural College, Cirencester.

Mr. Martin F. Woodward, Demonstrator in Biology at the Royal College of Science, and Secretary of the Malacological Society of London (see Geol. Mag. dec. 4, vol. viii. p. 480, 1901).

Much might easily be written in appreciative comment on the character, the writings, and the influence of the lost friend who cherished the Linnean Society with so much earnestness of willing service. But the thoroughness which he threw into all his scientific undertakings has elicited so many tributes of honour to his memory, that it becomes expedient to avoid repetition even in eulogium. The simple outline of his career and work that has here been given should prove to the most critical that he was a

man unsparing of himself even to a fault, and that his object in life was the promotion of science, not the acquisition of riches or fame. [T. R. R. S.]

The following catalogue, chiefly compiled by Mr. B. Daydon Jackson for the benefit of this memoir, may be relied on as containing all the more important writings published by Howes, with the exception of various articles signed or unsigned which he contributed to 'Nature.'

The Journal of Anatomy and Physiology.

1879. On some points in the anatomy of the Porpoise (*Phocæna communis*). xiv. pp. 467–474, pl. 29.
1887. On the vestigial structures of the reproductive apparatus in the male of the Green Lizard. xxi. pp. 185–189.
„ The morphology of the mammalian coracoid. xxi. pp. 190–198.
1889. Rabbit with an intra-narial epiglottis, with a suggestion concerning the phylogeny of the mammalian respiratory apparatus. xxiii. pp. 263–272.
„ Additional observations upon the intra-narial epiglottis. xxiii. pp. 587–597.
1890. Vertebral skeleton of a Fire Toad (*Bombinator?* sp.). xxiv. pp. xvi–xvii.
„ Crania of three Rabbits (*Lepus cuniculus*), showing the presence of Wormian bones in the coronal and sagittal sutures. xxiv. pp. xvii–xix.
„ Variation in the kidney of the Common Thornback (*Raia clavata*): its nature, range, and probable significance. xxiv. pp. 407–422.
1892. Rabbit's backbone having a free lumbar rib. xxvi. pp. ii–v.
„ On the pedal skeleton of the Dorking fowl, with remarks on laxodactylian and phalangeal variation in the Amniota. xxvi. pp. 395–403.
„ Notes upon the shoulder-girdle of certain dicynodontoid reptiles. xxvi. pp. 433–405.
1893. On the mammalian pelvis, with especial reference to the young of *Ornithorhynchus anatinus*. xxvii. pp. 543–556.
1896. On the mammalian hyoid, with especial reference to that of *Lepus*, *Hyrax*, and *Cholœpus*. xxx. pp. 513–526.

Philosophical Transactions of the Royal Society.

1882. Notes on the cranio-facial skeleton of the Sturgeon (*Acipenser sturio*), incorporated in W. K. Parker's monograph. pp. 171–175.

Proceedings of the Zoological Society.

1887. On the skeleton and affinities of the paired fins of *Ceratodus*, with observations upon those of the Elasmobranchii. pp. 3–26.
„ Exhibition of, and remarks upon, an original drawing of the head of an abnormal *Palinurus* (*P. penicillatus*). pp. 463–470.
„ On a hitherto unrecognised feature in the larynx of the Anurous Amphibia. pp. 491–501.
1888. (With W. G. Ridewood.) On the carpus and tarsus of the Anura. pp. 141–181.
„ (With A. M. Davies.) Observations upon the morphology and genesis of supernumerary phalanges, with especial reference to those of the Amphibia. pp. 495–511

1890. Exhibition of, and remarks upon, some specimens of *Hatteria* showing the "pro-atlas" and vomerine teeth. pp. 357–360.
„ On the visceral anatomy of the Australian Torpedo (*Hypnos subnigrum*), with especial reference to the suspension of the vertebrate alimentary canal. pp. 669–675.
„ Observations on the pectoral fin-skeleton of the living Batoid fishes and of the extinct genus *Squaloraja*, with especial reference to the affinities of the same. pp. 675–688.
1891. On the probable existence of a Jacobson's organ among the Crocodilia; with observations upon the skeleton of that organ in the Mammalia, and upon the basi-mandibular elements in the Vertebrata. pp. 148–159.
1893. Exhibition of, and remarks upon, an abnormal sternum of the Common Marmoset. pp. 168–170.
„ Notes on variation and development of the vertebral and limb-skeleton of the Amphibia. pp. 268–278.
„ On the coracoid of the terrestrial Vertebrata. pp. 585–592.
„ Exhibition of, and remarks upon, some specimens of abnormal Marsipobranch Fishes. pp. 730–733.
1894. On synostosis and curvature of the spine in Fishes, with especial reference to the Sole. pp. 95–101.
1895. Exhibition of, and remarks upon, a photograph of an embryo of *Ornithorhynchus*. pp. 1–2.
„ Exhibition of, and remarks upon, a skull of a Rabbit destitute of the second pair of upper incisors. pp. 521–522.
1900. (With H. H. Swinnerton.) On the development of the skeleton of the Tuatara, *Sphenodon* (*Hatteria*) *punctatus*. pp. 516–517.

Transactions of the Zoological Society.

1901. (With H. H. Swinnerton.) On the development of the skeleton of the Tuatara, *Sphenodon punctatus*; with remarks on the egg, on the hatching, and on the hatched young. xvi. part i. pp. 1–86, pls. 1–6.

Journal of the Linnean Society (Zoology).

1890. On the intestinal canal of the Ichthyopsida, with especial reference to its arterial supply and the Appendix Digitiformis. xxiii. no. 146, pp. 381–410, pls. 1 & 2.
1891. On some hermaphrodite genitalia of the Codfish (*Gadus morrhua*), with remarks upon the morphology and phylogeny of the vertebrate reproductive system. xxiii. no. 148, pp. 539–558, pl. 14.

Transactions of the Liverpool Biological Society.

1892. On the affinities, intra-relationships, and systematic position of the Marsipobranchii. vi. pp. 123–147; pls. 8–10.

Presidential Addresses.

1896. In Proceedings of the Malacological Society. ii. pp. 57–76.
1897. In Proceedings of the Malacological Society. ii. pp. 203–226.
1900. In Transactions of the South-Eastern Union of Scientific Societies. pp. 1–18.
1902. In Report of the British Association for the Advancement of Science; Meeting at Belfast, Section D. pp. 618–638.

Works not included in serial Literature.

1883. Zoology of Food Fishes (Handb. Internat. Fish Exhib.). London.
1885. An Atlas of Practical Elementary Biology. With a Preface by Professor Huxley, P.R.S.
An Atlas of Practical Elementary Zootomy. Revision of the preceding volume. (1902.)
1889. Huxley and Martin's Course of Practical Instruction in Elementary Biology: Revised edition, extended and edited by G. B. Howes and D. H. Scott.
1893. Wells (H. G.). Textbook of Biology; with an Introduction by G. B. H. (Another edition in 1899.)
1895. Wiedersheim's Structure of Man, an Index to his Past History; translated by H. and M. Bernard: the Translation edited and annotated and a Preface written by G. B. Howes.
[Life of William Kitchen Parker], Dict. Nat. Biog. xliii. pp. 290–2.
1904. St. George Mivart: in Obituary Notices of Fellows of the Royal Society. Part i, pp. 95–100.

Lieut.-Col. Leonard Howard Loyd Irby was born in 1836, and received his education at Rugby, and at the age of 18 he joined the 90th Light Infantry, and with it proceeded to the Crimea, there serving till the fall of Sebastopol. He published his notes on Crimean birds observed at the theatre of war in the 'Zoologist' for 1857, but he was in India at the outbreak of the Mutiny and, with the present Lord Wolseley of the same regiment, took part in the relief of Lucknow. In 1867 Irby was transferred to the 74th Highlanders, retiring from the service about eight years later.

In 1861 he published in the 'Ibis' his "Notes on Birds observed in Oudh and Kumaon." Birds were his favourite but not exclusive study, and in 1875 he produced his 'Ornithology of the Straits of Gibraltar,' from materials acquired during his frequent visits to Spain and the opposite coast; a second edition came out in 1895, containing an account of the Lepidoptera of the region. His other principal book appeared in 1887 as 'British Birds: Key-list,' in four years reaching a second edition. He joined the Zoological Society in 1873, and for many years served on the Council of that body; our own Society he joined on 21st June, 1888. He took much interest in the setting up of the life groups of birds at the British Museum, Cromwell Road, in some measure furnishing the material by his own skill in shooting. He died on the 14th May, 1905, soon after his return from Malaga, where he had passed the winter in familiar and delightful surroundings. [B. D. J.]

Sir Hugh Low was born 10th May, 1824, and died at Alassio on 18th April, in the present year. After an education at private schools he obtained an appointment in the Hon. East India Company's service. But on his way to take this up, he became acquainted with Mr. (afterwards Sir) James Brooke, and the intimate friendship between them which resulted, diverted the

boy's career from India to Borneo. Visiting that island at the early age of nineteen, young Low must have used his opportunities during the next two or three years with very remarkable precocity. For, having returned to Europe, in December 1847, that is while he was still in his twenty-third year, he was able to dedicate to his friend the Rajah his well-known book entitled 'Sarawak: its Inhabitants and Productions: being notes during a residence in that country with H.H. the Rajah Brooke: by Hugh Low, Colonial Secretary at Labuh-an.' This work is still full of charm and instruction for every lover of natural history, and shows how receptive a mind and how wide a range of sympathy its author must have possessed. Men and minerals, fauna and flora, alike engage his earnest attention. It was no slight triumph for a young botanist, after describing several novel and fascinating plants, to be able to add: "But of all those above mentioned, though they excel in beauty, none so much attract our curiosity as the various and beautiful pitcher-plants, eight different species of which I discovered in the western part of the island." As to the quest for pearl and mother-of-pearl, he remarks that "the fishery of the Soolu Islands has been long known and highly valued: in proper hands it would be the finest in the world; but pearls are produced in plenty all along the northern coast." His description of education as practised in those days by the people of Sarawak is rather historically interesting than exemplary for modern use. The boys, and the boys only, were taught. What they learned was to read and write their own language and to read and recite the Koran in Arabic, a tongue which neither they nor their teachers could translate. "The different periods of the progress of the son's advancement in educational knowledge afford the parents an opportunity of giving feasts to their relations, when the son is examined by the master in the presence of his family and connexions, who, in consideration of the liberal and expensive feast usually provided for them, congratulate the father on the splendid talents of the son." Notwithstanding these little weaknesses on their part, Low entertained a very favourable opinion of the people, and with generous warmth cautions the reader "that the terms of treacherous, and other equally abusive epithets, are no more applicable to them than we may suppose they would be to European nations in circumstances when, reduced by oppression, they could not revenge themselves by open and honest means."

In the 'Gardeners' Chronicle' for April 29, 1905, his friend Mr. F. W. Burbidge, F.L.S., has given an interesting summary of Low's later exploits among the mountains and forests of Borneo in botanical research, which were crowned with many successes. He was appointed British Resident of Perak in 1877 and retired in 1887. In reward for his political services he was created K.C.M.G. in 1883 and G.C.M.G. in 1889. He was elected a Fellow of the Zoological Society in 1893, and of the Linnean Society in the following year. He was chosen to serve on the Council of

our Society in 1896. Those who had the pleasure of meeting him from time to time at the Linnean Club in the latter part of his life will remember his dignified presence and amiable manners. On one of these occasions, conversation having turned to the ever fertile subject of affection between man and other animals, he told an experience of his own. Recollection of what he then said has been kindly confirmed by Lady Low, who writes as follows:—"The pet animal in question was one of the Gibbon Monkeys. It never left my husband, sat by his pillow, travelled with him on his elephant with its arms round his neck, sat by him while he worked in his office. He had cured the little beast of a bad wound early in their acquaintance, and this may have helped to deepen its devotion to him. But he had a quite extraordinary power of attracting and keeping the devotion of all weaker creatures. His strength and his tenderness were alike so great." In its last illness "the little monkey in question had to be put out of my husband's bed and to have a little warm bed made for it beside him on the verandah. It raised itself up at the last and died with its chin leaning on the ledge that separated it from its master and its eyes fixed on him." This was exactly the story told by Sir Hugh Low himself, except that he said nothing about the curing of the wound, and implied by his tone that all credit for the friendship was due to the monkey and none to the man. In his intercourse with his fellow human beings, civilized or uncivilized, he appears to have uniformly acted in a lofty spirit of unselfishness. While never missing an opportunity for furthering the interests of science, he sought no personal recognition. He suppressed his own ardent longing for scientific pursuits, because love of his neighbour demanded from him work of a more immediately practical character. His widow writes:—"He never sought nor cared for reward or praise. The love and veneration which surrounded him in his closing years were to him always a matter of unfeigned surprise and of a gentle pleasure for my sake who had the privilege for twenty years of sharing his life and fortunes." Permission has been obtained for confirming the testimonies of domestic affection and private friendship by the publication of the following official letter addressed to Lady Low from Downing Street, April 27, 1905:—

"Madam, I am directed by Mr. Secretary Lyttelton to express the regret with which he has learned of the death of your husband, Sir Hugh Low, and to convey to you his sympathy with you in your bereavement.

"Sir Hugh Low for forty years rendered exceptional service to the British Government in Labuan and in the Malay Peninsula. Taking up the appointment of Resident of Perak at a time of peculiar difficulty, he laid the foundation and in large measure reared the structure of the present prosperity of the Federated Malay States.

"He won the confidence of the Native Races placed under his

charge in a singular degree, and he equally secured and retained the confidence of those under whom he served.

"Mr. Lyttelton wishes as Secretary of State for the Colonies to bear witness at once to his public services and to the character and qualities which inspired those services; and he would put on record in this letter, a copy of which will be sent to the High Commissioner for the Federated Malayan States, his sense of the lasting gratitude which is due to the name and the memory of Sir Hugh Low from all who dwell in or are concerned with the British possessions and Protectorates in the Malay Indies.

"I am, Madam, your obedient servant,

(Signed) C. P. Lucas."

The Linnean Society cannot fail to deplore the loss of one who was so great an ornament to its ranks, and whose companionship in the past would have been still more emphatically cherished, had not his serene unconsciousness of his own distinguished capacity kept him ever in the background. [T. R. R. S.]

John George Luehmann was born in 1843, and settled in Victoria in 1862. Five years later he became secretary to Sir Ferdinand von Mueller, and remained in the department of Government Botany till shortly before his death. In this post he made the preliminary examination of the large accessions from various parts of Australia which were received at Melbourne, and were described by F. von Mueller, during the last eighteen years of his life, hereby acquiring a critical knowledge of the large genera *Eucalyptus* and *Acacia*. In 1896, after the death of his chief, he was appointed Curator of the National Herbarium, and subsequently Government Botanist. His published works were confined to short papers in the local societies' publications, one, reprinted from the issues of the Field Naturalists' Club of Victoria, is entitled "Reliquiæ Muellerianæ," Melbourne, 1896, a small pamphlet of a few pages. Confining his attention to the work of his department, he has left no printed record to testify to his acquirements, beyond the acknowledgment printed by his chief in the preface to the 'Key to the System of Victorian Plants' in 1885. Mr. Luehmann joined our Society on 16th April, 1885, and died on 18th November, 1904, aged sixty-one. [B. D. J.]

Robert McLachlan, F.R.S., F.L.S., F.Z.S., &c., died at his residence, Westview, Clarendon Road, Lewisham, on the 23rd May, 1904, in the 68th year of his age.

He was born at Upper East Smithfield on the 10th April, 1837, and was the son of Hugh McLachlan of Glasgow, who in early life settled in London. The early years of R. McLachlan's life were largely spent in the neighbourhood of Hainault Forest, near which his father had a small farm, and there he first acquired his love for Natural History. When he was about 16 he lost

his father, and on coming of age he found himself possessed of sufficient means to enable him to pursue his studies unfettered by business claims on his time. He was, however, nominally a ship-broker, and had an office in Fenchurch Street for some years.

In the Presidential Address to the Entomological Society of London in 1886, Mr. McLachlan gives a short autobiography of his early life. He there tells us that when a boy his natural history instincts embraced "the whole Systema Naturæ." Land and freshwater shells, and butterflies and moths, seem to have been his chief zoological fancies, but above these botany appears to have dominated. In 1855 he went for a voyage to New South Wales and Shanghai, and on this tour he amassed a considerable herbarium, the species of which were subsequently named with the assistance of the late Robert Brown. Soon after his return he must have commenced his entomological studies, the earliest of which he devoted to Lepidoptera, as he published a paper on *Acentropus* in the 'Entomologist's Weekly Intelligencer,' in 1861. In the same year he published his first Neuropterous paper in the 'Entomologist's Annual,' and from that time his papers on Lepidoptera and Neuroptera became numerous. The latter subject, however, soon occupied all his time. His chief work, 'A Monographic Revision and Synopsis of the Trichoptera of the European Fauna,' a thick volume with supplements altogether of 626 pages, with 59 plates of structural detail, was completed in 1880. His other numerous writings are scattered throughout the Entomological literature of his time, several of his papers appearing in the 'Journal' of the Linnean Society between the years 1871 and 1892.

Mr. McLachlan became a Fellow of the Entomological Society of London in 1858, and was President in 1885 and 1886, Secretary from 1868–72, and twice Treasurer; the latter office he held at his death. He was elected a Fellow of the Linnean Society in 1862, of the Royal Society in 1877, of the Zoological Society in 1881, of the Royal Horticultural Society in 1888; he was also on the Council of the Ray Society.

He was an honorary member of the Entomological Societies of Belgium, Holland, Sweden, Switzerland, the Société Impériale des Amis des Sciences Naturelles, Moscow, the Societas pro Fauna et Flora Fennica of Helsingfors, of the New Zealand Institute, of the South London Entomological and Natural History Society, and of the Natural History Society of Glasgow.

[Edward Saunders.]

Carl Eduard von Martens was born at Stuttgart on April 18th, 1831. His father held the position of Councillor in the Würtemburg Civil Service, but is better known as the author of a classical work, 'Reise in Italien,' and as one of the earliest and most successful explorers of the Fauna and Flora of that South German State. Young Martens was an only son and the devoted

brother of three elder sisters, who took an intelligent interest in their father's favourite pursuits; one was an accomplished artist, assisting father and brother by her pencil and brush to the end of her days. In such surroundings the boy developed into a Naturalist by heredity and example, but from his earliest years his interest concentrated itself in collecting and studying shells. This interest, however, was not allowed to interfere with the claims of school, and throughout his school-years he distinguished himself as an industrious and conscientious worker, while, on the other hand, he associated but little with his school-fellows, nor did he exhibit any taste for their games.

At the University of Tübingen he passed through the regulated curriculum of a medical student; at the same time his natural history studies expanded upon a wider and safer basis under the tuition of Hugo Mohl, Quenstedt, and Rapp, and the structure of animals and their distribution in space and time claimed at this period his special attention. Having received his M.A. degree, he migrated in 1855 to Berlin, to which University he, like other contemporary Zoologists, was attracted by the fame of Johannes von Müller. He accompanied the latter on one of his vacation tours to Norway, and soon after his return obtained an appointment at the Zoological Museum, which was then under the direction of Lichtenstein. To this institution he remained attached for the remainder of his life, a period of nearly half a century, eventually rising to the rank of Second Director in 1887. The division of Invertebrates (exclusive of Insecta) was assigned to his custody, and the collection of Mollusca, which Hugh Cuming had not considered worthy of a visit to Berlin, grew under his fostering care into what is now beyond doubt the most important in any of the Continental Museums. This growth was due not only to the incorporation in the Berlin Museum of celebrated collections like those of Albers, Dunker, and Pactel, or to the steadily increasing influx of materials from the newly-acquired German possessions, but also to his own efforts as a collector in many parts of Europe, and particularly in the Far East. In 1860 he joined as Naturalist the Prussian Expedition of the ship 'Thetis,' and accompanied it during the first two years of the voyage. For the two following years he explored independently, but with the consent and aid of the Prussian Government, the Fauna and especially the Mollusca of the Sunda Islands and Moluccas. The preparations for this long voyage, and his desire to become personally acquainted with the treasures of the Cumingian and other collections, brought him to England on a visit of several months' duration—the only visit which he paid to this country. His name, however, soon became familiar to English Malacologists through the excellent reports on Mollusca which he annually contributed for twenty years to the 'Record of Zoological Literature' founded by his friend Dr. Günther; the first appeared in 1865, less than a year after his return from the East.

With the completion of his masterly work on the zoological results of his voyage ('Die preussische Expedition nach Ost-Asien, Zoologie'), in 1879, his position as one of the foremost malacological authorities was firmly established. But although shells were his first, and remained his best love, his training, his wide and accurate knowledge, and his intimate acquaintance with zoological literature, enabled him to take up subjects from many different branches of zoology, and to treat of general questions, such as the distribution of animals, with a sense of responsibility which is often missed in the work of the compiler and even of the specialist.

The amount of work accomplished by Martens is truly astonishing. The arrangement and care of the collections in his custody must have occupied by far the greater part of the day; yet he found time for the preparation of some 200 papers for the press, for the systematic and detailed study of some important faunas, like the Land and Freshwater Mollusca of Central America, Venezuela, and German East Africa, the marine Fauna of Mauritius and the Seychelles, the mollusks collected by Max Weber and by the German Deep-sea Expedition, 1898–9, for the preparation of monographs of the genera *Nerita*, *Neritina*, and *Navicella*. The whole of this published work is characterized by painstaking accuracy, discipline of method, conservative principles, respect for classical form, and tolerance towards the views of others. His principal aim was the elucidation of facts.

Martens would have been satisfied, and would have felt himself amply rewarded by the general high esteem in which the world of science held him; but numerous honours succeeded each other in due course: the University of Rostock made him an honorary Doctor of Philosophy (1872), whilst the Berlin University placed him on the list of Extraordinary Professors (1873); the Prussian Government recognized his eminent services by bestowing upon him the title Geheimer Regierungsrath (1899). The Zoological Society elected him a Corresponding Member in 1865 and a Foreign Member in 1885; since 1899 he was one of the Foreign Members of the Linnean Society.

A wife and daughter mourn his loss. For his early friends he retained the most affectionate regard; to help his fellow-labourers was to him a pleasurable duty. A man without guile, he had no enemy. [A. Günther.]

Alpheus Spring Packard, who died on 14th February, 1905, was born at Brunswick, Maine, U.S.A., on 19th February, 1839. He was inclined towards Natural History from his early youth, and after some preliminary studies in Bowdoin College, he joined a scientific expedition to Labrador and Greenland, where he laid the foundation of the broad views of nature which characterized all his work. Between 1861 and 1864, while occupied with a medical course at Harvard, Packard came under the influence of

Louis Agassiz, whose inspiration led him to forsake applied science and devote himself entirely to the problems of geology and zoology. His early researches were mainly geological, and some of his most important results were eventually summarized in his book on 'The Labrador Coast' (1891). From 1869 onwards, however, Packard's publications were chiefly zoological, and his first important work was his memoir on the development and anatomy of *Limulus polyphemus* in 1871. He had already written a small 'Guide to the Study of Insects,' which met with great success; and after his appointment as State Entomologist of Massachusetts, in 1871, he rapidly became a leader in American Entomology. Between 1877 and 1882 he was a member of the United States Entomological Commission, and pursued important researches on the Rocky Mountain locust. For many years he was closely associated with the Peabody Academy of Science in Salem, where he directed a summer school of biology on the coast; and his final appointment was in 1878 to the Professorship of Zoology and Geology in Brown University, which he held until his death. Besides upwards of 300 smaller papers, he published his well-known monographs of Geometrid Moths (1876), the North American Phyllopod Crustacea (1883), the Cave-Fauna of North America (1888), and the Bombycine Moths of America (1895 and posthumous). He also prepared several valuable text-books, among which may be specially mentioned the 'Life-History of Animals' (1876), 'Forest and Shade Tree Insects' (1888), and the 'Text-Book of Entomology' (1898). He was, moreover, an industrious editor, and for many years had charge of the 'American Naturalist,' of which he was a founder. Throughout all his researches, Packard felt the deepest interest in underlying principles, and soon became an ardent member of the Neo-Lamarckian school. His admiration for the work of Lamarck led him to devote his leisure for many years to the preparation of his last-published volume, 'Lamarck, the Founder of Evolution,' which appeared in 1901. His last journey to Europe, in 1900, was, indeed, specially planned to visit the home and haunts of Lamarck in France. His unassuming modesty, ripe scholarship, and quiet enthusiasm endeared Packard to all with whom he came in contact either as teacher or friend. He received many honours and tokens of esteem, and was elected a Foreign Member of the Linnean Society on 2nd May, 1901. [A. S. Woodward.]

William Paul, the well-known rosarian, of Waltham Cross, died there at Waltham House on 31st March, 1905, aged 82. Born in 1822, of Huguenot descent, his earliest volume, 'The Rose Garden,' was issued in 1848, and is now in its 10th edition; before this he had helped J. C. Loudon, after whose death, in 1843, he performed similar services for Dr. Lindley. From the foundation of the 'Gardeners' Chronicle' in 1841, under Lindley's editorship, down to a comparatively recent date, Mr. Paul constantly con-

tributed articles. In 1860, some years after his father's death, he founded the present Royal Nurseries at Waltham Cross. At a provincial show at Manchester, in 1869, he delivered a lecture in which he gave the results of his practice in "improving" parsley, Brussels sprouts, asters, and hollyhocks, as well as his roses; this lecture forms a part of his 'Contribution to Horticultural Literature' in 1892, mostly reprints of his papers. He possessed a good collection of horticultural and scientific works, and was well acquainted with the old writers on gardening and botany. He was elected a Fellow on 18th November, 1875; and although he rarely attended the evening meetings, he frequently made use of the library. [B. D. J.]

Rudolf Amandus Philippi, who died in the closing hours of 23rd July, 1904, was our oldest Foreign Member, though elected so recently as the 2nd May, 1895. He was born at Charlottenburg on 14th September, 1808, and received his early training, first four years at Yverdun, then at the Berlin Gymnasium zum Grauen Klosten; in 1825 he entered the High School as student of medicine, and attended the lectures of Mitscherlich, Link, Wiegmann, and Alexander von Humboldt, and took his degree in the spring of 1830, in his twenty-second year. To widen his knowledge, he travelled south to Naples and Marseilles, visiting the hospitals, and making acquaintance with various men of science. In the course of his travels he explored Sicily, crossing it repeatedly, and twice ascending Etna. He returned to Berlin in 1833, and set himself to work up the results of his journeys. He became Professor of Natural History and Geography in the Gewerbeschule at Cassel in 1835, and was married in the same year to Anna Krumwiede, but his domestic happiness was soon disturbed by sickness. In the winter of 1836–37 he was attacked by influenza, a consequence of which was spitting of blood in the following summer, which obstinately resisted medical treatment in the severe climate of Northern Germany. Accordingly, in April 1838, he and his wife started for Italy by way of Bavaria, and they settled for a time in Naples, where his son Friedrich, afterwards so efficient a help to his father, was born. The pulmonary hæmorrhage gradually ceased, and his strength returned; he was thus able to undertake a journey through Apulia, Calabria, and Sicily, to supplement his former observations. The homeward round was by Marseilles, Lyons, and Switzerland.

On his return to Cassel he busied himself in issuing his travels in Italy, and an extensive work on Mollusca, and some years passed by quietly. The stormy years of 1848 broke up this quietude, for though Philippi took no part in political movements, he found himself involved in the currents caused by strong passions working in a small society. At this juncture his younger brother Bernard begged him to come out to him in Chile, where a fresh opening for scientific work had recently been made. After the suppression

of the Revolution came the reaction, and seeing no prospect of early amelioralion of his prospects, he sent in his resignation as Director of the Gewerbeschule, which was accepted 3rd January, 1851.

He embarked on the brig 'Bonito' at Hamburg, and after a voyage of 130 days reached Valparaiso on 4th December, 1851; early the next year he continued his journey to Valdivia. During the long voyage he had been busy on a volume of Conchology, which he brought to a conclusion when in the neighbourhood of Cape Horn. At first, his prospects were not brilliant, the Republic was torn by civil war, his brother's estate was in utter confusion, and, to crown all, Bernard Philippi, at that time Governor of the Maghellanes, was murdered by the Patagonians.

In spite of these hindrances, R. A. Philippi found himself in a rich place for collections of all kinds; he climbed the volcano Osorno, and thence obtained his first peep at the vegetation of the Southern Cordilleras. He reported his travels to the University at Santiago, and shortly afterwards, in October 1853, he was called to that university as Professor of Natural History and Director of the National Museum, the beginning of a residence there which exceeded half a century. He had scarcely taken up his duties in Santiago, when he was commissioned to travel over and report upon the desert of Atacama; in this expedition he was the leader, and his special share was to observe the vegetation of that high and little-known region. He published his new species in the volumes of 'Linnæa' from 1857 to 1864, but the official account of his journey was issued in 1860, as 'Reise durch die Wüste Atacama,' in German and Spanish; an appendix formed part, entitled 'Florula Atacamensis, seu Enumeratio Plantarum quas in itinere per Desertum Atacamense observavit R. A. Philippi. Halis, 1860,' a quarto volume of 62 pages and 6 plates. During the following years he was fully occupied in superintending the Museum, lecturing and travelling on behalf of the Government. In 1874 he resigned his Professorship, and in 1897 he quitted his post at the Museum in favour of his son Friedrich. His botanic publications amount to 98, the latest dated 1901; his zoological publications on Mollusca, Coleoptera, Birds, and Fishes, recent and fossil, are probably as many. Most of his detached botanic papers were printed in German journals or the 'Anales' of the Santiago University; during the last ten years of his authorship, he described many plants, which later botanists consider as forms rather than species, a fault apt to be committed by naturalists who have been restricted in their range, unchecked by reference to large and world-wide collections. His health remained good to a very advanced age, though hearing and sight became affected. He outlived his wife and seven of his nine children; in his adopted country he occupied an honoured station apart from all others, and his decease last year has been followed by two biographies, from which a condensed account was drawn up by Dr. K. Reiche, in the

twenty-second volume of the 'Berichte der Deutschen Botanischen Gesellschaft,' to which we are indebted for many of the foregoing details. [B. D. J.]

The name of the Rev. Thomas Arthur Preston is familiar to many by his work for phenology, the observation of the dates of the seasonal appearance or disappearance of certain selected plants and animals. He was born at Little Dean's Yard, Westminster, on October 10th, 1833, his father being one of the masters at Westminster School, and took part in the founding of the Athenæum Club in 1824. Our late Fellow held two scholarships at Emmanuel College, Cambridge, was bracketed 20th Wrangler in 1856, and in 1857 headed the first division in the Natural Sciences Tripos, with distinction in Botany and Mineralogy. He proceeded M.A. in 1859, but the year before he was ordained deacon at Salisbury, and one year later, priest at the same Cathedral. On taking holy orders, he became Assistant Master at Marlborough College, and from 1858 to 1873 he took a form in the Lower School; from 1873 to 1885 he was House-Master and taught a Mathematical Class. Familiar with the neighbourhood of Cambridge, he at first sight thought the Wiltshire surrounding of the College little other than a desert. But a better acquaintance with the available ground for exploration modified his view, and he found scope for his observations in plants and geology, soon inducing others to join him in these observations. After five years' residence he brought out his 'Flora of Marlborough, with notices of the birds, and a sketch of the geological features of the neighbourhood'; a handy volume of 130 pages, modelled on the then recently issued 'Flora of Cambridgeshire,' by Professor C. C. Babington. He was the founder and for sixteen years President of the School Natural History Society, which has just issued its 53rd Report.

In 1875, in conjunction with others, he issued a small 'Instructions for the observation of Phenological Phenomena,' and two years later, his 'Notes for observations of Injurious Insects.' Early in 1883, Drs. Hoffmann and Egon Ihne were in correspondence with the present writer, and the sequel was that in three successive numbers of the 'Botanical Journal' (Nos. 125–127), vol. 20, an appeal to observers was translated and printed on the wrappers of those numbers, with a list of the plants observed with their average dates. Mr. Preston supported this appeal whole-heartedly; it is now officially recognized as part of the work of the Royal Meteorological Society, and local societies are engaged in recording and averaging dates. Shortly before this, he had set on foot a series of small annual volumes on the Rainfall of Wiltshire, 1882–86, the last being published after he had quitted his position at Marlborough in 1885, for the Rectory of Thurcaston, Leicestershire, which he retained during the remainder of his life. 'The Flowering Plants of Wilts' was issued at Leicester in 1888; it was based on his notes during 27 years' residence in that county. He caused

'Twenty years' observations on Botany, Entomology, Ornithology, and Meteorology, taken at Marlborough College, 1864–84' to be issued by the College Natural History Society, whose reports began in 1865, under Mr. Preston's guidance.

He died at Thurcaston, 6th February, 1905. The last work undertaken by him was a Flora of Leicestershire, which, it is announced, will be completed by a friend and competent successor.

A former pupil writes:—"I remember that he was exceedingly kind to us boys, who learned from him so much about the zoology, botany, and geology of the Marlborough neighbourhood. He was a most careful observer and taught his pupils to record in a proper way everything that was noteworthy. He started a botanic garden after I left Marlborough. He was constantly arranging excursions, also lectures and discussions in his room in the evenings." A former colleague states:—"Not a master of the ordinary type, which compels immediate attention and commands popularity, not a great Form- or Housemaster, or athlete, yet in his own subjects and in his own way, his powers of originating and organizing, of stimulating and permanently influencing, mark him out as one of the leading spirits, and one of the truest benefactors of Marlborough College . . . His own enthusiasm was catching. Little bands of followers attended him armed with hammers, butterfly nets, moth boxes, and botany tins. His room a little before bedtime was a notable sight. Hither were brought the miscellaneous spoils of a half-holiday raid: flowers with the prospect of a 'first notice,' butterflies, flints, coins, all to be identified and discussed by the Master. Later in the sixties . . . Mr. Preston gave some excellent courses of lectures on botany, zoology, comparative anatomy, and physiology. This was a step in advance of the time, for Science Masters and Laboratories had not then been introduced. They were capital lectures, very stimulating, questions being asked and answered. The lecturer's munificence was shown here as in all his other work, fine specimens and beautiful instruments being freely provided. . . . . The Natural History Society did not, as was dreaded, injure games. The Society has long been an essential part of the school life, but it was a novel thing in the sixties, the first of its kind in the Public Schools of England, and those who appreciate the interest and the refreshment which it affords to minds somewhat jaded with cricket, and iambics, and essays, and turned lessons, the pure delight of a field-day's outing with its *al fresco* meals on grass or in barn, will surely bless the memory of the founder. Not a few famous scientific men have drawn inspiration from the Natural History Society."

On leaving Marlborough a crowded meeting presented him with a farewell address, which embodies much that has been set out above.

"Mr. Preston held the living of Thurcaston for over 19 years. He found it heavily encumbered, he left it free . . . His scientific

fame had preceded him; he rearranged the Botanical Section of the Leicester Museum . . . and assisted the scientific and philosophical societies of the town . . . In the last few months Mr. Preston suffered from a distressing complaint, which he bore with great courage and patience. He was a man of strong and simple Christian faith, a devoted brother, a fast friend, genuine as pure gold, and singularly modest."

The writer has to thank J. F. Duthie, Esq., F.L.S., Edward Meyrick, Esq., F.R.S., F. E. Thompson, Esq., and Miss Preston, for their invaluable help in drawing up the foregoing obituary.

[B. D. J.]

Bernard Renault was born at Autun on March 4th, 1836. During the early part of his scientific career his attention was devoted to Physics and Chemistry, to which he made some original contributions. It was in these sciences that he took his degree at Paris in 1867, and he then filled an official post as chemist in the Normal School of Cluny. But his life's work was destined to take a different course. The neighbourhood of his native place, Autun, is peculiarly rich in silicified remains of plants, of Permo-Carboniferous age, and Renault soon became interested in these specimens, and began to investigate their structure. He at once found himself on the road to important discoveries. Starting with the anatomy of fossil Ferns of the genera *Anachoropteris*, *Zygopteris*, and *Botryopteris*, he was led to found the new family Botryopterideæ, based not merely on vegetative characters, but on a detailed knowledge of the fructification in two of the genera.

Another early work of the highest value is his investigation of the structure of the remarkable genus *Sphenophyllum*, representing a group now wholly extinct, unless indeed, as some have lately maintained, the Psilotaceæ are to be included in the same division. He further elucidated the structure of fossil members of the Equisetales by his investigation of the anatomical and reproductive characters of *Annularia*.

The striking results which Renault was attaining in Fossil Botany soon attracted the attention of Adolphe Brongniart, the great master of that science, who summoned him to Paris, where he obtained the post of Assistant Naturalist at the Museum of Natural History. This modest appointment he continued to hold to the close of his life. Unfortunately, the efforts which were made to create for him a position more worthy of his eminent merits remained without result.

The work in which Brongniart specially desired the co-operation of his younger colleague was the investigation of silicified seeds, a subject which has proved of the utmost importance to morphological Botany. Renault was always careful to compare fossil with analogous recent structures; and in the course of his work on the seed, he re-discovered the pollen-chamber of Cycads, in ignorance

of the fact, long overlooked, that Griffith had already described and figured this organ, more than 20 years before. Renault had an important share in the preparation of the splendid volume on Silicified Seeds, published posthumously in Brongniart's name.

It was only for a short time that Renault delivered regular courses of lectures on Fossil Botany, but his teaching work bore permanent fruit in the publication of his famous 'Cours de Botanique Fossile,' in four volumes, 1881–85, by far the most important general work on the subject up to that time, and still an invaluable storehouse of facts, based almost wholly on original observation.

A somewhat earlier and more special work, the 'Structure comparée de quelques Tiges de la Flore Carbonifère,' 1879, had prepared the way; for in this memoir, among many other researches of importance, he published his complete account of all the organs of the extinct Gymnospermous family Cordaiteæ—perhaps the greatest contribution which he, or any botanist before him, had made to our knowledge of the plants of the past. It may be mentioned that Renault, in observing the structure of the pollen-grains within the pollen-chamber of Cordaitean and other fossil seeds, was led to anticipate the discovery of Ikeno and Hirase, suggesting the probability that in plants of this group fertilization took place by means of spermatozoids.

Renault's work on the higher plants of the Palæozoic Period was crowned by the completion, in 1896, of the magnificent 'Flore Fossile d'Autun et d'Epinac,' of which the first volume is the work of Zeiller, and the second that of Renault. This was in many respects his finest work, and the series of more than 60 plates, by which the volume is illustrated, is a worthy monument of the mass of detailed research which the text contains.

Renault was much engaged in controversy, more especially with our own distinguished countryman, Williamson. They differed principally on the question of the affinities of the Sigillarieæ and Calamodendreæ; families which Williamson regarded as essentially Cryptogamic, belonging to the Lycopodinean and Equisetinean series respectively, while Renault, following Brongniart, was led to place them among Gymnospermous Phanerogams, relying, to a great extent on the fact that these plants developed secondary wood, like Phanerogamic trees. The result has justified the opinion of Williamson rather than that of his great French rival; but it has been well pointed out, that even if wrong in detail, Renault and the French school represented by him deserve great credit for having realized that among related plants, some might be on one side, some on the other, of the ideal Phanerogamic-Cryptogamic boundary. Recent work on other groups has abundantly justified Renault's point of view.

During the last ten years of his life Renault allowed himself to be to a great extent diverted from the important studies on which

his reputation rests, to work of perhaps a less assured value, on the micro-organisms of the Carboniferous Period. Though to the popular mind researches on fossil Bacteria and their action may seem of fascinating interest, it may be doubted whether such investigations can ever lead to results sufficiently definite to repay the immense labour which they demand.

Renault never received in his own country the official recognition which his great work in a new field merited; it is the more satisfactory to us that his English colleagues did him such honour as lay in their power. He was elected a Foreign Member of our Society 5th May, 1898, and of the Royal Microscopical Society in 1904, only a few months before his death, which took place on 16th October of that year. [D. H. Scott.]

Alfred Sanders, M.R.C.S., was born 29th April, 1834, and died 14th February, 1905. He was elected a Fellow of the Linnean and Zoological Societies in 1863, and from about this time, having abandoned the practice of medicine, he devoted himself to a special branch of natural history. Among papers contributed to various societies, his principal essays were those which appeared in the 'Phil. Trans.' between the years 1879 and 1886, entitled "Contributions to the Anatomy of the central nervous system in Vertebrate Animals," of which parts 1 and 2 referred to the Teleostei, part 3 to the Plagiostomi, a fourth paper treating similarly of *Ceratodus Forsteri* in the Dipnoi. From yet another group of fishes, the Cyclostomi, *Myxine glutinosa* furnished him with the subject for a treatise published independently, and accompanied by a very long list of the authorities who have been attracted to discuss the unattractive personality of that worm-like fish.

Mr. Sanders is remembered at the Linnean Society as a man of amiable, retiring character, but also as somewhat over-sensitive, the latter attitude of his mind displaying itself elsewhere as well as here. For instance, it appears that on one occasion he put up under excellent auspices for the Fellowship of the Royal Society, but not being at once elected he withdrew his name in a kind of resentful modesty, which really had its root in a misapprehension. He failed to perceive that an unlimited number of candidates for a limited number of vacancies cannot be sure of election at the first time of asking, however worthy of it they all may be. Whatever his disappointments, however, there is no reason for thinking that his life on the whole was other than a quietly happy one. His wife writes that he combined the pleasure of travelling with his search for the materials of his study. He went to the Nile for *Ceratodus*, to America for the blind fish of the Caves of Kentucky, and visited Australia, Japan, and various other places with similar objects in view.

[T. R. R. S.]

John Charles Sawer was elected Fellow of this Society on the 21st April, 1881, and died at Brighton on 23rd August, 1904. He brought out a small volume entitled 'Rhodologia; a discourse on Roses and the odour of Roses,' Brighton, 1894, and his various contributions to our knowledge of perfumes and perfume-bearing plants were issued in various journals. [B. D. J.]

Stephen William Silver.—Among the Fellows whose deaths it is our melancholy duty to record is the late Mr. S. W. Silver, who passed away, after a brief illness, at his beautiful country seat at Letcomb Regis, near Wantage, on April 7th, 1905. He had been confined to his house at York Gate, in London, by a severe cold for several weeks, but having apparently thrown it off, he was permitted by his medical attendant to return to the Manor House, where he suffered a relapse to which he finally succumbed at the age of eighty-five, having retained his energies and faculties unimpaired almost to the very last.

The late Mr. Silver was a many-sided man, and for a long succession of years had taken an active part in many capacities. In 1846 he had succeeded to the management of the export and banking business founded by his father long before. This business brought him into touch with prominent men in all parts of the Empire. He took a special interest in the Colonies, and promoted their development by the publication of a series of Handbooks, which became everywhere popular. He was, furthermore, the proprietor for many years of a weekly newspaper called the 'Colonies and India.'

He took an active personal interest in all movements of a philanthropic and charitable kind. For some five-and-twenty years he was a member of the British and Foreign Bible Society, and of late years served on the Council. His annual garden party at Letcomb Regis in aid of this institution, which was a recurrent event for many years, will not soon be forgotten by those who were privileged to be present. He was, for close on fifty years, a Fellow of the Royal Geographical Society, and was over and over again elected to the Council of that body, where his business experience proved of great service. For some thirty-three years he was a Fellow of the Linnean Society, in whose operations he always manifested a very lively interest. He was also an energetic member of the Royal Botanic Society and of the Royal Colonial Institute.

After giving up active business in the City, Mr. Silver continued to be Chairman of the India-rubber and Telegraph Company, in which he had a considerable financial interest, the works of that Company being at Silvertown. He was a Deputy-Lieutenant of the City of London, a Past-Master of the Ironmongers' Company, a Director of the London Life Association, a Governor of St. Thomas's Hospital; also of St. Bartholomew's and Bridewell Hospitals. He was always a friend to geographical

explorers, and was, in his day, on terms of intimacy with such men as Livingstone, Sir Samuel Baker, and Mr. Selous. His invaluable geographical and scientific library at York Gate has, for many years, been frequented by the student, the main object of its owner being to disseminate useful information. In Colonial literature his library has long been famous.

Mr. Silver always took a leading hand in promoting Colonial Exhibitions and similar undertakings. He was the possessor of some unique specimens—such as the wonderful Frost-fish of New Zealand—and these were always readily lent on such occasions.

With the view of stimulating and promoting the education of the youth in his neighbourhood, he established a most interesting little Natural History Museum at his own home, erecting a building for its accommodation. His collection of New Zealand birds (a catalogue of which, prepared by Sir Walter Buller, was published sixteen or seventeen years ago) is one of the most perfect in this country.

Following up his interest in our Colonial dependencies, Mr. Silver, about the year 1879, purchased a beautiful estate in New Zealand—in the interior of the Wellington Province, now known as Silverhope, where for many years he expended large sums of money in improvements.

A good Christian man, kind and unostentatious, always ready with advice and money to help the deserving, a liberal donor to all charities, and a hospitable landlord, he leaves behind him many friends and admirers, both here and abroad. [W. L. Buller.]

Rev. Francis Augustus Walker, D.D., who died at his residence at Cricklewood, 31st January, 1905, came of a family long connected with this Society: his grandfather, John Walker, was Fellow from 1806 to 1824; his father, Francis Walker, the entomologist, was elected in 1832, and withdrew in 1872; and the subject of the present notice was elected Fellow 21st December, 1871. Thus for ninety-nine years, with one break of eight years, the family has been represented in the Society.

From school our late Fellow went up to Christ Church, Oxford, graduating B.A. in 1864, M.A. in 1867, B.D. in 1879, D.D. in 1888. He held several curacies in London and in the country, and a country rectory in Cambridgeshire, but in 1890 he came to live in the north-western suburb of London in which he ended his days. In 1889 he paid a visit to Iceland, collecting both plants and insects; of the former he made an exhibition on 21st November, 1889, at one of our meetings, Mr. Arthur Bennett having critically examined the collection and reporting that four were new, two were introduced species, and two were confirmations of earlier collectors (Proc. Linn. Soc. 1889–90, pp. 68, 101). The insects had been collected on so lavish a scale, that some criticism was called forth on the subject of taking so many specimens of the same species. In June 1899, Dr. Walker offered

his collections to the Society, but the Council were compelled, in conformity with the policy inaugurated forty years before, to decline accepting them. In addition to insects these collections consisted of shells, arranged geographically.

Dr. Walker was a Fellow of the Entomological Society, which he joined in 1870, the year before he was elected into the Linnean Society. [B. D. J.]

June 1st, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting of the 24th May were read and confirmed.

The President announced that he had appointed Mr. Frank Crisp, Mr. Charles Baron Clarke, Mr. Horace W. Monckton, and Dr. A. Smith Woodward to be Vice-Presidents for the ensuing year.

Mr. Arthur James Dicks was admitted a Fellow.

The Rev. William Jenkins Webb Anderson, Mr. Edward Russell Burdon, Miss Kate Marion Hall, Mr. Frederick William Lucas, and Mr. Hugh Fraser Macmillan, were severally balloted for and elected Fellows.

Mr. Jesse Reeves was proposed as a Fellow.

Two letters received from Prof. E. Strasburger, of Bonn, conveying his thanks for and appreciation of the Linnean Medal awarded at the Anniversary, and forwarded through Sir Dietrich Brandis, K.C.I.E., were read by order of Council (see pp. 31, 32).

Mr. H. E. H. Smedley, F.L.S., exhibited models of restorations of some extinct Dinosaurs, *Ceratosaurus*, and *Diplodocus*, also of *Ichthyosaurus*, *Plesiosaurus*, *Scelidosaurus*, and *Stegosaurus*. After the President had opened the discussion, Dr. A. Smith Woodward remarked that many of these restorations must still be considered hypothetical, for whilst the material for a reconstruction of the *Ichthyosaurus* was abundant enough to show the nature of its covering, in others we were still without accurate knowledge, even of the position assumed by the animals during life; the *Plesiosaurus*, it is now known, could not possibly have displayed the swan-like neck depicted, as its cervical vertebræ did not permit of sufficient movement. Dr. C. W. Andrews (a visitor) and the Rev. T. R. R. Stebbing also contributed remarks, and Mr. Smedley replied.

The General Secretary showed two photographs and read a letter from Mr. John F. Waby, F.L.S., with regard to the palms mentioned as follows in the 'Proceedings' of 18th June, 1903:—

"A photograph sent by Mr. J. Waby was shown and an extract from his letter was read, stating that two specimens of

Corypha elata in the Georgetown Botanic Gardens, of similar age and planting, were photographed: one had followed the normal course, flowered, fruited, and died; the other, instead of flowering, had developed a secondary crown of leaves." (Proc. Linn. Soc. 1902–03, p. 41.)

The photographs now shown were in continuation of this. Mr. Waby writes:—"I am able now to give you the sequel to the account of the *Corypha elata* which produced the abnormal growth, and of which I sent you a photograph in the first stage. I enclose two other photographs of two further stages which I promised you last May, and the details which I have gathered on felling the palm. It was cut down on the 3rd of April. It was impossible to obtain these details before cutting it down on account of its great height. Its various dimensions are:—

Height over all 68 feet.
Diameter at base 3 feet 6 inches.
„ „ middle 2 „ 3 „
„ „ top 1 foot 10 inches, this at the base of the secondary growth.

"The secondary growth occupied a space of 4 feet. Height of the spadix from the secondary growth, 20 feet; 5 feet of this being bare stem—the remaining 15 feet crowded with huge branches, which numbered 29.

"The length of the lower branches was 9 feet 6 inches. All leaves of the original stem had fallen long since, leaving it bare for 44 feet. The leaves of the secondary growth remaining on, quite dry.

"In the 4 feet length of the secondary growth, arranged in 3 spirals, were 25 flowering branches springing from the axils of the leaves, each one a separate spadix, with numerous spathes attached at the base. Only 3 were perfect; these were 12 feet long, having a few small branches at the ends bearing fruit, the others were abortive, ranging from 2 to 6 feet in length, without branches. The crop of fruit weighed 1100 lbs. and numbered over 51,000.

"The plant was just 25 years old. In over 30 years tropical experience I have seen seven of these giants go through their life's course, besides two of the 'Talipot,' and this is the only one which has shown anything out of the ordinary course."

Mr. C. B. Clarke remarked that though this palm grew in the Calcutta Botanic Garden, he had never noticed this abnormal behaviour, though branching in palms occurred in many species.

The General Secretary exhibited sundry rarities from the books and manuscripts of Linnæus, especially three which had been lost sight of owing to their having been placed amongst the manuscripts which remained unbound. Each exhibit was explained, with the circumstances attending its production, and its special interest indicated.

The President remarked that in spite of what had been done in

bringing to light certain items in the collections of Linnæus, doubtless much yet remained to be discovered, and instanced the fact of his exhibiting the artificially produced pearls from the Linnean Cabinets. He suggested that possibly among the Linnean manuscripts there might yet exist some documents still unutilized which would throw light upon the procedure adopted by Linnæus as regards pearl-mussels.

The following paper was read :—

"The Botany of Gough Island.—Part II. The Cryptogams, exclusive of Ferns and Unicellular Algæ." By R. N. Rudmose Brown, B.Sc. (Communicated by W. B. Hemsley, F.R.S., F.L.S.)

June 15th, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 1st June were read and confirmed.

Mr. Frederick William Lucas, the Rev. William Jenkins Webb Anderson, and Miss Kate Marion Hall were admitted Fellows.

The Rev. John Gerard, S.J., F.L.S., exhibited a series of lantern-slides of *Arum maculatum*, in disproof of the statements of Hermann Mueller and others as to the fertilization of this plant by small flies, pointing out that these flies were not imprisoned by the abortive hair-like organs above the stamens, but that these visitants became stupified by the nectar afforded by the ovaries, and were digested by the plant.

The Rev. T. R. R. Stebbing, Mr. Henry Groves, and the President joined in a brief discussion.

The following papers were read :—

1. "Biscayan Plankton.—Part VI. The Colloid Radiolaria." By Dr. R. N. Wolfenden, F.L.S.

2. "Biscayan Plankton.—Part VII. The Mollusca (except Cephalopoda)." By Prof. Paul Pelseneer. (Communicated by Dr. G. H. Fowler, F.L.S.)

3. "Remarks on the Longitudinal Nerves and Transverse Veins in the Leaves of Bamboos." By Sir Dietrich Brandis, K.C.I.E., F.R.S., F.L.S.

4. "On some Remarkable Indian Undershrubs." By the same.

5. "Note on a Skeleton of the Musk-Duck, *Biziura lobata*, with Special Reference to Skeletal Characters acquired by Adaptation." By W. P. Pycraft, A.L.S.

6. "Notes on the Genus *Widdringtonia*." By Dr. M. T. Masters, F.R.S., F.L.S.

ABSTRACTS.

Abstract of Prof. VINES's discourse on Proteid Digestion in Animals and Plants; read 1st December, 1904.

THE foundation of our knowledge of gastric digestion in animals was laid by van Helmont as long ago as early in the 17th century (*Ortus Medicinæ*, 1648), who held that it was effected by an "acid ferment." But in spite of continued research by Réaumur, Stevens, Spallanzani, and others, it was not until two hundred years later that the ferment was actually detected. This important discovery was made in 1836 by the celebrated Schwann, who gave to the ferment the name "pepsin."

In the course of subsequent investigation, it came to be recognised that the digestion of the food is not by any means completed in the stomach, but that the greater part of the digestive process is carried on in the small intestine (*duodenum*) by the pancreatic secretion. Claude Bernard ascertained in 1856 that the pancreatic juice contains a ferment that digests proteids; to this ferment the name "trypsin" was given by Kühne in 1876.

These two proteid-enzymes, or proteases, pepsin and trypsin, were found to differ as well in the conditions of their activity as in the products. Pepsin acts only in an acid liquid, whereas trypsin is most active in an alkaline liquid. Both proteases decompose, by hydrolysis, the higher proteids, such as albumin and fibrin, into others of simpler constitution which Lehmann (1850) termed "peptones"; but it has since been shown that under this term were included two classes of substances known as "albumoses" and peptones proper. Although there has been a good deal of discussion on the point, it may be regarded as established that the action of pepsin goes no further than this: that it is, in fact, a merely peptonising protease. It is, however, well-known that the action of trypsin is more far-reaching, going on to the decomposition of a portion, at least, of the peptone into non-proteid, crystallisable, nitrogenous bodies belonging to what are now known as the groups of amido-acids (*e. g.*, leucin, tyrosin, tryptophane, etc.) and hexon-bases (*e. g.* arginin, lysin, and histidin). Trypsin not only peptonises the higher proteids, but also decomposes, or peptolyses, albumoses and peptones.

These two were the only proteases known until quite recently (1901) a new protease, termed "erepsin" by Cohnheim its discoverer, was added to the list. Like trypsin, this protease peptolyses peptones, and is active in alkaline liquids; but its peptonising power is much less marked, as it is without action on albumin and fibrin, though it can peptonise caseïn.

The discovery of erepsin suggested the possibility that trypsin might be, not a single enzyme, as had hitherto been thought, but a mixture of enzymes; possibly of peptonising with peptolysing

enzymes. Research in this direction has, in the hands of Dr. Vernon, already (1903) shown that what is generally known as trypsin is a mixture of erepsin (pancreato-erepsin) with what may be termed trypsin proper. It is not inconceivable that analysis may be carried still further, and that trypsin proper may itself be found to be a mixture of a peptonising with a peptonising enzyme.

I now turn to proteid-digestion in plants. The study of this subject may be said to date from the publication, in 1875, of Darwin's 'Insectivorous Plants,' where an account is given of digestion-experiments with *Drosera*, *Dionœa*, *Nepenthes*, etc. This was accompanied, almost simultaneously, by the discovery (von Gorup-Besanez, '74) of the presence of proteases in germinating seeds; and a number of similar discoveries gradually followed—in Myxomycetes (Krukenberg, '79), the Papaw (Wurtz, '79), the Fig (Bouchut, '80), Moulds (Bourquelot, '93), Bacteria (Bitter, '87), Pine-apple (Marcano, '91), Yeast (Salkowski, '89), Mushrooms, etc. (Hjort, '97). My own contribution, made within the last three years, consists of a number of observations on many different plants or parts of plants, showing that a protease of some kind is probably to be found in all parts of all plants at one stage or other of their development.

But now, as to the nature of the vegetable proteases. At first it was thought that the protease was a pepsin, since it was active in acid liquid; but from the time of Wurtz's researches on papaïn, when the investigation of the products of digestion became more thorough, opinion gradually changed to the view that the protease was allied to trypsin. As a matter of fact, peptonisation has never been found to take place under normal conditions without peptolysis. Hence there is no evidence of the independent existence in plants of a purely peptonising protease allied to pepsin; if such a protease exists at all, it exists in admixture with some peptolysing enzyme.

Some progress was made towards a comprehension of vegetable proteolysis when I discovered—almost simultaneously with Cohnheim's discovery of it in the intestine of animals—that a protease of the nature of erepsin is very generally present in plants. One important point that I succeeded in establishing was this—that many plant-juices or extracts can peptolyse, but cannot digest the higher proteids, so that clearly erepsin occurs independently in these cases. The present state of knowledge is then this—that whilst all plants that have been investigated can effect peptolysis, only a limited number have been found capable of digesting fibrin: the plants enumerated above all digest fibrin, and to that list I may add the following: the fruit of the Kachri Gourd (*Cucumis Melo* var. *utilissimus*), discovered by Professor Green ('92); also various other gourds discovered by me (Melon, Cucumber, Vegetable Marrow); the etiolated shoots of Asparagus; the bulbs of the Hyacinth and the Tulip; and the leaves of

Phytolacca decandra, the only foliage-leaves that I have yet found, out of a large number of plants tried, to digest fibrin.

I may perhaps digress for a moment to explain that the wide distribution of proteases in the plant-body is now being paralleled by the discovery of a similar distribution in the animal body. Until comparatively recently it was thought that the proteases were confined to the alimentary canal of animals. But since 1890, thanks to the researches of Salkowsky, Jacoby, Hedin, and others, it has been gradually ascertained that a proteolytic enzyme is to be found generally in the tissues; an enzyme that resembles trypsin in its digestive activity, but differs from it in being more active in acid (0·1 per cent. HCl) than in neutral or alkaline liquids; this protease may be distinguished as "tissue-trypsin." But the most recent and, from the present point of view, the most interesting discovery in this direction is that made by Vernon, that an erepsin can be readily extracted from the various tissues of both vertebrate and invertebrate animals. Though his paper has not yet been published, I have the author's permission to make brief mention of his results on this occasion. In the Mammalia this "tissue-erepsin," as the protease may be designated, closely resembles in its properties the intestinal erepsin, "entero-erepsin," discovered by Cohnheim, more especially in requiring an alkaline medium. But the investigation of certain lower Vertebrates (Pigeon, Frog, Eel) and Invertebrates (Lobster, Anodon) has shown that in the latter cases an acid medium is less prejudicial than in the former to the action of the protease. These results demonstrate not only the fact of the essential similarity of distribution of erepsin in the tissues of animals and of plants, but also indicate a gradual convergence in the properties of the erepsins; so that it is not too much to anticipate the discovery of animals possessing an erepsin which, like that of plants, is more especially adapted for action in an acid medium.

But I must return to the consideration of the nature of the vegetable proteases, and more especially of the fibrin-digesting proteases. In endeavouring to solve this problem, I have ascertained that in certain cases (Yeast, Mushroom) the tissues contain a mixture of erepsin with a fibrin-digesting enzyme, a result which finds its analogue in Vernon's researches on pancreatic trypsin. But I have not succeeded in determining the nature of this fibrin-digesting enzyme, in deciding whether it is a pepsin or a trypsin, because there is no method by which all the erepsin can be certainly removed from the mixture so as to leave the other enzyme isolated.

However, I have recently made some observations in another direction which, though not yet conclusive, at any rate indicate a method by which a physiological analysis of a suspected mixture of proteases may be attempted. In investigating the somewhat debated digestive properties of papaïn, it was necessary, as in all experiments of this kind, to use an antiseptic. I tried various

antiseptics, such as toluol, prussic acid, and sodium fluoride, with the result that whilst in certain experiments both fibrin-digestion and peptolysis (of Witte-peptone) took place, in others peptolysis was effected without fibrin-digestion or *vice-versa*. The latter result is susceptible of two explanations: it may indicate the presence of a single protease of the nature of trypsin, of which either the peptonising or the peptolytic activity was paralysed by the antiseptic: or it may indicate the presence of two proteases—the one peptonising and of the nature of pepsin; the other peptolytic, an erepsin; the one having been paralysed by the antiseptic, but not the other. Of these two alternatives, the first would seem to be less probable; for it is natural to suppose that if a single protease were prejudicially affected, all forms of its activity would suffer equally. If the second alternative prove to be well-founded, it will be of exceptional interest; for, in that case, these observations will have demonstrated, for the first time, the presence of a peptic protease in plants. Not only so, but it will also point the way to the solution of the problem as to the nature of the trypsin of animals, which may be thus shown to consist, as I have already suggested, of a mixture of pepsin with erepsin.

Although my own investigations have been confined to plants, I have found it necessary to include the digestive processes of animals in my remarks this evening: not only because the progress of discovery in plants has been necessarily based for the most part on the earlier discoveries in animals, but chiefly because the processes are essentially the same in all living organisms, so that the subject can only be intelligently dealt with as a whole. It is safe to prophesy that, as investigation is extended more comprehensively to the digestive processes of the lower animals, the more manifest will this truth become.

Abstract of Dr. Augustine Henry's discourse on Botanical Collecting; read 19th January, 1905.

The actual methods were briefly alluded to, stress being laid on truthful labelling of the specimens at the moment of collection, instead of months afterwards, when identical numbers were often given to plants of different *provenance*. With the aid of nearly 50 lantern-slides, he showed his travels in China, demonstrating that the popular idea of that country as one vast rice-field was fallacious, as it mainly consisted of vast mountain-ranges cut up by deep valleys. In some of the slides the home of the wild forms of the Chrysanthemum, *Primula sinensis*, etc., were shown; and the lecturer alluded to the early history of horticulture in China, stating that the first botanical garden there was made 111 B.C. in Shensi, plants from subtropical regions, as the Banana, *Areca* Palm, and Orange, being introduced. Other slides showed typical forms of subtropical deciduous and evergreen trees; and the occurrence of epiphytes and lianes in vast numbers was mentioned.

Dr. Henry said that the text-book statement that epiphytes of higher types than ferns do not occur in Europe is too sweeping; as in the moist warm climate of Ireland, *Cotyledon Umbilicus* in Wicklow covers the trunk and branches of the Alder, while Rhododendrons in two cases were seen by him growing on the bark of *Pinus sylvestris*; and *Pyrus Aucuparia* seems to be a true epiphyte in various parts of Scotland and Wales. Dr. Henry alluded to "mimicry" in plants, in the case of two species of *Lysimachia* (a protomorphic genus in China), one of which mimicked *Paris quadrifolia*, with 4 leaves, while the other recalled another species of *Paris* with 10–12 leaves. He referred also to the extraordinary richness of species on calcareous soils as compared with other soils, a fact constantly seen in China, and well marked also in France; and asked for some explanation. In China, as elsewhere, pure woods were rare, being only formed by a few conifers, like *Abies Fargesii* at high altitudes in Hupeh, *Cupressus funebris* in the same province at lower levels (the home of the Reeves's Pheasant), *Pinus Massoniana* (almost everywhere in the Central and Southern provinces), other species of *Pinus* more local; also certain species of Oak widely distributed; and *Alnus nepalensis* in Yunnan. The explanation of the occurrence of pure forests was also a subject not completely understood: *e. g.*, in this country Ash seeded freely, and in some places for a time looked as if it would grow into a pure wood: but apparently pure forests of Ash only occurred on extremely rich soil in some districts in Russia.

With regard to botanical collecting, three stages had occurred. At an early period plants were collected to be merely named and classified; in fact they were treated like postage stamps. The second period began with Sir Joseph Hooker, who inaugurated the study of the geographical distribution of plants. The third period, that of the present day, was a step forward, in that attention should be paid to the plants themselves as social organisms, living in harmony and yet in competition together; and Dr. Henry urged that the time had come, when the hunt for new species should cease to be the sole aim of the collector, and the study of the known species be taken in hand in their living conditions. He advocated map-making of small areas, census-taking, measurements, records of natural seedlings, soil, shade, etc., etc.; and to illustrate this plan, showed a series of slides taken in France, the idea of which was to explain how the commoner species of trees behaved at different altitudes and on different soils. These slides included Beech, Spruce, *Pinus Cembra*, *Pinus montana* (which, according to Dr. Henry, often attains 80 feet in height and thrives on peat-mosses and on rocky soil, so thick with boulders that practically no vegetation existed except this hardy Pine), Larch, *Quercus sessiliflora* and *pedunculata*. He pointed out that these two species differed as to soil and situation, and complained that their areas had never been mapped out in

England. The causes favouring the existence of the two very different forms of the common Birch were unknown, yet in Scotland this problem could easily be attacked.

The systematic botanists had only asked from collectors specimens with leaves, flowers, and fruit: material to be named and classified. Yet in trees and shrubs, the winter stages were of extreme interest, also the seedling stage. Elm seedlings and seedlings showing the difference between the two common Oaks were not to be found in the national Herbaria, and are not described in books.

Dr. Henry also referred to the small amount of work that had been done in regard to peat-mosses, and the great importance of studying the ancient forests, of which these mosses were—to put it broadly—the ruins. He mentioned extraordinary growth of trees in deep peat-mosses of the present day, as Alder averaging 95 feet; even the Oak also occurred.

Owing to the small amount of attention that had been paid to scientific forestry in this country, trees had met with scanty recognition from the authors of local floras; and in some cases species (as the *Arbutus*) were put down as shrubs, though there was plain evidence that they attained the size and filled the functions of forest trees.

ADDITIONS AND DONATIONS

TO THE

LIBRARY.

1904–1905.

Albert. Honoré Charles (*Prince de Monaco*). Résultats des Campagnes Scientifiques accomplies sur son Yachts [l'*Hirondelle* et la *Princesse-Alice*]. Fascicules 27–30. 4to. *Monaco*, 1904.

XXVII. Siphonophores provenant des Campagnes du Yacht *Princesse-Alice* (1892–1902). Par Maurice Bedot. (1904.)

XXVIII. Méduses provenant des Campagnes des Yachts *Hirondelle* et *Princesse-Alice* (1886–1903). Par Otto Maas. (1904.)

XXIX. Mémoires océanographiques. (Première Série.) Par J. Thoulet. (1905.)

XXX. Description des Antipathaires et Cérianthaires recueillis par S.A.S. le Prince de Monaco dans l'Atlantique nord (1886–1902). Par Louis Roule. (1905.)

—— Zur Erforschung der Meere und ihrer Bewohner. Gesammelte Schriften des Fürsten Albert I. von Monaco. Aus dem französischen von Dr. Emil von Marenzeller. Pp. xvi, 207; mit 39 Abbildungen. 8vo. *Wien*, 1891.

Alcock (Alfred William). Catalogue of the Indian Decapod Crustacea in the Collection of the Indian Museum. Part II. Anomura. Fasciculus 1. Pagurides. *See* **Calcutta: Indian Museum.**

Alder (*the late* **John**) and **Hancock** (*the late* **Albany**). The British Tunicata. An unfinished Monograph. Edited by John Hopkinson. With a History of the Work by the Rev. A. M. Norman. Vol. I. Pp. xii, 146: plates 20. (*Ray Society.*) 8vo. *London*, 1905.

Allen (Henry A.). Catalogue of Types and Figured Specimens of British Gasteropoda and Scaphopoda from the Lower, Middle, and Upper Oolites, preserved in the Museum of Practical Geology, London. Pp. 13. (Append. vi. Summary Progress Geol. Surv. for 1903.) 8vo. *London*, 1904. **Author.**

Allioni (Carlo). Scritti Botanici pubblicati nella ricorrenza Centenaria della morte di Carlo Allioni, 30 Luglio 1804–30 Luglio 1904, di Oreste Mattirolo. (Istituto Botanico R. Univ. Torino.) Pp. 177; portraits 2, plate 1. 4to. *Genova*, 1904. **G. Mattirolo.**

Alphita. A Medico-Botanical Glossary from the Bodleian manuscript Selden B. 35. Edited by J. L. G. Mowat. (Anecdota Oxoniensia, Med. Lex. i., Part ii.) Sm. 4to. *Oxford*, 1887. **Frank Crisp.**

Ameghino (Florentino). La perforación Astragaliana en los Mamíferos no es un carácter originariamente primitivo. Pp. 112, figs. 98. (An. Mus. Nac. Buenos Aires, xi. pp. 349–460.) 8vo. *Buenos Aires*, 1904.

—— Nuevas especies de Mamíferos, Cretáceos y Terciarios de la República Argentina. Pp. 142. (An. Soc. Cient. Argentina, Tomos lvi., lvii., and lviii.) 8vo. *Buenos Aires*, 1904.

—— Paleontologia Argentina. (Public. Univ. La Plata, Facultad Ciencio, &c., No. 2.) 8vo. *La Plata*, 1904.

—— La faceta articular inferior única del Astrágalo de Algunos Mamíferos no es un carácter primitivo. Pp. 64, figs. 69. (An. Mus. Nac. Buenos Aires, xii.) 8vo. *Buenos Aires*, 1905.

—— Presencia de la perforación Astragaliana en el Tejón. Pp. 9, figs. 3. (An. Mus. Nac. Buenos Aires, xii.) 8vo. *Buenos Aires*, 1905. **Author.**

Annales Mycologici; editi in Notitiam Scientiæ Mycologicæ Universalis. Herausgegeben und Redigiert von H. Sydow. Vols. 1–3. 8vo. *Berlin*, 1903–1905.

Appel (Otto). *See* **Knuth (Paul).** Handbuch der Blütenbiologie.

Artedi (Peter). A Bicentenary Memoir, written on behalf of the Swedish Royal Academy of Science by Einar Lönnberg. Translated by W. E. Harlock. Pp. 44. 8vo. *Upsala & Stockholm*, 1905. **Author.**

Azara (Felix de). Geografía Física y Esférica de las Provincias del Paraguay, y Misiones Guaraníes. En la Asunción del Paraguay. Año de mdccxc. (Manuscrito en la Biblioteca Nacional de Montevideo.) Bibliografía, Prólogo y Anotaciones por Rodolfo P. Schuller. Pp. cxxxii, 478: pls. 8, maps 7, and a portrait. (Ann. Mus. Nac. Montevideo, Sección Hist.-Filos. i.) 4to. *Montevideo*, 1904.

Baikal-See. Wissenschaftliche Ergebnisse einer Zoologischen Expedition nach dem Baikal-See, unter Leitung des Professors Alexis Korotneff in den Jahren 1900–1902.
Liefg. 1. 4to. *Kiel & Berlin*, 1905.
I. Michaelsen (W.). Die Oligochæten des Baikal-Sees. Pp. 68; figs. 9. (1905.)

Bailey (Charles). Note on *Sisymbrium strictissimum*, Linn., at Heaton Mersey, for the last fifteen years (1890–1904). Pp. 7. (Mem. Manch. Lit. & Phil. Soc. vol. 49.) 8vo. *Manchester*, 1905. **Author.**

Barber (Charles Alfred). The Study of Sandal Seedlings. Pp. 4: plates 4. (Indian Forester, xxx.) 8vo. *Allahabad*, 1904.

—— The Haustoria of Sandal Roots. Pp. 13; plates 6. (Indian Forester, xxxi.) 8vo. *Allahabad*, 1905. **Author.**

Barcellos (Henrique de). *See* **Revista do Centro de Sciencias, Letras e Artes de Campinas.**

Beccari (Odoardo). Wanderings in the Great Forests of Borneo. Travels and Researches of a Naturalist in Sarawak. Translated by Dr. Enrico Hillyer Giglioli, and Revised and Edited by Francis Henry Hill Guillemard. Pp. xxiv, 424; figs. 61. 8vo. *London*, 1904. **Author.**

Bedot (Maurice). Siphonophores (*Princesse-Alice*). *See* **Albert.**

Belfast. A Guide to Belfast and the Counties of Down and Antrim. Prepared for the Meeting of the British Association by the Belfast Naturalists' Field Club. Pp. 283; 62 illustrations and 3 maps. 8vo. *Belfast*, 1902. **Belfast Nat. Hist. & Phil. Soc.**

Bergen Museum.

Bergens Museum Skrifter.

Nordgaard (O.) and Jörgensen (E.). Hydrographical and Biological Investigations in Norwegian Fiords. The Protist Plankton and the Diatoms in Bottom Samples. Pp. 254: with 21 plates, and 10 figs. in the Text. fol. *Bergen*, 1905.

Berlese (Antonio). *See* "**Redia**," Giornale di Entomologia, &c.

Bettelini (Arnoldo). La Flora Legnosa del Sottoceneri (Cantone Ticino meridionale). Dissertazione Inaugurale. Pp. 213; tav. 6, carta 2. 8vo. *Bellinzona*, 1904. **Dr. H. Schinz.**

Bibliotheca Botanica (*continued*).

Heft 62. Rumpf (Georg). Rhizodermis, Hypodermis und Endodermis der Farnwurzel. Pp. 48, Tafeln 4. 1904.

Bibliotheca Zoologica (*continued*).

Band XVII. Heft 42. Börner (Carl). Beiträge zur Morphologie der Arthropoden. I. Ein Beitrag zur Kenntnis der Pedipalpen. Pp. 104; mit 7 Tafeln und 114 Textfiguren. 1904.

Band XVIII. Heft 43. Escherich (Karl). Das System der Lepismatiden. Pp. 164; mit 4 Tafeln und 67 Textfiguren. 1905.

„ „ 44. Daday (Eugen von). Untersuchungen über die Süsswasser-Mikrofauna Paraguays. Mit einem Anhang: Zur Kenntnis der Naididen, von Dr. Wilhelm Michaelsen. Pp. 374, Taf. 28. 1905.

Blanchard (Raphaël). Règles internationales de la nomenclature zoologique adoptées par les Congrès internationaux de Zoologie. (Fr. Engl. Germ.) Pp. 57. 8vo. *Paris*, 1905.

Börner (Carl). Beiträge zur Morphologie der Arthropoden. I. Ein Beitrag zur Kenntnis der Pedipalpen. Pp. 104; mit 7 Tafeln und 114 Textfiguren. (Zoologica, Bd. xvii. Heft 42.) 4to. *Stuttgart*, 1904.

Bordeaux.

Société Linnéenne de Bordeaux.

Actes, Vols. 30–59. 8vo. *Bordeaux*, 1875–1904.

[Also divided into series of 10 volumes each.]

Boulenger (George Albert). The Flat Fishes of Cape Colony. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Descriptions of Two New Gobiiform Fishes from the Cape of Good Hope. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— Descriptions of New Fishes from the Cape of Good Hope. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— On a Specimen of *Lophotes Cepedianus* from the Cape of Good Hope. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

—— *See* **Cambridge Natural History,** Vol. VII. Fishes (Systematic Account of Teleostei).

Breda de Haan (J. van). De huidige stand der Rijstcultuur in Noord-Italië. Pp. iii, 74. (Mededeel. 'slands Plantentuin, lxxiv.) 8vo. *Batavia*, 1904.

Bridge (Thomas William). *See* **Cambridge Natural History,** Vol. VII. Fishes (excl. of the Systematic Account of Teleostei).

Briggs (Ella Marion). The Life-History of Case-bearers: I. *Chlamys plicatu*. *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs, IV.

British Association for the Advancement of Science.
Report (Cambridge), 1904. 8vo. *London*, 1905.
Council Brit. Assoc.

British Museum (*continued*).
The History of the Collections contained in the Natural History Departments of the British Museum. Vol. I.
8vo. *London*, 1904.

BIRDS.

Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History). By EUGENE WILLIAM OATES, assisted by Capt. SAVILE G. REID. Vol. IV. Pp. xviii, 352; plates 14.
8vo. *London*, 1905.

INSECTS.

Lepidopterous Insects.

Catalogue of the Lepidoptera Phalænæ in the British Museum. Vols. IV., V. Catalogue of the Noctuidæ in the Collection of the British Museum. By Sir GEORGE E. HAMPSON, Bart.
8vo. *London*, 1903–1905.

Vol. IV. Pp. xx, 689, figs. 125. Plates 55–77. (1903.)
,, V. Pp. xvi, 634, figs. 172. Plates 78–95. (1905.)

Orthopterous Insects.

A Synonymic Catalogue of Orthoptera. By W. F. KIRBY. Vol. I. Orthoptera Euplexoptera, Cursoria, et Gressoria. (Forficulidæ, Hemimeridæ, Blattidæ, Mantidæ, Phasmidæ.) Pp. x, 501. 8vo. *London*, 1904.

British Museum (*continued*).

ECONOMIC ZOOLOGY.

Economic Zoology. By FREDERICK V. THEOBALD. Reports 1–2. 8vo. *London*, 1903–1904.

PLANTS.

Illustrations of Australian Plants collected in 1770 during Captain Cook's Voyage round the World in H.M.S. 'Endeavour.' By The Right Hon. Sir JOSEPH BANKS, Bart., and Dr. DANIEL SOLANDER. With Determinations by JAMES BRITTEN. Part III.; plates 244–318. fol. *London*, 1905.

FOSSILS.

Catalogue of the Mesozoic Plants in the Department of Geology, British Museum (Natural History). The Jurassic Flora. Part II. Liassic and Oolitic Floras of England (excluding the Inferior Oolite Plants of the Yorkshire Coast). By A. C. SEWARD. Pp. xv, 192; plates 13. 8vo. *London*, 1904.

GUIDE-BOOKS.

Guide to the Gallery of Birds in the Department of Zoology in the British Museum (Natural History). By W. R. OGILVIE-GRANT. Pp. iv, 228; plates 24, and 7 illustrations. 4to. *London*, 1905.

Brooklyn.

Brooklyn Institute of Arts and Sciences.

Cold Spring Harbor Monographs.

Nos. 1–5. 8vo. *Brooklyn*, 1903–1905.

1. SMALLWOOD (MABEL E.). The Beach Flea: *Talorchestia longicornis*. Pp. 27; plates 3, figs. 3. (1903.)
2. DAVENPORT (CHARLES BENEDICT). The Collembola of Cold Spring Beach, with special reference to the Movements of the Poduridæ. Pp. 32; plate 1. (1903.)
3. SMALLWOOD (MABEL E.). The Salt-Marsh Amphipod: *Orchestia palustris*. Pp. 21; plates 2 & map. (1905.)
4. BRIGGS (ELLA MARION). The Life-History of Case-bearers: I. *Chlamys plicata*. Pp. 13; plate 1, figs. 11. (1905.)
5. DIMON (ABIGAIL CAMP). The Mud Snail: *Nassa obsoleta*. Pp. 48; plates 2. (1905.)

Bütschli (Otto). Investigations on Microscopic Forms and on Protoplasm: Experiments and Observations directed towards a Solution of the Question of the Physical Conditions of the Phenomena of Life. Authorised Translation by EDWARD ALFRED MINCHIN. Pp. xvi, 379; plates 12, figs. 23. 8vo. *London*, 1894.

Buitenzorg.

Flore de Buitenzorg, publiée par le Jardin Botanique de l'État. Vols. I.–VI. 8vo. *Leide*, 1898–1905.

I. Raciborski (Maryan). Die Pteridophyten. Pp. xii, 255. (1898.)
II. Penzig (Ottone). Myxomycètes. Pp. 83. (1898.)
III. Wildeman (Émile de). Les Algues. Pp. xi, 457; plates 16, figs. 149. (1900.)
IV. Schiffner (Victor). Les Hépatiques. Pp. 220. (1900.)
V. Fleischer (Max). Les Muscinées. Band I. Sphagnales; Bryales (Arthrodontei [Haplolepideæ]). Pp. xxxi, 379; figs. 1–71. (1900–1902.)
V. Fleischer (Max). Les Muscinées. Band II. Bryales (Arthrodontei [Diplolepideæ, i. p.]). Pp. xviii, 381–643; figs. 72–121. (1902–1904.)
VI. Smith (Johannes Jacobus). Die Orchideen von Java. Pp. viii, 652. (1905.)

Bullen (Robert Ashington). Japan and Australian Mollusca. Pp. 3, plate 1. (Proc. Malacol. Soc. vi.) 8vo. *London*, 1904. **Author.**

Buller (*Sir* Walter Lawry). Supplement to the 'Birds of New Zealand.' Vol. I. 4to. *London*, 1905.

Burgerstein (Alfred). Die Transpiration der Pflanzen. Eine physiologische Monographie. Pp. x, 283; figs. 24. 8vo. *Jena*, 1904.

Burwash (E. M.). The Geology of Michipicoten Island. Pp. 48; plates 9. (Univ. Toronto Studies, Geol. Ser. no. 3.) 8vo. *Toronto*, 1905.

Cairo.

Egyptian Government School of Medicine.

Records, Vol. II. 4to. *Cairo*, 1904.

Calcutta.

Indian Museum.

An Account of the Deep-Sea Holothurioidea collected by the Royal Indian Marine Survey Ship *Investigator*. By René Koehler and Clément Vaney. Pp. 123; plates 15. 4to. *Calcutta*, 1905.

Catalogue of the Indian Decapod Crustacea in the Collection of the Indian Museum. Part II. Anomura. Fasciculus I. Pagurides. By A. Alcock. Pp. xi, 197; plates 16. 4to. *Calcutta*, 1905.

Calman (William T.). Note on a Genus of Euphausid Crustacea. (Rep. Sea & Inland Fisheries of Ireland, 1902–1903. No. IV. Append. Part ii.) 8vo. *Dublin*, 1905. **Author.**

Calvet (Louis). Bryozoen. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

Cambridge (The) Natural History. Edited by S. F. Harmer and A. E. Shipley. Vol. VII. 8vo. *Cambridge*, 1904.

Vol. VII. Hemichordata. By S. F. Harmer. 1904.
Ascidians and *Amphioxus*. By W. A. Herdman. 1904.
Fishes (exclusive of the Systematic Account of Teleostei). By T. W. Bridge. 1904.
Fishes. (Systematic Account of Teleostei.) By G. A. Boulenger. 1904.

Cameron (John) *of Bangalore*. Note on the Introduction, Cultivation, and Propagation of *Agave rigida*, var. *sisalana*, in the Lal-Bagh, Bangalore. Pp. 2. fol. *Bangalore*, 1904. **Author.**

Canada.

Geological Survey (*continued*).

Contributions to Canadian Palæontology.

Vol. III. Part 3. 4to. *Ottawa*, 1904.

On *Dryptosaurus incrassatus* (Cope), from the Edmonton Series of the North-West Territory. By Lawrence M. Lambe. Pp. 27; plates 8. 1904.

Cape Town. *See* **South African Association for the Advancement of Science.**

Carpenter (William Benjamin). The Microscope and its Revelations. Eighth Edition, by William Henry Dallinger. Pp. xx, 1181; plates 22, and 817 wood-engravings. 8vo. *London*, 1901.

Ceylon Marine Biological Laboratory. *See* **Colombo.**

Chapman (Frederick). On some Brachiopods and a Bivalve from Heathcote. Pp. 4; plate 1. (Rec. Geol. Surv. Victoria, vol. i. pt. 3.) 8vo. *Melbourne*, 1904.

—— On some Cainozoic Foraminifera from Brown's Creek, Otway Coast. Pp. 4; plate 1. (Rec. Geol. Surv. Victoria, vol. i. pt. 3.) 8vo. *Melbourne*, 1904.

—— New or Little-known Victorian Fossils in the National Museum, Melbourne. Part IV. Some Silurian Ostracoda and Phyllocarida. Pp. 22; plates 5. (Proc. Roy. Soc. Victoria, xvii. pp. 298–319, plates 13–17.) 8vo. *Melbourne*, 1904. **Author.**

Chapman (Frederick) and **Pritchard (G. B.).** Fossil Fish-remains from the Tertiaries of Australia. Part I Pp. 31, plates 2. (Proc. Roy. Soc. Victoria, xvii. pp. 267–297, plates 11 & 12.) 8vo. *Melbourne*, 1904. **Authors.**

Chodat (Robert) und **Lendner (Alfred).** Une Excursion botanique à Majorque. Pp. 91; figs. 21. (Univ. Genève Inst. Bot. 7 ser. fasc. 1.) 8vo. *Genève*, 1905. **R. Chodat.**

Christensen (Carl). Index Filicum, sive Enumeratio omnium generum specierumque Filicum et Hydropteridum ab Anno 1753 ad Annum 1905, descriptorum adjectis Synonymis principalibus, Area Geographica, etc. Fasc. 1–3. 8vo. *Hafniæ*, 1905.

Church (Arthur Henry). On the Relation of Phyllotaxis to Mechanical Laws. Pp. vii, 353; figs. 112, plates 28.
8vo. *London*, 1901–1904.

I. Construction by Orthogonal Trajectories. (A. H. Church.) Pp. 1–78. (1901.)
II. Asymmetry and Symmetry. (A. H. Church.) Pp. 79–211. (1902.)
III. Secondary Growth Phenomena. (A. H. Church.) Pp. 215–326. (1904.)
Mathematical Notes on Log. Spiral Systems and their Application to Phyllotaxis Phenomena. (E. H. Hayes and A. H. Church.) Pp. 327–349. (1904.)

Clark (John Willis). A Concise Guide to the Town and University of Cambridge. In Four Walks; with an additional Walk through Ely Cathedral and its precincts. (British Assoc. Meeting.) Pp. xxiv, 220; figs. 75. 8vo. *Cambridge*, 1904.

Clayton (John). The 'Sequoias,' with special reference to the Section of the Big Tree named 'Mark Twain.'
4to. *Bradford*, 1896. **Author.**

Coe (Wesley Roswell). Nemerteans of the West and Northwest Coasts of America. Pp. 318: plates 25. (Bull. Mus. Comp. Zool. Harv. Coll. vol. 47.) 8vo. *Cambridge, Mass.*, 1905.

Cold Spring Harbor Monographs. *See* **Brooklyn Institute of Arts and Sciences.**

Cole (A.). Recherches sur la Disposition des faisceaux dans la Tige les feuilles de quelques Dicotylédones. (Ann. Sci. Nat. Bot. 8 ser. xx.) 8vo. *Paris*, 1904.

Collins (Frederick Howard). Author and Printer: A Guide for Authors, Editors, Printers, Correctors of the Press, Compositors, and Typists. With full list of Abbreviations. An Attempt to codify the best Typographical Practices of the Present Day. Pp. xv, 407. 8vo. *London*, 1905. **Author.**

Colombo.
Ceylon Marine Biological Laboratory.
Reports, No. 1. 4to. *Colombo*, 1905.

I. Hornell (James). The Biological Results of the Ceylon Pearl Fishery of 1904, with Notes on Divers and their Occupation. Pp. iv, 39; plates 15. (1905.)

Royal Botanic Gardens, Peradeniya.
Annals, Vols. I.–II. pts. 1, 2. 8vo. *Colombo*, 1901–1904.
J. C. Willis.

Conklin (Edwin Grant). The Organization and Cell-Lineage of the Ascidian Egg. Pp. 119; plates 12. (Journ. Acad. Nat. Sci. Philad. 2nd ser. xiii. part 1.) fol. *Philadephia*, 1905.

Cooke (Theodore). The Flora of the Presidency of Bombay. Vol. II. part 2. 8vo. *London*, 1905. **Author.**

Czapek (Friedrich). Biochemie der Pflanzen. Band I. Pp. xv, 584. 8vo. *Jena*, 1905.

Daday (Eugen von). Untersuchungen über die Süsswasser-Mikrofauna Paraguays. Mit einem Anhang: Zur Kenntnis der Naididen von Dr. Wilhelm Michaelsen. Pp. 374, Taf. 23. (Zoologica, Bd. xviii. Heft 44.) 4to. *Stuttgart*, 1905.

Davenport (Charles Benedict). The Collembola of Cold Spring Beach, with special reference to the Movements of the Poduridæ. *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs, II.

Dawson (*Sir* John William). Modern Ideas of Evolution as related to Revelation and Science. Pp. 252.
8vo. *London*, 1900.

Detto (Carl). Die Theorie der direkten Anpassung und ihre Bedeutung für das Anpassungs- und Deszendenzproblem. Versuch einer methodologischen Kritik des Erklärungsprinzipes und der botanischen Tatsachen des Lamarckismus. Pp. vi. 214; figs. 17. 8vo. *Jena*, 1904. **B. Daydon Jackson.**

Dimon (Abigail Camp). The Mud-Snail: *Nassa obsoleta*. *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs, V.

Dixon (Hugh Neville) and **Jameson (Hampden Gurney).** The Student's Handbook of British Mosses. Second Edition. Pp. xlix, 586; plates 65. 8vo. *Eastbourne & London*, 1904. **H. N. Dixon.**

Domin (Karl). Beiträge zur Kenntnis der böhmischen Potentillenarten. Pp. 47; Taf. 1. (S.B. Kgl. böhm. Ges. Wiss. 1903.) 8vo. *Prag*, 1903.

—— Fragmente zu einer Monographie der Gattung *Koeleria*. Pp. 59. (Magyar Botanikai Lapok. (Ungar. Bot. Blätter) Jahrg. iii.) 8vo. *Budapest*, 1904. **Author.**

Don (George). The Life and Work of. *See* **Druce (George Claridge).**

Druce (George Claridge). The Life and Work of George Don. Pp. 238. (Notes Roy. Bot. Gard. Edinb. no. 12.)
8vo. *Edinburgh*, 1904. **Author.**

Dublin.
Botanical School of Trinity College.
Notes. No. 6. 8vo. *Dublin*, 1905.
Dr. E. Perceval Wright.

Dyer (Thomas Firminger Thiselton). The Folk-Lore of Plants. Pp. 328. 8vo. *London*, 1889.

Dyer, *Sir* William Turner Thiselton-. *See* **Oliver, D.**

Edinburgh. Royal Caledonian Horticultural Society.
Memoirs. Vol. 1. part 1. 8vo. *Edinburgh*, 1905.

Egypt. *See* **Swedish Zoological Expedition** to Egypt and the White Nile, 1901.

Elfving (Fredrik). Studien über die Einwirkung des Lichtes auf die Pilze. Inaugural-Dissertation. Pp. 141; Tafeln 5.
8vo. *Helsingfors*, 1890.

Elliot (Daniel Giraud). The Land and Sea Mammals of Middle America and the West Indies. (Field Columbian Mus. Public. 95, Zool. Ser. vol. iv. pts. 1, 2.) 8vo. *Chicago*, 1904.

Vol. IV., Pt. 1: pp. xx, 1–439, Index i–xlix; plates 1–41, figs. 1–58, figs. 1–82.

Vol. IV., Pt. 2: pp. xii, 441–850; plates 42–68, figs. 59–142, figs. 83–167.

Elliot (George Francis Scott), Laurie (Malcolm), and Murdoch (J. Barclay). Fauna, Flora, and Geology of the Clyde Area; prepared for the Meeting of the British Association in Glasgow in 1901. Pp. x, 567, and Map.

8vo. *Glasgow*, 1901. **Authors.**

Engler (Adolf). Führer durch die biologisch-morphologischen Abteilungen des Königl. botanischen Gartens zu Dahlem, mit 2 Plänen, 1 Bild und 31 Figuren. Pp. 66. (Notizbl. Königl. bot. Gartens und Museums, Berlin. Append. xvi.)

8vo. *Leipzig*, 1905.

Escherich (Karl). Das System der Lepismatiden. Pp. 164, mit 4 Tafeln und 67 Textfiguren. (Zoologica, Bd. xviii. Heft 43.)

4to. *Stuttgart*, 1905.

Farran (George P.). On the Opisthobranchiate Mollusca. Pp. 36, plates 6. (Herdman, Rep. to the Govt. of Ceylon on Pearl Oyster Fisheries of the Gulf of Manaar, Part iii.)

4to. *London*, 1905. **Author.**

Fedtschenko (Olga). Trois espèces nouvelles du Genre *Eremurus*. Pp. 4. (Bull. l'Herb. Boissier, 2 ser. iv.)

8vo. *Genève*, 1904. **Author.**

Ferguson (Margaret Clay). Contributions to the Knowledge of the Life-History of *Pinus*, with Special Reference to Sporogenesis, the Development of the Gametophytes and Fertilization. Pp. 202; plates 24. (Proc. Washington Acad. Sci. vol. vi.)

8vo. *Washington*, 1904.

Firenze. *See* "**Redia**," Giornale di Entomologia pubblicato dalla R. Stazione di Entomologia Agraria in Firenze.

Fischer (Eduard). Die Uredineen der Schweiz. Pp. xciv, 590; figs. 342. (Beitr. z. Kryptogamenflora d. Schweiz, Bd. ii. Heft 2.) 8vo. *Bern*, 1904.

Ford (Sibille O.). The Anatomy of *Psilotum triquetrum*. Pp. 17, plate 1. (Ann. Bot. xviii.) 8vo. *Oxford*, 1905. **Author.**

Forel (August). Formiciden. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

Forests, Conservator of. *See* **Natal.**

Garden (The). Vols. 65, 66. 4to. *London*, 1904. **Editors.**

Gardeners' Chronicle. 3 ser. Vols. 35, 36.

fol. *London*, 1904. **Editor.**

Gemmellaro (Gaetano Giorgio). I Cefalopodi del Trias superiore della regione occidentale della Sicilia. Pp. xxviii, 319; Tav. 30. (Giorn. Soc. Palermo, xxiv.) 4to. *Palermo*, 1904.

Giglioli (Enrico Hillyer). *See* **Beccari (Odoardo).** Wanderings in the Great Forests of Borneo.

Gilchrist (John Don Fisher). Development of South African Fishes. Part II. Pp. 22, plates 7. *See* **Cape of Good Hope: Dept. of Agric.** Marine Investigations in South Africa.

Godet (Charles Henry). Flore de Jura, ou description des Végétaux Vasculaires qui croissent spontanément dans le Jura Suisse et Français, plus spécialement dans le Jura Neuchâtelois. Pp. xxvi, 872. 8vo. *Neuchâtel, &c.*, 1852–53.

—— —— Supplément. Pp. viii, 220. 8vo. *Neuchâtel*, 1869.

Graff (Ludwig von). *See* **Berlin**—Das Tierreich. Liefg. 23. Turbellaria, I. Acoela.

Grant (William Robert Ogilvie). *See* **British Museum.** Guide-Books. Guide to the Gallery of Birds in the Department of Zoology of the British Museum (Natural History).

Günthart (A.). *See* **Schroeter (Carl).** Das Pflanzenleben der Alpen.

Guillemard (Francis Henry Hill). *See* **Beccari (Odoardo).** Wanderings in the Great Forests of Borneo.

Gussone (Giovanni). Supplementum ad Floræ Siculæ Prodromum, quod, et specimen Floræ Insularum Siciliæ Ulteriori adjacentium. Fasciculus 1. Pp. viii, 166. 8vo. *Neapoli*, 1832.

Haeckel (Ernst Heinrich). Die Lebenswunder. Gemeinverständliche Studien über Biologische Philosophie. Pp. xii, 567. 8vo. *Stuttgart*, 1904.

—— The Wonders of Life; a popular Study of Biological Philosophy. Supplementary vol. to "The Riddle of the Universe." Translated by Joseph McCabe. Pp. xiv, 501. 8vo. *London*, 1904.

—— Der Kampf um den Entwickelungs-Gedanken. Drei Vorträge, gehalten am 14, 16, und 19 April 1905 im Saale der Sing-Akademie zu Berlin. Pp. 112; mit drei Tafeln und einem Porträt. 8vo. *Berlin*, 1905. **Author.**

Hagen (Ingebrigt S.) and **Porsild (Morten P.).** Descriptions de quelques espèces nouvelles de Bryacées récoltées sur l'île de Disko. Pp. 30; plates 6. (Meddelelser om Grönland, xxvi.) 8vo. *Copenhagen*, 1904. **M. P. Porsild.**

Hallier (Hans). New Propositions to Botanical Nomenclature. Pp. 14. (Jahrb. Hamb. Wiss. Anst. xxii., Beiheft 3.) 8vo. *Hamburg*, 1905. **Author.**

Hancock (*the late* Albany). *See* **Alder (*the late* John).** The British Tunicata: Ray Society.

Hancock (Joseph Lane). The Tettigidæ of Ceylon. Pp. 61; plates 4. (Spolia Zeylanica, vol. ii.) 8vo. *Colombo*, 1904. **Author.**

Hansen (Emil Christian). Grundlinien zur Systematik der Saccharomyceten. Pp. 10. (Centralbl. f. Bakteriol., Parasit. u. Infektionskr. xii.) 8vo. *Jena*, 1904.

Hansen (Emil Christian). Ueber die Brutstätten der Alkoholgärungspilze oberhalb der Erde. Pp. 6. (Centralbl. f. Bakter., Parasitenk. u. Infektionskr., Abt. ii. Bd. 14.)
8vo. *Jena*, 1905. **Author.**

Hansen (Hans Jacob). Preliminary Report on the Schizopoda collected by H.S.H. Prince Albert de Monaco during the Cruise of the *Princesse-Alice* in the Year 1904. Pp. 32; figs. 22. (Bull. Mus. Océanogr. Monaco, n. 30.) 8vo. *Monaco*, 1905.

—— Further Notes on the Schizopoda. Pp. 32. (Bull. Mus. Océanogr. Monaco, n. 42.) 8vo. *Monaco*, 1905. **Author.**

Hansen (H. J.) and **Sörensen (William).** The Tartarides, a Tribe of the Order Pedipalpi. Pp. 78; plates 7. (Arkiv f. Zool. Bd. ii.)
8vo. *Stockholm*, 1905. **Authors.**

Harlock (W. E.). *See* **Artedi (Peter).** A Bicentenary Memoir.

Harmer (Sidney Frederic). *See* **Cambridge Natural History,** Vol. VII. Hemichordata.

—— The Pterobranchia of the Siboga Expedition, with an Account of other Species. **Siboga-Expeditie,** Monogr. 26 *bis*.

Hayes (Edward Harold) and **Church (Arthur Harry).** Mathematical Notes on Log. Spiral Systems and their Application to Phyllotaxis Phenomena. (Church, On the Relation of Phyllotaxis to Mechanical Laws, pp. 325–349.) 8vo. *London*, 1904.

Hazewinkel (J.) and **Wilbrink (G.).** Onderzoekingen aan het Proefstation voor Indigo in de jaren 1903 en 1904. Pp. 171. (Mededeel. 'slands Plantentuin, lxxiii.) 8vo. *Batavia*, 1904.

Heigel (K. Th. von). Zum Andenken an Karl von Zittel. Rede in der öffentlichen Festsitzung der K.-B. Akademie der Wissenschaften am 14. März, 1904. Pp. 17. 4to. *München*, 1904.

Herdman (William Abbott). *See* **Cambridge Natural History,** Vol. VII. Ascidians and *Amphioxus*.

—— *See* **Kermode (Philip M. C.).** Illustrated Notes on Manks Antiquities.

Hesse (Oswald). Beitrag zur Kenntnis der Flechten und ihrer charakteristischen Bestandteile. (Neunte Mitteilung.) Pp. 54. (Journ. f. praktische Chemie, N. F. Band 70, pp. 449–500.)
8vo. *Leipzig*, 1904. **Author.**

Hill (Matthew Davenport) and **Webb (Wilfred Mark).** Eton Nature-Study and Observational Lessons. With a Foreword by the Rev. Edmond Warre. Part II. Pp. xvi, 174; figs. 135–255. 4to. *London*, 1904. **Authors.**

Hissink (D. J.). Een Studie over Deli-Tabak naar aanleiding van de in 1900 en 1901 genomen bemestingsproeven op de onderneming Padang Boelan (Deli). Pp. iv, 78. (Mededeel. Dept. van Landbouw. I.) 8vo. *Batavia*, 1905.

Hitchcock (Albert S.). North American Species of *Agrostis*. Pp. 68; figs. 2, plates 37. (U.S. Dept. Agric., Bureau of Plant Industr., Bull. no. 68.) 8vo. *Washington*, 1905.
B. Daydon Jackson.

Hochreutiner (B. P. G.). Plantæ Bogorienses exsiccatæ novæ vel minus cognitæ quæ in Horto Botanico coluntur. Pp. ix, 75. 8vo. *Buitenzorg*, 1904.

Holle (Gustav). Ueber den anatomischen Bau des Blattes in der Familie der Sapotaceen und dessen Bedeutung für die Systematik. Inaugural-Dissertation. Pp. 59; Tafel 1. 8vo. *München*, 1892.

Holt (Ernest W. L.) and **Tattersall (W. M.).** Schizopodous Crustacea from the North-East Atlantic Slope. (Rep. Sea and Inland Fisheries of Ireland, 1902–1903. No. IV. Append. Part II.) 8vo. *Dublin*, 1905. **Authors.**

Hooker (*Sir* Joseph Dalton). An Epitome of the British Indian Species of *Impatiens*. Parts I., II. (Records Bot. Surv. India, vol. iv., nn. 1, 2.) 8vo. *Calcutta*, 1904–1905.

Hopkinson (John). *See* **Alder (*the late* John)** and **Hancock (*the late* Albany).** The British Tunicata: Ray Society.

Hornell (James). The Biological Results of the Ceylon Pearl Fishery of 1904. *See* **Colombo**: Ceylon Marine Biological Laboratory, No. 1.

Hudson (George Vernon). New Zealand Neuroptera. A Popular Introduction to the Life-histories and Habits of May-flies, Dragon-flies, Caddis-flies, and Allied Insects inhabiting New Zealand . . . . including Notes on their relation to Angling. Pp. viii, 102; plates 11 col. 8vo. *London*, 1904. **A. W. Walker.**

Immermann (Ferdinand). *See* **Plankton-Expedition.** Die Tripyleen-Familie der Aulacanthiden.

India.

Geological Survey (*con.*).

Memoirs (Palæontologia Indica).

Ser. XV. Himalayan Fossils.

Vol. IV. The Fauna of the Spiti Shales. By Dr. Victor Uhlig. Pp. 1–132, plates 18. (1903.)

Indian Forester (The). A Quarterly Magazine of Forestry. Edited by E. P. Stebbing.

Vol. XXXI. No. 1→ 4to. *Allahabad*, 1905→

Jackson (Benjamin Daydon). The History of Botanic Illustration. An Address delivered at the Anniversary Meeting of the Hertfordshire Natural History Society on the 8th of March, 1905. Pp. 12; plates 3. (Trans. Hertford. Nat. Hist. Soc. xii.) 8vo. *London & Hertford*, 1905. **Author.**

Jagerskiöld (Leonard Axel). *See* **Swedish Zoological Expedition** to Egypt and the White Nile, 1901.

Jameson (Hampden Gurney). *See* **Dixon (Hugh Neville).** The Student's Handbook of British Mosses.

Janet (Charles). Description du matériel d'une petite installation scientifique. Partie 1. Pp. 37 ; figs. 9, plates 7.
8vo. *Limoges*, 1903.

—— Observations sur les Guêpes. Pp. 85 ; figs. 30.
8vo. *Paris*, 1903.

—— Observations sur les Fourmis. Pp. 68 ; figs. 11, plates 7.
8vo. *Limoges*, 1905. **Author.**

Jerosch (Marie). *See* **Schroeter (Carl).** Das Pflanzenleben der Alpen.

Jörgensen (E.). The Protist Plankton and the Diatoms in Bottom Samples. *See* **Bergens Museum Skrifter.**

Jost (Ludwig). Vorlesungen über Pflanzenphysiologie. Pp. xiii. 695 ; mit 172 Abbildungen. 8vo. *Jena*, 1904.

Journal of Botany. Vol. 42. 8vo. *London*, 1904. **Jas. Britten.**

Journal of Mycology, The. [Edited by] William A. Kellerman. Vols. 8–11. 8vo. *Columbus*, 1902–1905.

Kearney (Thomas H.). Reports on a Botanical Survey of the Dismal Swamp Region. (U.S. Dept. Agric., Contrib. from U.S. Nat. Herb., Vol. v. No. 6.) 8vo. *Washington*, 1901.

Kellerman (William A.). *See* **Journal of Mycology.**

Kermode (Philip M. C.) and **Herdman (William Abbott).** Illustrated Notes on Manks Antiquities. Pp. 108 ; figs. 56. (18th Ann. Rep. New Biol. Station Port Erin.)
8vo. *Liverpool*, 1904.

Kew.
Royal Botanic Gardens.
Bulletin of Miscellaneous Information.
Appendix 4 for 1903.
,, 1–4 for 1904.
,, 1–3 for 1905.
8vo. *London*, 1904–1905.
Director.

Kirby (William Forsell). *See* **British Museum.** Orthopterous Insects : Synonymic Catalogue of Orthoptera, Vol. I.

Klapálek (Franz). Plecopteren. *See* **Hamburger Magalhaensischen Sammelreise, Liefg. 7.**

Klein (Edward Emanuel). The Etiology and Pathology of Grouse Disease, Fowl Enterites, and some other Diseases affecting Birds. Pp. xii, 130, with 53 illustrations.
8vo. *London*, 1892.

Knuth (Paul). Handbuch der Blütenbiologie ; unter Zugrundelegung von Hermann Müllers Werk : "Die Befruchtung der Blumen durch Insekten." 3 vols.
8vo. *Leipzig*, 1898–1905.

Band I. Einleitung und Litteratur. Pp. xix, 400 ; figs. 81, und Porträt. (1898.)

Band II. Die bisher in Europa und im arktischen Gebiet gemachten Blütenbiologischen Beobachtungen.

I. Ranunculaceæ bis Compositæ. Pp. 697 ; figs. 1–210, und Porträt. (1898.)

II. Lobeliaceæ bis Gnetaceæ. Pp. 705 ; figs. 211–429, und Porträt. (1899.)

Band III. Die bisher in Aussereuropäischen Gebieten gemachten Blütenbiologischen Beobachtungen unter Mitwirkung von Dr. Otto Appel. Bearbeitet und Herausgegeben von Dr. Ernst Loew.
I. Cycadaceæ bis Cornaceæ. Pp. 570; figs. 1–141, und Porträt (Paul Knuth's). (1904.)
II. Clethraceæ bis Compositæ. Pp. v, 601; figs. 142–197. (1905.)

Köhler (Alwin). Der systematische Wert der Pollenbeschaffenheit bei den Gentianaceen. Inaugural-Dissertation. Pp. 72, plates 3. (Mitt. Bot. Mus. Univ. Zürich, xxv.)
8vo. *Zürich*, 1905. **Dr. Hans Schinz.**

Koehler (René). *See* **Siboga-Expeditie.** Ophiures de l'Expédition du Siboga. 2e Partie. Ophiures littorales.

—— and **Vaney (Clément).** An Account of the Deep-Sea Holothurioidea collected by the Royal Indian Marine Survey Ship *Investigator*. *See* **Calcutta : Indian Museum.**

Kükenthal (Willy). Versuch einer Revision der Alcyonarien. II. Die Familie der Nephthyiden. Teil I., II. (Spengel, Zool. Jahrb. Abt. Syst. xix., xxi.) 8vo. *Jena*, 1903–1905.

Lafar (Franz). Handbuch der Technischen Mykologie, &c. Liefg. I.→ 8vo. *Jena*, 1904→

Lambe (Lawrence M.). On *Dryptosaurus incrassatus* (Cope), from the Edmonton Series of the North-West Territory. Pp. 27; plates 8. (Geol. Surv. Canada, Contrib. to Canad. Palæont. Vol. iii. part 3.) 4to. *Ottawa*, 1904.

Laurie (Malcolm). *See* **Elliot (George Francis Scott).** Fauna, Flora, and Geology of the Clyde Area.

L'Héritier (*de Brutelle*) **(Charles Louis).** Stirpes novæ aut minus cognitæ. 2 Vols. (L. p. with a double set of plates, plain and coloured). fol. *Parisiis*, 1787–1788. **F. Justen.**

Lendner (Alfred). *See* **Chodat (Robert).** Une excursion botanique à Majorque.

Lewis (George). A Systematic Catalogue of Histeridæ. Pp. vi, 81. 8vo. *London*, 1905. **Author.**

Lindau (Gustav). *See* **Sorauer (Paul).** Handbuch der Pflanzenkrankheiten.

Liverpool.
Biological Station at Port Erin (Isle of Man).
Annual Report 18. 8vo. *Liverpool*, 1904.
W. A. Herdman.

Löfgren (Alberto). A Fructicultura em Argentina. Observações feitas numa Excursão à Buenos Ayres em Commissão do Governo do Estado de S. Paulo. Pp. 43. (Revista Agricola.)
8vo. *São Paulo*, 1904. **Author.**

Lönnberg (Einar). *See* **Artedi (Peter).** A Bicentenary Memoir.

Loew (Ernst). Einführung in die Blütenbiologie auf historischer Grundlage. Pp. xii, 432, mit 50 Abbildungen.
8vo. *Berlin*, 1895.

—— *See* **Knuth (Paul).** Handbuch der Blütenbiologie.

Lohmann (Hans). *See* **Plankton - Expedition.** Eier und sogenannte Cysten der Plankton - Expedition. Anhang : *Cyphonautes.*

Lomax (James). *See* **Weiss (Frederick Ernest).** The Stem and Branches of *Lepidodendron selaginoides.*

Maas (Otto). Méduses provenant des Campagnes des Yachts *Hirondelle* et *Princesse-Alice* (1886–1903). *See* **Albert.**

McCabe (Joseph). *See* **Haeckel (Ernst Heinrich).** The Riddle of the Universe at the Close of the Nineteenth Century.

—— *See* **Haeckel (Ernst Heinrich).** The Wonders of Life.

McCarthy (Gerald). Edible and Poisonous Mushrooms. Pp. 33 ; plates 8. (Bull. North Carolina State Board of Agric. xxvi. no. 1.) 8vo. *Raleigh*, 1905. **Author.**

MacDougal (Daniel Trembly). *See* **Vries (Hugo de).** Species and Varieties : their Origin by Mutation.

McIntosh (William Carmichael). Notes from the Gatty Marine Laboratory, St. Andrews. (Ann. Mag. Nat. Hist. 7 ser. xi., xii.) 8vo. *London*, 1903.

—— British Fisheries Investigations and the International Scheme. Pp. 33. 8vo. *Dundee*, 1903. **Author.**

Magellansländern. Wissenschaftliche Ergebnisse der Schwedischen Expedition nach den Magellansländern 1895–1897 ; unter Leitung von Dr. Otto Nordenskjöld.

Band II. Zoologie. Heft 1.
Band III. Botanik. Heft 1.

8vo. *Stockholm*, 1899–1904.

Maiden (J. H.). A Critical Revision of the Genus *Eucalyptus.* Part 5. 4to. *Sydney*, 1904. **Author.**

Manchester.

Botanical Exchange Club of the British Isles.

Report for 1904. 8vo. *Oxford*, 1905. **G. C. Druce.**

Manchester Microscopical Society.

Report and Transactions for 1904. 8vo. *Manchester*, 1905.

Manila.

Department of the Interior.

Bureau of Forestry of the Philippine Islands. Report for 1903. 8vo. *Manila*, 1904.

—— The Forest Manual, containing the Forest Act (No. 1148), Extracts from other Laws of the Philippine Commission relating to the Forest Service, and the Forest Regulations, prepared in accordance with the provisions of the Forest Act. Pp. 64. 8vo. *Manila*, 1904.

Marenzeller (Emil von). Zur Erforschung der Meere und ihrer Bewohner. Gesammelte Schriften des Fürsten Albert I. von Monaco. Aus dem französischen von E. v. M. Pp. xvi, 207 ; mit 39 Abbildungen. 8vo. *Wien*, 1891.

[**Marfelde, Mirfeld, or Marifeldus, John**]. Sinonoma Bartholomei; a glossary from a fourteenth century manuscript in the Library of Pembroke College, Oxford. Edited by JOHN LANCASTER GOUGH MOWAT. (Anecdota Oxoniensia, Mediæval Ser. I. part i.) Sm. 4to. *Oxford*. 1887. **Frank Crisp.**

Martelli (Ugolino). Pandani Asiatici Nuovi. Pp. 7. (Bull. Soc. bot. ital. 1904.) 8vo. *Firenze*, 1904. **Author.**

Mattirolo (Oreste). Scritti Botanici pubblicati nella ricorrenza Centenaria della morte di CARLO ALLIONI, 30 Luglio 1804–30 Luglio 1904. (Istituto Botanico R. Univ. Torino.) Pp. 177; portraits 2, and plate 1. 4to. *Genova*, 1904. **Author.**

Meissner (Maximilian). Asteroideen. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

Michaelsen (Wilhelm). Zur Kenntnis der Naididen Paraguays. (Zoologica, xviii. Heft 44.) 4to. *Stuttgart*, 1905.

—— Die Oligochæten des Baikal-Sees. *See* **Baikal-See**: Wissenschaftliche Ergebnisse einer Zoologischen Expedition &c.

Minchin (Edward Alfred). *See* **Bütschli (Otto)**. Investigations on Microscopic Forms and on Protoplasm.

Moebius (Karl August). Die Formen und Farben der Insekten ästhetisch betrachtet. Pp. 8. (S.B. Kgl. Preuss. Akad. Wiss. 1905, No. v.) 8vo. *Berlin*, 1905. **Author.**

Monaco.

Musée Océanographique de Monaco.

Bulletin, Nos. 1–45. 8vo. *Monaco*, 1904–1905.

Mowat (John Lancaster Gough). *See* **Alphita**: **Marfelde (John)**.

Mueller (The) Botanic Society. *See* **Perth**: West Australian Natural History Society.

Munich.

Koniglich-bayerische Akademie der Wissenschaften.

Ueber Wert und angeblichen Unwert der Mathematik. Festrede gehalten in der öffentlichen Sitzung der K.-B. Akademie der Wissenschaften zu München zur Feier ihres 145. Stiftungstages am 14. März 1904, von ALBERT PRINGSHEIM. Pp. 44. 4to. *München*, 1904.

Zum Andenken an KARL VON ZITTEL. Rede in der offentlichen Festsitzung der K.-B. Akademie der Wissenschaften am 14. März 1904, von K. TH. VON HEIGEL. Pp. 17. 4to. *München*, 1904.

Murdoch (J. Barclay). *See* **Elliot (George Francis Scott)**. Fauna, Flora, and Geology of the Clyde Area.

Natal.

Conservator of Forests.

Reports for 1903–1904. 8vo. *Pietermaritzburg*, 1905.

Nestel (Adolf). Beiträge zur Kenntnis der Stengel und Blattanatomie der Umbelliferen. Inaugural-Dissertation. Pp. 126, plates 2. (Mitt. Bot. Mus. Univ. Zürich, xxiv.) 8vo. *Tübingen*, 1905. **Dr. Hans Schinz.**

Neuhaus (François). Contribution à l'étude des ferments oxydants. I. De l'action combinée de la Peroxydase et de la Catalase. II. La Catalase de l'urine normale et pathologique. Pp. 58. (Univ. Genève Inst. Bot. 7 ser. fasc. ii.) 8vo. *Genève*, 1905. **R. Chodat.**

Neuweiler (E.). Die Prähistorischen Pflanzenreste Mitteleuropas mit besonderer Berücksichtigung der schweizerischen Funde. Pp. 110. (Vierteljahrsschrift Naturf. Ges. Zürich, Jahrg. 50.) 8vo. *Zürich*, 1905.

Nomenclature Zoologique. Règles Internationales de la Nomenclature Zoologique adoptées par les Congrès Internationaux de Zoologie. Pp. 57. (R. Blanchard, Président.) 8vo. *Paris*, 1905.

Nordgaard (O.). Hydrographical and Biological Investigations in Norwegian Fiords. *See* **Bergens Museum Skrifter.**

Norman (*Rev.* **Alfred Merle**). *See* **Alder** (*the late* **Joshua**) and **Hancock** (*the late* **Albany**). The British Tunicata: Ray Society.

Oliver (Daniel). Flora of Tropical Africa. Vols. I.–III. 8vo. *London*, 1868–77.

[*Continued as*]

Flora of Tropical Africa. By various Botanists. Edited by Sir William Turner Thiselton-Dyer. Vol. IV. part 4. 8vo. *London*, 1904. *Sir* **W. T. Thiselton-Dyer.**

Olsson-Seffer (Pehr). The Place of Linnæus in the History of Botany. Pp. 8. (Journ. Bot. vol. 42.) 8vo. *London*, 1904. **B. Daydon Jackson.**

Oltmanns (Friedrich). Morphologie und Biologie der Algen. 8vo. *Jena*, 1904.

Band I. Spezieller Teil. Pp. vi, 733, mit 476 Abbildungen.

Oxford: Botanical Exchange Club of the British Isles. *See* **Manchester.**

Packard (Alpheus Spring). Studies on the Transformations of Saturnian Moths, with Notes on the Life-history and Affinities of *Brahmæa japonica*. Pp. 32. (Proc. Amer. Acad. Arts & Sci. xxxix.) 8vo. *Boston*, 1904.

—— Opisthenogenesis, or the Development of Segments, Median Tubercles and Markings *a tergo*. Pp. 6. (Proc. Amer. Phil. Soc. vol. 43.) 8vo. *Philadelphia*, 1904. **Author.**

Pavlow (Alexis Petr.). Le Crétacé inférieur de la Russie et sa faune. Pp. 87; figs. 4, plates 8. (Nouv. Mém. Soc. Imp. Nat. Moscou, xxi.) fol. *Moscow*, 1901.

Pearson (Henry Harold Welch). South African Verbenaceæ. Pp. 8. (Trans. South Afric. Phil. Soc. xv.) 8vo. *Cape Town*, 1905. **Author.**

Peradeniya: Royal Botanic Gardens. *See* **Colombo.**

Perth.

West Australian Natural History Society.

Journal, Nos. 1–2. 8vo. *Perth*, 1904–1905.

[With which is incorporated the Mueller Botanic Society.]

Philadelphia.
University of Pennsylvania.
Contributions from the Botanical Laboratory, &c. (Reprinted from Trans. & Proc. Bot. Soc. Pennsylvania.) Vol. II. No. 3. 8vo. *Philadelphia*, 1904.

Pietermaritzburg. *See* **Natal**: Conservator of Forests.

Popofsky (A.). *See* **Plankton-Expedition**: Die Acantharia. Teil I. *Acanthometra*.

Porsild (Morten P.). *See* **Hagen (Ingebrigt S.).** Descriptions de quelques espèces nouvelles de Bryacées récoltées sur l'île de Disko.

Porsild (Morten P.) and **Simmons (Herman George).** Om Færøernes Havalgevegetation og dens Oprindelse. En Kritik. Pp. 72. (Bot. Not. 1904.) 8vo. *Lund*, 1904. **Author.**

Portici. *See* "**Redia**," Giornale di Entomologia, &c.

Potonié (Henry). Lehrbuch der Pflanzenpalæontologie mit besonderer Rücksicht auf die Bedürfnisse des Geologen. Pp. viii, 402; Tafeln 3, Textfiguren 355. 8vo. *Berlin*, 1899.

Prain (David). On the Morphology, Teratology, and Diclinism of the Flowers of *Cannabis*. Pp. 32; plates 5. (Scient. Mem. Officers of the Medical and Sanitary Dept. of the Govt. India, n. s. no. 12.) 4to. *Calcutta*, 1904.

—— The Vegetation of the Districts of Hughli-Howrah and the 24-Pergunnahs. Pp. 197 and Map. (Records Bot. Survey India, vol. iii. no. 2.) 8vo. *Calcutta*, 1905.

Pringsheim (Albert). Ueber Wert und angeblichen Unwert der Mathematik. Festrede gehalten in der öffentlichen Sitzung der K.-B. Akademie der Wissenschaften zu München zur Feier ihres 145. Stiftungstages am 14. März 1904. Pp. 44. 4to. *München*, 1904.

Pritchard (G. B.). *See* **Chapman (Frederick).** Fossil Fish-remains from the Tertiaries of Australia, Part 1.

Ratzel (Fritz). Beiträge zur anatomischen und systematischen Kenntniss der Oligochæten. Dissertation. Pp. 31, Tafel 1. (Zeitschr. wiss. Zool. xviii.) 8vo. *Leipzig*, 1868.

Ray Society. *Publications* (cont.).
Alder (*the late* Joshua) and Hancock (*the late* Albany). The British Tunicata. An unfinished Monograph. Edited by John Hopkinson and Rev. A. M. Norman. Vol. I. Pp. xii, 146; plates 20. 8vo. *London*, 1905.

"**Redia.**" Giornale di Entomologia pubblicata dalla R. Stazione di Entomologia Agraria in Firenze, sotto la Direzione di Antonio Berlese. Vol. I.→ 8vo. *Portici, Firenze*, 1903→

Reh (L.). *See* **Sorauer (Paul).** Handbuch der Pflanzenkrankheiten.

Reid (Clement). *Najas marina* in the Megaceros-Marl of Lough Gur. P. 1. (Irish. Nat. xiii.). 8vo. *Dublin*, 1904. **Author.**

Reid (*Capt.* **Savile G.**). *See* **British Museum.** Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History), Vol. IV.

Rendle (**Alfred Barton**). Mr. Hesketh Prichard's Patagonian Plants. Pp. 26, plate 1. (Journ. Bot. vol. 42.)
8vo. *London*, 1904. **Author.**

Rennes.
Université de Rennes.
Travaux Scientifiques. Vols. I.–III.
8vo. *Rennes*, 1902–1904.

Report of the Conservator of Forests, Natal. *See* **Natal**: Conservator of Forests.

Retzius (**Gustaf**). Biologische Untersuchungen. Neue Folge, XII. fol. *Stockholm*, 1905. **Author.**

Revista do Centro de Sciencias, Letras e Artes de Campinas. Redactor Gerente: Henrique de Barcellos. Anno 1–3.
8vo. *Campinas*, 1902–1904.

Richmond (**Charles Wallace**). Notes on the Birds described by Pallas in the "Adumbratiuncula" of Vroeg's Catalogue. (Smiths. Miscell. Coll. vol. 47, part 3.)
8vo. *Washington*, 1905. **C. D. Sherborn.**

Ridley (**Henry Nicholas**). The Gesneraceæ of the Malay Peninsula. Pp. 188. (Journ. Straits Branch Roy. As. Soc. No. 43, 1905.) 8vo. *Singapore*, 1905. **Author.**

Ris (**Fr.**). Odonaten. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

Rosenberg (**Otto**). Physiologisch-cytologische Untersuchungen über *Drosera rotundifolia*, L. Inaugural-Dissertation. Pp. 126; Taf. 2. 8vo. *Upsala*, 1899.

Roule (**Louis**). Description des Antipathaires et Cerianthaires recueillis par S.A.S. le Prince de Monaco dans l'Atlantique nord (1886–1902). *See* **Albert.**

Rouy (**Georges**). Flore de France, ou Description des Plantes qui croissent spontanément en France, en Corse et en Alsace-Lorraine. Tome IX. 8vo. *Asnières* et *Paris*, 1905.

Rumpf (**Georg**). Rhizodermis, Hypodermis und Endodermis der Farnwurzel. Pp. 48; Tafeln 4. (Bibl. Bot. Heft 62.)
4to. *Stuttgart*, 1904.

Saccardo (**Domenico**). *See* **Saccardo** (**Pietro Andrea**). Sylloge Fungorum &c., xvii.

Saccardo (**Pietro Andrea**). Sylloge Fungorum omnium hucusque cognitorum. Vol. XVII. Supplementum Universale. Pars VI. Hymenomyceteæ—Laboulbeniomyceteæ. Auctoribus P. A. Saccardo et Domenico Saccardo, Fil. Pp. cvii, 991.
8vo. *Patavii*, 1905.

Sacco (**Federico**). I Molluschi dei Terreni Terziarii del Piemonte e della Liguria. Considerazioni Generali. Indice Generale dell' Opera. Pp. xxxvi. 4to. *Torino*, 1904. **Author.**

Safford (William Edwin). The Useful Plants of the Island of Guam; with an Introductory Account of the Physical Features and Natural History of the Island, of the Character and History of its People, and of their Agriculture. Pp. 416; plates 70. (U.S. Dept. Agric., Contrib. from U.S. Nat. Herb. vol. ix.) 8vo. *Washington*, 1905.

Schalow (Herman). Die Vögel der Arktis. Pp. 208. (Römer & Schaudinn, Fauna Arctica, Bd. iv.) fol. *Jena*, 1905.

Schenck (Heinrich). Die Biologie der Wassergewächse. Pp. iv, 162; mit 2 Tafeln. 8vo. *Bonn*, 1886.

Schindler (Hermann). Beitrag zur Kenntnis der Niederschlagsverhältnisse Mährens und Schlesiens. Pp. 13. Mit einer Karte. Herausgegeben vom naturforschenden Vereine in Brünn. 4to. *Brünn*, 1904.

Schlich (William). Manual of Forestry. Third Edition. Vol. III. 8vo. *London*, 1905. **India Office.**

Schoute (Johannes Cornelis). Die Stelär-Theorie. Inaugural-Dissertation. Pp. 175, figs. 7. 8vo. *Groningen*, 1902.

Schouteden (H.). Aphiden. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

Schroeter (Carl). Das Pflanzenleben der Alpen. Eine Schilderung der Hochgebirgsflora. Liefg. 1–. 8vo. *Zürich*, 1904.

Schroeter (Ludwig). *See* **Schroeter (Carl).** Das Pflanzenleben der Alpen.

Schuller (Rodolfo R.). *See* **Azara (Félix de).** Geografía Física y Esférica de las Provincias del Paraguay, y Misiones Guaraníes.

Scott (Andrew). On the Ostracoda collected by Professor Herdman, at Ceylon, in 1902. Pp. 20; plates 2. (Herdman's Report to the Govt. of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar, Part iii.) 4to. *London*, 1905. **Author.**

Sherborn (Charles Davies). The New Species of Birds in Vroeg's Catalogue, 1764. (Smiths. Miscell. Coll. vol. 47, part 3.) 8vo. *Washington*, 1905. **Author.**

Silvestri (Filippo). Contribuzione alla Conoscenza dei Termitidi e Termitofili dell' America Meridionale. Pp. 234; plates 6, figs. 57. ("Redia," Vol. I.) 8vo. *Portici*, 1903.

Sim (Thomas Robertson). *See* **Natal**: Conservator of Forests.

Simmons (Herman George). Notes on some rare or dubious Danish-Greenland Plants. Pp. 5. (Meddelelser om Grönland, xxvi.) 8vo. *Copenhagen*, 1904. **Author.**

—— *See* **Porsild (Morten P.).** Om Færøernes Havalgevegetation og dens Oprindelse.

Smallwood (Mabel E.). The Beach Flea: *Talorchestia longicornis*. *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs, I.

—— The Salt-Marsh Amphipod: *Orchestia palustris*. *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs, III.

Smith (Johannes Jacobus). Die Orchideen von Java. Pp. viii, 652. (Flore de Buitenzorg, Bd. vi.) 8vo. *Leiden*, 1905.

Sörensen (William). *See* **Hansen (Hans Jacob).** The Tartarides, a Tribe of the Order Pedipalpi.

Sorauer (Paul). Handbuch der Pflanzenkrankheiten. Dritte, vollständig neubearbeitete Auflage in Gemeinschaft mit Gustav Lindau und L. Reh. Liefg. 1–2. 8vo. *Berlin*, 1905.

South African Association for the Advancement of Science. Report, &c., Vols. I., II. 8vo. *Cape Town*, 1903–1904.

1. Cape Town. 1903. 2. Johannesburg. 1904.

Step (Edward). Wayside and Woodland Trees. A Pocket Guide to the British Sylva. Pp. 182; plates 127. Second Impression. 8vo. *London*, 1904. **Author.**

Sundbärg (Gustav). *See* **Sweden: its People and its Industry, &c.**

Suschkin (Peter). Zur Morphologie des Vogelskelets. Vergleichende Osteologie der normalen Tagraubvögel (Accipitres) und die Fragen der Classification. Pp. iv, 247; figs. 56, plates 4. (Nouv. Mém. Soc. Imp. Nat. Moscou, xxi.) fol. *Moscow*, 1905.

Sweden: its People and its Industry. Historical and Statistical Handbook. Edited by Gustav Sundbärg. Pp. xi, 1141. 4to. *Stockholm*, 1904. **Govt. of Sweden.**

Swedish Zoological Expedition to Egypt and the White Nile, 1901, under the Direction of L. A. Jägerskiöld.
Results. Part I. 8vo. *Upsala*, 1904.

Sydow (H.). *See* **Annales Mycologici.**

Tattersall (W. M.). *See* **Holt (Ernest W. L.).** Schizopodous Crustacea from the North-East Atlantic Slope.

Theobald (Frederick V.). Report on Economic Zoology. *See* **British Museum (Natural History).**

Thoulet (J.). Mémoires océanographiques. *See* **Albert.**

Trägardh (Ivar). Monographie der arktischen Acariden. Pp. 78; figs. 133, Tafel 1. (Römer & Schaudinn, Fauna Arctica, Bd. iv.) fol. *Jena*, 1905.

Trail (James William Helenus). Suggestions towards the Preparation of a Record of the Flora of Scotland. Pp. 12. (Trans. Bot. Soc. Edinb. xxii.) 8vo. *Edinburgh*, 1903.

—— Topographical Botany of the River-Basins Forth and Tweed in Scotland. Pp. 32. (Trans. Bot. Soc. Edinb. xxii.) 8vo. *Edinburgh*, 1903.

—— The Flora of Buchan. (Reprinted from the Transactions of the Buchan Field Club, vol. vi.) 4to. *Peterhead*, 1902. **Author.**

True (Frederick William). The Whalebone Whales of the Western North Atlantic compared with those occurring in European Waters, with some Observations on the Species of the North Pacific. Pp. 332; plates 50, figs. 57. (Smiths. Contrib. to Knowl. xxxiii.) fol. *Washington*, 1904.

Uhlig (Victor). The Fauna of the Spiti Shales. (Palæont. Ind. ser. xv. vol. iv.) fol. *Calcutta*, 1903.

Ulmer (Georg). Ephemeriden und Trichopteren. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

United States Department of Agriculture (*con.*).

Division of Botany.

Contributions from the U.S. National Herbarium.
Vol. IX. 8vo. *Washington*, 1905.

Bureau of Plant Industry.

Bulletin, No. 68. 8vo. *Washington*, 1905.

Bull. No. 68. Hitchcock (Albert S.). North-American Species of *Agrostis*. Pp. 68; figs. 2, plates 37. (1905.)

Valeton (Theodoric). Ueber neue und unvollständig bekannte Zingiberaceæ aus West-Java und Buitenzorg. Pp. 99. (Bull. l'Inst. Bot. Buitenzorg. No. 20.) 8vo. *Buitenzorg*, 1904.

Vaney (Clément). An Account of the Deep-Sea Holothurioidea collected by the Royal Indian Marine Survey Ship *Investigator*. *See* **Calcutta: Indian Museum.**

Verson (Enrico). Manifestazioni rigenerative nelle Zampe toracali del *B. mori*. Pp. 38. (Atti R. Ist. Veneto Sci. &c. vol. 64.) 8vo. *Venezia*, 1905.

—— Dei Segni Esterni atti a rivelare nel *Bombyx M.* il sesso della larva. Pp. 5, figs. 2. (Atti R. Ist. Veneto, Sci. &c. vol. 64.) 8vo. *Venezia*, 1905. **Author.**

Vogler (P.). *See* **Schroeter (Carl).** Das Pflanzenleben der Alpen.

Vries (Hugo de). Species and Varieties: their Origin by Mutation. Lectures delivered at the University of California. Edited by Daniel Trembly MacDougal. Pp. xviii, 847. 8vo. *London*, 1905.

Walker (John Francis). The Formation of a Species. Pp. 2. (Geol. Mag. dec. 5, vol. ii.) 8vo. *London*, 1905. **Author.**

Weiss (Frederick Ernest) and **Lomax (James).** The Stem and Branches of *Lepidodendron selaginoides*. Pp. 8, plate 1. (Mem. Manch. Lit. & Phil. Soc. vol. 49.) 8vo. *Manchester*, 1905. **Author.**

Wendehake (Bruno). Anatomische Untersuchungen einiger Bambusen. Inaugural-Dissertation. Pp. 56; Tafeln 2. 8vo. *Groitzsch*, 1901.

Werner (Franz) Reptilien und Batrachier. *See* **Hamburger Magalhaensischen Sammelreise**, Liefg. 7.

West Australian Natural History Society. *See* **Perth.**

Wettstein (Richard von). Handbuch der Systematischen Botanik. Band I.–II. Theil I. 8vo. *Leipzig* and *Wien*, 1901–1903.

White (James). Dictionary of Altitudes in the Dominion of Canada. With a Relief Map of Canada. (Department of the Interior.) 8vo. *Ottawa*, 1903.

White Nile. *See* **Swedish Zoological Expedition** to Egypt and the White Nile. 1901.

Wilbrink (G.). *See* **Hazewinkel (J.).** Onderzoekingen aan het Proefstation voor Indigo in de jaren 1903 en 1904.

Wille (N.). *See* **Plankton-Expedition.** Die Schizophyceen.

Willis (John Christopher). *See* **Colombo:** Royal Botanic Gardens, Peradeniya.

Wissenschaftliche Ergebnisse einer Zoologischen Expedition nach dem Baikal-See, unter Leitung des Professors Alexis Korotneff in den Jahren 1900–1902. *See* **Baikal-See.**

Wood (John Medley). Natal Plants. Vol. IV. Part 3. 4to. *Durban*, 1904. **Author.**

Zoologica. *See* **Bibliotheca Zoologica.**

Zoological Record. Vol. 40 (1903). 8vo. *London*, 1904.

DONATION IN AID OF PUBLICATIONS.

1905.		£	s.	d.
March 8.	The Royal Society. First grant in aid of Dr. G. Herbert Fowler's "Biscayan Plankton" (Trans. 2nd ser., Zool. vol. x.).	50	0	0

INDEX TO THE PROCEEDINGS.

SESSION 1904–1905.

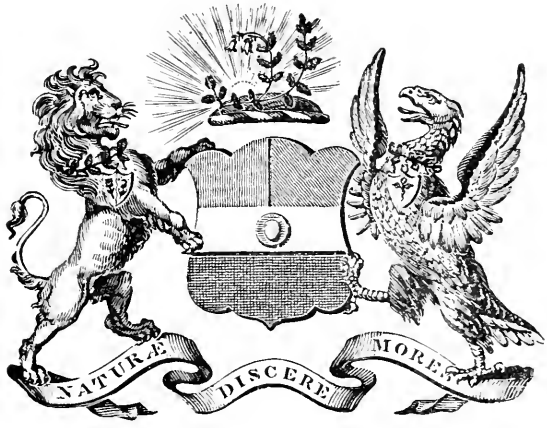
Note.—The following are not indexed:—The name of the Chairman at each meeting; speakers whose remarks are not reported; and passing allusions.

PRINTED BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.



118TH SESSION.

FROM NOVEMBER 1905 TO JUNE 1906.

LONDON:

PRINTED FOR THE LINNEAN SOCIETY,

BURLINGTON HOUSE, PICCADILLY, W.,

1906.

PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

CONTENTS.

Publications of the Society issued during the period, 31st July, 1905, to 31st July, 1906:—

Journal (Botany), No. 255–256, 20th Dec., 1905.
„ 259, 30th Sept., 1905.
„ 260, 23rd July, 1906.
„ (Zoology), No. 193, 21st Feb., 1906.
„ 194, 23rd July, 1906.

Transactions (2nd Ser. Botany), Vol. VII. Part III., April 1906.
„ IV., Sept. 1906.
„ (2nd Ser. Zoology), Vol. IX. Part X., July 1906.
Vol. X. „ IV., Nov. 1905.
„ V., Feb. 1906.

Proceedings, 117th Session, 1904–1905, October 1905.

List of [Fellows, Associates, and Foreign Members], 1905–1906.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND EIGHTEENTH SESSION, 1905–1906.)

November 2nd, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 15th June were read and confirmed.

Colonel Arthur Henry McMahon, C.S.I., C.I.E., was admitted a Fellow.

Mr. Jesse Reeves was elected a Fellow.

Mr. Oakes Ames, A.B., A.M., Harvard; Mr. Edward Archibald Smith, M.B., F.R.C.S.; The Rt. Hon. William Geoffrey Bouchard de Montmorency, Viscount Mountmorres; and Mr. Alfred Douglas Hardy, were proposed as Fellows.

The Rev. George Henslow, M.A., F.L.S., exhibited the tails of trout and grayling to show the heterocercal origin of the homocercal tail, by means of the hypural bones which balance the vertebra turning upward towards the upper lobe.

The Rev. George Henslow then delivered an address on "Plant Oecology, interpreted by direct response to the conditions of Life." He remarked that Plant Geography and Plant Surveying—that is, Phytotopography—comprise records of the fluctuating

distribution of species within definite areas, Associations, the result of Natural Selection, which he defined as the Struggle for Existence, and the Survival of the better-adapted under the circumstances.

Oecology proper, or the Physiology of Plant-geography, implied what had been defined by Prof. Tansley as "The Study of the vital relations of Organisms to their Environment." These include the origin of adaptive structures, as varietal, specific, and generic characters, by means of the protoplasmic response to what was formulated by Darwin as "The Direct Action of the Conditions of Life, leading to definite results, whereby new subvarieties arise without the aid of Natural Selection."

These statements were illustrated by specimens, diagrams, and lantern-slides.

The President opened the discussion, which was carried on by Mr. H. M. Bernard, Dr. D. H. Scott, Mr. W. F. Kirby, Rev. T. R. R. Stebbing, Mr. H. Groves, Dr. W. G. Ridewood (who pointed out the use of "Adaptation" in two senses), and Mr. W. C. Worsdell, and the lecturer replied.

November 16th, 1905.

C. B. Clarke, Esq., F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 2nd November were read and confirmed.

The following resolution was put from the Chair, and after adoption was signed by the Chairman and Secretaries for transmission to the President:—

> "The Fellows of the Linnean Society of London in General Meeting assembled, 16th November, 1905, congratulate the University of Liverpool on the approaching inauguration of the new Zoological Department, and request their President, Professor Herdman, to convey the expression of their good will and good wishes to the Chancellor, Council, and Senate of the University on that occasion."

Messrs. H. and J. Groves exhibited a number of specimens of British Water *Ranunculi*, with the purpose of showing the modifications in the form of the leaves. They pointed out that the species might be roughly grouped under three headings: (1) those in which only broadly lobed aerial leaves were produced; (2) those in which submersed multifid leaves with capillary segments were also produced; and (3) those with multifid leaves only: that although the plants of the first group as a rule occurred only on mud or in shallow water, those of the second and third

groups frequently occurred together; and they suggested therefore that it required something more than the "direct response to the conditions of life" to account for the different behaviour of closely allied plants growing under precisely the same conditions.

The Rev. T. R. R. Stebbing exhibited a photograph showing, of the natural size, the otoliths from thirty-five species of fishes, a collection made by the late David Robertson, LL.D., F.L.S., "The Naturalist of Cumbrae."

Mr. E. M. Holmes exhibited a leaf and seed of *Macrozamia spiralis*, Miq., from Queensland, where it is stated to cause symptoms of paralysis of the hind-quarters of cattle eating the leaves. The chemical nature of the constituents of the plant appear to be unknown.

Prof. F. W. Oliver contributed some remarks on the subject of this exhibition.

The following paper was read and discussed:—

"Contributions to the Embryology of the Amentiferæ. Part II.: *Carpinus Betulus*." By Margaret Benson, D.Sc., F.L.S., Elizabeth Sanday, B.Sc., and Emily Berridge, B.Sc., F.L.S.

December 7th, 1905.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 16th November were read and confirmed.

Mr. Edward Russell Burdon and Mr. Charles Gilbert Rogers were admitted Fellows.

Mr. Oakes Ames, A.B., A.M., Harvard; Mr. Edward Archibald Smith, M.B., F.R.C.S.; The Rt. Hon. William Geoffrey Bouchard de Montmorency, Viscount Mountmorres; and Mr. Alfred Douglas Hardy, were elected Fellows.

Dr. Edmund Burke, F.Z.S., Dr. William Thomas Calman, F.Z.S., Mr. William Francis Cooper, B.A. Cantab., F.Z.S., F.C.S., and Mr. Walter Draper, were proposed as Fellows.

A letter from Professor Herdman, F.R.S., was read, thanking the Society for the resolution passed at the General Meeting of the 16th November congratulating the University of Liverpool on the inauguration of the new buildings in the Zoological Department, which resolution had been placed in the hands of the Chancellor, and had much gratified the University and the staff of the Department.

Mr. W. T. Hindmarsh, F.L.S., sent three photographs taken by Mr. J. C. Ruddock in April last of a plant of *Shortia uniflora*, Maxim., in his rock-garden at Alnbank, Alnwick; the plant this year had 60 blooms, more than double the number it had the previous year.

Mr. H. J. Elwes and Mr. Frank Crisp spoke on the difficulty of inducing the plant to flower in cultivation, and Mr. E. M. Holmes also contributed some remarks.

Dr. A. B. Rendle, F.L.S., showed a branch of a *Widdringtonia* from a farm belonging to the late Cecil Rhodes in Rhodesia, displaying two forms of leaves.

Mr. James Saunders, A.L.S., showed a series of lantern-slides illustrating the habits of Mycetozoa. His observations were practically confined to the species seen within a radius of ten miles from Luton. Out of 207 species catalogued by Mr. A. Lister from the whole world, no fewer than 96, or 46 per cent., have been found in the district specified. The species shown were *Badhamia utricularis*, *Trichia varia*, *Chondroderma radiatum*, and *Physarum leucopus*, with remarks on their irregular and uncertain appearance, and distribution in certain parts of the world.

The President commented on the exhibition, and mentioned that a small dried-up plasmodium had long served him for demonstration to his junior classes on the phenomenon of restoration to activity by moisture and warmth.

Dr. Jonathan Hutchinson, F.R.S., gave a *résumé* of his paper "On the Ætiology of Leprosy," which was communicated by the Rev. T. R. R. Stebbing, F.R.S., Sec.L.S.; it was discussed at some length.

December 21st, 1905.

C. B. Clarke, Esq., F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 7th December were read and confirmed.

The Viscount Mountmorres and Mr. James Stuart Thomson were admitted Fellows.

Mr. Charles T. Druery, F.L.S., exhibited an aposporous seedling of *Polypodium vulgare*, with a frond bearing a well-defined prothallus at the tip. The species being impatient of close culture, rendered it difficult to treat it successfully under glass. He also showed a new case of apospory in *Cystopteris montana*, presenting the following novel features:—(1) Apospory appearing upon an

otherwise normal plant; (2) entire fronds of abnormally small size characterized by the aposporous diaphanous tissue, which is usually confined to the apices of the fronds; (3) by simple layering these have, without development of root-hairs, produced prothalli; (4) in July last this usually deciduous fern produced six minute pinnatifid fronds at the base of a normal frond, which persisted, and produced young plants from apogamic buds.

The Vice-President in the Chair, and Prof. J. Bretland Farmer contributed some critical remarks, to which Mr. Druery replied.

Dr. A. B. Rendle, F.L.S., then gave a report of the recent Congress, in which he was the Society's delegate:—

The International Botanical Congress at Vienna in June last was attended by more than 600 botanists from all parts of the world. The most important work was that of the Conference on Botanical Nomenclature, which met daily throughout the week. The publication of Dr. Otto Kuntze's 'Revisio Generum,' in 1891, had brought to a head the discussion arising, partly, from a certain vagueness in some of the articles of the Candollean code of laws of 1867, and partly from a neglect, by some botanists, of the principles of that code. The actual work of the Conference was to discuss the various suggested amendments of, and additions to, the articles of the Code of 1867, which had been correlated and arranged in the 'Texte Synoptique' by Dr. Briquet, the official reporter-general of the International Botanical Commission appointed at the Paris Congress in 1900. The result is embodied in a set of Rules which will shortly be issued in English, French, and German. The chief points of difference between the new rules and the laws of 1867 are as follows:—

In the first place a distinction is drawn between Rules and Recommendations. The former are retroactive and deal with more important points—names or forms of nomenclature which are contrary to a rule and cannot be maintained. Recommendations deal with points of secondary importance; and while names or forms of nomenclature contrary to a recommendation are not to be regarded as a model, they cannot be rejected.

For sake of uniformity the Congress adopted the terms *Order* and *Suborder* in place of *Cohort* and *Subcohort*; thus *Order* ceases to be synonymous with *Family*. The laws of 1867 gave no precise date of departure for botanical nomenclature; the new code states that botanical nomenclature begins with the 'Species Plantarum' of Linnæus, ed. 1 (1753). Names of genera appearing in this work may be associated with the descriptions which are given in the 'Genera Plantarum,' ed. 5 (1754). To obviate the loss of well-known generic names by a strict adherence to the law of priority, a list of names, to be retained in all cases, was approved by the Conference and will form an appendix to the new code. The articles of the original code dealing with method of formation of names have been made more precise and placed in the new code

as recommendations. A veto is put on the use of the binary form for subspecific or varietal names.

Publication is restricted to the sale or public distribution of printed matter or indelible autograph; the issue of sets of plants with numbers does not constitute publication. On and after January 1, 1908, new names will not be valid unless accompanied by a latin diagnosis, and the same time limit is put on the acceptance of plates with analyses but without description. Precision in publication is emphasized by two recommendations, as to the accurate dating and paging of reprints from Journals.

Priority of place is not recognized; to the original article of A. De Candolle, which provided that for names of the same date the author chooses which he will adopt, the new code adds "and this choice cannot be modified by subsequent authors."

In the case of transference of names the Congress upheld the principle of 1867, which insisted on the retention of the original name; a genus, species, or subspecies must retain its generic, specific, or subspecific name, in case of transference, provided its rank is unaltered. *Betula incana*, Linn. f. (1781), when transferred to the genus *Alnus*, becomes *Alnus incana*, Willd. (1805), in spite of an earlier name under *Alnus*, viz. *A. lanuginosa*, Gilib. (1792). Where, however, the rank changes in the transference this rule is not insisted on; thus *Primula veris*, L., var. *acaulis*, L. (1753), is written *P. vulgaris*, Huds. (1762), since the latter combination is earlier than *Primula acaulis*, Jacq. Where, however, a transference leads to tautology, the resulting combination is rejected; botanical nomenclature thus becomes freed from absurdities such as *Linaria Linaria*.

The articles of the old code dealing with the alteration or rejection of names were made more stringent: a name cannot be rejected on account of the existence of an older homonym which by general consent is regarded as non-valid—the principle of "once a synonym always a synonym" is not accepted. Nor, as was allowed under the old code, may a name be rejected because it is obviously unsuitable: a name is a name, and once given cannot be altered unless it is contrary to rules.

The last article of the code provides that the rules of nomenclature may be altered only by competent authors at an expressly convened international congress. Several recommendations are appended urging the exclusive use of the metric system for weights and measurements and the Centigrade method of expressing degrees of temperature; and authors are requested to indicate clearly the scale employed in their illustrations.

The speaker expressed the hope that the new code would lead to uniformity of nomenclature, and thereby save much valuable time for workers in systematic botany, as well as add to the convenience of botanists generally.

The discussion was opened by the Vice-President in the Chair, and carried on by Dr. Stapf, Lieut.-Col. Prain, Mr. John Hopkinson,

Mr. F. N. Williams, the General Secretary, and Mr. Henry Groves, and replied to by Dr. Rendle.

The following papers were read and discussed:—

1. "Cyrtandreæ Malayæ insularis novæ." By Dr. Fritz Kränzlin. (Communicated by Dr. Otto Stapf, F.L.S.)
2. "On Characeæ from the Cape collected by Major A. H. Wolley-Dod, R.A." By H. and J. Groves, F.L.S.

January 18th, 1906.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 21st December were read and confirmed.

Mr. Jesse Reeves was admitted a Fellow.

Dr. Edmund Burke, F.Z.S., Dr. William Thomas Calman, F.Z.S., Mr. William Francis Cooper, B.A. Cantab., F.Z.S., F.C.S., and Mr. Walter Draper, were severally elected Fellows.

Miss Nina Frances Layard, Mr. Frank Morey, and Mr. Arthur Ernest Bousfield Steains, were proposed as Fellows.

Mr. William Carruthers, F.R.S., a past-President of the Society, on the part of the following list of Subscribers, presented a portrait of Prof. S. H. Vines, D.Sc., F.R.S., President from 1900 to 1904, painted by the Hon. John Collier, and the President in the Chair accepted the gift on behalf of the Society.

Anderson, Prof. R. J.
Archer-Hind, T. H.
Avebury, The Lord.

Baker, J. G., F.R.S.
Balfour, Prof. I. B., F.R.S.
Barber, C. A.
Bentley, B. H.
Bisset, J.
Blackman, V. H., M.A.
Boodle, L. A.
Bower, Prof. F. O., F.R.S.
Brandis, Sir D., K.C.I.E., F.R.S.
Brown, Dr. H. T., F.R.S.
Burkill, I. H.

Carruthers, W., F.R.S.
Christy, G.
Christy, T.
Clarke, C. B., F.R.S.

Darwin, F., F.R.S.
Drabble, Dr. E.
Druce, G. C., M.A.
Drummond, J. R.
Duthie, J. F.
Dyer, Dr. B. S.
Dyer, Sir W. T. Thiselton-, K.C.M.G., F.R.S.

Edwards, S.
Errera, Prof. L.
Evans, Sir John, K.C.B., F.R.S.
Ewart, Dr. A. J.

Forbes, F. B.
Ford, C., I.S.O.
Foster, Sir M., K.C.B., F.R.S.
Fry, G.
Fry, Rt. Hon. Sir E., F.R.S.

Gamble, J. S., F.R.S.
Gardiner, W., F.R.S.
Geffcken, A. W.
Godman, F. D., F.R.S.
Green, Prof. J. Reynolds, F.R.S.

Groom, Prof. P.
Günther, Dr. A., F.R.S.
Günther, R. T., M.A.
Gwynn-Vaughan, D. T.

Hanbury, F. J.
Hanbury, Sir T., K.C.V.O.
Hemsley, W. B., F.R.S.
Henslow, Rev. G., M.A.
Herdman, Prof. W. A., F.R.S.
Hill, Dr. A.
Hill, T. G.
Hillhouse, Prof. W., M.A.
Hooker, Sir J. D., G.C.S.I., F.R.S.
Hopkinson, J.

Ito, Tokitaro.

Jackson, B. Daydon.
Jackson, W. Hatchett.

Kanjilal, U.
King, Sir G., K.C.I.E., F.R.S.

Le Brocq, W. P. J., M.A.

Massee, G.
Masters, Dr. M. T., F.R.S.
Middleton-Wake, Rev. C. H., M.A.

Newton, Prof. A., F.R.S.
Nicholls, C. H.

Oliver, Prof. F. W., F.R.S.

Peckover, A., LL.D.
Percival, Prof. J., M.A.
Phillips. Dr. R. W., M.A.
Potter, M. C., M.A.
Poulton, Prof. E. B., F.R.S.

Ransom, W.
Rendle, Dr. A. B.

Saunders, G. S.
Scott, Dr. D. H., F.R.S.
Seward, A. C., F.R.S.
Shillitoe, Buxton.
Shipley, A. E., F.R.S.
Silver, S. W.
Smart, F. G., M.A.
Stapf, Dr. O.
Stebbing, Rev. T. R. R., M.A., F.R.S.
Sutton, A. W.
Swinhoe, Col. C., M.A.

Trow, Dr. A. H.

Voelcker, Dr. J. A.

Wager, H., F.R.S.
Walker, A. O.
Ward, Prof. H. Marshall, F.R.S.
Watt, Sir G.
Weiss, Prof. F. E.
Woodward, Dr. A. Smith, F.R.S.
Worsdell, W. C.

Mr. T. Ernest Waltham exhibited a series of coloured transparencies from flowers in natural colours, partly by the three-colour process, partly by hand. They were shown on frames specially devised, the light being reflected from beneath, and a frame with a stereoscope slid along above the series. One admirable lantern-slide was displayed upon the screen, to show the success of the process. Mr. A. O. Walker and Dr. A. B. Rendle contributed some remarks.

The following papers were read and discussed:—

1. "The Life-History of *Margaritifera Panasesæ*." By A. W. Allen. (Communicated by the Rev. T. R. R. Stebbing, F.R.S., Sec.L.S.)

2. "On some Endophytic Algæ." By A. D. Cotton, F.L.S.

3. "On the Organ of Jacobson in *Sphenodon*." By Dr. R. Broom. (Communicated by Prof. A. Dendy, F.L.S.)

February 1st, 1906.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th January were read and confirmed.

Dr. William Thomas Calman was admitted a Fellow.

Mr. Hugh Findon, Mr. James Eustace Radcliffe McDonagh, M.R.C.S., L.R.C.P., Mr. Thomas Hawkes Russell, and Mr. Ernest Justus Schwartz, M.A. Cantab., B.Sc.Lond., were proposed as Fellows.

By special invitation of the Council, Mr. J. Stanley Gardiner, M.A., gave an account of the Percy Sladen Trust Expedition in H.M.S. 'Sealark' to the Indian Ocean, of which he was leader.

In 1904, at the request of the Royal Society, His Majesty's Government agreed to allow the Author to undertake a six months' cruise in H.M.S. 'Sealark' in the following year, to investigate the western part of the Indian Ocean between India and Madagascar. The author was responsible for the whole work, and with Mr. Forster Cooper took charge especially of the biology and geology, while Commander Boyle Somerville and the Officers of H.M.S. 'Sealark' did most of the practical work connected with the oceanography.

Leaving Colombo on May 9, 1905, H.M.S. 'Sealark' proceeded to the Chagos Archipelago, where a stay of two months was made: Salomon, Peros Banhos, Diego Garcia, and Egmont, all ring-shaped reefs with land, were carefully examined, and the first resurveyed on a big scale. The reefs were found to be very largely formed by calcareous algæ, and the marine fauna to be singularly poor in species. Numerous soundings were put down between the different atolls and banks, and sections were run off Salomon Atoll, where also a series of dredgings was obtained. The talus slope off the reefs was very marked, and the bottom between the different banks was found to be current-swept down to 500 fathoms.

The expedition having left Mauritius on August 22nd, the submerged Nazareth and Saya de Malha Banks were examined and dredged. Coetivy was next visited, and its fauna and flora, terrestrial and marine, carefully collected for comparison with the Chagos. The line between Madagascar and Seychelles was then investigated. The low hills of Farquhar were found to be merely sand dunes, while St. Pierre turned out to be a raised coral island. Off Providence specimens were obtained of a volcanic rock, which probably forms the foundation of that coral bank. Alphonse and Desroches were subsequently visited, and the Amirante Bank was carefully dredged; Poivu Darros, St. Joseph, and Eagle Islands also being examined.

In oceanography, tidal, current, meteorological, and magnetic observations were made wherever possible, and serial temperatures and water samples were secured down to 1000 fathoms. The charts were everywhere examined and corrected, and the existence of any shallow connecting bank between India and Madagascar was disproved. About 150 dredgings were run down to 900 fathoms, and plankton was extensively collected by closing and other nets down to 1200 fathoms. The reef faunas and floras were especially collected in the Chagos and at Coetivy in view of the distribution of marine organisms, and the islands everywhere were carefully examined, their land animals and plants being collected as thoroughly as possible.

The PRESIDENT announced that amongst the visitors who had been invited to attend, all the Trustees of the Percy Sladen Trust were present, and he invited their Chairman, Mr. T. Bailey Saunders, to open the discussion. He was followed by Dr. Tempest Anderson and Mr. Henry Bury; discussion was contributed by Dr. G. C. Bourne, who contrasted his own difficulties when in Diego Garcia twenty-five years ago and the facilities at the disposal of Mr. Stanley Gardiner, Dr. G. Herbert Fowler, Dr. N. Wolfenden, Mr. A. P. Young, Mr. W. P. Pycraft, the President concluding by a few observations, and Mr. Stanley Gardiner replied *seriatim* to the questions which had been put.

February 15th, 1906.

Dr. A. SMITH WOODWARD, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 1st February were read and confirmed.

Dr. Tempest Anderson was proposed as a Fellow.

Miss Nina Frances Layard, Mr. Frank Morey, and Mr. Arthur Ernest Bousfield Steains, were severally balloted for and elected Fellows.

Dr. H. C. BASTIAN, F.R.S., F.L.S., gave a lantern demonstration of the developmental changes in *Zooglœa*, of which the following is the author's abstract:—

Masses of *Zooglœa* in their early stage were first shown, in which the constituent Bacteria were plainly recognizable. The growth of the masses, their alteration in appearance and in reaction to staining fluids, together with the progressive segmentation which they undergo, were revealed by other specimens. Segmentation was shown to progress till minute spherical or ovoidal units were produced. During the first 3–5 days, while these changes are

occurring, the masses remain colourless and the ultimate segmentation units develop into flagellate Monads or, more rarely, into equally minute Amœbæ—myriads of one or of the other of these forms appearing (all of about the same size) where a few hours before they were absent.

Later, from 5th to 10th day, the ultimate segmentation units of other masses appear as aggregates of brown Fungus-germs. Often the masses as a whole become brown before segmentation has much advanced, and the different stages were shown by which the bacterial aggregates are completely converted into masses of brown Fungus-germs, together with the development of hyphæ therefrom. All the stages in the complete conversion of the *Zooglœa* masses into Monads or Amœbæ in the one case, or into brown Fungus-germs in the other, are clearly recognizable—though it is impossible to say from the appearance of the masses in their early stages which of these three interchangeable forms of life will ultimately be produced.

The Vice-President in the Chair having invited discussion, Prof. Dendy enquired what means were employed to exclude the entrance of foreign germs into the hay-infusion, to which the Author replied.

The following papers were read and discussed:—

1. "The Structure of *Isis hippuris* (Linnæus)." By J. J. Simpson. (Communicated by the President.)
2. "Note on the Distribution of the Genus *Shortia*, Torr. & Gray." By B. Daydon Jackson, Gen. Sec. L.S. (See p. 52.)

March 1st, 1906.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 15th February were read and confirmed.

Miss Catherine Alice Raisin, D.Sc. (Lond.), was proposed as a Fellow.

The vacancies in the List of the Foreign Members caused by the deaths of Prof. A. S. Packard and Prof. R. A. v. Koelliker having been declared, the following were proposed for election in their place:—Oscar Hertwig, Professor of Comparative Anatomy, Berlin University; and Henry Fairfield Osborn, D.Sc., Da Costa Professor of Zoology, Columbia University, New York.

Miss Nina Frances Layard, Mr. Frank Morey, and Mr. Arthur Ernest Bousfield Steains, and later, after election, Mr. Robert Hawkes Russell, were admitted Fellows.

Mr. Hugh Findon, Mr. James Eustace Radcliffe McDonagh, Mr. Thomas Hawkes Russell, and Mr. Ernest Justus Schwartz were severally balloted for and elected Fellows.

Dr. D. H. Scott, F.R.S., Sec.L.S., described "A New Type of Stem [*Sutcliffia*] from the Coal-Measures."

Prof. F. W. Oliver, Mr. W. C. Worsdell, Prof. A. G. Tansley, and the President joined in a discussion, and the Author replied.

The following papers were read and discussed:—

1. "Notes on some Species of *Nereis* in the District of the Thames Estuary." By Dr. H. C. Sorby, F.R.S., F.L.S.
2. "Membranous Labyrinths of *Echinorhinus* and *Cestracion*." By Prof. C. Stewart, F.R.S., F.L.S.

March 15th, 1906.

Prof. W. A. Herdman, F.R.S., President in the Chair.

The Minutes of the General Meeting of the 1st March were read and confirmed.

Mr. Hugh Findon, Mr. James Eustace Radcliffe McDonagh, and Mr. Ernest Justus Schwartz were admitted.

Mr. Dhirendra Lal Day, M.A., B.Sc., and Colonel John William Yerbury, late R.A., were proposed as Fellows.

Dr. Tempest Anderson was elected a Fellow.

A letter from Dr. Chr. Aurivillius, Secretary of the Kungl. Svenska Vetenskapsakademien, Stockholm, was read, in which presentation was made of copies by Jean Haagen of the portraits of Carl von Linné by Per Krafft the elder, and Alexander Roslin, in possession of the Academy, sent in acknowledgment of the loan of Linné's 'Philosophia Botanica' interleaved and annotated by the author, which had been returned a few weeks ago through the Swedish Legation. A special vote of thanks for this most acceptable gift was moved from the Chair, and carried unanimously.

Dr. D. H. Scott, F.R.S., Sec.L.S., read a communication from Dr. R. Zeiller, F.M.L.S., conveying his good wishes for a successful discussion that evening, which he had been invited to open, but was prevented by his professorial duties at the École Nationale Supérieure des Mines, Paris.

Prof. F. W. Oliver, F.R.S., F.L.S., then opened the announced discussion on "The Origin of Gymnosperms." (See p. 53.)

Mr. E. A. Newell Arber, F.L.S., followed, on the "Earlier Geological Record of the True Ferns." (See p. 54.)

Mr. A. C. Seward, F.R.S., F.L.S., then spoke on "The Evolution of Gymnosperms: the Position and Ancestry of the Araucarieæ." (See p. 56.)

The discussion was then adjourned to 3rd May, 1906.

April 5th, 1906.

Dr. A. Smith Woodward, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 15th March were read and confirmed.

Dr. Robert Brown, of Glasgow, and Mr. Henry John Waddington, of Bournemouth, were proposed as Fellows.

Miss Catherine Alice Raisin, D.Sc.Lond., was elected a Fellow.

Dr. Horace T. Brown, F.R.S., and Mr. Frank Crisp were proposed as Auditors on behalf of the Council, and the Rev. R. Ashington Bullen and Mr. John Hopkinson on behalf of the Fellows, and by show of hands were duly elected.

Mr. Clement Reid, F.R.S., exhibited nearly 50 photographs, entitled "Some Plants new to the Preglacial Flora of Great Britain." He explained that these were derived from material procured at Pakefield, near Lowestoft, and had occasioned many months' continuous labour on the part of Mrs. Reid and himself. On a former occasion (April 21st, 1904) he had shown a series of drawings from the fruits, obtained by breaking up the matrix and selecting the liberated specimens; but this process was tedious and unsatisfactory, and he had resorted to photography. The remains were black, and therefore troublesome to photograph, but the specimens themselves could not long be preserved, as an efflorescence occurred, and they fell to pieces, but experiments were now being conducted with a view of permeating the fruits with paraffin, and so ensuring their preservation.

After some introductory remarks from the Vice-President in the Chair, a discussion followed, in which Count Solms-Laubach, F.M.L.S., Mr. H. W. Monckton, Dr. Henry Woodward, F.R.S.

(who was present as a visitor), and the Rev. T. R. R. Stebbing, F.R.S., engaged, Mr. Clement Reid replying.

The following papers were read and discussed :—

1. "A Second Contribution to the Flora of Africa: Rubiaceæ, and Compositæ Part II." By Spencer Moore, F.L.S.
2. "The Structure of the Stem and Leaf of *Nuytsia floribunda*, R. Br." By E. J. Schwartz, F.L.S. (See p. 57.)
3. "On *Taiwanites* [afterwards changed to *Taiwania*], a new genus of Coniferæ from the Island of Formosa." By B. Hayata. (Communicated by Dr. Maxwell T. Masters, F.R.S., F.L.S.)

May 3rd, 1906.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 5th April were read and confirmed.

Miss Catherine Alice Raisin, D.Sc., was admitted a Fellow.

Mr. Henry Robert Knipe, LL.B.Cantab., and Miss Evelyn Janie Welsford, were proposed as Fellows.

Mr. Dhirendra Lal Day, M.A., B.Sc., and Colonel John William Yerbury, were elected Fellows; and Professor Oscar Hertwig, of Berlin, and Professor Henry Fairfield Osborn, of New York, were elected Foreign Members.

The President exhibited a tube of small pearls obtained from *Mytilus edulis* at Port Erin a short time previously.

Dr. D. H. Scott, F.R.S., Sec.L.S., then resumed the discussion on the "Origin of Gymnosperms" adjourned from the 15th March, by an address on "The Affinities of Pteridosperms and Gymnosperms." (See p. 57.)

The President having contributed a few remarks, then invited Mr. Boyd Thomson, of Toronto, who was present as a visitor, to open the general discussion. He was followed by Mr. William Carruthers, F.R.S., Prof. F. E. Weiss, Dr. A. B. Rendle, Mr. W. C. Worsdell, and Miss E. N. Thomas (a visitor). Prof. F. W. Oliver, F.R.S., and Mr. A. C. Seward, F.R.S., then replied, the President closing the discussion.

May 24th, 1906.

Anniversary Meeting.

Prof. W. A. Herdman, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 3rd May were read and confirmed.

Dr. Tempest Anderson was admitted a Fellow.
Mr. Henry Edward Houghton and Mr. Thomas Fox were proposed as Fellows.

The Treasurer then submitted the Statement of Accounts for the year ended 30th April, as audited, and commented on the various items. (See p. 16.) Mr. Henry Groves remarked on the satisfactory financial aspect of the Statement, but suggested that some Trustee security yielding more revenue than Consols might be chosen for investment. The Accounts on the President's motion were then approved by the Meeting.

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

Since the last Anniversary 18 Fellows have died or their deaths been ascertained :

Mr. Edward Atkinson.
Mr. John Bidgood.
Mr. George Bowdler Buckton.
Mr. Vincent Ind Chamberlain.
Mr. Thomas Christy.
Rev. James Morrison Crombie.
Rt. Hon. Sir Mountstuart Elphinstone Grant Duff.
Hon. Charles Arthur Ellis.
Mr. Frederick John Horniman.
Mr. Frederick Lovell Keays.
Sir Robert Lloyd Patterson.
Mr. William Phillips.
Mr. Richard Rimmer.
Mrs. Constance Percy Sladen.
Mr. William Sowerby.
Mr. Frederick Townsend.
Prof. Walter Frank Raphael Weldon.
Mr. William Watson-Will.

Foreign Member (1).

Dr. R. Albert von Koelliker.

The following 9 Fellows have withdrawn :

Mr. Frederick Howard Collins.
Mr. William Dennis.
Mr. Charles French.
Mr. William Henry Heathcote.
Rev. Willis Fleming Aston Lambert.
Mr. George Payne.
Mr. Charles William Slater.
Mr. John Watson.
Mr. Henry Williams.

Receipts and Payments of the Linnean Society from May 1st, 1905, to April 30th, 1906.

Receipts.	£	s.	d.
Balance at Bankers on the 1st May, 1905	283	18	10
Interest on Investments	187	10	7
Admission Fees	168	0	0
Annual Contributions	1541	18	6
Compositions	180	0	0
Sales of Publications:—			
Transactions £79 2 9			
Journals 123 2 2			
Proceedings and Catalogues 3 1 9			
	205	6	8
Miscellaneous Receipts	91	10	0
	£2658	4	7

Payments.	£	s.	d.
Taxes and Insurance	10	1	3
Repairs and Furniture	64	1	10
Coals and Gas	53	0	9
Salaries	738	10	0
Library:—			
Books £195 9 0			
Binding 122 15 4			
	318	4	4
Expenses of Publications:—			
Printing £566 9 10			
Illustrations 128 11 3			
Distribution 51 7 8			
	746	8	9
Miscellaneous Printing and Stationery	97	6	0
Petty Expenses (including Tea and Postage)	119	8	4
Investment of Compositions	150	0	0
Balance at Bankers, 30th April, 1906	361	3	4
	£2658	4	7

Investments on April 30th, 1906.

	£	s.	d.		£	s.	d.
Consols, $2\frac{1}{2}$ per cent.	4380	16	5	@ $90\frac{1}{4}$	3953	13	9
Metropolitan Board of Works $3\frac{1}{2}$ per cent. Stock	1079	11	3	@ $103\frac{1}{2}$	1117	7	0
Great Indian Peninsula Railway, Annuity Class B	42	1	5	@ $20\frac{1}{2}$	862	9	0
Forth Bridge Railway 4 per cent. Stock	450	0	0	@ 116	522	0	0
Consols (Westwood Bequest), $2\frac{1}{2}$ per cent.	249	3	8	@ $90\frac{1}{4}$	224	17	9
					£6680	7	6

HORACE W. MONCKTON, *Treasurer.*

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1906, and found them correct.

R. ASHINGTON BULLEN,
JOHN HOPKINSON,
HORACE T. BROWN,
B. DAYDON JACKSON,
FRANK CRISP,
Auditors.

W. B. KEEN, *Chartered Accountant.*

The following have been removed from the List of Fellows, under the provisions of the Bye-Laws, Chapter II., Section 6 :—

Mr. Ernest J. Bickford.
Mr. Edward Russell Budden.
Mr. John William Willis Bund.
Rev. William Burgess.
Mr. William Elborne.
Mr. Edward A. Fitch.
Mr. Harvey St. John Jackson.
Mr. Thomas W. Kirk.
Mr. George Robert Milne Murray.
Rev. Laurence Scott.
Rev. John Frome Wilkinson.

One Fellow, Mr. Robert Morton Middleton, has been reinstated in the List, the annulment of his withdrawal not being received until after its announcement.

Twenty Fellows have been elected (of whom 19 have qualified), and two Foreign Members.

The Librarian's report was put in and read as follows :—

During the past year, 76 Volumes and 257 Pamphlets have been received as Donations from Private Individuals.

From the various Universities, Academies, and Scientific Societies 301 volumes and 114 detached parts have been received in exchange and otherwise, besides 70 volumes and 30 parts obtained by exchange and as Donations from the Editors and Proprietors of independent Periodicals.

The Council have sanctioned the purchase of 187 volumes and 97 parts of important works.

The total additions to the Library are therefore 634 volumes and 498 separate parts.

The number of Books bound during the year is as follows :— In half-morocco 295 volumes, in half-calf 6 volumes, in full cloth 226 volumes, in vellum 26 volumes, in buckram 46 volumes, in boards or half-cloth 18 volumes. Relabelled (half-morocco and cloth backs) 60 volumes. Total 677 volumes.

The General Secretary having read the Bye-Laws governing the Elections, the President opened the business of the day, and the Fellows present proceeded to vote for the Council and Officers.

The President then delivered his Address.

PRESIDENTIAL ADDRESS.

Fellows of the Linnean Society,—

Let me thank you most heartily for your kindness in electing me as your President for a second Session. A more extended acquaintance with the work of the office has by no means diminished my sense of the difficulties that surround the position. The honour carries with it a considerable weight of responsibility, which, I am thankful to say, is shared to the full by my colleagues the Treasurer and the Secretaries—to all of whom I am much indebted for effective support and kindly consideration.

The past Session, I think I may say, has been an interesting but an uneventful one. We cannot have every year such great advances in the Constitution and Fellowship of the Society as it fell to my lot to record on our last Anniversary. The Supplemental Charter and the new Bye-Laws are historic landmarks that do their beneficent work for the Society silently and for the most part unnoticed. Our lady-Fellows, on the other hand, I am glad to say have made their presence felt both as authors and in debate. We have had further accessions of duly qualified scientific women during this Session, and we may be sure that every such admission is a strength to the Society. When they bring their work before us we shall appreciate still further the added gain.

Every biologist, man or woman, engaged in original work ought to belong to the Linnean Society—it is their natural destiny, their scientific home. There must be many outside the fold who would be glad to enter if piloted by a friendly hand, and whom we should be glad to welcome when satisfied of their qualifications and of their desire to join us in advancing Natural Science. I commend the idea—the further extension of our Fellowship by the introduction of suitable candidates—to the careful personal consideration of each and every Fellow.

In last year's Address I alluded to the retirement of Mr. Crisp from the office of Treasurer, which he had held with great advantage to the Society for over twenty years. We are fortunate in having appointed as his successor Mr. Horace W. Monckton, whom we now welcome and congratulate on the first anniversary meeting since his appointment.

In all 26 new Fellows have joined the Society this Session—after the extraordinary accession of last year we return to normal numbers. On the other side there are the inevitable losses. We have this year to regret the death of 17 Ordinary Fellows and

of one on the Foreign list; the latter being the illustrious and veteran Zoologist of Würzburg, Professor Rudolph Albert von Kölliker—recipient of the Linnean Medal in 1902.

The obituaries of our late Fellows have been prepared by the Secretaries, and will be presented to the Society in the usual manner. I do not propose to detain you by traversing the same ground, but will merely make a passing reference to two special cases.

In Mrs. Constance Percy-Sladen we lose one who had recently become a great benefactor of Science, and had founded a noble memorial of her late husband, at one time Zoological Secretary of the Linnean Society. Her interest in this Society was great, she was gratified at being admitted to our Fellowship, she was present at one of our meetings last session, and the sad news of her death was received only a few days before the meeting appointed for the reception of the preliminary account of the first Percy-Sladen Exploring Expedition promoted by the Trust that Mrs. Sladen had founded. It is no great secret, I believe, that when the Indian Ocean was omitted from the great oceanic areas explored during the 'Challenger' Expedition, Mr. Percy Sladen was one of those who earnestly hoped that some other public or private expedition would be organised to make good the omission: and that later on in life he and his wife talked of planning and promoting such an exploration themselves. Sladen did not live to carry out the plan, but the Trust founded by his widow adopted as its first venture an expedition under the leadership of Mr. Stanley Gardiner, which seemed to have that very purpose in view, and which we now know has been successfully accomplished. The name borne by our late Fellow and her husband, our former Secretary, will in the future be a familiar word in Science, and especially in our Society, as a result of the explorations supported by the Percy-Sladen Trust.

The recent terribly sudden death of Professor Weldon removes from our Society one of the most distinguished of Zoologists, still in the prime of life and in the fulness of work. Of extraordinary vigour as a lecturer and debater, full of keenness in every research that he undertook, deeply interested in the advancement of all that is best in scientific life, and having transcendent ability and superabundant energy, he was able to accomplish much in his too short working life—and it is almost impossible yet to realise that he has left his work unfinished and that other hands must now carry on what his fertile and enthusiastic mind had planned. His early death is a serious blow to Biological Science in this country, which has suffered many unexpected losses during the last quarter century—since the tragic death of Professor F. M. Balfour on the Alps in 1882.

The Howes Memorial Fund started by the Officers of this Society and other colleagues and friends of our late Zoological Secretary has now been closed, a Trust-deed has been prepared,

Trustees have been appointed, and a report upon the amount and destination of the fund has been issued by the Committee to all subscribers.

The two vacant places in our list of Foreign Members this year have been filled by the election of Professor Oscar Hertwig of Berlin, and Professor Henry Fairfield Osborn of New York. It is a matter of congratulation to the Society that these distinguished names have been added to our roll.

The Council have awarded the Linnean Medal on this occasion to the Reverend Canon A. M. Norman, F.R.S., the veteran Naturalist who has made additions to nearly every group of the British Marine Fauna. This is perhaps the highest distinction we can confer; and we are honoured by the growing list of eminent men of science whose fair fame it links to that of our Society. Last year the medal was conferred upon a distinguished foreign Botanist. This year we honour one of our own Fellows who has done much for British Science.

One of the events of the Session has been the discussion on "The Origin of Gymnosperms," which extended over two meetings. We had hoped when the proposal first came before Council that this debate might be inaugurated by our Foreign Member, Dr. R. Zeiller of Paris. However, that eventually proved impossible, and the discussion was opened on March 15th by Professor F. W. Oliver, Mr. Newell Arber, and Mr. A. C. Seward, and on May 3rd by Dr. D. H. Scott—after which others took part in a most spirited and illuminating debate.

Amongst important matters which have engaged the attention of your Council this Session, I may mention the arrangement under which we have undertaken to publish, with a certain amount of outside help, the series of Reports upon the Percy-Sladen Expedition to the western part of the Indian Ocean, under the leadership of Mr. Stanley Gardiner, in H.M. ship 'Sealark'; and also the Reports upon the Collections made by Mr. Cyril Crossland upon the Sudan Coast of the Red Sea. I consider it a natural thing that the results of biological exploring expeditions should come before the Linnean Society, and our publications in the past have contained several such series of Reports, which have been a credit to science and have enhanced the reputation of our Society. As examples, we may recall the series of papers on the Fauna of the Mergui Archipelago, in volumes 21 and 22 of the Zoological Journal, and the "Enumeration of the Chinese Flora," lately completed after a run of 20 years through volumes 23, 26, and 36 of the Botanical Journal.

To my mind, in undertaking such work we are performing an important function in Biology. The publication of the results of a great exploration, such as Mr. Stanley Gardiner's expedition down the Indian Ocean from Ceylon, through the Chagos Archipelago, Mauritius, Coetivy and various submerged banks to the

Seychelles, has undoubtedly been, would be creditable to any Society; and when that exploration is a biological one, dealing with land plants and marine algæ as well as with deep-sea animals, and with general problems of distribution and association and habitat such as concern both sides of our house, it is difficult to see what Society could more appropriately undertake the task than our own. The Sladen Trust has made a financial offer to our Council which will meet half the expenses of the publication, and we may look forward to receiving as Fellows a special series of about six extra volumes of our 'Transactions' devoted to the Fauna and Flora of the Indian Ocean.

Committees appointed by the Council are now deliberating on such important matters as Zoological Nomenclature, the destiny of the Wallichian Herbarium, and the form of our Publications—subjects of interest to all of us.

This review of some of the chief events of the Session will perhaps serve to show that the Linnean Society is still performing important functions in the advancement of Natural Science; and that your Council has its hands full of interesting work requiring careful attention.

In my Address last year I chose for some further remarks the historic connection between the production of artificial pearls and the great Linnæus, whose reputed birthday we commemorate at this Anniversary Meeting; and that enabled me to treat briefly of one side of the interesting biological process known as "pearl-formation." I propose on the present occasion to complete the subject, so far as I am able, by discussing briefly the other methods of pearl-formation apparently unknown to Linnæus.

I pointed out last year that "there are three main methods which have been advanced as explaining the formation of pearls; and, as is so often the case where there are several competing theories, it cannot be said that one only is correct and of universal application, and that the others are quite erroneous. The three I refer to are:—(1) the grain-of-sand irritation; (2) the pathological secretion; and (3) the stimulation caused by the presence of a parasitic worm, which acts as a nucleus around which an epithelial sac deposits successive layers of pearly material." I discussed sufficiently on that occasion the grain-of-sand theory, both as accounting for some pearls in Nature, and also in its application to the artificial pearls produced by Linnæus from the fresh-water mussels in Sweden. It may be that there is a future before such semi-artificial methods. If so, I am convinced that the process will consist essentially in pushing in before the inorganic nucleus a portion of the nacre-secreting ectoderm covering the mantle, so as to form an epithelial sac in which the pearl will be produced. But this method occurs rarely in Nature; and I now pass to the process of pearl-production which is stimulated by a parasitic worm, and which results in the finest Orient pearls. I shall not

recount again the early history of this discovery, but the Linnean Society may care to be reminded that the first in this country to connect Trematode parasites with pearls in mussels was one of our Fellows, Robert Garner, whose paper on the subject will be found in our Journal for 1871 ; and I may add that still earlier in the last century another of our Fellows, Dr. E. F. Kelaart, accounted for pearls in the Ceylon Pearl-Oyster by the presence of platyhelminthian worms.

Coming now to more recent work, especially during the last four or five years, we must examine the matter more minutely. The recent activity in this subject originated in France, and we associate with the investigations there the names of our Foreign Member Giard, of Dubois, Boutan, and Seurat. Giard had ascribed pearl-formation in the case of *Donax* and other Lamellibranchs to a Distomid worm, which he supposed to be a species of *Brachycœlium*, but has since identified as *Distomum constrictum*, Mehlis ; when Dubois, in 1901, visited a mussel-bed, near Billiers (Morbihan) on the south coast of Brittany, which was known to be rich in pearls, and attributed the pearl-production to the presence of a Trematode larva which he named *Distomum margaritarum*. The next year, H. Lyster Jameson followed with a more detailed account of the relation existing between the pearls in *Mytilus edulis* and the Distomid larvæ, which he, like others, found, and which he identifies as belonging to the species *Distomum (Brachycœlium) somateriæ*, the same subgenus as Giard had found in *Donax* some years before. Jameson's observations were made first at Billiers, the locality where Dubois had worked, and partly at the Lancashire Sea-Fisheries Laboratory of Piel in the Barrow Channel. Dubois published a further note * in January 1903, by way of establishing his claim to have first made known the dependence of the pearls at Billiers upon the Distomid larva. In regard to the identification of the species of Trematode involved, Odhner has recently shown that Jameson's larval stages and his sexually mature form cannot belong to the same species, and that both belong to the genus *Gymnophallus*.

The adult, according to Odhner †, is *Gymnophallus somateriæ* (Levinsen), and the larval form which causes the pearl-formation in *Mytilus* belongs to *Gymnophallus bursicola*, Odhner. In a still more recent paper ‡ Lühe also refers Jameson's stages to different species of *Gymnophallus*, but considers it probable that the one causing the pearl-formation in the mussel is a distinct species which must be called *Gymnophallus margaritarum* (Dubois). Jameson's work may be said to have established quite clearly, if any doubt previously remained, that in our common marine mussel Trematodes are the parasites concerned in pearl-formation.

There are, however, two points which were left in a somewhat

* C. R. Acad. Sci. Jan. 19, 1903.
† Fauna Arctica, iv. 2, p. 291 (1905).
‡ 'Ueber die Entstehung der Perlen.'

unsatisfactory condition, viz. :—(1) the supposed transference of the parasite from another Molluscan host (*Tapes* or the Cockle) to the Mussel, and (2) the mode of origin of the epithelial sac which encloses the larval parasite and secretes the pearl. As I am discussing these two points in some detail in the forthcoming Part V. of my Ceylon Report, I shall not go into the matter here beyond saying that Jameson, although drawing attention to the similarity between the epithelium of the pearl-sac and that of the outer surface of the mantle, evidently considered that the two layers are not genetically related. He states definitely in regard to the pearl-sac, "this epithelium appears to arise quite independently of the outer epidermis." Boutan, in France, has written * controverting this independence, and contrasting Jameson's view of a mesodermal origin with his own view (which, I may add, I entirely agree with) that the two epithelia are genetically related, and that the pearl-sac must arise from the exactly similar cells of the ectoderm. It is highly probable that the parasite in burrowing into the mantle carries in with it one or more epidermal cells which proliferate to form the sac. As the Distomid larvæ are found moving on the inner surface of the shell before coming to rest in the mantle, they must traverse the epidermis, and it is natural to suppose that in their migration they may push some epidermal cells in before them. Even in the absence of direct evidence of this (and we have some evidence) it will be admitted that the process does not involve such a violent assumption as that the connective tissue in the centre of the mantle can produce an epithelial sac, the cells of which are indistinguishable both in structure and in function from the epidermis outside.

In order that I might make certain how far our views really differed, I thought it worth while lately to exchange letters on the matter with Dr. Jameson, who is now in charge of the Biological department of the Transvaal Technical Institute at Johannesburg; and his answer, received a week or two ago, contains the following passage, which he evidently wishes me to make public :—"I am very glad to have the opportunity of clearing up, through you, the uncertainty caused by my unintentionally ambiguous statements *re* origin of pearl-sac epithelium. I had never any doubt that it is a true epidermis, but I never got so far as to determine actually by observation whether it arose, as I think you have suggested, by the Trematode carrying in with it a fragment or pocket of epidermis ; or, as I suspected, by means of epidermal or sub-epidermal replacement cells (Ersatz-Zellen) which are known to occur in many invertebrates, often in sub-epidermal tissues, and which replace epidermal cells if they are injured. I left the question open in my paper because I hoped to make some experiments on the nature of the epidermal cells ; indeed, I had actually started these experiments when the temporary breakdown of my health necessitated my dropping the work, and as you know,

* Arch. Zool. Expér. sér. 4, t. ii. (1904).

since I came out here I have had no chance to continue my pearl-work."

From this it seems clear that Dr. Jameson would now agree with his critics (such as Boutan); and in fact I take it that all who are working on the subject are now agreed that the epithelium of the sac secreting the pearl must be derived, directly or indirectly, from the nacre-secreting ectoderm covering the outside of the mantle.

To return to the French investigators, Dubois, whose first observations were made in Brittany (1901), has since turned his attention to the Mediterranean Coast. He there finds that the Southern French Mussel (*Mytilus gallo-provincialis*) forms pearls caused by another species of Distomid. He then worked at the acclimatization of a true Oriental pearl-oyster ("pintadine") in French waters and the artificial production of pearls. He brought the pearl-oysters from the Gulf of Gabes in Tunis to the Marine Laboratory at Sfax, and caused them to multiply and increase in size. The pearls produced in Tunis are small and very rare—it is necessary to open 1200 to 1500 oysters to find one pearl; but Dubois tells us (C. R. 19 Oct. 1903, p. 611) that by placing them on ground where *Mytilus gallo-provincialis* becomes infested with pearls and parasites, he very easily provoked the production of fine pearls in the "pintadine" to such an extent that three successive individuals opened contained each two little pearls.

This, if corroborated, is a remarkable circumstance from several points of view. First, it will, if it proves a success, be a striking verification of what Kelaart in Ceylon, fifty years ago, declared might be done when he said—"It may yet be found possible to infect oysters in other beds with these worms, and thus increase the quantity of these gems." Secondly, if the "pintadine" in question is really the same species as the Ceylon Pearl-Oyster (Giard considers that it is not), it is curious that a Distomid parasite should prove to be so efficacious in setting up pearl-formation, since Mr. Hornell and I found that, in the Gulf of Manaar, the pearl-parasite is a Cestode larva. Thirdly, it is remarkable that the parasite of the *Mytilus* should transfer itself so readily to a new host belonging to a distinct family.

It is this last paper by Dubois that has given rise to various more or less exaggerated or even erroneous statements in the public press—such as that the pearl-oyster must be infected with a microscopic germ in order to render it pearl-producing; or even that inoculation with a serum causes the oyster to produce artificial pearls. The parasite that causes the irritation is, as has been known for many years, not a "germ," and still less a "serum," but a worm which is visible to the eye—a worm which in *Mytilus* seems to be usually a Trematode, and in the Ceylon Pearl-Oyster (*Margaritifera vulgaris*), according to Mr. Hornell's and my observations, is certainly a Cestode.

According to an interesting note by Prof. Giard *, the discovery of Cestode larvæ as nuclei of pearls, which we had made upon the Ceylon Pearl-Oyster in 1902, was shortly afterwards corroborated by Dr. L. G. Seurat, working independently in his Laboratory at Rikitea in the island of Mangareva (Gambier Archipelago). The oyster on which Seurat worked was *Margaritifera margaritifera*, var. *cumingi*, Reeve, and the Cestode parasite found is, according to Giard, an *Acrobothrium* (= *Cyathocephalus*) or some allied form. It is possible that some of our Ceylon Pearl-Oyster parasites may also belong to the genus *Cyathocephalus*, although most of them are certainly Tetrarhynchids.

Giard in a further note in the same Journal (p. 1225) discusses the statements that have been made in regard to "margarose artificielle," and evidently considers that Dubois's claim to have established the artificial production of pearls is not yet justified by the facts. Last of all Boutan † shows that "fine pearls" do not really differ from "nacre-pearls" since both are secreted from open or closed epithelial sacs derived from the epidermis; and Giard very properly replies a few days later ‡ that this fact is quite in accord with general principles, and was previously known. M. Boutan in a letter (20th Jan. 1904) states that he is on the point of departure for the East in order to investigate the matter further. But so far as I am aware, he has as yet made no further contribution to the subject.

In what I told you of Linnæus and pearls last year, the pearl-forming mollusc was a freshwater mussel of the genus *Unio*. In the greater part of what I have told you now of the recent investigations on the coasts of France and England, the molluscs in question belong to the genus *Mytilus*. But the pearl-formation in which I personally have taken most interest, and which is of the greatest importance to the pearl-merchant, is the Ceylon Pearl-Oyster belonging to the genus *Margaritifera*,—and to that I now pass.

I desire to pay passing tribute to the work of a pioneer. It was Dr. Kelaart who, in the Gulf of Manaar, half a century ago, first connected pearl-formation in a true pearl-oyster with the presence of Vermean parasites. In his 'Introductory Report on the Natural History of the Pearl-Oyster in Ceylon' (1857), after describing the secretion of nacre by the mantle, he said:—"It will be thus clearly understood that when a grain of sand or the larva of an insect is introduced between the mantle and shell, it will become covered over with the pearly secretion, which, always going on, is augmented at the part where the foreign matter lies. This phenomenon I have detected with the aid of the microscope in its very earliest stage." The probability is that by "larva of

* Comptes Rendus, Soc. Biol. Paris, 6 Nov. 1903, lv. p. 1222.

† Comptes Rendus Acad. Sci. 14 Dec. 1903, p. 1073; and also Arch. Zool. Exp. 1904.

‡ Comptes Rendus, Soc. Biol. Paris, 19 Dec. 1903, p. 1618.

an insect" in this passage Kelaart meant such an organism as the Cestode larva, which we now find is the determining cause of such pearl-formation. There are other passages on which there is not time to comment which show that Kelaart was tackling the problem in a scientific manner when his work on the subject was tragically interrupted by his sudden death in the Red Sea in 1859.

Thurston, in 1894, confirmed Kelaart so far as regards finding in the tissues and also in the alimentary canal of the Ceylon pearl-oyster the "larvæ of some Platyhelminthian (flat-worm)," but he was able to add little beyond figuring a couple of parasites encysted in the body. Here the matter practically rested so far as actual investigation of the Ceylon pearl-oyster was concerned, until Mr. Hornell and I found the Cestode larvæ in association with pearls in the liver and gonads during our cruises in the steamer 'Lady Havelock' in the Gulf of Manaar during February and March 1902. It was about March 6th, when cutting up oysters on the western part of the Cheval Paar, that we first became convinced that the opaque white globular larvæ we were finding encysted in the liver belonged to Cestode worms. Subsequent work showed us that some of them at least were referable to the genus *Tetrarhynchus*, and the various stages that we were able to find up to the spring of 1904 were described by Shipley and Hornell in the second volume of the Ceylon Report (p. 79). Since then large numbers of pearl-oysters from various localities in the Gulf of Manaar have been examined by Mr. Hornell in the field, and many parasites and small pearls from these oysters have been investigated by myself and my assistants in the laboratory. Although the work is by no means complete, we have come to certain definite conclusions, which will be published in the forthcoming fifth and last volume of the Ceylon Report (Royal Society, 1906).

The youngest stages in the life-history of our *Tetrarhynchus* are still unknown, and it is still uncertain whether some free-swimming larvæ caught in the tow-net on the Muttuvaratu Paar just over the infected oysters really belong to this life-history. They have calcareous corpuscles of the right appearance, and an indication of the invaginated anterior end which we find in our later stages, and they are almost certainly young Cestodes. One cannot add materially to the statement of Shipley and Hornell: "On the whole we think it probable that this larva is the first stage in the life-history of the pearl-forming organism." The next stages occur freely in the body of the pearl-oyster, where we find more or less globular larvæ of various sizes encysted in various parts of the body—the smaller ones mostly in the mantle and the gills, and larger ones in the liver and gonads and also sometimes in the mantle. In referring all these larvæ to the Cestoda we rely upon the following four characteristics:—

1. The invagination to form the head of the adult worm.
2. The hooks upon portions of the invaginated surface.

3. The calcareous corpuscles in the walls of the vesicle.
4. The division of the (? muscular) tissue in the floor of the invagination into several masses which probably represent bothria.

The possession of all these characters together definitely stamps the organisms as larval Cestodes.

The majority of these Cestode larvæ in the tissues of the Oyster do not die to become entombed in the costly sarcophagus which we know as a pearl. Probably it is only those that are provided with an ectodermal covering forming a pearl-sac that become sacrificed for the profit of man and adornment of women. The rest grow to some extent in the pearl-oyster, and then await, encysted in the tissues but alive, their legitimate further development in the next host when their sheltering mollusc is devoured by a fish. In such cysts and around such parasites we find no epithelial sac, and as a consequence there can be no deposition of pearly matter. Whether or not it is the case that only dead parasites supply the stimulus necessary to induce pearl-formation, and whether, as Giard has suggested, the parasites may be infested and killed by a species of the protozoon *Glugea*, so that that Sporozoon comes to be eventually responsible for the pearl, I am not yet prepared to say—the Ceylon material has yielded no fresh evidence bearing upon that point. It seems clear, however, that the epithelial sac is always associated with pearl-formation, and that, in the absence of the epithelium, only a thick-walled connective-tissue cyst is produced. If we adopt the view (stated above) that this epithelium is genetically related to the ectoderm, then a possible explanation of the difference in behaviour in the encysted condition would be that those larvæ that carried in ectodermal cells before them became covered (when dead or while still alive) by a pearl-sac and embedded in a pearl, while those that were free from ectoderm became surrounded by the connective-tissue cyst, and remained alive to perpetuate the race by reaching a final host.

In the first account I gave of these Ceylon parasites, it was suggested that the next stage after that found in the pearl-oyster occurred in a species of *Balistes* (which is sometimes found feeding on the oysters), and that the adult worm inhabited one of the large Elasmobranch fishes (Sting-Rays and Eagle-Rays) which frequent the Pearl Banks. Shipley has now identified as the adult of our *Tetrarhynchus unionifactor* a parasite that we found in the Great Ray, *Rhinoptera javanica**, the "Walwadi tirikkai" of the Tamils, which is known to feed sometimes upon pearl-oysters and sometimes upon fish. No fresh light has been thrown upon the possible occurrence of an intermediate (late immature) stage in the *Balistes* (which eats the oysters and in its turn is eaten by the large rays); and although that intermediate host may not be absolutely necessary

* See the Section on Parasites by Shipley and Hornell in the forthcoming Part V. of the Ceylon Report.

to the life-history, since the rays also feed upon pearl-oysters, still there is nothing in the observed facts to forbid the existence of such a stage, and it is not unusual in Tetrarhynchids to have two fish-hosts, an intermediate Teleostean which is devoured by a final Elasmobranch.

The huge fish, then, which devastates our Pearl Banks is all-important in passing on to future generations of the oysters which it devours the parasite upon which pearl-production depends. No one knowing the facts could advocate the destruction or even the exclusion of this particular enemy of the pearl-oyster. If the rays increase much in number the beds of oysters will be decimated if not exterminated, and the pearl-fisheries ruined; and, on the other hand, if the rays are greatly reduced in number the parasites will be likewise reduced, and although the oysters may flourish they will have few pearls and the fisheries again will be ruined—so intricate and nicely balanced are sometimes the processes of Nature.

The further question then arises—Can we profitably follow up Kelaart's suggestion that it might be possible to increase the number of pearls by infecting the molluscs with the appropriate parasites? This "Margarose artificielle" has been tried, as we have shown above, by Dubois in a case where the parasite was supposed to migrate from one mollusc (a *Mytilus*) to another of a different genus (*Margaritifera*). Giard and others have pointed out the difficulties in the way of accepting this case and the doubts that naturally arise, and we are probably correct in concluding that the method has not as yet resulted in a marked success on the southern coast of France; although it is quite possible that similar methods with other shell-fish elsewhere may give good results.

On the Ceylon pearl-banks, however, it is probably quite unnecessary under present conditions to take any steps to ensure infection with the appropriate parasite. Oysters wherever they appear, when they are old enough, contain pearls, and encysted parasites are even more abundant. Even when new beds are formed artificially by transplanting to unoccupied ground, as we do not doubt will be the case in the future, this may be done with perfect confidence that when the four-year-old oyster is fished it will contain the normal * supply of pearls. The parasites are probably so widely spread that every pearl-oyster in the Gulf of Manaar, or for that matter around the coast of Ceylon, runs a fair chance of becoming infected. Cyst-pearls are found in the oysters at Trincomalee; the fishes that are, in all probability, the hosts of the parasite in its more advanced stages also abound at various points. It is the molluscan host, and not the parasite, that stands in need of artificial aid in Ceylon. If we can increase

* Of course, some beds are richer in pearls than others and some years are better than others.

the number of beds, and can prevent catastrophes from devastating the oyster-populations, so that the divers can collect the spoil annually in their tens of millions, we need not fear any scarcity of pearls.

As Boutan, who thinks favourably of artificial methods, points out*: "Mais il ne faut pas oublier que l'infection d'un animal par un parasite ne favorise pas précisément le développement normal du sujet infesté." He advocates as an alternative method experimental trepanning of the shell, but that or any other mode of individual treatment is clearly impracticable in dealing with the millions of the Ceylon pearl-banks. My own opinion is that, although all pearl-production is a departure from the normal, the pearl-inducing parasites are not sufficiently abundant to affect seriously the health of the oyster; and that, to reverse the popular saying, if we attend to the prosperity of the bed as a whole, the individual oysters may be left to take care of themselves, both in regard to health and pearl-production.

I quoted last year Linnæus's statement, made in connection with his process of artificial pearl-formation:—"As all the knacks of Nature are very simple, so is this when properly hit upon." It was certainly much simpler † than the "knack of Nature" I have just discussed, requiring a parasitic worm and several successive hosts, which we now believe is necessary to produce the finest Oriental pearls. And although I hope we have now "properly hit upon" this "knack of Nature," I do not for a moment suppose that the subject is exhausted. There is still much to be investigated. Mr. Hornell, another Fellow of our Society, is now Inspector of Pearl Banks to the Ceylon Government, and is ably carrying on the work commenced in the Gulf of Manaar fifty years ago by our former Fellow, Dr. Kelaart.

Altogether, I think we may feel that the Linnean Society has played a not unimportant part in the investigation of the connection between parasites and pearl-formation; and that therefore, perhaps, it is not inappropriate that one of your Anniversary Addresses should have been devoted to that subject.

Mr. Henry Groves moved:—That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated amongst the Fellows—which, after being seconded by Dr. Maxwell T. Masters, was put and carried unanimously.

* Arch. Zool. Expér. 1904, p. 89.

† In the sixth edition of the 'Systema Naturæ' (1746), p. 195, Linnæus gives the following definition of a pearl:—"Calculus testæ concharum. Margarita, Unio. Locus: Testæ excrescentia latere interiore, dum exterius latus perforatur"—which is certainly simple enough.

The ballots for Council and Officers having been closed at the times laid down in the Bye-Laws, the President appointed Mr. G. S. Saunders, Mr. Henry Groves, and the Rev. R. Ashington Bullen to be Scrutineers for both ballots; and the votes having been examined, the Scrutineers reported to the President, who thereupon declared the result as follows:—

For the Council:—R. Assheton, M.A., V. H. Blackman, M.A., Dr. Gilbert C. Bourne, Dr. Horace T. Brown, F.R.S., *Prof. Arthur Dendy, Rev. Canon Fowler, M.A., Prof. W. A. Herdman, F.R.S., B. Daydon Jackson, Esq., Horace W. Monckton, F.G.S., Prof. F. W. Oliver, F.R.S., *Prof. E. B. Poulton, F.R.S., *Lt.-Col. D. Prain, F.R.S., Clement Reid, F.R.S., Dr. A. B. Rendle, M.A., *Miss Ethel Sargant, Dr. Dukinfield H. Scott, F.R.S., *Arthur Everett Shipley, F.R.S., Dr. Otto Stapf, Rev. T. R. R. Stebbing, M.A., F.R.S., and Dr. A. Smith Woodward, F.R.S.

The new Councillors are denoted by a star prefixed; the five retiring Councillors being: Frank Crisp, LL.B., C. B. Clarke, F.R.S., Prof. J. B. Farmer, F.R.S., Dr. W. G. Ridewood, and D. Sharp, F.R.S.

The ballot for the Officers was declared as follows:—

President: Prof. W. A. Herdman, F.R.S.

Treasurer: Horace W. Monckton, F.G.S.

Secretaries: Dr. D. H. Scott, M.A., F.R.S.; Rev. T. R. R. Stebbing, M.A., F.R.S.; B. Daydon Jackson.

The President then addressing the Rev. Canon Norman, F.R.S., said:—

"Canon Norman,—It gives me peculiar pleasure, on the present occasion, to be the mouthpiece of the Linnean Society. The Council has selected you this year as the recipient of the highest honour at their disposal—the award of the Linnean Medal. You will be gratified, I know, when you think of the list of distinguished botanists and zoologists who have preceded you as Medallists, and we are gratified at being able to add your honoured name to that illustrious list.

"In your presence I find it difficult to say all that I might as to those high claims to the distinction which the Council recognised in making the award; but it is customary to make such a statement, and I may therefore be permitted to remind those who hear me now, and those who read of this Meeting in our 'Proceedings' hereafter, that we honour in our Medallist a naturalist who has probably done more than any other man living to make known to Science the Invertebrate Fauna of the seas of North-West Europe.

His name occurs as the discoverer or the recorder of rare and interesting marine animals in nearly every faunistic text-book and monograph from 1852 onwards. For more than half-a-century Dr. Norman has been indefatigable in collecting and in elucidating the British species of Crustacea and other Invertebrata; and the many parts of the 'Museum Normanianum' form a record of a vast collection which has ever been at the service of scientific workers both at home and abroad. Bate and Westwood, in their work on 'British Sessile-eyed Crustacea,' make acknowledgments to the Rev. A. M. Norman, 'who has forwarded to us his entire collection of Edriophthalmatous Crustacea for examination'—and that is only one of many similar instances. Haeckel, Bowerbank, H. B. Brady, G. S. Brady, Hincks, M'Intosh, Bonnier, Canu, Alder and Hancock, Haddon, Jeffrey Bell, Della Valle, P. Mayer, and Giesbrecht are some of the eminent marine zoologists who acknowledge in their publications the help freely given by our Medallist.

"Norman's own scientific writings are numerous, extending from 1851 to 1906; and his wide scope is indicated by the Shetland Dredging Report to the British Association in 1868, 'On the Crustacea, Tunicata, Polyzoa, Echinodermata, Actinozoa, Hydrozoa, and Porifera.' Bowerbank, at that date, naming a new genus of sponges *Normania*, says: 'I have named this genus after my friend the Rev. Alfred Merle Norman, the ardent and accomplished naturalist, to whom I am indebted for numerous new and valuable species of British Sponges.' This compliment Norman amply repaid in 1882 by completing Dr. Bowerbank's unfinished work on the British Sponges for the Ray Society.

"A genus *Normania* was named by G. S. Brady among the Ostracoda in 1866; and it may be noted that under the dates 1889 and 1896 Brady and Norman are found collaborating in an important monograph on the Ostracoda, published by the Royal Dublin Society. That in 1871 Axel Boeck named a genus of Amphipods *Normania* (now *Normanion*, Bonnier) is only one more evidence of our Medallist's varied activity. I cannot refer to all his papers: they include useful faunistic lists from different parts of the country, records of dredging expeditions in the North Sea and elsewhere. In the Zoological Society's 'Transactions' for 1886 will be found his joint paper with Mr. Stebbing on the Crustacea Isopoda of the 'Lightning,' 'Porcupine,' and 'Valorous' expeditions.

"His definition of the 'British Area in Marine Zoology,' issued in 1890, has been generally accepted. At the same date he published a valuable 'Revision of British Mollusca,' worthy of a sometime President of the Conchological Society. His 'Month on the Trondhjem Fiord' in the 'Annals and Magazine of Natural History' for 1893 to 1895, followed more recently by his 'Notes on the Natural History of East Finmark' in the same Journal for 1902-05, could only have been written by a Field-Naturalist of

very extensive experience and knowledge. The vigour and acuteness of research displayed in the memoir on *Splanchnotrophus* by Hancock and Norman, read before this Society in 1862, are equally prominent in the volume by Norman and Scott on the Crustacea of Devon and Cornwall, published a few weeks ago.

"Besides his own meritorious studies in those branches of Natural History in which this Society has always taken an exceptional interest, Dr. Norman has even wider and more general claims on our gratitude and regard. He has ever been ready and eager to encourage beginners in Science. He has cultivated the friendliest intercourse with the eminent naturalists of other nations. His co-operation with French zoologists in the cruises of the 'Talisman' and the 'Travailleur' in the Gulf of Gascony, on the invitation of the French Government, is well known, and was highly appreciated by his fellow-workers. He has received from the 'Institut' of France the medal struck in honour of the expeditions. Thus he has been continually a referee open to appeal for information and advice, whether demanded of him by the humblest worker or the proudest Government.

"These, Dr. Norman, are some of the considerations that have influenced the Council in awarding to you this Linnean Medal, which they hope you will accept as an indication of their high appreciation of your services to Marine Zoology in general and to Carcinology in particular—services which we hope may be continued for years to come."

The recipient made a reply expressing his gratification at the award.

The General Secretary having laid before the meeting the Obituary Notices of Fellows, the meeting terminated.

OBITUARY NOTICES.

John Bidgood died at Bournemouth on 6th October, 1905, from blood poisoning, in his fifty-third year, and was buried at Gateshead on the 10th October. At the time of his death he was head of the Secondary School at Gateshead-upon-Tyne. He was an enthusiastic botanist and geologist, and of late years he had given much attention to colour in flowers, especially in Orchids, on which he had written and lectured. He was elected Fellow, 6th March, 1889.

George Bowdler Buckton (1818–1905).—Among other losses of last year, the Linnean Society has to record that of one of its oldest members, and one who served on its Council, 1855–56. On September 25th, 1905, at the ripe age of eighty-seven, George Bowdler Buckton, F.R.S., F.L.S., F.C.S., F.E.S., &c., passed away, "leaving behind him," to use the words of Sir William

Huggins, "the deep grief of a large circle of friends, and a noble example of unwearied devotion to the successful prosecution of scientific work, notwithstanding great physical infirmity."

Born in London, May 24th, 1818, and brought up at Oakfield, Highgate, G. B. Buckton was the eldest son of a large family, his father, George Buckton, being Proctor of the Prerogative Court of Canterbury, and his mother, Eliza, the daughter of Richard Merricks, Chichester, Deputy-Lieutenant of the County of Sussex.

About the age of five years, Buckton sustained an accident which crippled him for life, a misfortune which he always bore with courage and silence, but which a man of his strong build and active temperament must have felt acutely. Unfitted thus for public school and University life, he was educated by the Rev. Oliver Lodge, Rector of Barking, and the Rev. D. Meuse, formerly head-master of the Cholmondeley School, Highgate. Popular with his class-mates, he shared their escapades, and was often carried "pick-a-back" by some strong fellow on daring excursions.

Left a good deal to himself, he became a fair classical scholar, and read widely. He showed a marked taste for music and painting, which remained his favourite pleasures to the end of his life. He evinced also remarkable powers of inventive construction in illustrating his youthful lectures on scientific subjects.

While scarcely more than a boy he made the acquaintance of Thomas Bell, who lived at Hornsey, and became his close friend for more than forty years. Stimulated by Prof. Bell, he became an earnest student of natural history. With a pony he roamed the Highgate Woods and their neighbourhood, and made careful and very complete collections of bees, shells, butterflies, and birds; most of the latter he shot and prepared with his own hands. He became also a good fisherman, and visited the rivers of Scotland and of Ireland. Always keenly alive to the interest of allied issues, his enjoyment of works on astronomy led him, quite early, to grind telescopic specula. Frankland, with whom he afterwards became intimate, vied with him in being the first to produce specula on glass, which method had been lately invented by the French philosopher, Foucault. Subsequently he worked specula of 12 inches diameter, and, as an amateur, mounted these equatorially.

When, on the death of his father, he moved into London, he built a circular observatory on the leads of his house, and made and mounted more than one telescope. It was about this time that he became the pupil, friend, and assistant of Professor A. Hofmann at the Royal College of Chemistry. His first recorded scientific paper was "Observations on the deportment of Diplatosomine with Cyanogen," which was published by the Chemical Society, 1852, and translated into French and German periodicals. A succession of other papers followed, notably one on his discovery and isolation of the radical Mercuric Methyl (Royal Society's 'Proceedings,' 1857). The last of the series, worked out with the collaboration of William Odling, was upon Aluminium Compounds,

and was published in the Royal Society's 'Proceedings,' 1865. A list will be found in that Society's Catalogue of Scientific Papers, which however omits his paper in the 'Zoologist,' xiv. 1854, pp. 436–438, on Cyanide of Potassium for killing insects.

It was on December 16th, 1845, that Buckton became a Fellow of the Linnean Society, coming into contact with Yarrell, Westwood, Wilson Saunders, Owen, Huxley, the Hookers, and other naturalists, and contributions from his pen are to be found in our Proceedings, Journals, and Transactions.

In 1852 he was made a Fellow of the Chemical Society; and in 1857 was elected to the Royal Society, becoming a member of the Philosophical Club of that Society, whose meetings he attended with great interest (in spite of the effort any journey entailed) till extreme old age compelled him to relinquish them. In 1883 he became a member of the Entomological Society; and later of the Entomological Society of France, and of the Academy of Natural Sciences, Philadelphia.

In 1865 Buckton married Mary Ann, the only sister of his friend Professor W. Odling of Oxford. He purchased the estate of Weycombe, Haslemere, Surrey, then a rural village, where he built himself a stone-gabled house, according to his own designs, taking with him his observatory and transit instruments. Here he lived for the remainder of his peaceful and happy married life. Of his eight children, five daughters and a son are still living.

From this time, though he kept his chemical laboratory and lathe-room and gave private lectures to his children and his friends, he devoted himself to Natural History, beginning with a study of the Parthenogenesis of Aphides, which resulted in four volumes on British Aphides for the Ray Society, 1876–1883, with profuse illustrations made under the *camera lucida*, which he lithographed on blocks of stone and coloured with his own hand. This was the first of his valuable series of Entomological monographs relating chiefly to the obscure and somewhat neglected suborder Homoptera. In 1890 he published his Monograph of British Cicadæ, or Tettigidæ (2 vols., Macmillan), in which he was helped by his children, who collected specimens and worked at the colouring of many of the plates. This was followed by the 'Natural History of *Eristalis tenax*, or the Drone-fly' (published by Macmillan, 1895), and finally by a large and important work on the Membracidæ of the World (Lovell Reeve & Co., 1901–1903), the Supplement to which, with many drawings, was finished for the Transactions of the Linnean Society only two months before the author's death. The original plates of the Monograph have been presented to the Hope Museum, Oxford. His lightness of hand in setting his many hundred slides was remarkable. Often in laying out the delicate nervous organisation of an insect, he would take for the purpose the sting of a wasp, as the finest procurable tool.

Various societies and museums, abroad and in the colonies, were in communication with him, and he had a wide correspondence.

There was a dignity and unconscious charm even in his business letters that one associates with another generation, the simplest reply communicating the touch of a rare and genial personality.

Until they were nine and ten years of age Buckton taught his own children in various subjects, from grammar and languages to Euclid, drawing, and physiology. He had an unusual gift of exposition, and was ever ready to share his knowledge with others. His humility and simplicity made him one to be easily approached, and he gave often his tools and specimens to small boys who showed an interest in natural history. The story is still told of the stonemason who stopped him in his pony-carriage in the village street, to ask the cause of the colours in the rainbow. One writes: "None who ever met him could fail to be struck with his kindly courtesy, his intense vitality, his wide range of knowledge, and his unflagging interest in every topic affecting mankind." In spite of his physical disabilities he travelled in Italy, France, and elsewhere, ascended Vesuvius, saw the Commune in Paris, and climbed the barricades, his great will-power enabling him to surmount difficulties that would have daunted many.

The visits to the observatory, which was built in his garden some way from the house, were abandoned after a serious accident which befel him in the autumn of 1882, when he overbalanced himself in reaching the long focus of a Newtonian. He lay with a double-fractured leg for some hours before he was found; but his recovery, though slow, was complete.

In politics a Conservative, he interested himself in all sorts of public matters, acting as treasurer and chairman on various local bodies. He was a moderate Churchman with broad sympathies, and gave liberally to Church and schools. Among his large circle of friends he numbered many of eminence, among them Tyndall and Tennyson, of whom he saw a good deal. "Though sometimes swift and uncompromising in his judgments, and of a quick temper, he was withal of a significant self-control, especially as regards his physical difficulties. Those most intimately associated with him have no single remembrance of moodiness or murmuring. Rather is their recollection, when some unexpected hindrance presented itself, of a lightly sad, resigned, half-humorous reference to his disability, a reference not easily forgotten by those who heard it." One has said that the most striking thing about him was his "magnificent calm." He kept his powers to the last. The fine and picturesque bust exhibited of him by R. Hope-Pinker in the Academy of 1904, showed how little age had impaired his clear intellect and vigour. He was finishing some water-colour sketches of Norway within a few weeks of his death. The end was the natural end of old age. After three weeks' suffering and illness following a chill, conscious to the last, his spirit passed peacefully, on the night of September 25th, 1905, surrounded by his wife and his children.

"Truly a devoted, spiritual, knightly nature," writes the present

Lord Tennyson, "with a faith as clear as the height of the pure blue heaven. His views and my father's, upon life, death, and immortality, were very much alike. My father always used to say, 'My most passionate and earnest desire is to have a fuller and clearer knowledge of God.'"

There is scarcely a preface to any of his larger works where Buckton does not incidentally reveal his deep-lying interest and trust in "things unseen."

The urn with the ashes, after cremation, was buried, according to his wish, in Haslemere churchyard, in the presence of many friends and representatives of the various societies to which he belonged, the subdued festivity of the place, which was keeping its harvest home, adding to the calm and beauty of a somewhat unusual ceremony. [* * *]

The death of Mr. Thomas Christy, which took place on 7th September, 1905, removes from us a very constant attendant at our meetings, and for many years a very frequent exhibitor. He was born of an old Quaker family on the 9th December, 1832, and was thus in his seventy-third year at the time of his decease. Early in his business career he went to China, and was there associated with Sir Thomas Hanbury, and whilst engaged in his produce and drug business he corresponded with Daniel Hanbury and other leading pharmacologists. Returning to London in the early sixties, he established himself as an importer and merchant in drugs, distinguishing himself by the introduction of *Strophanthus* and menthol. In addition to his special catalogues, he from time to time published a part of his 'New Commercial Plants and Drugs,' of which twelve parts appeared from 1878 to 1897. He was an enthusiastic believer in ensilage, and in 1897 issued a pamphlet on the system. For much of the scientific information contained in these publications he depended upon specialists whom he induced to work with him. Many of the plants thus introduced by him were cultivated in his garden, first at Sydenham, afterwards at Wallington. One of the last matters which engaged his attention was the so-called "grass-rubber" or "root-rubber," *Landolphia Thollonì*, from the Congo. His connection with this Society dated from 21st December, 1876, and he served on the Council from 1883 to 1886. He was buried at Wallington, Surrey, on 11th September last. [B. D. J.]

The death of the Rev. James Morrison Crombie removes from our roll one who bore his share in the work of the Society nearly a generation ago. He was born in Aberdeen, where he was baptised 20th April, 1830; on leaving school at the age of fifteen he entered at Marischal College, in the University of his native town, thence going up to Edinburgh, where he took his degree of M.A. Prof. Macgillivray, his first instructor in natural science, wrote of him: "He

has in all respects been one of the best students I have ever had under my charge, and will yet distinguish himself as a botanist." In a clerical capacity he was first licensee in Edinburgh in the Established Church of Scotland in 1858, and was ordained a minister of that communion in 1862. His first essay in natural history was his small volume, 'Braemar, its Topography and Natural History,' Aberdeen, 1861, 8vo. This was written during his probation at Castleton; later he was stationed at North Leith, before he came to London as assistant to Dr. John Cumming. He had a ministerial charge at Swallow Street, Piccadilly; and on its sale, served for many years as an acting-chaplain to the forces at Aldershot.

In spite of these claims upon his time he managed to engage in botanic work, especially devoting himself to lichenology, in which branch he published his first paper in the 'Journal of Botany' for 1869, in three parts, entitled "New British Lichens," many of which were described from his own collecting. He was at this time an indefatigable pedestrian, and would even pass the night among the heather, in order to get at plants he wanted; though most averse to trade collectors, with whom he sometimes had warm disputes in the wilder districts. In the next year he brought out a manual for British lichenologists, namely, 'Lichenes britannici, seu lichenum in Anglia, Scotia et Hibernia vigentium enumeratio,' Londini, 1870. From this time onward to 1893 Crombie published many papers on his favourite study, in which he ranged himself with Nylander, and against the symbiotic nature of the lichen. He described many novelties from the Arctic and Antarctic regions, and investigated *de novo* the lichens of Dillenius and of Withering. For the Trustees of the British Museum he undertook an enumeration of the British Lichens in the Department of Botany, of which the first volume came out in 1894 as 'A Monograph of the Lichens found in Britain,' &c., but the second volume was not completed in the author's lifetime. He was elected a Fellow of the Linnean Society, 6th May, 1868, and served on the Council from 1879 to 1882; in 1879 also he became Lecturer on Botany at St. Mary's Hospital Medical School till 1891. Shortly after his retirement from this lectureship he removed to Ewhurst, Surrey, and there quietly lived till his death on 12th May, 1906.

His herbarium is now at the British Museum (Natural History).

[B. D. J.]

The Right Hon. Sir Mountstuart Elphinstone Grant Duff, G.C.S.I., was the son of James Cunningham Grant Duff, the author of the 'History of the Mahrattas,' and Jane Catherine, the only child of Sir Whitelaw Ainslie, author of the 'Materia Medica of Hindostan,' published at Madras in 1813, and recast in two volumes, London, 1826. He was born at Eden, Aberdeenshire, 21st February, 1829, received his education successively at

Edinburgh Academy, the Grange, Bishop Wearmouth, and Balliol College, Oxford, where he took a second class in 1850, and was called to the Bar in 1854, of the Inner Temple. He declared that "the chief interests of his life were politics and administration," of which abundance fell to his share. He represented the Elgin Burghs in Parliament from 1857 to 1881, and held office as Under-Secretary of State for India, 1868–1874; Under-Secretary for the Colonies, 1880–81, which post he quitted to become Governor of Madras, which he held for five years to 1886. Connected as he was on both father's and mother's sides with India, this appointment was congenial. He had previously been Lord Rector of Aberdeen University, 1866–69, and after his return to England he was President of the Royal Geographical Society, 1889–93, of the Royal Historical Society, 1892–99, a Trustee of the British Museum from 1903, and a Member of the Senate of London University from 1891. Amongst these varied scenes he mingled with the best informed people, which furnished him with material for his fourteen volumes of 'Notes,' embracing a period of fifty years, from the time of his taking his degree to the First Council of King Edward VII. Besides three or four political works, he wrote three memoirs—of Sir Henry Maine (1892), Ernest Renan (1893), and an appreciative notice of the fourth Baron de Tabley, which was prefixed to that nobleman's posthumous 'Flora of Cheshire,' in 1899. He described his recreations as "fencing, botanising, travelling, conversation."

In 1859 he married Anna Julia, only daughter of Edward Webster, Ealing, by whom he had four sons and as many daughters. He was elected into our Society 18th April, 1872, and in 1881 also into the Royal Society. He died on 12th January, 1906.

[B. D. J.]

The Hon. Charles Arthur Ellis was born at Lisbon in December 1839. He was the third son of Lord Howard de Walden, the sixth Baron and a distinguished diplomatist who represented Great Britain as Minister in Lisbon and Brussels, at which places Charles passed the first years of his life. He received his education at Harrow, and after having graduated at Balliol College, Oxford, he qualified as a barrister of the Inner Temple. From an early age he showed great fondness for Natural History; without entering into a methodical study of the subject, he cultivated it by reading, collecting and keeping every kind of living animals for the purpose of observing their habits. Of sport he saw and enjoyed as much as a man can desire, but this home experience as a sportsman only served him as an apprenticeship for the travels and expeditions which he undertook in the desire to see wild nature in her grandest and purest aspects. In 1861–62 he paid his first visit to Canada and the United States under exceptionally favourable conditions. A friend of his father's, Admiral E. W. Vansittart, who com-

manded at the time the 'Ariadne' which escorted H.R.H. the Prince of Wales on his visit to America, invited Ellis to be his guest on the occasion. During the progress of the Prince's visit, Ellis remained attached to the retinue, seeing in a short time more of the country than would have been possible to him, if he had travelled by himself, and preparing himself for other visits which he made in subsequent years and which he extended into many parts of the Far West. The object of these later visits was mainly sport with rod and gun, and several seasons were devoted to the big game of the Rocky Mountains; he travelled southwards into Mexico and British Guiana, attempting even the ascent of Roraima, a feat accomplished many years later by Im Thurn.

The accounts of the wonderful success of sportsmen in South Africa induced him to undertake an expedition into that continent. Having secured the goodwill and assistance of a professional hunter, John Dunn, who enjoyed the special favour of the Zulu King, he was able to penetrate into, and shoot in parts of the country which were closed to the majority of travellers, and, therefore, still teeming with every variety of big game. On this expedition he met with a serious accident, as far as his friends know, the only one that befel him during his wanderings. A crocodile seized him by the leg inflicting dangerous wounds, by which he was kept for six weeks a close prisoner in a Kaffir kraal.

On the invitation of Lord Dufferin, then Governor-General and Viceroy of Canada, he fished in 1879 the Grand Cascapedia River, Bay of Chaleur, in the Province of Quebec, having for his companions Mr. L. Iveson and Captain G. A. Percy. An idea of the abundance of fish in that river at that time may be gathered from the record kept by Ellis of that expedition. Between June 19th and August 14th he fished on 44 days, during which he caught to his own rod 269 salmon of an aggregate weight of 6714 pounds; 53 weighed between 30 and 44 pounds.

In 1882 he visited India and organized an expedition into Eastern Turkestan; travelling by the usual route through Cashmere and Leh, and spending the winter in Yarkand and Kashgar. During this expedition he had an opportunity of releasing a Punjabi trader from an embarrassing situation; and from a sense of gratitude, this man not only kept up a correspondence with Ellis after his return to England, but also sent him a series of some thirty heads of *Ovis poli*, such as is not likely to be ever brought together again. On his journey home Ellis visited Japan, some of the South Sea Islands, and New Zealand, without making a protracted stay in any of these countries.

After his return to England he gradually laid aside gun and rod, and finally selected Surrey for his residence. In the charming neighbourhood of Haslemere he built Frensham Hall, a

commodious house, in which he could find room for the numerous trophies, and other objects of interest which he had collected during his wanderings, and to which many reminiscences of his life were attached. It was among them that his friends had an opportunity of learning something of his experiences in foreign countries. Pictures, chiefly of Mammals, Birds, and Fishes—among them many originals by Joseph Wolf—adorned the walls. The surroundings of the house, which is situated on the top of a ridge, the well-wooded slope and the plantations of the valley were devoted to the cultivation of an immense variety of hardy plants; a collection of ligneous plants was an object of his special care and attention. Ellis did not care about plants or animals which would have to be kept under artificial conditions or in confinement. But in the well-watered low-lying part of his grounds he had constructed a series of ponds for the acclimatization of such species of Fishes, Frogs, and Tortoises as might be expected to thrive in our climate. The continent of Europe and North America supplied most of the species of the Frensham Colony; he obtained large consignments of Bull-frogs, Tree-frogs, Freshwater Turtles, and for the last five years he had the pleasure of seeing the majority sufficiently well established and regularly breeding in his ponds. The progress of the growth of his plantations and the observation of the habits of his aquatic animals were a never-failing source of delight to him, and the correspondence with his friends teems with valuable hints and interesting facts.

He joined the Society on 18th February, 1897, and was one of the generous donors enabling the Society to acquire the Swainson correspondence. He was not married, and died on the 30th March, 1906. [A. G.]

Frederick John Horniman died on the 5th March, 1906, at Falmouth House, Hyde Park Terrace, London, in his 71st year. He was a native of Bridgewater, Somerset, where he was born on the 8th October, 1835, and was educated at the Friends' College, Croydon. He entered into business as partner in the well-known firm of W. H. & F. J. Horniman, which afterwards was made into a company. Throughout his life he collected largely and travelled widely, visiting North America, China and Japan, Ceylon, Burma, and British India.

His collections were gathered into a Museum, which in 1901 was presented by him to the London County Council in trust as a public museum; the gift was stated to have cost the donor £40,000. He sat for the boroughs of Penryn and Falmouth as a Liberal from 1895 till the recent dissolution, when failing strength determined his retirement. He was elected a Fellow of this Society 2nd March, 1896, and belonged also to the Royal Geographical, Zoological, and other societies. He was twice married, and left an only son, who was returned to Parliament for Chelsea last January, thus preserving the connection of his family with the House of Commons. [B. D. J.]

Rudolph Albert von Koelliker was born at Zürich in Switzerland on the 6th of July, 1817. Before his death, on the 2nd of November, 1905, he had become Geheimrat Prof. Dr. Rudolph Albert von Koelliker. His long life was filled with science. But just as a caisson may be filled with cannon balls and yet have room for bullets and shot, so Koelliker found means to dovetail in with intellectual pursuits many other activities. His ambition did not need to spurn delights, while he was living laborious days. From boyhood to old age he rejoiced in every sort of athletic exercise. His agreeable "Reminiscences," published in 1899, diversify the details of anatomical research with glimpses of his exploits and powers of endurance in skating, swimming, riding, mountaineering, and chamois hunting. He attributes in part his vigorous health to this constant indulgence in outdoor pursuits. It is just possible, however, that the vigorous health made the indulgence possible, rather than resulted from it. On one of his early voyages he was able to resist a strong temptation to be sea-sick, and celebrates this as a victory of mind over matter. On a subsequent occasion the tumbling waves were too much even for his resolution. He does not in this case point any moral as to the victory of matter over mind, but it is creditable to his fairness that he reports the circumstance. His candour is manifested at several points. For example, in 1845, as our Proceedings show, he adopted the current opinion, and argued against Costa that the hectocotylus-arm of the Octopoda was an independent organism. Fifty-four years later he calls this mistake to mind. Be the excuses what they might, he can scarcely forgive himself for it, and speaks of it as a still gnawing worm. In the course of his career he had so many successes and received so many distinctions, that a few errors and disappointments help to humanise the picture. At the age of twenty-seven he became a professor in his native town, and would fain have remained there. But the home authorities were insufficiently awake to the claims of his budding renown, so that at thirty he reluctantly accepted an invitation to Würzburg, with the result that its university profited for more than half a century by his valuable and steadfastly loyal service.

It is pleasant to reflect that at every stage of his public life the genius of Koelliker met with appreciation in Great Britain. So early as 1853 his 'Manual of Human Histology' was translated into English by Busk and Huxley. He was elected a Foreign Member of the Linnean Society in 1858, and was awarded the Linnean medal in 1902. Our Proceedings for the latter year contain the eloquent eulogium passed upon him by Professor Vines, then president. From the Royal Society he received the Copley medal in 1897. He had been one of its Foreign Members since 1860, and delivered the Croonian lecture before it in 1862. In 1889 he took part in the 'Challenger' reports, contributing a Monograph on the Pennatulidæ, and utilising the opportunity to introduce a new classification of that group.

Koelliker's visits to our Island were frequent, and from the outset, while he was quite a young professor, he was received with a distinguished welcome. This was in great measure due to the Pacinian corpuscles. Koelliker, it should be explained, after having been a favourite pupil of Henle, began his official life as prosector to that eminent anatomist at Zürich. In this employment he happened one day to be examining the intestine of a cat for lymphatic vessels, when his attention was caught by some peculiar bodies with a pearly lustre. These he showed to Henle, who examined them with him under the microscope, and said at once that such bodies were described in a work he had just received from the Italian anatomist Pacini. The professor and his prosector then in amicable concert examined these organs in man and a series of other animals, and gave the first exact description of them, after discovering in them the nerves which Pacini had not seen, a success which is described as easy in the case of the cat, but more difficult in the human subject. Their joint treatise appeared in 1844. In the following year Koelliker, now himself a professor, journeyed to London. He sums up his stay there as "very interesting, often pleasant, but on the whole very fatiguing." The fact was that he compressed into a few weeks the sight-seeing and experiences which perhaps not many Londoners compass in a lifetime. He was taken about not only to museums, but to docks, exchanges, warehouses, bazaars, galleries, gardens, and country-houses. It rained invitations to the breakfasts, which were in that day fashionable, and to dinners which at that epoch lasted, he says, from six o'clock to eleven! With these engagements were intermingled soirées scientific and social, dances at Almack's and elsewhere, and a presentation at Court. Amid this whirl of amusement he carried out the principal object of his journey, which was to have intercourse with all our most prominent men of science. They gave him a ready and genial reception, even the jealous reserve of Owen being in this instance overcome. In colloquies on matters of professional interest and in demonstrations with the microscope, it is clear that the visitor and his hosts found reciprocal and appreciative satisfaction.

On Koelliker's services as one of the chief pioneers in the modern development of microscopical and microtomical investigation, as an ingenious, active, and inspiring teacher, as a luminous writer on histology and many other branches of comparative anatomy, it is unnecessary to enlarge. It may be of interest here to give, as nearly as may be in his own words, the summary of his views on the doctrine of descent. He insists that the process of inheritance can only be understood through the phenomena of generation. The generating organisms transmit to the generated a morphologically definite substance of typical composition, on whose operations the whole conformation of the generated offspring depends. This heritable matter (Nägeli's *idioplasma*) is contained in the germinal vesicles of eggs and in

the sperm-threads, both of which are equivalent to nuclei, and probably are characterized chemically by the so-called Nuclein. By the conjugation of one of these male and one of these female nuclear structures arises the first nucleus of the new creature, which is therefore to be regarded as a hermaphroditic formation, and appears as carrier of male and female characters. From this first embryonic nucleus all nuclei of the perfected creature are derived in uninterrupted succession, and these therefore are likewise representatives of both the generating organisms. Through special operations of their minutest constituent particles, the nuclei condition first the phenomena of multiplication of the cells, and secondly their growth in volume and quality. Typical conformations of particular organs and complete organisms are the result of definite combinations of cell-divisions and processes of cell-growth, and therefore the nuclei, by means of their typical forces derived from the generative elements, dominate the whole constituent process of the organisms, or, in one word, the inheritance.

In agreement with his friend Nägeli's views as to the vegetable kingdom, Koelliker believed in a polyphyletic origin for the animal kingdom. He did not accept Ontogeny as any guide to a general Phylogeny, arguing that the stages of development in one group of creatures might recapitulate the genealogical history of that group, without in any way proving its relationship to other groups. He courteously but emphatically explains his attitude of opposition to Darwin, Haeckel, and Weismann. To the manifolding of organisms through the natural selection of favourable variations, he opposes his own idea that "the origin of the whole organized world is to be accounted for by a great plan of evolution continually driving on the simpler forms to more and more diversified developments." There is something unsatisfying in a doctrine which seems to say that the world has been evolved by a plan of evolution which evolves it. But naturally the acute professor has much to say to make his opinion wear an air of plausibility. For those who advocate a whole forest of genealogical trees in place of one grand many-branching stem, there is at least this to be said. Any complete and self-consistent theory of evolution must surely have its basis, not in spontaneous generation, but in some orderly transition from the inorganic to the organic. That the requisite conditions for this should have occurred only at one point of time and one point of space, and have produced only one or two organisms, is not on the whole very probable. Nature works with so much affluence that very rarely does any known thing prove in the end to be really rare. When the undiscoverable is discovered, one expects soon to hear that the new rarity is in fact freely disseminated through the universe. It is quite conceivable that in past ages countless specimens of the simplest organic type were produced and that they are still being produced, but none the less all chance of

favourably starting independent phylogenies may have come to an end at a very early period through the domineering capacity of some masterful race. On these questions the open mind is still as ever desirable. Indefatigable, minute investigation of facts, by men like Koelliker, can never be dispensed with.

[T. R. R. S.]

Sir Robert Lloyd Patterson, Knight Bachelor, Deputy Lieutenant, Justice of the Peace, and Fellow of the Society since 17th April, 1874, was the son of Robert Patterson, F.R.S., the zoologist, and was born at Belfast on 28th December, 1836. He went to school at the Royal Academical Institution, Belfast, and afterwards spent some time at Stuttgart. Returning to Belfast, he joined in business with Richardson Brothers, in the staple trade of flax, yarn, and linen; in 1858 he set up on his own account, and a prosperous career resulted till his retirement in 1886. His work in connection with the Chamber of Commerce was from 1864 onward; he was twice its President, in 1880 and 1895, and was Honorary Treasurer at the time of his death; he was knighted in August 1902.

His recreations were in natural history; his favourite cruising ground was Belfast Lough, and he was constantly scanning its fauna: in 1880 he published a volume on 'The Birds, Fishes, and Cetacea of Belfast Lough,' which ran into a second edition. He was a constant contributor to the 'Irish Naturalist,' 'The Field,' and Nature Notes published weekly in the 'Northern Whig.' He had a fine collection of Irish birds, and gave many specimens to the Patterson Museum, established at the People's Palace. An active supporter of the Belfast Natural History and Philosophical Society, he twice filled the chair, in 1881 and 1894. The 'Northern Whig' summarised his life thus in a leading article:—"The death of Sir Robert Lloyd Patterson, although not unexpected by his relatives and by those who knew his recent condition of health, will come with something of a shock to the public, long accustomed to his active and vigorous presence in their midst. Sir Robert represented a type now less often seen—the shrewd and active business man, who also finds leisure thoroughly to cultivate some branch of science or literature and to make a name for himself in connection with it." [B. D. J.]

William Phillips was born at Presteign in Radnorshire in May 1822, migrated to Shrewsbury at the age of ten, and there breathed his last, on 22nd October, 1905, in his 84th year. It was not till about 1861 that he took up the study of Botany, at first in a general sense, afterwards concentrating his attention on Fungi. He was a neighbour of the Rev. W. A. Leighton, author of the well-known 'Flora of Shrewsbury,' and 'The Lichen-flora of Great Britain,' 1871, etc. Mr. Phillips drew up a list of flowering plants and ferns of the neighbourhood, for

Pigeon's 'Handbook of Shrewsbury,' and he was connected with the Caradoc Field Club, as botanic referee from 1873 up to the time of his death, when he was Vice-President.

He prepared and issued four fasciculi of 'Elvellacei britannici,' from 1874 to 1881. His contributions published in our issues were:—"On a new species of *Helvella* (*H. californica*, Phillips)," Transactions, ser. II. Bot. i. (1880) p. 423, pl. 48; "A Revision of the Genus *Vibrissea*," *ib.* ii. (1881) pp. 1–10, pls. 1, 2; and "Some Observations on the 'Breaking' of the Shropshire Meres," which came out in our Proceedings, 1881–82, p. 29. This last was amplified in an account issued in the seventh volume of the 'Transactions' of the Shropshire Archeological Society in 1884; and the subject was again taken up, read before the Caradoc Field Club, and published in 'The Midland Naturalist,' with two coloured plates, in 1893. His most extensive work, and only volume, was 'A Manual of British Discomycetes' in the International Science Series in 1887; other papers were contributed to the local societies named, and with Dr. Plowright he drew up two papers on "New and Rare British Fungi," which appeared in 'Grevillea' in 1873–74. Always fond of antiquarian research, latterly he gave nearly the whole of his leisure to that study, but preserved his interest in botany to the last. A short time before his death, his health failed somewhat; an attack of heart-trouble had apparently yielded to medical treatment, but in the same night he passed quietly away during sleep. He was buried amidst tokens of universal mourning on the part of friends and fellow-citizens.

Quiet and unassuming, he did an immense amount of work, not only in botany and archæology, but in more purely local requirements, as at the Museum, on the public documents, and similar work, at the same time shunning publicity. His connection with the Linnean Society began 3rd June, 1875, and he was also a Fellow of the Society of Antiquaries.

The genus of Fungi *Phillipsia* was established in our Journal in 1881, by the Rev. M. J. Berkeley, in honour of our deceased Fellow. [B. D. J.]

Richard Rimmer, who died at his residence, Dalawoodie, Dumfries, on 19th August, 1906, was a keen all-round naturalist, but he paid special attention to the Mollusca of Britain. He was elected Fellow of our Society on 1st May, 1879, and in the following year he brought out a small volume on his favourite subject, entitled 'The Land and Fresh-water Shells of the British Islands,' London, 1880, 8vo., of more than 200 pages and a dozen plates, some of which were produced by photography, one of the earliest applications of that art to malacologic illustration. In 1887 he removed from Westbourne Crescent, Hyde Park, to St. Albans, and after two years in that town he migrated to Dumfries, where he ended his days, at the age of 79. [B. D. J.]

Mrs. Percy Sladen, 1848–1906.—Constance Anderson, daughter of the late William Charles Anderson, M.R.C.S., J.P., sometime Sheriff of York, was born in that city on the 11th of August, 1848. The noble minster of her native place may be credited with having kindled in her an enthusiasm for architecture and antiquarian lore. One of her brothers, Dr. Tempest Anderson, M.D., D.Sc., F.L.S., has informed us that in the outset of life her taste was cultivated at the York School of Art and in Rome. Among the results of the proficiency thus attained are spirited accounts of some important English churches, which she published at the prompting and under the editorship of Professor Bonney, F.R.S., in 1884 and 1890. One of these essays describes the grand cathedral with which from childhood she had been familiar. The others are concerned with the less renowned but archæologically and otherwise very interesting parish churches of Louth, Halifax, and Bradford, and the Abbey church of Selby. In regard to the last of these, the authoress remarks that "to give any idea of the beauty of the interior, words utterly fail," and then proceeds, with perhaps designed inconsistency, by her own skilfully worded sketch to evoke a very pleasing conception of its numerous charms. Upon wedding Mr. Percy Sladen in 1890 she readily allowed her lively intelligence to be directed to a new sphere of interest. For five years after his marriage Sladen continued to be, as he had been for five years before it, Zoological Secretary of this Society. The President in his address has explained how the sympathy between genial husband and genial wife led eventually to the foundation of the Percy-Sladen Trust, a boon to science great in promise and already not insignificant in performance. Before this came about there had to be intervening days of sunshine and days of sorrow. In 1898 the husband inherited a large fortune. In 1900 the wife became a widow. Thus it fell to her lot to carry out his wishes, and to show in only too brief opportunity that she knew how to make no ignoble use of riches. In the tribute of this memorial notice she herself enjoys a sorrowful primacy, won by what in the language of human ignorance we call her untimely death on the 17th of January, 1906. In the ranks of women who have been expressly honoured by the Linnean Society, the past yields two conspicuous examples—Lady Smith, who survived her husband, our Founder, for nearly fifty-six years, and Queen Victoria, who was for a still longer period our gracious patron. But neither of these remarkable persons was eligible for the ordinary Fellowship, to which Mrs. Percy Sladen was admitted, with a bevy of other ladies, on the memorable 19th of January, 1905, when the tardy recognition of women's aptitude for biological research received its inaugural blessing so far as this great house of science was able to bestow it. [T. R. R. S.]

William Sowerby, who died on 9th March, 1906, at his residence at Baker's End, Ware, Herts, aged 79, came of a family well known in the records of natural history in this country. His

grandfather, James Sowerby, A.L.S. (1757–1822), is known for his drawings in 'English Botany' and 'Coloured Drawings of English Fungi,' and his three sons, James De Carle Sowerby, F.L.S., George Brettingham Sowerby, F.L.S., and Charles Edward Sowerby, A.L.S., continued the family tradition as botanic artists or conchologists.

The subject of our notice, the son of James De Carle Sowerby, was born in 1827. About the year 1844 he became assistant to his father, the first Secretary to the Royal Botanic Society, Regent's Park, whom he ultimately succeeded about 1869. In 1880 he noticed the presence of a freshwater Medusa in the tank in which the great water-lily *Victoria regia* was cultivated in the Gardens under his charge, and the singular occurrence in fresh-water was investigated independently by the late Prof. Allman, at that time our President, and Prof. E. Ray Lankester. The President described the animal as *Limnocodium Victoria* in our 'Journal,' Zoology (xv. pp. 131–137), while Prof. Lankester suggested that *L. Sowerbii* would appropriately commemorate the discoverer. In 1895 Mr. Sowerby resigned his post, and was succeeded by his son, Mr. J. B. Sowerby, the present Secretary. He was elected Fellow, 7th March, 1872. [B. D. J.]

Frederick Townsend, who died at Cimiez, Alpes-Maritimes, on 16th December, 1905, at the age of 83, was elected comparatively recently into the Linnean Society, on 18th April, 1878. He was born at Rawmarsh Rectory, Yorkshire, on 5th December, 1822, was educated at Harrow, and Trinity College, Cambridge, graduating B.A. in 1850, and proceeding M.A. in 1855. It was whilst he was in residence at Cambridge that he became acquainted with C. C. Babington and W. W. Newbould, whose critical views on British botany were congenial with his own. With them he botanised round Cambridge, and his first paper, on *Glyceria pedicellata*, was published in the 'Annals and Magazine of Natural History' in 1850; from this time onward he was constantly publishing notes of his observations, as may be seen overleaf. and in 'The Journal of Botany' for April 1906, which also contains an admirable photogravure of our late Fellow. In our 'Journal,' Botany, xviii. (1881) pp. 398–405, pl. 15, he gave an account of his discovery of *Erythræa capitata*. His most considerable undertaking was his 'Flora of Hampshire,' 1883, the result of many years' work, and he lived to revise it and issue a second edition in 1904.

Soon after his marriage in 1863, Townsend settled at Shedfield Lodge, Wickham, South Hants, and there he began his work on the county flora, which practically ended only with his life. In 1874 he succeeded to the family seat of Honington Hall, Shipston-on-Stour, Warwickshire, on the border of Gloucestershire. Here he lived as an ideal country squire, and represented the Stratford-on-Avon division in the House of Commons, from 1886 to 1892, when he retired.

The genus *Euphrasia* was his special study during the last few years of his life, and he described one form as *E. canadensis* which he gathered at Quebec, and figured in the 'Journal of Botany' for January 1898.

He was a Member of the Botanical Society of Edinburgh so far back as 1846, and also of the Société botanique de France from 1872, to whose 'Bulletin' in 1878 he contribnted a note on a *Veronica*. He was an accomplished draughtsman, and excelled in certain field sports, but was extremely modest and free from the slightest suspicion of ostentation. From his residence being far removed from London, he was not a frequent attendant at our Meetings, but almost every few months he was accustomed to work in our Library, and paid constant visits to the Department of Botany, British Museum.

Bibliography.

On a supposed new species of *Glyceria* [*G. pedicellata*]. Ann. Mag. Nat. Hist. ser. II. v. (1850) pp. 104–108; Trans. Edinb. Bot. Soc. iv. (1853) pp. 27–30.

[On a monstrosity of *Daucus Carota* from Guernsey.] Bot. Gazette, London, iii. (1851) p. 50.

Contributions to a Flora of the Scilly Isles. Journ. Bot. ii. (1864) pp. 102–120.

On some points relating to the Morphology of *Carex* and other Monocotyledons. *Ib.* xi. (1873) pp. 162–166.

On *Anthoxanthum Puelii*, Lec. et Lam.; with some remarks on other species of the genus. *Ib.* xiii. (1875) pp. 1–5, pl. 157.

On some species of *Cerastium*. *Ib.* xv. (1877) pp. 33–37.

Sur une nouvelle espèce de *Veronica* [*V. lilacina*]. Bull. Soc. Bot. Fr. xxv. (1878) pp. 15–21, pl. 1.

Ulex nanus in South Hants. Journ. Bot. xvii. (1879) p. 84.

Vulpia ambigua, Le Gall, and *V. ciliata*, Link. *Ib.* pp. 195–196.

Notes on the Flora of Hampshire. London [1879] 8vo. pp. 15.

Euphorbia Paralias, L. [a native of the Isle of Wight]. Journ. Bot. xvii. (1879) pp. 314–315.

Erythræa in the Isle of Wight. *Ib.* pp. 327–329.

Hampshire Botany. *Ib.* xviii. (1880) pp. 50–51.

On an *Erythræa* new to England [*E. capitata*, var. *sphærocephala*] from the Isle of Wight and South Coast. Journ. Linn. Soc., Bot. xviii. (1881) pp. 398–405, pl. 15.

On *Erythræa capitata*, Willd. Journ. Bot. xix. (1881) pp. 87–88.

Note on *Carex flava*, L. *Ib.* pp. 161–163.

Notes on report of Botanical Exchange Club for 1879. *Ib.* p. 175.

Festuca ovaria, Dumortier. *Ib.* p 242.

On *Erythræa capitata*, Willd., var. *sphærocephala*. *Ib.* pp. 302–303.

Flora of Hampshire, including the Isle of Wight; or, a List of the Flowering Plants and Ferns found in the County of Southampton, with localities of the less common species. London (Lovell Reeve & Co.) 1883. 8vo, pp. xxiv, 524, 2 pls., map (1 page additional corrections).

—— Second Edition. *Ib.* 1904, pp. xl, 658, 2 pls. & map.

Homologies of the Floral Envelopes in Gramineæ and Cyperaceæ. Journ. Bot. xxiii. (1885) pp. 65–74, 17 figs.

Ranunculus Steveni, Andrz., and *R. acris*, L. Journ. Bot. xxvii. (1889) pp. 140–141.

Monograph of the British species of *Euphrasia*. Prefaced by an epitome of Prof. Wettstein's views on the development and distribution of the European species. *Ib.* xxxv. (1897) pp. 321–336, 395–406, 417–426, 465–477, pls. 374–380, figs.

Ranunculus acer, L. *Ib.* xxxviii. (1900) pp. 379–383.

Lepidium heterophyllum, Bentham. *Ib.* pp. 420–421.

Botany [of Hampshire including the Isle of Wight]. In Victoria History of Hampshire and the Isle of Wight. Westminster, 1900. Fol. Vol. i. pp. 47–69.

[The special groups, *Rubi*, Roses, and Cryptogams, forming pages 69–87, were contributed by specialists.]

A new form of *Euphrasia curta*, Fr., by Prof. James W. H. Trail. Ann. Scot. Nat. Hist. (1902) pp. 177–178.

[Contains the technical description by Townsend of *E. curta* forma *piccola*; reprinted in Journ. Bot. xl. (1902) pp. 362–363.]

Euphrasia scotica. Journ. Bot. xli. (1903) pp. 57–58.

Lepidium Smithii, Hook., var. *alatostyla*. *Ib.* pp. 97–98.

Arabis ciliata, R. Br. [collected in South Kerry]. *Ib.* pp. 278–279.

Galium sylvestre in Worcestershire. *Ib.* xlii. (1904) p. 240.

North Devon Plants. *Ib.* pp. 353–354.

[B. D. J.]

WELDON, Prof. W. F. R.; see page 109.

June 7th, 1906.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting of the 24th May were read and confirmed.

Rev. James Lamont was admitted a Fellow.

Mr. Morley Thomas Dawe, Dr. Arthur Thomas Masterman, and Mr. James Anthony Weale were proposed as Fellows.

Dr. Robert Brown (of Glasgow), Mr. Henry Robert Knipe, Mr. Henry John Waddington, and Miss Evelyn Janie Welsford were severally elected Fellows.

The President announced that he had nominated the following as Vice-Presidents for the ensuing year:—Rev. Canon Fowler, Mr. Horace W. Monckton, Lt.-Col. Prain, and Dr. A. Smith Woodward.

The General Secretary exhibited a small oil-painting on panel of Linnæus, after Pasch (sight measure $9\frac{1}{4} \times 7\frac{3}{4}$ in.), the property of Mr. Blackwell, which he had acquired as a portrait of Jean Jacques Rosseau (the *Linnæa* having been taken for periwinkle). He had detected the error by the close correspondence of a print engraved by C. E. Wagstaff, and published by Charles Knight for the Society for the Diffusion of Useful Knowledge. This print

purported to be engraved from a portrait in the possession of Robert Brown, but it displayed a curtailment of the figure and accessories from the picture by L. Pasch which Robert Brown gave to this Society in 1853 on his quitting the Chair, the history of which is well known (Proceedings, 1888–90, pp. 24–25). The question was raised, could this cabinet picture have been also in the possession of Robert Brown?

In the discussion which followed, Mr. Carruthers stated that Robert Brown left all his property to his successor, J. J. Bennett, his own predecessor at the British Museum, and he was certain that if the portrait now shown had belonged to Brown, Bennett would have carefully kept it, and ensured its conservation. Mr. Hopkinson, Dr. G. H. Fowler, Rev. T. R. R. Stebbing, Sec.L.S., Rev. Canon Smith, who pointed out that by a still legible label the frame must have been made not later than 1837, and Mr. Henry Groves also spoke.

The President exhibited tubes showing stages in the metamorphosis of a young flat-fish (*Pleuronectes platessa*), the plaice, leading from the symmetrical larva to the asymmetrical young flat-fish. These fish were hatched and reared in the Port Erin Biological Station. He further mentioned the operations conducted this year in hatching and liberating some millions of young plaice.

The following papers were read and discussed:—

1. "On two new Species of *Populus* from Darjeeling." By H. H. Haines, F.L.S.
2. "Biscayan Plankton.—Part VIII. The Cephalopoda." By W. E. Hoyle. (Communicated by Dr. G. H. Fowler, F.L.S.)
3. "Biscayan Plankton.—Part IX. The Medusæ." By E. T. Browne. (Communicated by Dr. G. H. Fowler, F.L.S.)
4. "On the Conifers of China." By Dr. M. T. Masters, F.R.S., F.L.S.

June 21st, 1906.

Dr. A. Smith Woodward, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 7th June were read and confirmed.

Miss Lilian Suzette Gibbs, Miss Evelyn Janie Welsford, Mr. William Denison Roebuck, and Mr. Henry John Waddington were admitted Fellows.

Mr. Henry Edward Houghton and Mr. Thomas Fox were severally elected Fellows.

Mr. W. Saville Kent, F.L.S., exhibited transparencies and lantern-slides in a three-colour process of photographs of Fish and associated Fauna of the Polynesian Coral-reefs.

The Vice-President in the Chair, Rev. T. R. R. Stebbing, and Mr. W. Carruthers contributed to the discussion which followed, and were replied to by the exhibitor.

Prof. F. E. Weiss, F.L.S., showed a section and an enlarged drawing of a section of the root-tip of *Lyginodendron oldhamium*, a fossil Cycadofilix from the Lower Coal-Measures, displaying an extraordinary preservation of the young tissues.

The Chairman having invited discussion, Dr. D. H. Scott and Mr. Carruthers spoke on the highly interesting character of the section shown.

Mr. H. J. Waddington, F.L.S., placed on the table some cases of prepared Crustacea, in series from the youngest to the fully adult state. The Rev. T. R. R. Stebbing and Prof. C. Stewart referred to the remarkable excellence of the preparations; and Mr. Waddington, in acknowledging the vote of thanks, stated that most of the credit was due to his wife, who was his most effectual helper.

The following papers were read and discussed :—

1. "Botany of Southern Rhodesia." By Lilian Susette Gibbs, F.L.S.

2. "The Original Portraits of Linnæus." By William Carruthers, F.R.S., F.L.S.

3, "Plantæ novæ Daweanæ in Uganda lectæ." By Dr. Otto Stapf, F.L.S.

4. "The Genitalia of Diptera." By W. Weschè, F.R.M.S. (Communicated by John Hopkinson, F.L.S.)

ABSTRACTS.

I.

Note on the Distribution of the Genus *Shortia*, Torr. & Gray.

By B. Daydon Jackson, Gen. Sec. L.S.

[Read 15th February, 1906.]

At the General Meeting held on the 7th December, 1905, Mr. W. T. Hindmarsh, F.L.S., sent photographs of a plant of *Shortia uniflora* in cultivation in his garden at Alnwick. In the discussion which followed, enquiry was raised as to the number of species contained in the genus, and the present short paper is an attempt to answer the question then put.

The original species, *S. galacifolia*, was collected in Carolina by Michaux, in fruit, and described by Asa Gray from the single specimen at Paris, in 1839; the plant was not again found till nearly a century after the first discovery, and then in McDowell County, in South-west Virginia. The original station has since been found again by referring to Michaux's manuscript journal, as recounted in the 'Botanical Magazine,' t. 7082.

The second species, *S. uniflora*, was at first placed under the closely allied genus *Schizocodon*, it was found in the province of Shinano, Nippon; and a third, *S. sinensis*, is recorded from Mengtze, Yunnan.

Investigation of the material contained in the national herbaria of Kew and the British Museum, seems to point out that there are three good species of *Shortia* (noted above); one doubtful one, *S. rotundifolia*, described by Maximowicz as *Schizocodon*, but the corolla not seen by him; and *Shortia thibetica*, more appropriately placed as a monotypic genus.

The distinctions between the allied genera, *Shortia*, *Schizocodon*, and *Berneuxia* are not very strongly marked in every case, but the following lists may be of some use.

Berneuxia, Decne. in Bull. Soc. Bot. Fr. xx. (1873) 159.
- thibetica, *Decne. l. c.*—Mupin.
  - Syn. *Shortia thibetica*, Franch.

Schizocodon, Sieb. & Zucc. in Abh. Akad. Muench. iii. (1843) 723, t. 2.
- ilicifolius, *Maxim. in Bull. Acad. Pétersb.* xii. (1868) 71.—Japon.
- rotundifolius, *Maxim. l. c.* xxxii. (1888) 497.—Ins. Meiaco Sima.
- soldanelloides, *Sieb. & Zucc. l. c.*—Japon.
- *uniflorus*, Maxim. in Bull. Acad. Pétersb. xii. (1868) 71= Shortia uniflora, *Maxim.*

Shortia, Torr. & Gray, in Am. Journ. Sc. ser. I. xlii. (1842) 48; et ser. II. xlv. (1868) 402.

Davidi, Franch. in Nouv. Arch. Mus. Par. sér. II. x. (1887) t. 13 B = Berneuxia thibetica, *Decne.*

galacifolia, *Torr. & Gray, l. c.*—Am. bor.

rotundifolia, Makino, in Tokyo, Bot. Mag. ix. (1895) 327; et x. (1896) 221 = Schizocodon rotundifolius, *Maxim.*

sinensis, *Hemsl. in Hook. Ic. Pl.* t. 2624.—Yunnan.

thibetica, Franch. in Nouv. Arch. Mus. Par. sér. II. x. (1887) 54, t. 13 B (*Davidi*) = Berneuxia thibetica, *Decne.*

uniflora, *Maxim. in Bull. Acad. Pétersb.* xvi. (1871) 225. —Japon.

II.

The Origin of Gymnosperms.

By Prof. F. W. Oliver, F.R.S., F.L.S.

[Read 15th March, 1906.]

The investigations of Hofmeister have been regarded as settling once for all the general relation of affinity between the Gymnosperms and Vascular Cryptogams. Critical analysis of this work and later contributions in the same field have led to the recognition of several distinct lines of descent within the latter class, and at one time and another each of these lines has been favoured as that from which the Gymnosperms arose. In recent times, the balance of opinion has set in the direction of the Ferns, the point of closest contact being found in the Cycads. The view has gained material support through the discovery of multiciliate spermatozoids in the last-named group and in *Ginkgo*, as well as from the recognition of the existence in Palæozoic times of an extensive plexus of forms (the Cycadofilices) which, whilst retaining the habit and many of the structural peculiarities of Ferns, show a distinct advance in the direction of the Cycads. Now that evidence has come to light proving that many of the forms there included were seed-bearing plants, the foundation of a new Class, the Pteridospermeæ, has been judged expedient for these Spermophytes which have so much in common with the Ferns.

As matters are shaping at the present time, it would appear that certainly a preponderating number of so-called Palæozoic "Ferns" are in reality Pteridosperms which have been hitherto confounded with true Ferns in view of their frond-like habit and lack of distinguishing organs of reproduction. The existence of a great reserve of supposed Ferns in the older rocks has served as a material bulwark to the Hofmeisterian doctrine of the passage of Pteridophytes into Spermophytes. But if the Palæozoic is in reality the "age of Pteridosperms" rather than the "age of

Vascular Cryptogams," the position becomes altered, and the question is one that should engage the attention of Botanists. When it is borne in mind that, so far as the geological record goes, seed-bearing plants (Cordaiteæ) are of at least equal age with true Ferns, the perplexities of the situation become manifest.

Another question upon which an expression of opinion would be valuable, is whether the whole group of Gymnosperms may be regarded as having been evolved along the Fern-Cycad line, or whether, on the other hand, some of them at least may have had a quite distinct origin.

Palæobotanical work has shown that in the Lycopod phylum seed-like structures were occasionally produced, and this discovery no doubt seems to strengthen what has always been a possibility, viz., that a portion of the Gymnosperms may have had its origin along this line.

III.

On the Earlier Geological Record of the True Ferns.

By E. A. Newell Arber, M.A., F.L.S., F.G.S.

[Read 15th March, 1906.]

It is evident that the Palæozoic Pteridosperms exhibit, both in their habit and anatomy, marked characters in common with the true Ferns, and it is therefore regarded as more than probable that they sprang from a Fern-like stock. Thus the Fern line of descent must be geologically older than the Pteridosperms. Yet the recent discoveries as to the nature of the male and female fructifications of these Fern-like, seed-bearing plants have tended in part to obliterate, and in part to cast strong suspicion upon, much that was formerly regarded as undeniable evidence of the existence of the true Ferns in the Palæozoic Period.

There is, however, every reason to believe that true Ferns did exist in Carboniferous and Permian times. The Botryopterideæ, and certain unassigned fronds bearing annulate sporangia were among the chief representatives. But it is doubtful whether the Palæozoic Ferns were clearly and generally differentiated into Eusporangiatæ and Leptosporangiatæ. In the fossil state we have naturally no evidence as to the development of the sporangia, and further, the biseriate or multiseriate annulus of Palæozoic sporangia does not agree with that of modern Leptosporangiate spore-bearing organs. It would thus seem better to regard the Palæozoic Ferns as a separate class, from which both the Leptosporangiatæ and Eusporangiatæ were eventually derived. The name Primofilices is suggested to denote this race; since the preferable terms, Archæopterideæ and Palæopterideæ, are not available. The

Botryopterideæ constitute one family of the Primofilices, and others will probably be distinguished in the near future.

The origin of the Leptosporangiatæ from the Primofilices is clear. This group began to differentiate at the close of the Palæozoic period. Possibly some of the Sphenopterid fronds of the Carboniferous and Permian rocks, bearing annulate sporangia, were the earliest offshoots in this direction. In the true Mesozoic floras (Rhætic, Jurassic, and Wealden) the various families became marked out, and there is abundant evidence that the Leptosporangiatæ then formed one of the dominant or ruling types of Mesozoic vegetation.

On the other hand, the question may well be asked, Is there any trustworthy evidence of the existence of the Eusporangiatæ in either the Palæozoic or truly Mesozoic floras? In neither is there any evidence at all of the Ophioglossaceæ, and the only instance of possible Mesozoic Marattiaceous fronds with which I am acquainted are three in number, and all of Rhætic age. In two species of *Tæniopteris* (including the typical Rhætic species *T. Münsteri*) sporangia, resembling those of the modern *Marattia*, have been found on certain fronds while in *Danæopsis*, another related genus, the synangia more closely resemble those of *Danæa*. The suspicion is not wanting, however, that the fronds of *Tæniopteris* may have been those of a Cycad rather than a Fern.

In the Palæozoic rocks, we find a plexus of fronds of the Sphenopterid and Pecopterid type, bearing exannulate sporangia, arranged independently in the sorus, or united to form synangia. These have been generally regarded as of Marattiaceous affinity. The great difficulty, at the present moment, is to decide as to the true nature of these fronds. Did they belong to true homosporous Ferns, or were they the male fronds of Pteridosperms? On the present evidence, I am inclined to think that a large number, though not necessarily all, will eventually prove to fall under the latter category. We already know that one *Pecopteris* (*P. Pluckeneti*), though not a very typical member of the genus, belonged to a Pteridosperm. Also the male frond of the Bennettiteæ, a group descended from the Pteridosperms, is known to have borne sporangia not unlike those of the Palæozoic Pecopterids and the modern Marattiaceæ.

The anatomy of the tree-fern, *Psaronius*, affords the most trustworthy evidence, at present, of the existence of the *Eusporangiatæ* in Palæozoic times; though there would appear to be little to indicate that this group ever attained to the position of a dominant or ruling type in either the Palæozoic or truly Mesozoic floras.

IV.

The Evolution of Gymnosperms: The Position and Ancestry of the Araucarieæ. By A. C. Seward, F.R.S., F.L.S.

[Read 15th March, 1906.]

The genera *Araucaria* and *Agathis* may be regarded as surviving members of an ancient group of Gymnosperms distinguished by several well-marked characters from other Coniferales. During the Mesozoic era the Araucarieæ were widely distributed and played a prominent part in the Northern floras; they are now confined to comparatively restricted areas in the Southern hemisphere. Our object is to enquire into the evidence on which the statement as to the antiquity of the Araucarieæ is based, and to ascertain whether the records of the rocks lend support to a view expressed by some botanists that they represent the oldest section of the Coniferales. A further question suggested by the examination of palæontological data, is the possession by *Agathis* and *Araucaria* of characters which may be designated primitive.

In view of the widely accepted conclusion that Cycads and Ferns were descended from common ancestors, it is important to consider whether the contention that Conifers as well as Cycads are derived from a Filicinean stock is supported by satisfactory evidence. While accepting Cycads as descendants of Filicinean ancestors, the Author is led to the conclusion that Conifers, or at least the Araucarieæ, should be referred to a Lycopodiaceous origin.

The following headings may serve to suggest some of the questions to be dealt with in discussing the origin of the Araucarieæ:—

i. The widespead occurrence of Mesozoic fossils referred to the Araucarieæ.

ii. Features in which *Agathis* and *Araucaria* differ from other members of the Coniferales: the isolated character of the Araucarieæ and the primitive nature of some of their peculiarities.

iii. Examination of the evidence adduced in favour of including Conifers with Cycads as descendants of Filicinean ancestors.

iv. Comparison of the vegetative and reproductive shoots of the Araucarieæ with those of recent and fossil Lycopods from the point of view of a close relationship between the two phyla.

V.

On the Structure of the Stem and Leaf of *Nuytsia floribunda*, R. Br. By E. J. Schwartz, F.L.S.

[Read 5th April, 1906.]

Nuytsia floribunda is a member of the Loranthaceæ and a native of West Australia; unlike other members of this order, it is non-parasitic and a tree attaining a height of some 30 feet. The leaves are linear-acute, of length about 1 inch, and the stomata, which are in more or less regular rows, are transverse to the leaf-axis. In section, the leaves show a meristele of three bundles embedded in a water-storing tissue which is in turn surrounded by the assimilatory tissue; one or more resin-sacs are to be found above the bundles. The stem has many points of interest—a heterogeneous strongly thickened and pitted pith containing a central resin-canal proper to the stem itself, accompanied by three or more perimedullary canals; islands of phloem and cambium embedded in secondary xylem; and a cork of epidermal origin,—all points of difference from the other members of the Loranthaceæ. The assimilatory tissue throughout the plant is rich in tannin, and no calcium-oxalate crystals are to be found in the stem.

The paper was illustrated by slides from photographs of the author's preparation.

VI.

The Affinities of Pteridosperms and Gymnosperms. By Dr. D. H. Scott, F.R.S., Sec.L.S.

[Read 3rd May, 1906.]

As an advocate, for the last ten years, of the Filicinean origin of Cycads, and probably of Gymnosperms generally, I should like to remove a misapprehension which appears to exist in some quarters. It was suggested in 1895 that the Cycadofilices *Lyginodendron* and *Heterangium* were the "derivatives of an ancient and generalized (or rather non-specialized) Fern-stock," and in 1899 the opinion was expressed that this "common stock was to be sought among simple Ferns or Fern-like plants." At no time has it been held that the Cycadofilices or Pteridosperms, to use the current name, sprang from any family of Ferns already known, still less from any family represented in the recent Flora.

So far as the morphological evidence is concerned, the position is unaltered at the present time. The important discoveries of the seeds of the Pteridosperms scarcely touch this question, for

these organs are of too advanced a type to throw light on the probable derivation of the group.

The anatomical characters clearly indicate an affinity with the Fern-stock closer than that with any other Cryptogamic phylum. The male organs, now beginning to be known, further support this affinity. Hence we are led to conclude that the Pteridosperms had a common origin with the Ferns, and may assume that the common ancestors resembled Ferns in being Cryptogamic rather than Spermophytic.

The difficulty arises from the surprising extension of the Pteridosperms, which threaten to absorb everything Palæozoic that used to be called a Fern. But this idea is of the nature of a "scare." Though the Ferns were not the dominant group in the Palæozoic that they were once supposed to be, there is as yet no justification for the extreme view that they were non-existent. The important position of the Botryopterideæ as a synthetic family, perhaps most nearly representing among known Palæozoic plants the common stock from which Ferns and Pteridosperms may have sprung, has already been indicated by a previous speaker. I agree with him that the family is best regarded as a special type of a much more extensive group.

As regards the other great question under discussion—the affinities of the Coniferæ—the data are still very inadequate, for we have little knowledge of the structure of early forms of Coniferæ. In some Permian plants referred to Araucarieæ, the structure of the wood was of the *Araucarioxylon* type, a widespread form of wood, common to Cordaiteæ, Pteridospermeæ, and even Botryopterideæ, but almost wholly absent from the Lycopod phylum. Whatever this character may be worth, it favours a common origin of the Araucarian Conifers with the Cordaitean and Pteridospermic series.

The existence of the Cordaiteæ, offering clear points of agreement at once with Pteridosperms, Cycads, Ginkgoales, and Conifers, certainly suggests that all these groups ultimately had a common origin from the same great plexus of primitive Filicineæ. *Ginkgo* itself forms a bond of union between the Cordaitean phylum and the Taxaceæ among Conifers.

The Lycopods attained a high development on their own lines, producing seed-like organs in certain cases, and showing some anatomical analogies with Conifers. A more exact comparison appears to indicate that these characters are homoplastic, and not indicative of any affinity with the higher plants.

VII.

On the Original Portraits of Linnæus.

By William Carruthers, F.R.S., F.L.S.

(With Plates 1–8.)

[Read 21st June, 1906.]

At the Annual Meeting in May 1889, I presented to the Society the results of some investigations into the portraits of Linnæus. I had not then seen any of the original paintings. But having made a considerable collection of the published portraits, which is now in the possession of the Society, I classified them, reducing them to nine different types. This opinion has been practically confirmed by subsequent inquiries. I resolved to inspect the authoritative originals from which these nine types of engravings had their origin. In 1891 I visited the various localities where these portraits are preserved. This led me slightly to modify and also to add to the statements published in the Proceedings of the Society for the Session 1888–89. After too long an interval I venture to place before the Society the results of my further investigations, quickened by the fact that the 23rd of May 1907 is the bicentenary of the birth of Linnæus, and that special interest will then be shown in every thing that relates to that great naturalist. I procured original photographs of all the authentic portraits, and I trust that these with the notes I submit may be of some interest to the Fellows of this Society.

I have been much assisted in this work by my friend Mr. Antony Gepp, F.L.S., and still more by his brother, the late Mr. Hubert M. Gepp, Adjunct Professor in Upsala University, who became much interested in my investigations, secured for me many engravings of Linné, and supplied me with information and with personal help when I visited Sweden.

I. 1737. Hoffman.

The earliest portrait of Linné was painted by Martinus Hoffman at Hartekamp, near Haarlem, for Dr. George Clifford, a rich merchant and burgomaster, who was of English descent, his ancestors having been for some time in Holland. Dr. Clifford had a great love for plants, and had collected many rare and interesting specimens in his fine garden. On the recommendation of Boerhaave, Dr. Clifford engaged Linné to name and classify all his plants. Linné had gone to Harderwyk to take his doctorate in the university there, which he did on the 24th June, 1735. His funds were exhausted, but the naturalists in Holland were kind and hospitable: in 1736 he took up his abode at Hartekamp, where he found in the owner of the house a cordial and liberal

friend. He published the 'Hortus Cliffortianus' in 1737, and in the same year the 'Flora Lapponica.' The frontispiece to this work, dedicated to Clifford, represents a Lapland landscape with Linné in the foreground, having on his knees the "drum," which appears in the full-length picture. This frontispiece was drawn by Hoffman, who in the same year painted the portrait of Linné for Clifford. This fine painting has remained in his family until this time, though no longer at Hartekamp. In 1891 Mr. Clifford was living at Nieuwetsluys, and when I visited him there he was most helpful. The painting has been very carefully conserved and is in extremely good condition. He gave me leave to have a photograph taken from it. He traced his family back to the days of William the Conqueror, and showed me an interesting record of the family history, turning to the pages which contained contemporary notes about Linné while he was at Hartekamp.

The original portrait has never been reproduced. Linné is standing with his face turned somewhat to the left, in his Lapland dress, with his gloves and various implements hanging from an ornamented leathern girdle. His right hand holds a plant of *Linnæa* in flower but without a label, and his left hand supports a large oval object which has puzzled many, but in the frontispiece to the 'Flora Lapponica' this is shown in two separate portions which have spread out on them small objects: it is apparently a press for drying plants. Around the sides of this press are written the words:—"Carolus Linnaeus e Lapponia Redux. Ætat. 30. Anno 1737. Mart. Hoffman fecit 1737." There is nothing on the canvas besides the portrait of Linnæus.

A replica or a copy of this portrait, painted in 1739, came into the possession of Dr. Robert Thornton towards the end of the eighteenth century. This is known only from the mezzotint engraving by H. Kingsbury, which was "published April 6, 1795, by H. Kingsbury, No. 4 Warren Street, Fitzroy Square." In 1804 Dr. Thornton had an exhibition of his botanical paintings at 49 New Bond Street, and the printed catalogue states that this painting is "A whole length of Linnæus aged only thirty-two, in his Lapland Dress. By Hoffman. An Original Picture. This was painted for Gronovius in Holland and is the only original Picture of Linnæus in England." Linné was indebted for much friendly help to Gronovius; at his suggestion Boerhaave introduced Linné to Clifford, and at the expense of Gronovius the first edition of the 'Systema Naturæ' was published at Leyden in 1735. It is very likely that he would desire to possess the portrait of a friend he valued so highly.

In 1811 Thornton got permission from Parliament to dispose of his paintings by a lottery, but this was unsuccessful. Thornton lived for twenty-six years after this, having died at his residence in Howland Street, Fitzroy Square, on June 22nd, 1837. I have failed to discover what has become of this or any of the other botanical paintings that belonged to Thornton. The only help

known by which one can form an idea of this painting is Kingsbury's mezzotint. There are in it several obvious modifications of the Clifford portrait. The standing collar is larger, the right hand holding the plant is more raised above the girdle, and there is attached to it a paper label with "Linnea Gronov." written on it; a small horn is suspended from the belt between the clip which carries the gloves and the tastle, the ornaments on the drying-press are much modified, and the feet are wider apart. These modifications suggest that they were introduced by the original artist in painting a replica, though they may have been introduced by Kingsbury in his engraving. The most obvious difference between the mezzotint and the Clifford portrait is the column on which are placed eight volumes of Linné's works, each of them labelled, and all published in 1737 or the two previous years. If the engraver in 1795 had been working from a replica of the original painting, he may have thought it necessary to introduce the column in order to convert the comparatively narrow painting into his nearly square engraving. But, on the other hand, the works selected would have been much more likely to consist of the more important ones published after 1737. On the whole, it appears to me more probable that Thornton's painting was a replica in which the original artist introduced several modifications, and that it was painted for Gronovius. If it still exists it ought to be found in England, and is deserving of a careful search; the name being painted on the side of the drying-press would enable it to be easily identified.

There is a modern, three-quarters portrait based on the Clifford portrait in the possession of the Zoological Society of Amsterdam.

II. 1739. Scheffel.

There are two portraits in Linné's house at Hammarby by Scheffel, a well-known Swedish portrait-painter. The one is inscribed on the back of the canvas—"Carl Linnæus: Med. Doctor, Dioscorides 2^{dus} dictus. Natus 1707 d. 13 Maij. I. H. Scheffel, p: 1739." The other is dated 1755, and though no name of a painter is given, there is good reason for saying that it was the work of Scheffel in the year stated. This will be more fully examined when I describe that portrait. The earlier one is of Linné as a bridegroom, when he was 32 years of age. It is now in a bad condition. It represents Linné about the age specified. The painting, however, so exactly agrees in its general treatment with Scheffel's other portrait taken sixteen years later, that I cannot get rid of the conviction that Scheffel, having produced a good likeness in 1755, painted his second portrait as a bridegroom, giving his own idea of what Linné would be like at that time. Linné returned in July 1738 from Holland by way of France to Sweden, and soon thereafter he was betrothed to Sarah Elizabeth Moræus, to whom he was married in June 1739.

The engraving by Ruckman after Scheffel is from this painting; I formerly, being misled by the softness of the engraving, thought it represented a third and younger painting by Scheffel.

III. 1740. Ehrensverd.

The next portrait of Linné, taken when he was 33 years of age, was the work of Augustus Ehrensverd. The original engraved plate was, in 1891, in the possession of Baron Lewenhaupt, Upsala. It has not been published, but impressions have been taken from the plate at different times and circulated privately. Eichhorn had in his collection a print taken before the plate was lettered, and our Society possesses in a volume that was in the Library of Linné a print inserted while it was in his possession. The comparatively recent print in our collection of the Linnean portraits was presented by Dr. G. Lindström.

The engraving is lettered "Carolvs Linnæus Med: Doct: Natus 1707 Maj $\frac{13}{24}$ Ætat: 33," and immediately below the portrait "Au. Ehrensverd amica manu sc. 1740." The engraving has been made from life or from a drawing, so that in the print the whole is reversed. The wart which was on Linné's right cheek appears on the left cheek. The face is turned to the left, the right hand rests on a volume labelled on the back "Syst. Nat.," while the left hand, resting on the right, holds a flowering plant of *Linnæa borealis*. On his left shoulder is an academic gown which comes round below the right arm to the front of the body in great folds.

Ehrensverd's engraving is the original of most of the 8vo plates which illustrate the works of Linné.

There is in the possession of Prof. Tullberg, Upsala, a small painting on vellum, 5 inches by $3\frac{1}{2}$, which is certainly copied from Ehrensverd. The general pose of the figure, and the similar accidental peculiarities like the creases in the sleeve of the coat and in the gown, are conclusive evidence of this. The direction of the figure is the same as in the metal plate engraved by Ehrensverd, and consequently differs from that on the prints from his plate. The left hand rests on the volume, and the right hand holds the *Linnæa*. Besides an obvious feebleness and softness in the portrait, this picture and its reproductions can easily be distinguished from its original by the narrow black tie which passes through the holes in the shirt collar, by the less luxuriance of the wig, and by the coniferous trees introduced in the background.

Tullberg's small vellum painting was engraved by Bernigeroth, and published as the frontispiece to the Stockholm and Leipzig editions of the 'Systema Naturæ' issued in the same year, 1748. The engraver did not reverse the portrait, so that the aspect of the figure in the print is the same as in that from Ehrensverd's plate. Bernigeroth states that the original from which he worked was "delin. 1748," and that is probably the date of Prof. Tullberg's painting. The softness in the treatment of the features in that

painting, and reproduced in Bernigeroth's engraving, is probably intended to cover the change that eight years would produce in the face of Linné.

Further modifications were subsequently introduced by Bergquist and Tanje in their engravings after Bernigeroth.

IV. and V. 1747. Rehn.

The two sketches by J. E. Rehn, dated 1747, are now known only by reproductions. Rehn was a copper-plate engraver, who was sent by Count Tessin to Paris to study under Le Bas.

The first portrait by Rehn is a full-length sketch of Linné in his every-day dress when he was 40 years old. The original drawing came into the possession of the Right Hon. Henry W. W. Wynne. It was reproduced by J. S. Templeton, and published by Colnaghi for the proprietor in January 1830. I have been unable to discover the original; the representatives of Mr. Wynne cannot discover it in the collections left by him, and Messrs. Colnaghi know nothing of the original. The lithograph represents Linné in a long frock coat, a frock vest, knee breeches, and gaiters buttoned to the knee. He has on a wig, wears a sword, and seems to be meditating under the influence of the *weed*, which he is enjoying from a long-stemmed pipe.

The second sketch is an outline head and shoulders. It is known from a lithographic reproduction which is said to be the "Facsimile d'un profil dessiné d'après nature par J. E. Rehn." In the Royal Library, Stockholm, there is a copy having "en 1747" inserted before "par J. E. Rehn." It seems to me very probable that this profile was made for the medal struck in honour of Linnæus in 1646, and dedicated to Count Tessin by four noblemen. In so far as the portrait on this medal differs from Inlander's medallion it agrees with Rehn's sketch. The die-sinker executed the profile directly on the metal, and the portrait on the medal came out reversed. The discrepancy in the dates is not serious, and the likelihood of Rehn's desire to acknowledge in some way his gratitude to Count Tessin favours this suggestion.

VI. 1751. Lundberg.

In 1751, or the following year, Gustaf Lundberg made a beautiful pastel portrait of Linné. Lundberg was born in 1695. When he was 22 years of age his master David von Krafft sent him to Paris, where he studied under Rosalba, who introduced pastel painting into France. Lundberg became famous in this art. He returned to Sweden, and in 1750 was appointed painter to the Court. He painted many portraits of the Royal family. Linné resided at the Court at Drottningholm Palace in 1751, and afterwards in 1752 and the beginning of 1753 at Ulriksdal and at Stockholm, being occupied in naming and cataloguing the extensive natural history collections belonging to members of the Royal

family. At one or other of these places the court painter produced this portrait of Linné in his court dress. It is a striking likeness and a beautiful work of art. It is not signed; the artist seldom signed his portraits, but those acquainted with his works are satisfied that this was painted by Lundberg.

Mr. Olof Wijk purchased the painting at the sale in 1888 of the collections of Mr. Bomans, who obtained it from a descendant of Linné. Considerable doubt has been entertained as to this being a portrait of Linné at all. I am, however, able to present some evidence which appears to me to establish that it is a genuine portrait. In the collection of the Linnean portraits in the Royal Library, Stockholm, there is a lithograph by Carl Schroeder, which suggested to me Lundberg's pastel. The lithograph was lettered "Carl von Linnée . . . Das Original-Gemälde befindet sich im Herzoglichen Museum zu Braunschweig." That I might see this painting I went to Brunswick, and found that the painting was a copy of Lundberg's pastel. The entry in the official catalogue stated that this portrait of Linné was a "Brustbild vermutlich nach einen Pastell gemalde von G. Lundberg." I have no doubt that this is so, and that the original is in the possession of Mr. Wijk.

The Society is indebted to Mr. Wijk for an excellent photograph of this fine portrait. The photograph includes the old frame of the pastel on which are carved the initials of Linné's name.

VII. 1755. Scheffel.

In 1755 J. H. Scheffel, a portrait-painter in Sweden during the first half of the eighteenth century, painted a portrait of Linné when he was 48 years of age. The original painting is at Hammarby. It is a half length (30½ inches by 25), the face is turned to the left, but the eyes look towards the spectator. In his right hand he holds a *Linnæa*, and the cross of the Polar Star is attached to his coat. On the back of the canvas is written "Carol. Linnaeus. Archiator [*sic*], Professor Upsaliensis, Eques de Stella Polari, nat: 1707 Maij 13. delineatus 1755." In the accurate engraving by I. M. Preisler it is said that his age when the portrait was taken was 55; this is an error.

Dr. Fridr. Ohren of Jerfso, in the province of Helsingland, has a portrait which is claimed to be the original. His wife is a lineal descendant of Linné. It is a copy of Scheffel's painting, and it is not at all likely that it was the work of that painter. The copy has a softer and somewhat meaningless face.

Another copy of Scheffel's portrait was presented to the Smaalands Nationshus, Upsala, by Dr. Nordstedt in 1822. In his history of the Smaalands Nationshus, Palmberg says that this is a copy of Scheffel's picture at Hammarby, and a very poor copy it is.

VIII. 1773. Inlander.

By command of the King a profile model in wax of Linné was made by Carl Fridr. Inlander in 1773. This medallion is preserved in the house at Hammarby. On the back of it is inscribed in the handwriting of Linné:—

"Carl v. Linné.
1773. Aug. 17.
Carl Fridr. Inlander
bor i Stockholm Giöthgatan;
Glasmastare Skiöld."

The last three lines were kindly translated for me by Dr. Skottsberg (July 5, 1906)—

Carl Fridr. Inlander
lives in Stockholm, Giöthgatan;
[at] Glassmaker Skiöld.

This must be considered the original portrait, but Inlander produced two replicas: one of these is in the possession of the Royal Academy of Sciences, Stockholm, and the other was presented to the Linnean Society by Sir Joseph Banks on the 2nd February 1790, and is now hanging in our library. These medallions are all certainly by Inlander, and may therefore be looked upon as equally authentic portraits. In a letter from Linné, written on the day after Inlander finished the medallion, he says that Inlander "has modelled me in wax so skilfully that all say they had never seen anything more skilfully done or more like me."

The reproduction in the royal medal by Liungberger, which was issued in 1778, is far from satisfactory.

Prof. Tullberg has a silhouette reduced to about two-thirds of the original and looking to the left.

The alabaster medallion presented to the Linnean Society by the Medical Society of Stockholm is a reproduction of Inlander's portrait.

The beautiful Wedgwood Cameo was no doubt reproduced from the Inlander medallion in the possession of the Society.

IX. 1774. Krafft.

In the following year, 1774, Per Krafft, a famous Swedish painter, and member of the Stockholm Academy, painted a portrait of Linné for the College of Physicians in Stockholm (formerly Sundhets Collegium, now Medicinalen Styrdsens), to be placed on the wall of their meeting-room as one of the founders of the College. It is a half-length, nearly full face but turned very little to the left, with the eyes directed towards the spectator. The left hand rests on the back of an octavo volume, holds a plant of *Linnæa*, and partly covers the cross of the Polar Star. The portrait was for some years at the College of Physicians, and was engraved by Akrel in 1797, while it was still there. In March 1890 Prof. Thöre M. Fries informed me that the portrait existed

no more at the College, and where it was gone no one knew. When I visited the College in 1891, the Secretary showed me Eichhorn's catalogue of the portraits in their possession. Under Linnæus by Krafft, it was said that the painting had been lost and it was not known where it now was. I afterwards, with the kindly help of the late Baron Nordenskjöld, made a careful examination of the portraits of Linné at the Royal Academy of Sciences. The well-known portrait presented by the artist, Roslin, to the Academy had the best position on the wall; above it was a copy of the oil-painting belonging to the Zoological Society of Amsterdam, a three-quarters reproduction after the Clifford portrait. Above that, high on the wall, was a portrait which I recognized to be like the engravings of Krafft's painting. I suggested that it might be the lost picture that had belonged to the Medical College. The Baron had it brought down from the wall, and on careful examination we found it was signed and dated "Krafft 1774," and on the back of the canvas was written "Carl v. Linné 1774 ætat. 67." There could be no doubt that this was the lost painting.

Linné had his first paralytic stroke in May 1774, which obliged him to relinquish the more active part of his professorial duties, and to close his literary labours. The portrait exhibits no traces of this malady, and was probably painted before May.

Krafft's portrait may have been in the possession of the Academy of Sciences before 1833, for Adam Afzelius, in his "Egenhändiga Anteckningar af Linnæus" published in that year, says (p. 67) that the Royal Academy had Linné's portrait painted to put among its founders, likewise the medallion Akrell had previously made in wax, both very like. But Inlander, not Akrell, was the artist of the medallion. The reference to the portrait may be that of Roslin, but that was not painted for the Academy but was presented to it. If for Royal Academy we substitute Medical College, the statement would apply to Krafft's portrait. But one cannot say from the defective and erroneous statement what Afzelius really meant.

The Linnean Society owes to the generosity of the Royal Academy of Sciences, Stockholm, a faithful reproduction of Krafft's beautiful portrait.

There has just been published an admirable collotype, two-thirds the size of the original, reproduced by J. Cederquist of Stockholm.

There is at the Medical College a copy by John von Breda of this portrait. It is very softly painted; the wrinkles and warts on the face have been omitted. There are also some modifications in the details,—the necklace (?) is tied in a single knot, and the left hand holding the *Linnæa* rests on the page of an open book.

Magnus Hallman, described as a student of Linné, made several copies of Krafft's portrait. Two of these are to be found in the house of Linné at Hammarby. Both are very poor reproductions. One is not signed, the other has on the back of the canvas "Magn. Hallman pinxit 1769." I have no doubt that both of them are posthumous portraits based chiefly on Krafft, but with suggestions

from Roslin and from the engravings after Ehrensverd which appeared in some of Linné's works. The mysterious mass of paint making the portrait appear as if springing out of a cloud, was probably suggested by the academic gown which appears in these engravings.

The small portrait by Hallman, presented to the Society by its former President, Lord Avebury, is a more creditable work. It seems to be influenced more by Roslin than by Krafft.

What appears to me to be a portrait based on the signed painting by Hallman at Hammarby is in the possession of Prof. Tullberg, Upsala. It has no history and the painter is unknown. The artist has tried to get rid of the poor work of Hallman, and has produced a more intellectual looking face, but the features are not those one is familiar with in the authoritative portraits by Scheffel, Inlander, Krafft, and Roslin. The face is shorter and broader than that of Linné, and the nose is too much improved. The cloud-like gown is also introduced.

Prof. Tullberg has a small water-colour portrait which has much in common with his large portrait. It was "delin. 1747" by N. P. Petræus, but it represents a much older man than Linné in his fortieth year.

X. 1775. Roslin.

The best known portrait of Linné is that painted by Alexander Roslin in 1775. Roslin was a Swede, born in 1718. He studied in Germany and Italy, and settled in Paris in 1752. He visited Sweden in 1774–75, when he painted portraits of the Royal family and also one of Linné. He died in 1793, being 60 years old.

The portrait of Linné was taken to Paris to finish, and was there engraved by Bervie, under the superintendence of Roslin, at the expense of the Stockholm Academy. The painting was presented by the artist to the Academy in 1779. It is not quite a half-length. The face is turned a little to the left and the eyes look on the spectator. The principal wart is shown on the right cheek on a line with the mouth. The queue of the wig rests on the right shoulder. The lower arm of the cross of the Polar Star has the extremity cut off, and the *Linnæa* rises from the button-hole which carries the ribbon of the cross.

The face was not reversed in Bervie's engraving, but the dress was modified to retain the cross of the Polar Star and the *Linnæa* on the left side.

Roslin painted a replica which he presented to the widow of Linné, who sold it to King Gustaf III., and it was placed by him in the Castle of Gripsholm, where it still remains. I had obtained a photograph of this portrait, which showed it to be an oval. This however is the work of the photographer; the painting in size and in every way agrees with that in the possession of the Academy. On the back of the canvas is written "Carol. v. Linné. natus 1707 Maij 13. delineavit 1775."

Archbishop von Troil commissioned Laurenz Pasch, the younger, to paint for him a portrait of Linné. He copied the Roslin in the Academy, but made his painting a three-quarters length. Linné is seated at a table on which his left hand rests holding a plant of *Linnæa*, which is left out from his coat. The right hand rests on his knee. This painting was presented by the Archbishop to Sir Joseph Banks in acknowledgment of certain civilities shown by Sir Joseph to his son. It was bequeathed to Robert Brown, who presented it to the Linnean Society in 1853; it now hangs in the Library. While it carefully reproduces the likeness by Roslin, the additions which Pasch has made converts Roslin's portrait into a fine picture, and in it the Society possesses the most beautiful memorial of the illustrious naturalist whose name it bears.

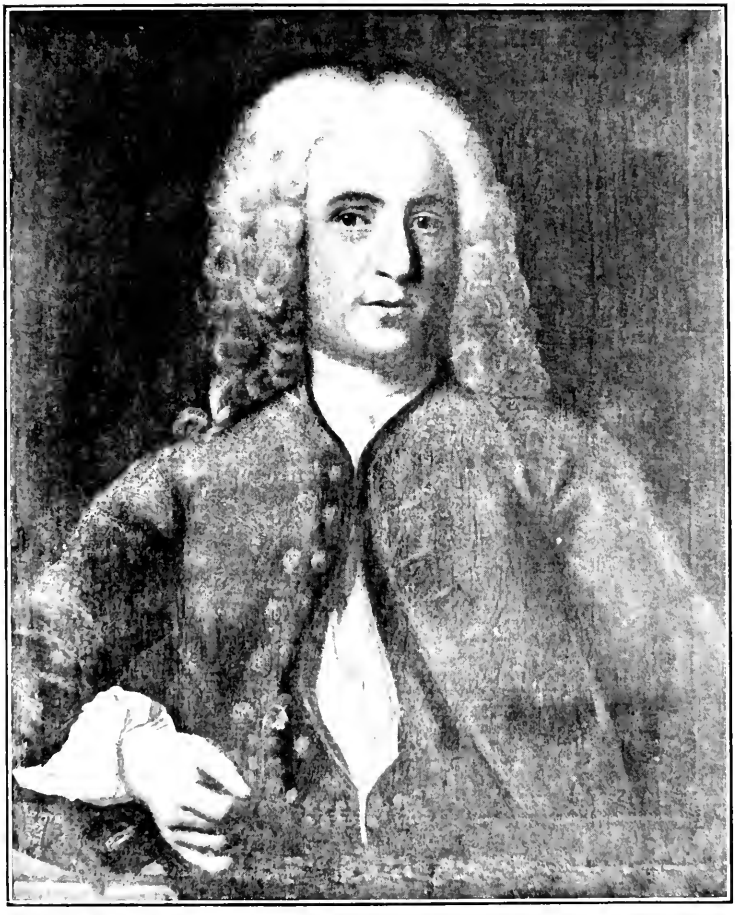
The Society has in its possession another painting from the Roslin portrait, presented to the Society in 1814 by Joseph Sabine, one of the original Fellows of the Society. For many years it hung in the meeting-room behind the President's chair, but has been displaced by the reproduction of the Krafft portrait recently presented to the Society. This portrait has no claim to be original. Nothing is known of its history before it came into the possession of the Society. It is without doubt a reproduction in oil of Bervie's or Alix's engraving from Roslin's painting.

The following list gives the materials in the possession of the Linnean Society bearing on the original portraits of Linné:—

1. **1737.** 30 years old. Hoffman. Photograph of the original painting in the house of Mr. Clifford, Nieuwetsluys, Holland.
2. **1739.** 32 years old. J. H. Scheffel. Photograph of the original painting in Linné's house, Hammarby.
3. **1740.** 33 years old. Au. Ehrensverd. Print from the original plate in the possession of Baron Lewenhaupt, Upsala.
4. **1747.** 40 years old. J. E. Rehn. Full-length facsimile. Original lost, belonged to Rt. Hon. H. W. W. Wynne in 1830.
5. **1747.** 40 years old. J. E. Rehn. Profile facsimile. It is not known where the original is.
6. **1752.** 45 years old. G. Lundberg. Photograph of the original pastel in the house of Mr. Olof Wijk, Gothenburg.
7. **1755.** 48 years old. J. H. Scheffel. Photograph of the original painting in Linné's house, Hammarby.
8. **1773.** 66 years old. C. F. Inlander. Replica of the original medallion, presented by Sir Joseph Banks, 1790.
9. **1774.** 67 years old. P. Krafft. Photograph of the original painting, and copy in oil of the original, presented by the Royal Swedish Academy of Sciences, Stockholm.

CARL VON LINNÉ.

From the original by M. Hoffman in the possession of Mr. Clifford, Nieuwetsluys.



CARL VON LINNÉ.

From the original by J. Scheffel. In Linné's house at Hammarby.

Fig. 1.

From the engraving by Ehrensverd.
"Amica manu sc."

Fig. 2.

From the small painting belonging to
Prof. Tullberg, Upsala.

Fig. 3.

From the lithograph of J. E. Rehn's sketch.
The original is lost.

Fig. 4.

From the facsimile of J. E. Rehn's sketch.

CARL VON LINNÉ.

From the original by G. Lundberg in the possession of Mr. Olof Wijk, Gothenburg.

CARL VON LINNE.

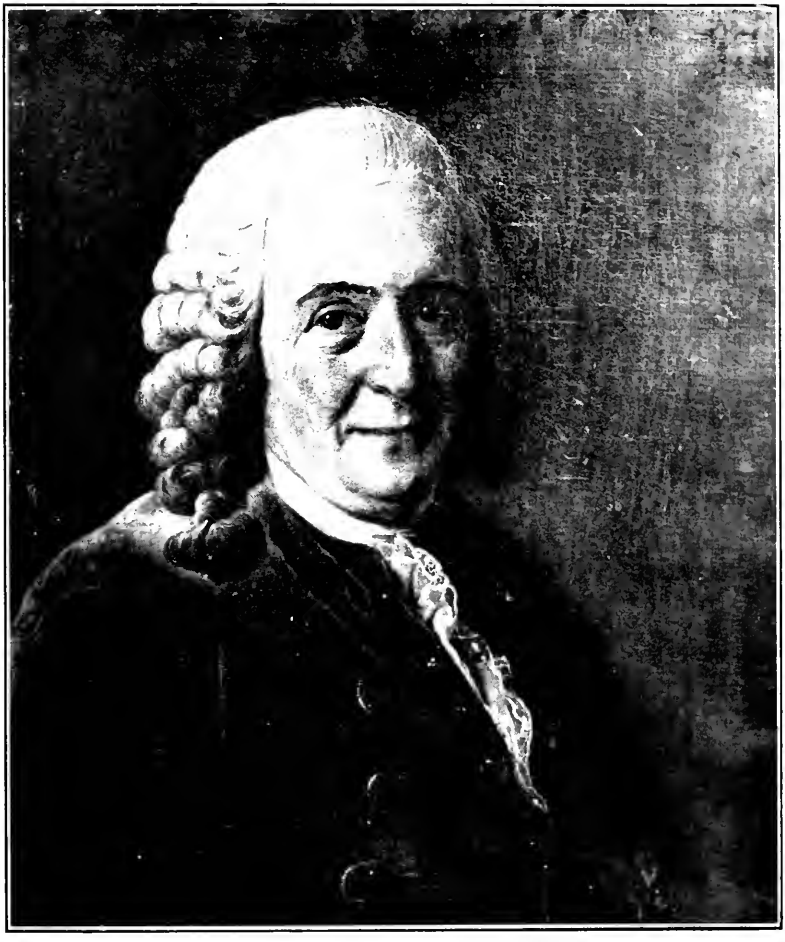
From the original by J. Scheffel. In Linné's house at Hammarby.

CARL VON LINNÉ.

From the original by C. F. Inlander, at the Linnean Society, London.

CARL VON LINNÉ.

From the original by P. Krafft sen., at the Royal Swedish Academy of Sciences, Stockholm.



CARL VON LINNÉ.

From the original by A. Roslin at the Royal Swedish Academy of Sciences, Stockholm.

10. **1775.** 68 years old. A. Roslin. Photograph of the original painting, and copy in oil of the original, presented by the Royal Swedish Academy of Sciences, Stockholm. And copy by Pasch of the original, presented by Robert Brown, 1853.

A list of the published engravings and lithographs of Linné will be found in the 'Proceedings' of the Society, Session 1888-9, pp. 28–30. This was chiefly based on a collection I made, which was presented to the Society.

EXPLANATION OF PLATES.

CARL von LINNÉ.

All these reproductions present the same aspect of face and figure as the original paintings or engravings from which they have been taken.

PLATE 1.

From the original by M. Hoffman in the possession of Mr. Clifford, Nieuwetsluys.

PLATE 2.

From the original by J. Scheffel. In Linné's house at Hammarby.

PLATE 3.

Fig. 1. From the engraving by Ehrensverd, "Amica manu sc."
Fig. 2. From the small painting belonging to Prof. Tullberg, Upsala.
Fig. 3. Full length; from the lithograph of J. E. Rehn's sketch. The original is lost.
Fig. 4. Profile bust; from the facsimile of J. E. Rehn's sketch.

PLATE 4.

From the original by G. Lundberg in the possession of Mr. Olof Wijk, Gothenburg.

PLATE 5.

From the original by J. Scheffel. In Linné's house at Hammarby.

PLATE 6.

From the original by C. F. Inlander, at the Linnean Society, London.

PLATE 7.

From the original by P. Krafft, sen., at the Royal Swedish Academy of Sciences.

PLATE 8.

From the original by A. Roslin at the Royal Swedish Academy of Sciences.

BENEFACTIONS.

LIST *in accordance with Bye-Laws, Chap.* XVII. *Sect.* 1, *of all Donations of the amount or value of Twenty-five pounds and upwards.*

1790.

The Rt. Hon. Sir Joseph Banks, Bart.
Cost of Copper and engraving of the plates of the first volume of Transactions, 20 in number.
The same: Medallion of C. von Linné, by Inlander.

1796.

The same: a large collection of books.

1800.

Subscription towards the Charter, £295 4*s.* 6*d.*
Claudius Stephen Hunter, Esq., F.L.S. (Gratuitous professional services in securing the Charter.)

1802.

Dr. Richard Pulteney.
His collections, and £200 Stock.
Aylmer Bourke Lambert, Esq.
Portrait of Henry Seymer.

1804.

Sir Joseph Banks, Bart.
His collection of Insects.

1807.

Richard Anthony Salisbury, Esq.
Portrait of D. C. Solander, by J. Zoffany.

1811.

Sir Joseph Banks, Bart.
His collection of Shells.
Mrs. Pulteney.
Portrait of Dr. R. Pulteney, by S. Beach.

1814.

Joseph Sabine, Esq.
Portrait of C. von Linné, after Roslin, reversed.
Dr. John Sims.
Portrait of Dr. Trew.

1818.

Subscription of £215 6*s.* for Caley's Zoological Collection.

1819.

The Medical Society of Stockholm.
A medallion of Linnæus in alabaster.

1822.

Bust of Sir Joseph Banks, by Sir F. Chantrey, R.A.
Subscription of the Fellows.

1825.

The late Natural History Society.
£190, 3½ Stock.
Bust of Sir James Edward Smith, P.L.S., by Sir F. Chantrey, R.A., by Subscribers.

1829.

Subscription for the purchase of the Linnean and Smithian Collections, £1593 8*s*.

1830.

Sir Thomas Grey Cullum, Bart.
£100 Bond given up.

1832.

The Honourable East India Company.
East Indian Herbarium.

1833.

Subscription for Cabinets and mounting the East Indian Herbarium, £315 14*s*.

1835.

Subscription portrait of Robert Brown, by H. W. Pickersgill, R.A.

1836.

Subscription portrait of Edward Forster, by Eden Upton Eddis.
Subscription portrait of Archibald Menzies, by E. U. Eddis.

1837.

Subscription portrait of Alexander MacLeay, by Sir Thomas Lawrence, P.R.A.

1838.

Collections and Correspondence of Nathaniel John Winch.
Portrait of Dr. Nathaniel Wallich, by John Lucas, presented by Mrs. Smith, of Hull.

1839.

Subscription portrait of William Yarrell, by Mrs. Carpenter.

1842.

David Don: herbarium of woods and fruits.
Archibald Menzies: bequest of £100, subject to legacy duty.
Portrait of John Ebenezer Bicheno, by E. U. Eddis, presented by Mr. Bicheno.

1843.

Subscription in aid of the funds of the Society, £994 3*s*.

Subscription portrait of Sir William Jackson Hooker, by S. Gambardella.

1845.

Microscope presented by Subscribers.

1846.

Joseph Janson: £100 legacy, free of duty, and two cabinets.

1847.

[Bequest of £200 in trust, by Edward Rudge; declined as set forth in Proceedings, i. pp. 315–317.]

1849.

Portrait of Sir J. Banks, Bart., by T. Phillips, R.A., presented by Capt. Sir E. Home, Bart., R.N.

1850.

Subscription portrait of the Rt. Rev. Edward Stanley, D.D., Bishop of Norwich, by J. H. Maguire.

1853.

Portrait of Carl von Linné, by L. Pasch, presented by Robert Brown.

Pastel portrait of A. B. Lambert, by John Russell, presented by Robert Brown.

1854.

Professor Thomas Bell, £105.

1857.

Subscription portrait of Prof. T. Bell, P.L.S., by H. W. Pickersgill, R.A.

Thomas Corbyn Janson: two cabinets to hold the collection of fruits and seeds.

Pleasance, Lady Smith: Correspondence of Sir J. E. Smith, in 19 volumes.

1858.

Subscription portrait of Nathaniel Bagshaw Ward, by J. P. Knight.

Subscription for removal to Burlington House, £1108 15*s*.

Diary of Carl von Linné, and letters to Bishop Menander, presented by Miss Wray.

Dr. Horsfield's Javan plants, presented by the Court of Directors of the Hon. East India Company.

Dr. Ferdinand von Mueller's Australian and Tasmanian plants, including many types.

1859.

Books from the library of Robert Brown, presented by J. J. Bennett, Sec.L.S.

Robert Brown: two bonds given up, £200.

1861.

Subscription bust of Robert Brown, by Peter Slater.
Collection of birds' eggs, bequeathed by John Drew Salmon, F.L.S.

1862.

The Linnean Club: presentation bust of Prof. T. Bell, by P. Slater.

1863.

Subscription portrait of John Joseph Bennett, by E. U. Eddis.

1864.

Beriah Botfield, Esq.: Legacy, £40 less Duty.

1865.

Executors of Sir J. W. Hooker, £100.
George Bentham, Esq.: cost of 10 plates to his "Tropical Leguminosæ," Trans. vol. xxv.

1866.

Dr. Friedrich Welwitsch: Illustrations of his 'Sertum Angolense,' £130.

1867.

George Bentham, Esq.: General Index to Transactions, vols. i.–xxv.
Royal Society: Grant in aid of G. S. Brady on British Ostracoda, £80.

1869.

Carved rhinoceros horn from Lady Smith, formerly in the possession of C. v. Linné.

1874.

Subscription portrait of George Bentham, by L. Dickinson.
George Bentham, Esq., for expenditure on Library, £50.

1875.

Legacy from James Yates, £50 free of Duty.
,, ,, Daniel Hanbury, £100 less Duty.

1876.

Legacy of the late Thomas Corbyn Janson, £200.
,, ,, ,, Charles Lambert, £500.
George Bentham, Esq.: General Index to Transactions, vols. xxvi.–xxx.

1878.

Subscription portrait of John Claudius Loudon, by J. Linnell.
Subscription portrait of Rev. Miles Joseph Berkeley, by James Peel.

1879.

Rev. George Henslow and Sir J. D. Hooker: Contribution to illustrations, £35.

1880.

The Secretary of State for India in Council: cost of setting up Dr. Aitchison's paper, £36.

1881.

George Bentham, Esq., special donation, £25.
The same: towards Richard Kippist's pension, £50.
Portrait of St. George Jackson Mivart, by Miss Solomon; presented by Mrs. Mivart.

1882.

Executors of the late Frederick Currey: a large selection of books.
Subscription portrait of Charles Robert Darwin, by Hon. John Collier.
The Secretary of State for India in Council: Grant for publication of Dr. Aitchison's second paper on the Flora of the Kurrum Valley, £60.

1883.

Sir John Lubbock, Bart. (afterwards Lord Avebury).
Portrait of C. von Linné, ascribed to M. Hallman.
Philip Henry Gosse, Esq.: towards cost of illustrating his paper, £25.
Royal Society: Grant in aid of Mr. Gosse's paper, £50.
Sophia Grover, Harriet Grover, Emily Grover, and Charles Ehret Grover: 11 letters from C. von Linné to G. D. Ehret.

1885.

Executors of the late George Bentham, £567 11*s.* 2*d.*
Subscription portrait of George Busk, by his daughter Marian Busk.

1886.

A large selection of books from the library of the late Spencer Thomas Cobbold (a bequest for a medal was declined).
Sir George MacLeay, Bart.: MSS. of Alexander MacLeay and portrait of Rev. William Kirby.

1887.

William Davidson, Esq.: 1st and 2nd instalments of grant in aid of publication, £50.
Francis Blackwell Forbes, Esq., in aid of Chinese Flora, £25.

1888.

The Secretary of State for India in Council: Grant in aid of publication of results of the Afghan Boundary Delimitation Expedition, £150.
Dr. J. E. T. Aitchison, towards the same, £25.
Trustees of the Indian Museum: Mergui Archipelago report, for publication in Journal, £135.
Dr. John Anderson, for the same, £60.
Wm. Davidson, Esq.: 3rd and last instalment, £25.

1889.

Bronze copy of model for Statue of C. von Linné, by J. F. Kjellberg; presented by Frank Crisp, Esq.

1890.

The Secretary of State for India in Council: Grant for Delimitation Expedition report, £200.

Oak table for Meeting Room, presented by Frank Crisp, Esq.

Subscription portrait of Sir Joseph Dalton Hooker, K.C.S.I., by Hubert Herkomer, R.A.

Executors of the late John Ball, Esq.: a large selection of books.

An anonymous donor, £30.

Colonel Sir Henry Collett, K.C.B., towards the publication of his Shan States collections, £50.

1891.

Subscription portrait of Sir John Lubbock, Bart. [Lord Avebury], by Leslie Ward.

George Frederick Scott Elliot, Esq., towards cost of his Madagascar paper, £60.

1892.

Dr. Richard Charles Alexander Prior: projection lantern, £50.

1893.

Executors of Lord Arthur Russell: his collection of portraits of naturalists.

Electric light installation: cost borne by Frank Crisp, Esq.

1894.

Algernon Peckover, Esq., Legacy, £100 free of Duty.

Miss Emma Swan, "Westwood Bequest," £250.

1896.

Clock and supports in Meeting Room, presented by Frank Crisp, Esq.

1897.

William Carruthers, Esq.: Collection of engravings and photographs of portraits of Carl von Linné.

Royal Society: Grant towards publication of paper by the late John Ball, £60.

Subscription portrait of Professor George James Allman, by Marian Busk.

1898.

Sir John Lubbock, Bart.: Contribution towards his paper on Stipules, £43 14*s.* 9*d.*

Royal Society: Contribution towards Cole's paper, £50.

,, ,, ,, ,, Murray & Blackman's paper, £80.

,, ,, ,, ,, Elliot Smith's paper, £50.

,, ,, ,, ,, Forsyth Major's paper, £50.

1899.

A. C. Harmsworth, Esq.: Contribution towards cost of plates, £43.
Royal Society: Contribution towards Mr. R. T. Günther's paper on Lake Urmi, £50.

1901.

Hon. Charles Ellis, Hon. Walter Rothschild, and the Bentham Trustees: The Correspondence of William Swainson.
Royal Society: Contribution towards F. Chapman's paper on Funafuti Foraminifera, £50.
Prof. E. Ray Lankester: Contribution towards illustration, £30 5*s*.
Portrait of St. G. J. Mivart; presented by Mrs. Mivart.

1903.

Royal Society: Contribution toward Elliot Smith's paper, £50.
Legacy from the late Dr. R. C. A. Prior, £100 free of duty.
Mrs. Sladen: Posthumous Portrait of the late Walter Percy Sladen, by H. T. Wells, R.A.
B. Arthur Bensley: Contribution to his paper, £44.

1904.

Royal Society: Grant in aid of third volume of the Chinese Flora, £120.
Supplementary Royal Charter: cost borne by Frank Crisp, Esq.

1905.

Royal Society: First grant in aid of Dr. G. H. Fowler's 'Biscayan Plankton,' £50.
Executors of the late G. B. Buckton, Esq.: Contribution for colouring plates of his paper, £26.

1906.

Royal Society: Second grant to 'Biscayan Plankton,' £50.
Subscription portrait of Prof. S. H. Vines, by Hon. John Collier.
Royal Swedish Academy of Sciences: Copies of portraits of C. von Linné, after Per Krafft the elder, and Alexander Roslin, by Jean Haagen.

ADDITIONS AND DONATIONS

TO THE

LIBRARY

1905–1906.

Achával (Luis). *See* **Río (Manuel E.).** Geografía de la Provincia de Córdoba.

Agricultural (The) Journal of India.
Vol. I., Part 1→ 8vo. *Calcutta*, 1906.

Albert, Honoré Charles (*Prince de Monaco*). Résultats des Campagnes Scientifiques accomplies sur son Yachts [l'*Hirondelle* et la *Princesse-Alice*]. Fascicules 31–32. 4to. *Monaco*, 1905.

XXXI. Description des encéphales de *Grampus griseus* Cuv., de *Steno frontatus* Cuv., et de *Globicephalus melas* Traill, provenant des Campagnes du Yacht *Princesse-Alice*. Par Auguste Petit. (1905.)

XXXII. Mollusques provenant des dragages effectués a l'Ouest de l'Afrique pendant les Campagnes Scientifiques de S. A. S. le Prince de Monaco. Par Philippe Dautzenberg et Henri Fischer. Pp. 125; plates 5. (1906.)

Alcock (Alfred William). Catalogue of the Indian Decapod Crustacea in the Collection of the Indian Museum. Part III. Macrura. Fasciculus I. The Prawns of the *Peneus* Group. *See* **Calcutta: Indian Museum.**

—— *See* **Maldive and Laccadive Archipelagoes.** Marine Crustaceans: Paguridæ.

Ameghino (Florentino). La perforación astragaliana en *Priodontes*, *Canis* (*Chrysocyon*), y *Typotherium*. Pp. 19; figs. 15. (An. Mus. Nac. Buenos Aires, xiii.) 8vo. *Buenos Aires*, 1905.

—— La perforation astragalienne sur quelques Mammifères du Miocène Moyen de France. Pp. 18; figs. 12. (An. Mus. Nac. Buenos Aires, xiii.) 8vo. *Buenos Aires*, 1905.

—— La perforación astragaliana en el *Orycteropus* y el Origen de los Orycteropidæ. Pp. 37; figs. 31. (An. Mus. Nac. Buenos Aires, xiii.) 8vo. *Buenos Aires*, 1905.

—— Enumeración de los impennes fósiles de Patagonia y de la Isla Seymour. Pp. 71; plates 8, figs. 4. (An. Mus. Nac. Buenos Aires, xiii. pp. 97–167.) 8vo. *Buenos Aires*, 1905.

—— Les Edentés fossiles de France et d'Allemagne. Pp. 76; figs. 61. (An. Mus. Nac. Buenos Aires, xiii. pp. 175–250.) 8vo. *Buenos Aires*, 1905. **Author.**

Andrews (Charles William). *See* **British Museum.** Fossils. A Descriptive Catalogue of the Tertiary Vertebrata of the Fayûm Egypt.

Antarctique Expédition Belge. *See* **Belgica.**

Aquila: a Periodical of Ornithology. Edited by Otto Herman. Vols. XI., XII. 4to. *Budapest*, 1904–1905.

Arber (Edward Alexander Newell). *See* **British Museum.** Fossils. Catalogue of the Fossil Plants of the *Glossopteris* Flora in the Depart. of Geology, British Museum (Natural History).

Archiv für Hydrobiologie und Planktonkunde. Herausgegeben von Dr. Otto Zacharias.
Band I.→ 8vo. *Stuttgart*, 1905–1906.

Arens (C.). Observations on the Spawning Season of the Rainbow Trout. Pp. 5. (Rept. Fisheries Ireland, Sci. Investig., 1904, vii.) 8vo. *Dublin*, 1906.

Australian Naturalist. Journal and Magazine of the New South Wales Naturalists' Club.
Vol. I., Part 1→ 8vo. *Sydney, N.S.W.*, 1906.

Avebury (*Right Hon.* **John**, *Lord*). *See* **Lubbock** (*Sir* **John**).

Baldrey (F. S. H.). *See* **Journal of Tropical Veterinary Science.**

Banker (Howard James). A Contribution to a Revision of the North-American Hydnaceæ. Pp. 96. (Mem. Torrey Bot. Club, xii.) 8vo. *New York*, 1906.

Bastian (Henry Charlton). The Nature and Origin of Living Matter. Pp. 344; plates 32. 8vo. *London*, 1905. **Author.**

Bell (Francis Jeffrey). *See* **Maldive and Laccadive Archipelagoes.** Actinogonidiate Echinoderms.

Beneden (Pierre Joseph van). Mémoire sur les Vers Intestinaux. Pp. viii, 376; avec 27 planches. 4to. *Paris*, 1858.
N. H. W. Maclaren.

Berg (L. S.). On the Distribution of *Cottus pœcilopus*, Heck., in Siberia. Pp. 17. (Trav. Sous-Section Troïtskosawsk-Kiakhta, Soc. Impér. Russe Géographique, vii. Livr. 1, pp. 78–92.)
8vo. *St. Petersburg*, 1905. **Author.**

Bergh (Rudolph). Die Opisthobranchiata der Siboga-Expedition. *See* **Siboga-Expeditie.** Monogr. L.

Bibliotheca Botanica (*continued*).

Heft 63. Lohauss (Karl). Der anatomische Bau der Laubblätter der Festucaceen und dessen Bedeutung für die Systematik. Pp. vi, 114; mit 16 Tafeln. 1905.

Bibliotheca Zoologica (*continued*).

Band XIX. Heft 45, Liefg. 1. Fischer (Guido). Vergleichend-anatomische Untersuchungen über den Bronchialbaum der Vögel. Pp. 45; mit 5 Tafeln und 2 Textfiguren. 1905.
,, ,, 46[1]. Wagner (M.). Psychobiologische Untersuchungen an Hummeln. 1906.
,, ,, 47. Kupelwieser (Hans). Untersuchungen über den feineren Bau und die Metamorphose des *Cyphonautes*. Pp. 50; plates 5. 1906.
,, ,, 48. Borcherding (Friedrich). Achatinellen-Fauna der Sandwich-Insel Molokai, &c. Pp. 195; Taf. 10, and Map. 1906.

Biehringer (Joachim). Beiträge zur Anatomie und Entwicklungsgeschichte der Trematoden. Inaugural-Abhandlung. Pp. 26. (Arb. zool.-zoot. Inst. Würzburg, vii.)
8vo. *Wiesbaden*, 1884. **N. H. W. Maclaren.**

Bohny (Paul). Beiträge zur Kenntnis des Digitalisblattes und seiner Verfälschungen mit Berücksichtigung des Pulvers. Inaugural-Dissertation. Pp. 61; plates 3. 8vo. *Basel*, 1906.
Dr. Hans Schinz.

Bolus (Harry). Contributions to the African Flora. Pp. 18. (Trans. South Afric. Phil. Soc. xvi.)
8vo. *Cape Town*, 1905. **Author.**

—— Sketch of the Floral Regions of South Africa. Pp. 42, and Map. (Science in South Africa, Aug. 1905.)
8vo. *Cape Town*, 1905. **Author.**

Boman (E.). Deux *Stipa* de l'Amérique du Sud développant de l'acide cyanhydrique. Pp. 7. (Bull. Mus. d'Hist. Nat. 1905, no. 5, p. 337.) 8vo. *Paris*, 1905. **Author.**

Bonnier (Gaston) et Sablon (Leclerc du). Cours de Botanique. Vol. I. Pp. 1328; figs. 2389. 8vo. *Paris*, 1901–1905.

Borcea (I.). Recherches sur les système uro-genital des Elasmobranches. Pp. 288; plates 2, figs. 103. (Arch. Zool. Expér. 4 ser. iv.) 8vo. *Paris*, 1906.

Borcherding (Friedrich). Achatinellen-Fauna der Sandwich-Insel Molokai, nebst einem Verzeichnis der übrigen daselbst vorkommenden Land- und Süsswassermollusken. Pp. 195; Taf. 10, and Map. (Zoologica, Heft 48.) 4to. *Stuttgart*, 1906.

Borger (Adolf). *See* **Plankton-Expedition.** Die Tripyleen Radiolarien: Atlanticellidæ.

Borgström (Ernst). Ueber *Echinorhynchus turbinella*, *brevicollis*, und *porrigens*. Pp. 60; Taf. 5. (Bih. K. Sv. Vet.-Akad. Handl. xvii. Afd. iv. no. 10.) 8vo. *Stockholm*, 1892.
N. H. W. Maclaren.

Borradaile (Lancelot Alexander). *See* **Maldive and Laccadive Archipelagoes.** Hydroids.

—— —— Land Crustaceans.

—— —— Marine Crustaceans.

Bose (Jagadis Chunder). Plant Response as a Means of Physiological Investigation. Pp. xxxviii, 781; figs. 278.
8vo. *London*, 1906. **Frank Crisp.**

Bouvier (Eugène L.). Monographie des Onychophores. Pp. 383; plates 13, figs. 140. (Ann. Sci. Nat., Zool. 9 ser. ii.)
8vo. *Paris*, 1905.

—— *See* **Gruvel (Abel).** Monographie des Cirrhipèdes ou Thécostracés.

British Association for the Advancement of Science. Report (South Africa), 1905. 8vo. *London*, 1906.
Council Brit. Assoc.

British Museum (*continued*).

INSECTS.

Homopterous Insects.

A Synonymic Catalogue of Homoptera. By W. L. DISTANT. Pp. 207. 8vo. *London*, 1906.

ANTHOZOA.

Catalogue of the Madreporarian Corals in the British Museum (Natural History). Vol. V. The Family Poritidæ.—II. The Genus *Porites*. Part I. Porites of the Indo-Pacific Region. By HENRY M. BERNARD. Pp. vi, 303; plates 35. 1905.

FOSSILS.

A Descriptive Catalogue of the Tertiary Vertebrata of the Fayûm, Egypt. By CHARLES WILLIAM ANDREWS. Pp. xxxvii, 324; figs. 98, plates 27. 4to. *London*, 1906.

Catalogue of the Fossil Plants of the *Glossopteris* Fauna in the Department of Geology, British Museum (Natural History). Being a Monograph of the Permo-Carboniferous Flora of India and the Southern Homisphere. By EDWARD ALEXANDER NEWELL ARBER. Pp. lxxv, 255; plates 8. 1905.

Britten (James). "Botany in England." Being some Comments on Prof. F. W. Oliver's Address so entitled delivered to the Botanical Section of the British Association at York, 1906. Pp. 5. (Journ. Bot. vol. xliv. pp. 310–314.)
8vo. *London*, 1906. **Author.**

Brooklyn.

Brooklyn Institute of Arts and Sciences.

Cold Spring Harbor Monographs. No. 6.
8vo. *Brooklyn*, 1906.

6. WALTER (HERBERT E.). The Behaviour of the Pond Snail, *Lymnæus elodes*, Say. Pp. 35. (1905.)

Browne (Edward T.). *See* **Maldive and Laccadive Archipelagoes.** Hydromedusæ.

—— —— Scyphomedusæ.

Bruce (Alexander). *See* **Wright (Herbert).** Para Rubber in Ceylon.

Buchanan (Francis). *See* **Prain (David).** A Sketch of the Life of Francis Hamilton (once Buchanan).

Buchenau (Franz). Juncaceæ. Pp. 284, figs. 121; mit 777 Einzelbildern. *See* **Engler (H. G. A.).** Das Pflanzenreich etc. Heft 25 (iv. 36). 8vo. *Leipzig*, 1906.

Budapest. *See* **Aquila.**

Bürger (Otto). *See* **Berlin**—Das Tierreich. Liefg. 20. Platyhelminthes: Nemertini.

Buitenzorg.

Département de l'Agriculture aux Indes Néerlandaises.

Bulletin, Nos. 1–3. 8vo. *Buitenzorg*, 1906.

Buitenzorg (*continued*).

's Lands Plantentuin.

Icones Bogorienses. Vols. I.–II. fasc. 1.
8vo. *Batavia, Leide*, 1897–1903.

Bulawayo.

Rhodesia Scientific Association.

Proceedings, Vols. I.–V. Part 1.
8vo. *Bulawayo*, 1903–1905. **Dr. P. L. Sclater.**

Bullen (Robert Ashington). Land and Fresh-water Mollusca from Sumatra. Pp. 5; plate 1. (Proc. Malacol. Soc. vii. Part. 1.)
8vo. *London*, 1906.

—— Holocene Deposit at Harlton. Pp. 3, fig. 2. (Proc. Malacol. Soc. vii. Part 2.) 8vo. *London*, 1906.

—— Microzoa and Mollusca from East Crete. Pp. 5; plates 5. (Geol. Mag., n. s. Decade 5, vol. iii. pp. 353–358.)
8vo. *London*, 1906. **Author.**

Burgess (Edward Sandford). Studies in the History and Variations of Asters. Part II. Species and Variations of Biotian Asters, with Discussion of Variability in *Aster*. Pp. xv, 419; plates 13, figs. 108. (Mem. Torrey Bot. Club, xiii.)
8vo. *New York*, 1906.

Burr (Malcolm). *See* **Maldive and Laccadive Archipelagoes.** Orthoptera.

Buttel-Reepen (H. von). Zur Kenntniss der Gruppe des *Distomum clavatum*, insbesondere des *Dist. ampullaceum* und des *Dist. Siemersi*. Pp. 72; plates 5. (Zool. Jahrb., Abt. Syst. xvii.)
8vo. *Jena*, 1902. **N. H. W. Maclaren.**

Byrne (L. W.). *See* **Holt (Ernest W. L.).** First Report on the Fishes of the Irish Atlantic Slope.

Calcutta.

Asiatic Society of Bengal.

Memoirs, Vol. I. 4to. *Calcutta*, 1905–1906.

Indian Museum.

Catalogue of the Indian Decapod Crustacea in the Collection of the Indian Museum. Part III. Macrura. Fasciculus 1. The Prawns of the *Peneus* Group. By A. Alcock. Pp. ii, 55: plates 9. 4to. *Calcutta*, 1906.

Calman (William Thomas). The Cumacea of the Siboga Expedition. *See* **Siboga-Expeditie**, Livr. 23.

Cameron (Peter). *See* **Maldive and Laccadive Archipelagoes.** Hymenoptera.

Campbell (Douglas Houghton). The Structure and Development of Mosses and Ferns (Archegoniatæ). 2nd Edition. Pp. vii, 657. 8vo. *New York & London*, 1905.

Cape Town.

South African Museum.

Report for 1905. fol. *Cape Town*, 1906.

Casado (Manuel). Estudio sobre la enfermedad de los Naranjos y Limoneros de la Provincia de Málaga. Pp. 28.
8vo. *Malaga*, 1886. **Don José Luis A. de Linera.**

Cash (James) and Hopkinson (John). The British Freshwater Rhizopoda and Heliozoa. Vol. I. Rhizopoda. Part I. Pp. x, 148; plates 1–16. (*Ray Society.*) 8vo. *London*, 1905.

Ceylon—Royal Botanic Gardens. *See* **Pérádeniya.**

Chalubinski (Tytus). Enumeratio Muscorum Frondosorum Tatrensium hucusque cognitorum. Pp. viii, 207, and Map.
4to. *Warzawa*, 1886. **Dr. R. Braithwaite.**

Chapman (Frederick). Notes on the older Tertiary Foraminiferal Rocks on the West Coast of Santo, New Hebrides. Pp. 14; plates 4. (Proc. Linn. Soc. N. S. Wales, xxx.)
8vo. *Melbourne*, 1905. **Author.**

—— New or Little-known Victorian Fossils in the National Museum, Melbourne.

Part V. On the Genus *Receptaculites*. With a Note on *R. australis* from Queensland. Pp. 11; plates 3.
Part VI. Notes on Devonian Spirifers. Pp. 4; plate 1.
(Proc. Roy. Soc. Victoria, xviii. pt. 1.)
8vo. *Melbourne*, 1905. **Author.**

Part VII. A new Cephalaspid, from the Silurian of Wombat Creek. Pp. 8; plates 2. (Proc. Roy. Soc. Victoria, N.S. xviii.)
8vo. *Melbourne*, 1906. **Author.**

Collinge (Walter Edward). *See* **Journal of Economic Biology.** Edited by W. E. Collinge.

Colombo—Royal Botanic Gardens. *See* **Pérádeniya.**

Contemporary Science Series. Edited by Havelock Ellis.
8vo. *London*, 1889–1893.

Geddes (P.) and Thomson (J. A.). The Evolution of Sex. (1889).
Weismann (A.). The Germ-Plasm: a Theory of Heredity. (1893.)

Cooper (C. Forster). *See* **Maldive and Laccadive Archipelagoes.** Antipatharia.

—— —— Cephalochorda. Syst. and Anatomical Account.

Corrado (Parona). Di alcuni Elminti raccolti nel Sudan Orientale da O. Beccari e P. Magretti. Pp. 24, Tav. 2. (Ann. Mus. Genova, ser. 2, vol. ii.) 8vo. *Genova*, 1885.
N. H. W. Maclaren.

Coutière (H.). *See* **Maldive and Laccadive Archipelagoes.** Marine Crustaceans—Alpheidæ.

Cristofoletti (Ugo). Studien über *Rheum rhaponticum*. Inaugural-Dissertation. Pp. 63; plates 5. 8vo. *Bern*, 1905.
Dr. Hans Schinz.

Cunnington (William A.). Studien an einer Daphnide, *Simocephalus sima*. Beiträge zur Kenntniss des Centralnervensystems und der feineren Anatomie der Daphniden. Inaugural-Dissertation. Pp. 75; mit 3 Tafeln und 6 Textfiguren. 8vo. *Jena*, 1902. **N. H. W. Maclaren**

Dautzenberg (Philippe). Mollusques provenant des dragages effectués a l'Ouest de l'Afrique pendant les Campagnes Scientifiques de S.A.S. le Prince de Monaco. *See* **Albert.**

Dawe (Morley Thomas). Report on a Botanical Mission through the Forest Districts of Buddu and the Western and Nile Provinces of the Uganda Protectorate. Pp. 63; plates 5, and Map. fol. *London*, 1906. **Author.**

Deane (Ruthven). Letters from William Swainson to John James Audubon. (Hitherto unpublished Letters.) Pp. 11. (The 'Auk,' xxii. pp. 248–258). 8vo. *New York*, 1905. **Author.**

Degen (Arpád von). Ueber das spontane Verkommen eines Vertreters der Gattung *Sibirea* in Südkroatien und in der Hercegovina. Pp. 15. (Ungarische Bot. Blätter, Jahrg. 1905, No. 8/10.) 8vo. *Budapest*, 1905.

De Toni (Giovanni Battista). Sulla *Griffithsia acuta*, Zanard. herb. Pp. 5. (Nuovo Notarisia, xvii.) 8vo. *Padova*, 1905.

—— Sylloge Algarum omnium hucusque cognitarum. Vols I.–IV. Patavii, 1889–1905. Notice of, by MARTIN MÖBIUS. Pp. 3. (Naturwiss. Wochenschr. xx.) 4to. *Jena*, 1905.

—— Sul Reagente di Schweizer. Nota, pp. 4. (Atti R. Ist. Veneto, vol. 65.) 8vo. *Venezia*, 1906. **Author.**

Diels (Ludwig). Die Pflanzenwelt von West-Australien südlich des Wendekreises. Pp. xii, 413, mit 1 Vegetations-Karte und 82 Figuren im Text, sowie 34 Tafeln. (Engler-Drude, Vegetation der Erde, vii.) 8vo. *Leipzig*, 1906.

Distant (William Lucas). *See* **British Museum.** Homopterous Insects. A Synonymic Catalogue of Homoptera.

—— *See* **Maldive and Laccadive Archipelagoes.** Rhynchota.

Dode (L. A.). Extraits d'une Monographie inédite du Genre "*Populus*." Pp. 73, plates 2. (Mém. Soc. d'Hist. Nat. Autun, xviii.) 8vo. *Autun*, 1905. **Author.**

—— Procédés de transport des Graines et des Boutures. Pp. 2. (Rev. Horticole, No. 1.) 8vo. *Orléans*, 1906.

Doncaster (Leonard). *See* **Maldive and Laccadive Archipelagoes.** Chætognatha.

Drabble (Eric). A Note on Vascular Tissue. Pp. 5. (New Phytol. iv.) 8vo. *London*, 1905. **Author.**

Drabble (Eric) and Lake (Hilda). On the Effect of Carbon Dioxide on Geotropic Curvature of the Roots of *Pisum sativum* L. Pp. 8. (Proc. Roy. Soc. B. vol. 76.) 8vo. *London*, 1905. **Authors.**

—— —— The Osmotic Strength of Cell-Sap in Plants growing under different Conditions. Pp. 3. (New Phytol. iv.) 8vo. *London*, 1905. **Authors.**

Dublin.

Department of Agriculture and Technical Instruction for Ireland. Fisheries Branch.

Scientific Investigations:

1902–1903.	Nos. 1, 2, 3, 7, 10, 11.	(1905).
1904.	Nos. 3–7.	(1905–6).
1905.	No. 2.	(1906).

8vo. *Dublin*, 1905–1906. **Authors and Scientific Adviser.**

Royal Zoological Society of Ireland.

Annual Report, 74. 8vo. *Dublin*, 1905.

Dunn (Stephen Troyte). Alien Flora of Britain. Pp. xvi, 208. 8vo. *London*, 1905. **Author.**

Durand (Théophile) and **Jackson (Benjamin Daydon).** Index Kewensis Plantarum Phanerogamarum. Supplementum Primum Nomina et Synonyma Omnium Generum et Specierum ab initio anni 1886 usque ad finem anni 1895 complectens. Fasciculus IV. 4to. *Bruxellis*, 1906. **B. Daydon Jackson.**

Duss (Le R. P.). Flore phanérogamique des Antilles Françaises (Guadeloupe et Martinique) . . . Avec annotations du . . . E. Heckel sur l'emploi de ces Plantes. Pp. xxviii, 656. (Ann. Inst. Colonial Marseilles, iii.) 8vo. *Marseilles*, 1897.

—— Flore Cryptogamique des Antilles Françaises. Pp. 360. 8vo. *Lons-le-Saunier*, 1904.

Duthie (John F.). *See* **Strachey (*Sir* Richard).** Catalogue of the Plants of Kumaon, &c.

Dyer (*Sir* William Turner Thiselton-). *See* **Oliver (D.).** Flora of Tropical Africa.

Eichler (Julius), Gradmann (Robert), und **Meigen (Wilhelm).** Ergebnisse der pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern. I. Pp. 78, mit 2 Karten. (Beilage z. Jahresh. Ver. Vaterl. Naturk. Württemberg. Jahrg. 61.) 8vo. *Stuttgart*, 1905.

Eisig (Hugo). *Ichthyotomus sanguinarius.* Eine auf Aalen schmarotzende Annelide. Pp. xi, 300; mit 10 Taf. und 34 Textfig. *See* **Naples: Zoological Station.** Monogr. xxviii.

Eliot (*Sir* Charles). *See* **Maldive and Laccadive Archipelagoes.** Nudibranchiata.

Elliot (George Francis Scott). A First Course in Practical Botany. Pp. viii, 344, figs. 158. 8vo. *London*, 1906. **Author.**

Engler (Adolf). Das Pflanzenreich. Regni vegetabilis conspectus. . . . . Herausgegeben von A. Engler. Hefte 1–22. 8vo. *Leipzig*, 1900–1905.

—— Syllabus der Pflanzenfamilien. Vierte, umgearbeitete Auflage. Pp. xviii, 237. 8vo. *Berlin*, 1904.

Engler (Adolf) und **Drude (Oscar).** Die Vegetation der Erde. VII. 8vo. *Leipzig*, 1906.

VII. Die Pflanzenwelt von West-Australien südlich des Wendekreises, von Dr. Ludwig Diels. Pp. xii, 413; mit 1 Vegetations-Karte und 82 Figuren im Text, sowie 34 Tafeln. (1906.)

English Men of Science. Edited by JOSEPH REYNOLDS GREEN. 8vo. *London*, 1906.

BENTHAM (GEORGE). By B. DAYDON JACKSON. Pp. xii, 292, and Portrait. (1906.)

B. D. Jackson.

Everett (W. H.). Memorandum on Mechanical Tests of some Indian Timbers. Pp. 7. (Forest Bull. no. 6.)

8vo. *Calcutta*, 1906.

Farlow (William Gilson). Bibliographical Index of North American Fungi. Vol. I. Part 1. (Carnegie Institution of Washington. Public. No. 8.)

8vo. *Washington*, 1905. **Author.**

Federley (Harry). Lepidopterologische Temperatur-Experimente mit besonderer Berücksichtigung der Flügelschuppen. Pp. 117; mit 3 Tafeln und 7 Abbildungen im Text. (Festschrift f. Palmen. no. 16.) 4to. *Helsingfors*, 1905. **Lord Avebury.**

Fischer (Guido). Vergleichend-anatomische Untersuchungen über den Bronchialbaum der Vögel. Pp. 45; mit 5 Tafeln und 2 Textfiguren. (Zoologica, Heft 45, Bd. xix, Liefg. 1.)

4to. *Stuttgart*, 1905.

Fischer (Henri). Mollusques provenant des dragages effectués a l'Ouest de l'Afrique pendant les Campagnes Scientifiques de S. A. S. le Prince de Monaco. *See* **Albert.**

Fischer (Paul Moritz). Ueber den Bau von *Opisthotrema cochleare*, nov. genus, nov. spec. Ein Beitrag zur Kenntnis der Trematoden. Inaugural-Dissertation. Pp. 42. Taf. 1. (Zeitschr. wiss. Zool. Band 40.) 8vo. *Leipzig*, 1883. **N. H. W. Maclaren.**

Fisheries.

North Sea Fisheries Investigation Committee.

FISHERY BOARD FOR SCOTLAND.

Report on Fishery and Hydrographical Investigations in the North Sea and Adjacent Waters. Conducted for the Fishery Board for Scotland in co-operation with the International Council for the Exploration of the Sea under the Superintendence of D'ARCY WENTWORTH THOMPSON. 1902–03. fol. *London*, 1905.

North Sea Fisheries Investigation Committee.

MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM. International Fishery Investigations.

First Report on Fishery and Hydrographical Investigation in the North Sea and Adjacent Waters (Southern Area). Conducted for His Majesty's Government by the Marine Biological Association of the United Kingdom. 1902–03. fol. *London*, 1905.

North Sea Fisheries Investigation Committee.

Fletcher (James). Canada Department of Agriculture Central Experimental Farm. Report of the Entomologist and Botanist. (Ann. Rep. Exper. Farm, 1904.) Pp. v, 52, plates 2.

8vo. *Ottawa*, 1905.

Fletcher (James). Insects injurious to Grain and Fodder Crops, Root Crops, and Vegetables. Pp. 48, plates 8. (Bull. No. 52, Dept. Agric. Centr. Exper. Farm.) 8vo. *Ottawa*, 1905.

—— The Division of Insects and Plants. Evidence of JAS. FLETCHER before the Select Standing Committee on Agriculture and Colonization. 1905; pp. 25. 8vo. *Ottawa*, 1905. **Author.**

Flint (James Monroe). A Contribution to the Oceanography of the Pacific. Pp. 62, plates 14. (Bull. U.S. Nat. Mus. No. 55.) 8vo. *Washington*, 1905.

Flora and Silva. Edited by WILLIAM ROBINSON. Vol. I. 4to. *London*, 1903. **W. Robinson.**

Forster-Cooper (C.). *See* **Cooper (C. Forster).**

Foslie (M.). *See* **Maldive and Laccadive Archipelagoes.** Lithothamnia.

Foslie (M.) and Howe (Marshall A.). New American Coralline Algæ. Pp. 9, plates 14. (Bull. New York Bot. Garden, iv.) 8vo. *New York*, 1906. **Authors.**

Fries (Robert Elias). Zur Kenntnis der Alpinen Flora im Nördlichen Argentinien. Pp. 205; Taf. 9 and 1 map. (Nova Acta Reg. Soc. Sci. Upsal. ser. 4, vol. i.) 4to. *Upsala*, 1904–1905.

Gadow (Hans). *See* **Maldive and Laccadive Archipelagoes.** Aves.

Garden (The). Vols. 67, 68. 4to. *London*, 1905. **Editors.**

Gardeners' Chronicle. 3 ser. Vols. 37, 38. fol. *London*, 1905. **Editor.**

Gardiner (John Stanley). *See* **Maldive and Laccadive Archipelagoes.**

Garry (Francis Nicholas Arbuthnot). Notes on the Drawings for Sowerby's 'English Botany.' Pp. 276. (Journ. Bot. vols. 41 & 42.) 8vo. *London*, 1903–1905.

Ghorozhankin (Ivan Nikolaevich). On the Corpuscles and Sexual Process in Gymnospermous Plants. Pp. 174, plates 9. (Proc. Imper. Moscow Univ., i.) (*In Russian.*) 8vo. *Moscow*, 1880.

—— Beiträge zur Kenntnis der Morphologie und Systematik der Chlamydomonaden. (Bull. Soc. Impér. Moscou, n. s. vols. iv. & v.) 8vo. *Moscow*, 1890–91.

I. *Chlamydomonas Braunii* (mihi).
II. *Chlamydomonas Reinhardi* (Dangeard) und seine Verwandten.

—— Ueber den Befruchtungs-Process bei *Pinus Pumilio*. Pp. 4. 8vo. *Strassburg*, 1883.

Glasgow.
Marine Biological Association of the West of Scotland.
Annual Report for 1905. 8vo. *Glasgow*, 1906. **The Director.**

Goebel (Karl). Zur Erinnerung an K. F. PH. v. MARTIUS. Gedächtnisrede bei Enthüllung seiner Büste im K. Botanischen Garten in München am 9. Juni, 1905. Pp. 20. 4to. *München*, 1905.

Goroschankin or **Goroshankin.** *See* **Ghorozhankīn** (**Ivan Nikolaevich**).

Goto (**Seitaro**). On *Diplozoon nipponicum*, n. sp. Pp. 42; plates 3. (Journ. Sc. Coll. Tokyo, iv.) 8vo. *Tokyo*, 1890.

—— Studies on the Ectoparasitic Trematodes of Japan. Pp. 273; plates 27. (Journ. Coll. Sc. Tokyo, viii.) 4to. *Tokyo*, 1894. **N. H. W. Maclaren.**

Gough (**Lewis Henry**). Plankton collected at Irish Light Stations in 1904. Pp. 55. (Rept. Fisheries Ireland, Sci. Investig., 1904, vi.) 8vo. *Dublin*, 1906. **Author.**

Gradmann (**Robert**). *See* **Eichler** (**Julius**). Ergebnisse der pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern, I.

Gray (**Asa**). *See* **Sullivant** (**William Starling**). Icones Muscorum, Supplement.

Green (**Joseph Reynolds**). *See* **English Men of Science.** Edited by J. Reynolds Green.

Gross (**J.**). Untersuchungen über die Histologie des Insectenovariums. Pp. 116; Taf. 9. (Zool. Jahrb., Abt. Anat. xviii. pp. 72–186, Taf. 6–14.) 8vo. *Jena*, 1903.

—— Die Spermatogenese von *Syromastes marginatus*, L. Pp. 60; Taf. 2. (Zool. Jahrb., Abt. Anat. xx.) 8vo. *Jena*, 1904. **N. H. W. Maclaren.**

Gruvel (**Abel**). Monographie des Cirrhipèdes ou Thécostracés. Préface de Eugène L. Bouvier. Pp. xii, 472; avec 427 figures dans le texte. 8vo. *Paris*, 1905.

Guppy (**Robert John Lechmere**). The Growth of Trinidad. Pp. 13; figs. 8, map 1. (Trans. Canad. Inst. viii.) 8vo. *Toronto*, 1905. **Author.**

Gurley (**Revere Randolph**). The Myxosporidia, or Psorosperms of Fishes, and the Epidemic produced by them. Pp. 239; plates 47. (U.S. Commission on Fish and Fisheries, Commissioner's Rept., Part 18, for 1902.) 8vo. *Washington*, 1904.

Haass (**Everhard**). Beitrag zur Kenntnis der Actinomyceten. Inaugural-Dissertation. Pp. 81. 8vo. *Zürich*, 1905. **Dr. Hans Schinz.**

Haberlandt (**Gottlieb**). Die Lichtsinnes-organe der Laubblätter. Pp. viii, 142; mit 8 Textfig. & 4 Taf. 8vo. *Leipzig*, 1905.

Haeckel (**Ernst Heinrich**). Last Words on Evolution. A Popular Retrospect and Summary. Translated from the Second Edition by Joseph McCabe. Pp. 127, with Portrait and Three Plates. 8vo. *London*, 1906.

—— Prinzipien der Generellen Morphologie der Organismen. Pp. xvi, 447, and Portrait. 8vo. *Berlin*, 1906. **Author.**

Hagen (**Ingebrigt S.**). Musci Norvegiæ Borealis. Bericht über die im Nördlichen Norwegen hauptsächlich von den Herren Arnell, Fridtz, Kaalaas, Kaurin, Ryan und dem Herausgeber in den Jahren 1886–1897 gesammelten Laubmoose. Pp. xxiii, 142, Taf. 2. (Tromsö Mus. Aarshefter, xxi.–xxii. n. 3.) 8vo. *Tromsö*, 1904.

Hall (Alfred Daniel). The Book of the Rothamsted Experiments. Pp. xl, 294, with 2 Portraits. 8vo. *London*, 1905. **Author.**

Hamilton (Francis) [*formerly* **Buchanan**]. *See* **Prain (David).** A Sketch of the Life of F. Hamilton (once Buchanan).

Hansen (Emil Christian). Considerations on Technical Mycology. (Lecture delivered at the Opening of the Department for Technical Mycology at the Heriot Watt College, Edinburgh, Oct. 18th, 1905.) 8vo. *London*, 1905. **Author.**

Hartog (Marcus Manuel). The Dual Force of the Dividing Cell. Part I. The Achromatic Spindle Figure illustrated by Magnetic Chains of Force. Pp. 20; plates 3. (Proc. Roy. Soc. B. vol. 76.) 8vo. *London*, 1905. **Author.**

Heckel (Édouard). Flore phanérogamique des Antilles Françaises .... par le R. P. Duss .... Avec annotations du .... E. Heckel sur l'emploi de ces Plantes. Pp. xxviii, 656. (Ann. Inst. Colonial Marseille, iii.) 8vo. *Marseilles*, 1897.

—— Annales de l'Institut Botanic-Géologique Colonial [afterwards Institut Colonial] de Marseille, publiées sous la direction de .... E. Heckel. Vol. I.→ *See* **Marseilles.**

Heckert (Gustav A.). Leucochloridium Paradoxum. Monographische Darstellung der Entwicklungs- und Lebensgeschichte des *Distomum macrostomum*. Pp. 66: Taf. 4. (Bibl. Zool. Heft 4.) 4to. *Cassel*, 1889. **N. H. W. Maclaren.**

Hecksteden (Eduard). Beitrag zur Lehre vom Echinokokkus. Inaugural-Dissertation. Pp. 28; Taf. 1. 8vo. *Kiel*, 1881. **N. H. W. Maclaren.**

Henslow (*Rev.* George). The Uses of British Plants; traced from Antiquity to the Present Day; together with the derivations of their names. Pp. vi, 184, and 288 illustrations. 8vo. *London*, 1905. **Author.**

—— Imitative Forms of *Fusus antiquus* and *Buccinum undatum*, subequent to Injury. (The Illustrations are mainly from the Collection of the late John Gwyn Jeffreys.) 4to. *London* [1905]. **Author.**

Herdman (William Abbott). *See* **Liverpool:** Lancashire Sea-Fisheries Laboratory, &c.

—— *See* '**Triton**,' Cruise of H.M.S. Tunicata.

Herman (Otto). *See* **Aquila.**

Hertwig (Richard). Beiträge zur Kenntniss der Acineten. Inaugural-Dissertation. Pp. 64; Taf. 2. 8vo. *Leipzig*, 1875. **N. H. W. Maclaren.**

Hesse (Richard). Ueber das Nervensystem und die Sinnesorgane von *Rhizostoma Cuvieri*. Pp. 46; Taf. 3, figs. 3. (Zeitschr. wiss. Zool. Bd. 60.) 8vo. *Leipzig*, 1895. **N. H. W. Maclaren.**

Hickson (Sydney John). *See* **Maldive and Laccadive Archipelagoes.** Alcyonaria.

Hillas (A. B. E.). Record of Salmon Marking Experiments in Ireland, 1902–1905. Pp. 39. (Rept. Fisheries Ireland, Sci. Investig., 1904, vii.) 8vo. *Dublin*, 1906. **Author.**

Hise (Charles Richard van). A Treatise on Metamorphism. Pp. 1286; plates 13, figs. 32. (U.S. Geol. Surv. Monogr. 47.) 4to. *Washington*, 1904.

Hochreutiner (B. P. G.). Catalogus Bogoriensis novus plantarum phanerogamarum quæ in Horto Botanico Bogoriensi coluntur Herbaceis exceptis. Fasc. 1, 2. 8vo. *Buitenzorg*, 1904–1905.

Hoek (Paulus Peronius Cato). *See* 'Triton.' Cruise of H.M.S. Pycnogonida.

Holt (Ernest W. L.). Report on the Artificial Propagation of Salmonidæ during the Season of 1904–1905. (Rept. Fisheries Ireland, Sci. Investig., 1904, vii.) 8vo. *Dublin*, 1906. **Author.**

Holt (Ernest W. L.) and **Byrne (L. W.).** First Report on the Fishes of the Irish Atlantic Slope. Pp. 28; plate 1. (Rept. Fisheries Ireland, Sci. Investig., 1905, ii.) 8vo. *Dublin*, 1906. **Authors.**

Holt (Ernest W. L.) and **Tattersall (W. M.).** Schizopodous Crustacea from the North-East Atlantic Slope. Supplement. Pp. 50; plates 5. (Rept. Fisheries Ireland, Sci. Investig., 1904, v.) 8vo. *Dublin*, 1906. **Authors.**

Hope Reports. (A Series of Reprints and Extracts from various Journals, reissued for private Circulation.) Edited by Edward B. Poulton. Vol. V. 1903–1906. 8vo. *Oxford*, 1906. **E. B. Poulton.**

Hopkinson (John). *See* **Cash (James).** The British Freshwater Rhizopoda and Heliozoa. (Ray Society.)

Hovey (Edmund Otis). The Grande Soufrière of Guadeloupe. Pp. 18; figs. 9. (Bull. Amer. Geogr. Soc., Sept. 1904.) 8vo. *New York*, 1904. **Author.**

Howe (Marshall Avery). *See* **Foslie (M.).** New American Coralline Algæ.

Hoyle (William Evans). *See* **Maldive and Laccadive Archipelagoes.** Cephalopoda.

Imhof (Othmar Emil). Beiträge zur Anatomie der *Perla maxima*, Scopoli. Inaugural-Dissertation. Pp. 41; plates 2. 8vo. *Aarau*, 1881.

India.

Geological Survey (*con.*).

Memoirs (Palæontologia Indica).

New Series, Vol. II., Memoir No. 2.

Permo-Carboniferous Plants and Vertebrates from Kashmir. By A. C. Seward and A. Smith Woodward. Pp. 14; plates 3. fol. *Calcutta*, 1904.

Jackson (Benjamin Daydon). A Glossary of Botanic Terms with their Derivation and Accent. Second Edition, Revised and Enlarged. Pp. xi, 370. 8vo. *London*, 1905. **Author.**

—— *See* **Durand (Théophile).** Index Kewensis.

—— *See* **English Men of Science**—Bentham (George).

Jägerskiöld (L. A.). Ueber den Bau des *Ogmogaster plicatus* [Creplin], (*Monostomum plicatum*, Creplin). Pp. 32; plates 2. (Kongl. Sv. Vet.-Akad. Handl. xxiv. n. 7.) 4to. *Stockholm*, 1891.

—— Ueber *Monostomum lacteum*, n. sp. Pp. 11; pl. 1. (Zool. Studien. Festskr. W. Lilljeborg, pp. 167–177, Taf. 9.) 4to. *Upsala*, 1896. **N. H. W. Maclaren.**

Jäggli (Mario). Notizie sulla Florula del Colle di Sasso Corbario. Presso Bellinzona. Pp. 7. (Boll. Soc. ticinese Sci. Nat., Anno ii.) 8vo. *Locarno*, 1905. **Author.**

Jensen (Adolf Severin). On the Mollusca of East Greenland.—I. Lamellibranchiata. With an Introduction on Greenland's Fossil Mollusc-Fauna from the Quaternary Time. Pp. 74. (Meddel. Grönland, xxix.) 8vo. *Copenhagen*, 1905. **Author.**

Johnstone (James). *See* **Liverpool:** Lancashire Sea-Fisheries Laboratory, &c.

Journal of Botany. Vol. 44. 8vo. *London*, 1906. **Jas. Britten.**

Journal (The) of Economic Biology. Edited by Walter Edward Collinge. Vol. I. nos. 1–3. 8vo. *London*, 1905–1906.

Journal (The) of Tropical Veterinary Science. (Issued Quarterly.) Editors: H. T. Pease, F. S. H. Baldrey, R. E. Montgomery. Vol. I. no. 1. 8vo. *Calcutta*, 1906.

Juel (H. O.). Beiträge zur Anatomie der Trematodengattung *Apoblema* (Dujard.). Pp. 46, Taf. 1. (Bih. K. Sv. Vet.-Akad. Handl. xv. Afd. iv. no. 6.) 8vo. *Stockholm*, 1889. **N. H. W. Maclaren.**

Kampen (P. N. van). Die Tympanalgegend des Säugetierschädels. Pp. 400; figs. 96. (Gegenb. Morphol. Jahrb. Bd. 34.) 8vo. *Leipzig*, 1905.

Kew.

Royal Botanic Gardens.

Bulletin of Miscellaneous Information.

Nos. 157–158 for (1900).
No. 2 for 1905.
Appendix II.
} 8vo. *London*, 1906.

Additional Series V. 1906. 8vo. *London*, 1900–1906.

V. The Wild Fauna and Flora of the Royal Botanic Gardens, Kew. 1906.

—— Catalogue of Portraits of Botanists exhibited in the Museums of the Royal Botanic Gardens. By James D. Milner. Pp. v, 105. 8vo. *London*, 1906. **Director.**

Kirchner (Oskar), Loew (Ernst), und Schröter (Carl). Lebensgeschichte der Blütenpflanzen Mitteleuropas. Spezielle Ökologie der Blütenpflanzen Deutschlands, Österreichs und der Schweiz. Band I. Liefg. 1–4. 4to. *Stuttgart*, 1904–1906.

Knischewsky (Olga). Beitrag zur Morphologie von *Thuja occidentalis*. Inaugural-Dissertation. Pp. 36, Tafeln 3. 8vo. *Bonn*, 1905. **Dr. H. Schinz.**

Knuth (R.) *See* **Engler (A.)**. Das Pflanzenreich. Heft 22. Primulaceæ.

Kölliker (Rudolph Albert von). Erinnerungen aus meinem Leben. Pp. x, 399; mit 7 Vollbildern, 10 Textfiguren und Porträt. 8vo. *Leipzig*, 1899.

—— Die Entwicklung der Elemente des Nervensystems. Pp. 38; mit 4 Tafeln und 12 Figuren im Text. (Zeitschr. für wiss. Zool. Bd. 82.) 8vo. *Leipzig*, 1905. **Author.**

Kostlivý (Stanislav). Untersuchungen über die Klimatischen Verhältnisse von Beirut, Syrien. Pp. 159. 8vo. *Prag*, 1905.

Krabbe (Harald). Bidrag til Kundskab om Fuglenes Bændelorme. Pp. 118; plates 10. (Danske Selsk. Skr., 5 Række, Afd. 8, Bind vi.) 4to. *Kjöbenhavn*, 1869.

—— Nye Bidrag til Kundskab om Fuglenes Bændelorme. Pp. 18, tab. 2. (Danske Selsk. Skr., 6 Række, Afd. i. n. 7.) 8vo. *Kjöbenhavn*. 1882. **N. H. W. Maclaren.**

Küchenmeister (Friedrich). Die Finne des *Bothriocephalus* und ihre Uebertragung auf den Menschen. Pp. 44. 8vo. *Leipzig*, 1886. **N. H. W. Maclaren.**

Kupelwieser (Hans). Untersuchungen über den feineren Bau und die Metamorphose des *Cyphonautes*. Pp. 50; plates 5. (Zoologica, Bd. xix. Heft 47.) 4to. *Stuttgart*, 1906.

Lafar (Franz). Technische Mykologie, III. 8vo. *Jena*, 1906.

Laidlaw (Frank Fortescue). *See* **Maldive and Laccadive Archipelagoes.** Amphibia and Reptilia.

—— —— Dragon-Flies.

—— —— Land Planarian.

—— —— Marine Turbellaria.

Lake (Hilda). *See* **Drabble (Eric)**. On the Effect of Carbon Dioxide on Geotropic Curvature of the Roots of *Pisum sativum*, L.

—— *See* **Drabble (Eric)**. The Osmotic Strength of Cell-Sap in Plants growing under different Conditions.

Lanchester (W. F.). *See* **Maldive and Laccadive Archipelagoes.** Marine Crustaceans: Stomatopoda.

Lebrun (Hector). Application de la méthode des disques rotatifs à la technique microscopique. Pp. 29; figs. 36. (Zeitschr. wiss. Mikrosk. xxiii.) 8vo. *Braunschweig*, 1906. **Author.**

Leicester.

Leicester Corporation Museum and Art Gallery.

Reports 14, 15. 8vo. *Leicester*, 1904–1905.

Leuckart (Rudolf). Untersuchungen über *Trichina spiralis*. Zugleich ein Beitrag zur Kenntniss der Wurmkrankheiten. Pp. 57; Tab. 2. 4to. *Leipzig & Heidelberg*, 1860.

—— Ueber den Larvenzustand und die Metamorphose der Echinorhynchen. Pp. 37. 4to. *Leipzig*, 1873.

Leuckart (Rudolf). *Archigetes Sieboldi*, eine geschlechtsreife Cestodenamme. Mit Bemerkungen über die Entwicklungsgeschichte der Bandwürmer. Pp. 14. (Zeitschr. f. wiss. Zool. xxx. Suppl.) 8vo. *Leipzig*, 1878. **N. H. W. Maclaren.**

Lewis (Francis John). The History of the Scottish Peat-Mosses and their Relation to the Glacial Period. Pp. 12; figs. 3. (Scottish Geogr. Mag., May 1906.) 8vo. *Edinburgh*, 1906. **Author.**

Linton (Edwin). Notes on Cestode Parasites of Fishes. Pp. 34; plates 8. (Proc. U.S. Nat. Mus. xx.). 8vo. *Washington*, 1898.

—— Notes on Trematode Parasites of Fishes. Pp. 42; plates 15. (Proc. U.S. Nat. Mus. xx.) 8vo. *Washington*, 1898.

—— Parasites of Fishes of Beaufort, North Carolina. Pp. 108; plates 34. (Bull. Bureau of Fisheries for 1904, vol. 24, pp. 321–428, plates 1–34.) 8vo. *Washington*, 1905. **N. H. W. Maclaren.**

Liverpool.

Institute of Commercial Research in the Tropics, Liverpool University.

Quarterly Journal. Vol. I. no. 1. 8vo. *Liverpool*, 1906.

Lancashire Sea-Fisheries Laboratory at the University of Liverpool and the Sea-Fish Hatchery at Piel.

No. XIV. Report for 1905.

(Drawn up by Prof. W. A. Herdman, assisted by Andrew Scott and James Johnstone.)

8vo. *Liverpool*, 1906. **Prof. W. A. Herdman.**

Marine Biological Station at Port Erin (Isle of Man).

Annual Report 19. 8vo. *Liverpool*, 1905. **Prof. W. A. Herdman.**

University of Liverpool.

History of the Department of Zoology New Museum and Laboratories to be opened by The Right Hon. The Earl of Onslow, on November 18, 1905. Pp. 17; 1 plate and 6 Plans. 8vo. *Liverpool*, 1905. **Prof. W. A. Herdman.**

Loew (Ernst). *See* **Kirchner (Oskar).** Lebensgeschichte der Blütenpflanzen Mitteleuropas.

Lohauss (Karl). Der anatomische Bau der Laubblätter der Festucaceen und dessen Bedeutung für die Systematik. Pp. vi, 114; mit 16 Tafeln. (Bibl. Bot. Heft 63.) 4to. *Stuttgart*, 1905.

London.

Rothamsted Experimental Station, Harpenden.

Guide to the Experimental Plots, 1906. 8vo. *London*, 1906. **A. D. Hall.**

South London Entomological and Natural History Society.

Proceedings for 1904–1905. 8vo. *London*, 1905. **Secretaries.**

Looss (Arthur). Zur Frage nach der Natur des Körperparenchyms bei den Trematoden, nebst Bemerkungen über einige andere, zur Zeit noch offene Fragen. Pp. 25. (Ber. Sächsisch. Ges. vii.) 8vo. *Leipzig*, 1892.

—— Ueber den Bau von *Distomum heterophyes* v. Sieb. und *Distomum fraternum*, n. sp. Pp. 59; Tab. 2. 8vo. *Kassel*, 1894. **N. H. W. Maclaren.**

Lortet (Louis) et Vialleton (Louis). Étude sur le *Bilharzia hæmatobia* et la Bilharziose. Pp. 118; pls. 8, figs. 8. (Ann. Univ. Lyon, ix.) 8vo. *Paris*, 1894. **N. H. W. Maclaren.**

Lubbock (*Sir* John) [*Lord* Avebury]. Notes on the Life-History of British Flowering Plants. Pp. xxiii, 450; figs. 352. 8vo. *London*, 1905. **Author.**

Maas (Otto). Die Craspedoten Medusen der Siboga-Expedition. *See* **Siboga-Expeditie.** Monogr. X.

McAlpine (Daniel). The Rusts of Australia, their Structure, Nature, and Classification. Pp. vi, 349; with 55 plates (including 366 Figures). 8vo. *Melbourne*, 1906. **Secretary of Agric.**

McCabe (Joseph). *See* **Haeckel (Ernst Heinrich).** Last Words on Evolution.

McGregor (Richard C.) and Worcester (Dean C.). A Hand-List of the Birds of the Philippine Islands. (Dept. of the Interior. Bureau of Govt. Laborat., no. 36.) 8vo. *Manila*, 1906.

MacMunn (C. A.). *See* **Maldive and Laccadive Archipelagoes.** Pigments of certain Corals, and Asteroid.

Magdeburg.

Museum für Natur- und Heimatkunde.

Abhandlungen und Berichte. Band I. Heft 1. 8vo. *Magdeburg*, 1905→

Maldive and Laccadive Archipelagoes. The Fauna and Geography of: being the Account of the Work carried on and of the Collections made by an Expedition during the years 1899 and 1900. Edited by John Stanley Gardiner. Vols. I.–II. Supplement I. 4to. *Cambridge*, 1901–1905.

Vol. I.

Introduction. By J. Stanley Gardiner. 1901.
Hymenoptera. By P. Cameron. 1901.
Land Crustaceans. By L. A. Borradaile. 1901.
Nemerteans. By R. C. Punnett. 1901.
Amphibia and Reptilia. By F. F. Laidlaw. 1902.
Lepidoptera. By Ed. Meyrick. 1902.
Echiuroidea. By A. E. Shipley. 1902.
Sipunculoidea, with an Account of a new Genus *Lithacrosiphon*. By A. E. Shipley. 1902.
Land and Freshwater Mollusca. By Edgar A. Smith. 1902.
Maldive and Laccadive Groups, with Notes on other Coral Formations in the Indian Ocean. By J. Stanley Gardiner. 1902.
Pigments of certain Corals, and Asteroid. By C. A. MacMunn. 1902.
Marine Crustaceans. I. Varieties. II. Portunidæ. By L. A. Borradaile. 1902.

Chætognatha, &c. By Leonard Doncaster. 1902.
Dragon-Flies. By F. F. Laidlaw. 1902.
Actinogonidiate Echinoderms. By Prof. F. Jeffrey Bell. 1902.
Orthoptera. By Malcolm Burr. 1902.
Marine Crustaceans. III. The Xanthidæ and some other Crabs. By L. A. Borradaile. 1902.
Fishes. By C. Tate Regan. 1902.
Marine Turbellaria. By Frank Fortescue Laidlaw. 1902.
Cephalochorda. Systematic and Anatomical Account. By C. Forster Cooper. 1903.
Cephalochorda. Note on Meristic Variation in the Group. By R. C. Punnett. 1903.
Aves. By H. Gadow and J. Stanley Gardiner. 1903.
Earthworms. By Frank E. Beddard. 1903.
Marine Crustaceans. IV. Some Remarks on the Classification of the Crabs. V. The Crabs of the Catometope Families. VI. Oxystomata. VII. The Barnacles. By L. A. Borradaile. 1903.
Marine Crustaceans. VIII. Stomatopoda, with an Account of the Varieties of *Gonodactylus chiragra*. By W. F. Lanchester. 1903.
Lithothamnia. By M. Foslie. 1903.

Vol. II.

Alcyonaria. Part I. By Prof. Sydney J. Hickson. 1903.
Alcyonaria. Part II. By Edith M. Pratt. 1903.
Nudibranchiata. By Sir Charles Eliot. 1903.
Marine Crustaceans. IX. The Sponge-crabs (Dromiacea). By L. A. Borradaile. 1903.
Land Planarian. By F. F. Laidlaw. 1903.
Lagoon Deposits.
I. General Account. By J. Stanley Gardiner. 1903.
II. Report on certain Deposits. By Sir John Murray. 1903.
Marine Mollusca. By Edgar A. Smith. 1903.
Enteropneusta. By R. C. Punnett. 1903.
Marine Crustaceans. X. The Spider-Crabs (Oxyrhyncha). XI. On the Classification and Genealogy of the Reptant Decapods. By L. A. Borradaile. 1903.
Marine Crustaceans. XII. Isopoda, with Description of a new Genus. By Rev. T. R. R. Stebbing. 1904.
Hydromedusæ, with a Revision of the Williadæ and Petasidæ. By Edward T. Browne. 1904.
Marine Crustaceans. XIII. The Hippidea, Thalassinidea, and Scyllaridea. By L. A. Borradaile. 1904.
Madreporaria. By J. Stanley Gardiner. 1904.
Antipatharia. By C. Forster-Cooper. 1904.
Arachnida. By R. I. Pocock. 1904.
Alcyonaria. By Sydney J. Hickson. 1905.
Marine Crustaceans. XIV. Paguridæ. By Major Alcock. 1905.
Hydroids. By L. A. Borradaile. 1905.
Notes on Parasites. By A. E. Shipley. 1905.
Rhynchota. By W. L. Distant. 1905.
Marine Crustaceans. XV. Les Alpheidæ. By Prof. H. Coutière. 1905.

Vol. II.—Supplement I.

Marine Crustaceans. XVI. Amphipoda. By A. O. Walker. 1905.
Madreporaria. III. Fungida. IV. Turbinolidæ. By J. Stanley Gardiner. 1905.
Scyphomedusæ. By Edward T. Browne. 1905.
Coleoptera. By D. Sharp. 1905.
Cephalopoda. By W. E. Hoyle. 1905.
Copepoda. By R. Norris Wolfenden. 1905.

Manchester.
Botanical Exchange Club of the British Isles.
Report for 1905. 8vo. *Oxford*, 1906. **J. Walter White.**

Manila.
Department of the Interior.
Bureau of Government Laboratories. No. 36.
8vo. *Manila*, 1906.

No. 36. McGregor (Richard C.) and Worcester (Dean C.). A Hand-List of the Birds of the Philippine Islands. Pp. 123. 1906.

Marquand (Ernest David). The Guernsey Dialect and its Plant Names. Pp. 17. (Trans. Guernsey Soc. Nat. Sci. 1905.)
8vo. *Guernsey*, 1905. **Author.**

Marshall (Arthur Milnes). *See* '**Triton**,' Cruise of H.M.S.

Pennatulida.

Marshall (John James). A List of the Mosses and Hepatics of the Riding. *See* **Robinson (James Fraser).** Flora of the East Riding of Yorkshire. Pp. 226.

Martius (Karl Friedrich Philipp von). Zur Erinnerung an K. F. Phl. v. Martius. Gedächtnisrede bei Enthüllung seiner Büste im K. Botanischen Garten in München am 9. Juni, 1905, von K. Goebel. Pp. 20. 4to. *München*, 1905.

Massee (George). British Fungi. Phycomycetes and Ustilagineæ. Pp. xv, 232; plates 8. 8vo. *London*, 1891.

Meigen (Wilhelm). *See* **Eichler (Julius).** Ergebnisse der pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern. I.

Melbourne.
Department of Agriculture.
Year Book for 1905. 8vo. *Melbourne*, 1905.
National Museum.
Memoirs. No. 1. 4to. *Melbourne*, 1906→

I. Woodward (Arthur Smith). On a Carboniferous Fish Fauna from the Mansfield District, Victoria. Pp. 32, plates 11. 1906.

Menzbier (Michael Alex). *Tetrastes griseiventris*, new species. Pp. 9, plate 1 col. (Proc. Imper. Moscow Univ., i.) (*in Russian*). 8vo. *Moscow*, 1880.

Meyrick (Edward). *See* **Maldive and Laccadive Archipelagoes.** Lepidoptera.

Milner (James D.). Catalogue of Portraits of Botanists exhibited in the Museums of the Royal Botanic Gardens, Kew. Pp. v, 105.
8vo. *London*, 1906.

Möbius (Karl August). Können die Tiere Schönheit wahrnehmen und empfinden? Pp. 9. (S.B. K. Preuss. Akad. Wiss. No. 10.) 8vo. *Berlin*, 1906. **Author.**

Möbius (Martin). De Toni, G. B. Sylloge Algarum omnium hucusque cognitarum. Vols. I.–IV. Patavii, 1889–1905. Notice of. Pp. 3. (Naturwissenschaftliche Wochenschrift, xx.) 4to. *Jena*, 1905. **G. B. De Toni.**

Moeller (Josef). Mikroskopie der Nahrungs- und Genussmittel aus dem Pflanzenreiche. Zweite, gänzlich umgearbeitete und unter Mitwirkung A. L. Winton's vermehrte Auflage. Pp. xvi, 599; mit 599 Figuren. 8vo. *Berlin*, 1905.

Monckton (Horace Woollaston). The Natural History of Berkshire. Geology. Pp. 24. (Victoria History of the County.) fol. *London*, 1906. **Author.**

Monnier (Alfred). Les Matières minérales et la loi d'accroissement des végétaux. Pp. 33; plates 9. (Univ. Genève Inst. Bot. ser. 7, fasc. 3.) 8vo. *Genève*, 1905. **R. Chodat.**

Montgomery (R. E.). *See* **Journal of Tropical Veterinary Science.**

Monticelli (Francesco Saverio). Saggio di una Morfologia dei Trematodi. Pp. 130. 4to. *Napoli*, 1888.

—— Studii sui Trematodi endoparassiti. Pp. 229, tav. 8, 3 figs. in text. (Zool. Jahrb. Jena, Suppl. iii.) 8vo. *Jena*, 1893. **N. H. W. Maclaren.**

Müller (Karl) in Freiburg i./Br. Monographie der Lebermoosgattung *Scapania* Dum. Pp. 312, Taf. 52. (Nova Acta, Bd. 83.) 4to. *Halle a./S.*, 1905.

Munich.

Königlich-bayerische Akademie der Wissenschaften.

Gedächtnisrede auf Karl Alfred von Zittel gehalten in der öffentlichen Sitzung der K.B. Akademie der Wissenschaften zu München zur Feier ihres 146. Stiftungstages am 15. März 1905, von August Rothpletz. Pp. 23. 4to. *München*, 1905.

Zur Erinnerung an K. F. Ph. v. Martius. Gedächtnisrede bei Enthüllung seiner Buste im K. Botanischen Garten in München am 9. Juni, 1905, von K. Goebel. Pp. 20. 4to. *München*, 1905.

Murray (*Sir* John). *See* **Maldive and Laccadive Archipelagoes.** Report on certain Deposits.

Naegeli (Otto) and Thellung (A.). Die Flora des Kantons Zürich. Teil I. Die Ruderal- und Adventivflora des Kantons Zürich. Pp. 82. (Vierteljahrsschr. Nat. Ges. Zürich, Jahrg. 50.) 8vo. *Zürich*, 1905. **Dr. Hans Schinz.**

Naples.

Zoologische Station zu Neapel.

Fauna und Flora des Golfes von Neapel. Monographie XXVIII. 4to. *Berlin*, 1906.

XXVIII. *Ichthyotomus sanguinarius.* Eine auf Aalen schmarotzende Annelide. Von Hugo Eisig. Pp. xi, 300; mit 10 Taf. und 34 Textfig. 1906.

Nash (C. W.). Check List of the Vertebrates of Ontario and Catalogue of Specimens in the Biological Section of the Provincial Museum. Birds. Pp. 82, figs. 21. 8vo. *Toronto*, 1905. **Author.**

Natal, Department of Agriculture. *See* **Pietermaritzburg.**

Němec (Bohumil). Studien über die Regeneration. Pp. 387, mit 180 Abbildungen im Text. 8vo. *Berlin*, 1905.

Nicoloff (Th.). Sur le type floral et le développement du fruit des Juglandées. Pp. 46, figs. 35, plates 2. (Journ. de Bot. xxviii., xxix.) 8vo. *Paris*, 1904–1905. **R. Chodat.**

Niemiec (J.). Recherches morphologiques sur les Ventouses dans le Règne Animal. Pp. 147, plates 5. (Rec. Zool. Suisse. ii.) 8vo. *Genève*, 1885. **N. H. W. Maclaren.**

Nordstedt (Carl Frederik Otto). Algological Notes, 1–4. Pp. 28. (Bot. Notiser, 1906.) 8vo. *Lund*, 1906. **Author.**

Norman (Alfred Merle). Museum Normanianum, or a Catalogue of the Invertebrata of Europe, and the Arctic and North Atlantic Oceans, which are contained in the Collection of the Rev. Canon A. M. Norman. Parts 1–12.
8vo. *Houghton-le-Spring and Durham*, 1886–1905.

—— Notes on the Natural History of East Finmark. (Ann. Mag. Nat. Hist. ser. 7, vols. x., xi., xii., xv.)
8vo. *London*, 1902–1905. **Author.**

Norman (Alfred Merle) and **Scott (Thomas).** The Crustacea of Devon and Cornwall. Pp. xv, 232; plates 24.
8vo. *London*, 1906. **Canon A. M. Norman.**

Normentafeln zur Entwicklungsgeschichte der Wirbelthiere. Herausgegeben von Dr. Franz Keibel. Heft 6.
fol. *Jena*, 1906.

VI. Sakurai (Tsunejiro). Normentafel zur Entwicklungsgeschichte des Rehes (*Cervus Capreolus*). Mit einem Vorwort von Dr. F. Keibel. Pp. 100, Taf. 3. 1906.

Oliver (Daniel). Flora of Tropical Africa. Vols. I.–III.
8vo. *London*, 1868–77.

[*Continued as*]

Flora of Tropical Africa. By various Botanists. Edited by Sir William Turner Thiselton-Dyer. Vol. IV. sect. 2, Parts 1, 2, 3. 8vo. *London*, 1905–1906.
Sir W. T. Thiselton-Dyer.

Olsson (Peter). Entozoa, iakttagna hos Skandinaviska hafsfiskar. Pp. 64, tab. 3. (Lunds Univ. Årsskrift, iv.)
4to. *Lund*, 1867.

—— Bidrag till Skandinaviens Helminthfauna. I., II. Pp. 35, Tafl. 4. (Kgl. Sv. Vet.-Akad. Handl. xiv. no. 1; xxv. no. 12.)
4to. *Stockholm*, 1876–1893.

—— Entozoa, iakttagna hos Skandinaviska hafsfiskar. Platyelminthes. I. Akademisk Afhandling. Pp. 39, tab. 2. (Lunds Univ. Årsskrift, iii.) 4to. *Lund*, 1867.
N. H. W. Maclaren.

Oltmanns (Friedrich). Morphologie und Biologie der Algen. Bände 2. 8vo. *Jena*, 1904–1905.

Band I. Spezieller Teil. Pp. vi, 733; mit 476 Abbildungen. 1904.
„ II. Allgemeiner Teil. Pp. vi, 443; mit 150 Abbildungen und 3 Tafeln. 1905.

Oxford. *See* **Manchester.** Botanical Exchange Club of the British Isles.

Parker (**William Newton**). *See* **Weismann (August).** The Germ-Plasm.

Parona (**Corrado**). Appunti storici di Elmintologia Italiana a Contributo della corologia Elmintologica umana in Italia. Pp. 21. (Gazzetta Medica Italiano-Lombardia, Anno 1888.) 8vo. *Milano*, 1888.

—— Sedi insolite del "*Cœnurus serialis*," Gerv. nel coniglio e nella lepre. Pp. 8, fig. 1. (Ann. R. Accad. Agric. Torino, vol. 46.) 8vo. *Torino*, 1903. **N. H. W. Maclaren.**

Pax (**Ferdinand**). *See* **Engler (A.).** Das Pflanzenreich. Heft 22. Primulaceæ.

Pease (**H. T.**). *See* **Journal of Tropical Veterinary Science**

Pérádeniya.

Royal Botanic Gardens.

Annals. Vols. I–III. Part 1. 8vo. *Colombo*, 1901–1906.

—— Circulars and Agricultural Journal. Vol. III. nos. 14, 15. 8vo. *Colombo*, 1906. **J. C. Willis.**

Pettit (**Auguste**). Description des encéphales de *Grampus griseus* Cuv., de *Steno frontatus* Cuv., et de *Globicephalus melas* Traill, provenant des Campagnes du Yacht *Princesse-Alice*. *See* **Albert.**

Pfeffer (**Wilhelm**). The Physiology of Plants: A Treatise upon the Metabolism and Sources of Energy in Plants. Second fully revised Edition. Translated and Edited by Alfred J. Ewart. 3 vols. 8vo. *Oxford*, 1900–1906.

Pflanzenreich (**Das**). *See* **Engler (Adolf).**

Pietermaritzburg.

Natal Department of Agriculture.

Bulletin 7. 8vo. *Pietermaritzburg*, 1905.

No. 7. Tree-Planting in Natal. By T. R. Sim. Pp. 354, Index pp. xviii; figs. 99. 1905.

Natal Government Museum.

Annals. Vol. I. Part 1. 8vo. *London*, 1906→

Report, 1. fol. *Pietermaritzburg*, 1906.

Piper (**Charles V.**). North American Species of *Festuca*. Pp. 48; plates 15. (Contr. U.S. Nat. Herb. x. pt. 1.) 8vo. *Washington*, 1906.

Plankton-Expedition der Humboldt-Stiftung (*con.*).

Band I.→ 4to. *Kiel & Leipzig*, 1892–1906.

Bd. II. F. *b.* Die Pteropoden, von P. Schiemenz. 1906.

„ II. G. *g.* Die Ostracoden (Halocypriden und Cypridiniden) .... von W. Vávra. 1906.

„ III. *h.* 3. Die Tripyleen Radiolarien: Atlanticellidæ von A. Borgert. 1906.

Pocock (**Reginald Innes**). *See* **Maldive and Laccadive Archipelagoes.** Arachnida.

Prain (**David**). A Sketch of the Life of Francis Hamilton (once Buchanan), sometime Superintendent of the Honourable Company's Botanic Garden, Calcutta. Pp. lxxv. (Ann. Roy. Bot. Garden, Calcutta, vol. x. pt. 2.) 4to. *Calcutta*, 1905. **Author.**

Pratt (**Edith M.**). *See* **Maldive and Laccadive Archipelagoes.** Alcyonaria, Part II.

Punnett (**R. C.**). *See* **Maldive and Laccadive Archipelagoes.** Cephalochorda. Meristic Variation in the Group.

—— —— Enteropneusta.

—— —— Nemerteans.

Rádl (**Emil**). Geschichte der Biologischen Theorien seit dem Ende des Siebzehnten Jahrhunderts. Teil I.→ Pp. vii, 320. 8vo. *Leipzig*, 1905.

Ray Society. *Publications* (cont.).

West (William) and West (George Stephen). A Monograph of the British Desmidiaceæ. Vol. II. Pp. x, 204; plates 33–64. 8vo. *London*, 1905.

Regan (**C. Tate**). *See* **Maldive and Laccadive Archipelagoes.** Fishes.

Reid (**Clement**). Plant-Remains of Roman Silchester. Pp. 2. (Archæologia, Soc. Antiqu. vol. 59, part 2, pp. 369–370.) 4to. *London*, 1905. **Author.**

Retzius (**Gustaf**). Biologische Untersuchungen. Neue Folge. XIII. fol. *Stockholm*, 1906. **Author.**

Rhodesia Scientific Association. *See* **Bulawayo.**

Richardson (**Harriet**). A Monograph on the Isopods of North America. Pp. liii, 727; figs. 740. (Bull. U.S. Nat. Mus. no. 54.) 8vo. *Washington*, 1905.

Riffarth (**Heinrich**). *See* **Berlin** — Das Tierreich, Liefg. 22. Lepidoptera: Heliconiidæ.

Río (**Manuel E.**) und **Achával** (**Luis**). Geografía de la Provincia de Córdoba. Text 2 vols. Roy. 8vo. *Buenos Aires*, 1904–1905.
Atlas. fol. ,, ,, 1905.
Vol. I. pp. xxix, 569.
,, II. pp. vi, 669. Atlas, maps 9, plates 6.

Robinson (**Charles Budd**). The Chareæ of North America. Pp. 65. (Bull. New York Bot. Gard. vol. iv. no. 13.) 8vo. *New York*, 1906. **B. Daydon Jackson.**

Robinson (**James Fraser**). The Flora of the East Riding of Yorkshire, including a physiographical sketch. To which is added a List of the Mosses and Hepatics of the Riding. Pp. 253 and Map. 8vo. *London*, 1902.

Robinson (**William**). *See* **Flora and Silva.** Edited by W. Robinson.

Rodway (**Leonard**). The Tasmanian Flora. Pp. xix, 320; plates 50. 8vo. *Hobart*, 1903.

Rönnfeldt (**Harriett**). *See* **Weismann** (**August**). The Germ-Plasm.

Rothpletz (August). Gedächtnisrede auf Karl Alfred von Zittel gehalten in der öffentlichen Sitzung der K.B. Akademie der Wissenschaften zu München zur Feier ihres 146. Stiftungstages am 15. März 1905. Pp. 23. 4to. *München*, 1905.

Roux (Wilhelm). Vorträge und Aufsätze über Entwickelungsmechanik der Organismen. Herausgegeben von W. Roux. Heft 1→ 8vo. *Leipzig*, 1905→

Sablon (Leclerc du). *See* **Bonnier (Gaston).** Cours de Botanique.

Saccardo (Pietro Andrea). Sylloge Fungorum omnium hucusque cognitorum. Vol. XVIII. Supplementum Universale. Pars VII. Discomycetæ—Deuteromycetæ. Auctoribus P. A. Saccardo et D. Saccardo Fil. Pp. vii, 838. 8vo. *Patavii*, 1906.

Sadebeck (Richard). Die Kulturgewächse der deutschen Kolonien und ihre Erzeugnisse. Pp. xiii, 366, mit 127 Abbildungen. 8vo. *Jena*, 1899.

Saefftigen (Armand). Zur Organisation der Echinorhynchen. Inaugural-Dissertation. Pp. 52, Taf. 3. (Morphol. Jahrb. x.) 8vo. *Leipzig*, 1884. **N. H. W. Maclaren.**

St. Petersburg.

Musée Botanique de l'Académie Impériale des Sciences.

Proceedings. Part 2. 8vo. *St. Petersburg*, 1905.

—— Schedæ ad Herbarium Floræ Rossicæ. V. (Nos. 1201–1600.) 8vo. *St. Petersburg*, 1905.

Sakurai (Tsunejiro). Normentafel zur Entwicklungsgeschichte des Rehes (*Cervus Capreolus*). Mit einem Vorwort von Dr. F. Keibel. Pp. 100, Taf. 3. *See* **Normentafeln zur Entwicklungsgeschichte der Wirbelthiere.** Heft 6.

Salmon (Ernest Stanley). The present danger threatening Gooseberry Growers in England. Pp. 4. (Gard. Chron. 3 ser. xxxviii.) 4to. *London*, 1905. **Author.**

Sargent (Charles Sprague). Trees and Shrubs: illustrations of new or little-known Ligneous Plants prepared chiefly from Material at the Arnold Arboretum of Harvard University. Vol. I. 4to. *Boston & New York*, 1902–1905. **Frank Crisp.**

Schauinsland (Hugo). Beitrag zur Kenntniss der Embryonalentwicklung der Trematoden. Pp. 63, Taf. 3. (Zeitschr. f. Naturwiss. xvi.) 8vo. *Jena*, 1883. **N. H. W. Maclaren.**

Schellens (W.). Ueber das Verhalten von pflanzlichen und tierischen Textilstoffen zu Metallsalzlösungen. Pp. 11. (Arch. der Pharmazie, Band 243, Heft 8.) 8vo. *Berlin*, 1905. **Dr. Ed. Schaer.**

Schenck (Otto). Die antennalen Hautsinnesorgane einiger Lepidopteren und Hymenopteren mit besonderer Berücksichtigung der sexuellen Unterschiede. Inaugural-Dissertation. Pp. 47, Taf. 2. 4to. *Jena*, 1902. **N. H. W. Maclaren.**

Scherren (Henry). On old Pictures of the Zebra. Pp. 3. (Proc. Zool. Soc. Lond. 1905, vol. i.) 8vo. *London*, 1905. **Author.**

Schiemenz (Paul). *See* **Plankton-Expedition.** Pteropoden.

Schinz (Hans). Plantæ Menyharthianæ; ein Beitrag zur Kenntnis der Flora des Unteren Sambesi. Pp. 79. (Denkschr. math.-nat. Klasse K. Akad. Wiss. Wien, Bd. 78, pp. 367–445.)
4to. *Wien*, 1905.

—— Beiträge zur Kenntnis der afrikanischen Flora. XVIII. (Vierteljahrsschr. Naturf. Ges. Zürich, Jahrg. 51, Heft 1.)
8vo. *Zürich*, 1906.

—— Die Myxomyceten oder Schleimpilze der Schweiz. Pp. 129, figs. 45. (Mitt. Naturw. Ges. Winterthur, Heft 6.)
8vo. *Winterthur*, 1906. **Author.**

Schlich (William). Manual of Forestry. Third Edition. Vol. I.
8vo. *London*, 1906. **India Office.**

Schneider (Camillo Karl). Illustriertes Handwörterbuch der Botanik. Pp. viii, 690; mit 341 Abbildungen im Text.
8vo. *Leipzig*, 1905.

Schroeder (August). Beiträge zur Kenntnis einiger ausländischen Fette und Öle. Inaugural-Dissertation. Pp. 67.
8vo. *Strassburg i./Elsass*, 1905. **Dr. Ed. Schaer.**

Schröter (Carl). *See* **Kirchner (Oskar).** Lebensgeschichte der Blütenpflanzen Mitteleuropas.

Schumann (Karl) und **Lauterbach (Karl).** Nachträge zur Flora der Deutschen Schutzgebiete in der Südsee. (Mit Ausschluss Samoa's und der Karolinen.) Pp. 446; mit 14 Tafeln und Bildnis von K. Schumann.
Royal 8vo. *Leipzig*, 1905.

Scott (Andrew). *See* **Liverpool:** Lancashire Sea-Fisheries Laboratory, &c.

Sellerbeck (Heinrich). De Trichinosi. Dissertatio Inauguralis. Pp. 30.
8vo. *Berlin*, 1866. **N. H. W. Maclaren.**

Seward (Albert Charles) and **Woodward (Arthur Smith).** Permo-Carboniferous Plants and Vertebrates from Kashmir. Pp. 14, plates 3. (Mem. Geol. Surv., Palæont. Ind., New Series, vol. ii. Mem. no. 2.)
fol. *Calcutta*, 1904.

Sharp (David). *See* **Maldive and Laccadive Archipelagoes.** Coleoptera.

Sherborn (Charles Davies) and **Woodward (Bernard Barham).** On the Dates of Publication of the Natural History Portions of the "Encyclopédie Méthodique." Pp. 6. (Ann. Mag. Nat. Hist. ser. 7, xvii.)
8vo. *London*, 1906. **Author.**

Shipley (Arthur E.). *See* **Maldive and Laccadive Archipelagoes.** Echiuroidea.

—— —— Parasites.

—— —— Sipunculoidea.

Siboga-Expeditie. Livr. 16–29.
4to. *Leiden*, 1904–06. **Dr. Max Weber.**

Silva. *See* **Flora and Silva.** Edited by W. Robinson.

Silvestri (Filippo). Contribuzioni alla conoscenza biologica degli Imenotteri Parassiti, 1. Pp. 51; tav. 5, figs. 13. (Ann. R. Scuola Sup. Agricolt. Portici, vi.)
8vo. *Portici*, 1906. **Author.**

Sim (Thomas R.). Tree Planting in Natal. Pp. 354, Index pp. xviii; figs. 99. (Bull. No. 7. Dept. Agric. Natal.) 8vo. *Pietermaritzburg*, 1905. **Author.**

Simmons (Herman George). Ytterligare om Färöarnes hafsalgvegetation och om hafsalgernas spridning. Pp. 16. (Bot. Notiser, 1905, pp. 193–208.) 8vo. *Lund*, 1905. **Author.**

Sinclair (S.). *See* **Sydney, Australian Museum.** Catalogue of the Library of the Austral. Mus.

Sladen (Walter Percy). *See* **'Triton,'** Cruise of H.M.S. Asteroidea.

Sluiter (C. Ph.). Die Tunicaten der Siboga-Expedition, Supplement zu der I. Abteilung: Die Socialen und Holosomen Ascidien. *See* **Siboga-Expeditie,** livr. 24.

Smith (Edgar Albert). *See* **Maldive and Laccadive Archipelagoes.** Land and Freshwater Mollusca.

—— —— Marine Mollusca.

Smith (Johannes Jacobus). Die Orchideen von Ambon. Pp. 125. (Herausgegeben vom Depart. Landwirtschaft.) 8vo. *Batavia*, 1905.

Smith (John Donnell). Enumeratio Plantarum Guatemalensium necnon Salvadorensium, Hondurensium, Nicaraguensium, Costaricensium. Pars VII. Pp. 73. 8vo. *Oquawka*, 1905. **Author.**

Sommer (Ferdinand). Die Anatomie des Leberegels, *Distomum hepaticum*, L. Pp. 104, Taf. 6. (Zeitschr. f. wiss. Zool. xxxiv.) 8vo. *Leipzig*, 1880. **N. H. W. Maclaren.**

Spinner (Henri). Des relations existant entre la disposition du parenchyme vert dans les feuilles de Carex et les localités habitées par ces végétaux. Pp. 3. (Bull. Soc. Neuchâtel. Sci. Nat. xxxi.) 8vo. *Neuchâtel*, 1903.

—— Sur les fruits anormaux de *Cheiranthus*. Pp. 7, figs. 18. (Bull. Soc. Neuchâtel. Sci. Nat. xxxii.) 8vo. *Neuchâtel*, 1905.

—— L'Anatomie caulinaire des Carex Suisses. Pp. 94; plates 3. (Bull. Soc. Neuchâtel. Sci. Nat. xxxii.) 8vo. *Neuchâtel*, 1905. **Author.**

Spire (André). *See* **Spire (Camille).** Le Caoutchouc en Indo-Chine.

Spire (Camille) et Spire (André). Le Caoutchouc en Indo-Chine. Étude Botanique Industrielle et Commerciale. Pp. viii, 262; plates 35. Roy. 8vo. *Paris*, 1906.

Spruce (Richard). Hepaticæ Amazonicæ et Andinæ, &c. Pp. xi, 588; plates 22. (Trans. & Proc. Bot. Soc. Edinb. xv.) 8vo. *Edinburgh*, 1884–85.

Staeps (Arminius). De Trichiniasi. Dissertatio Inauguralis. Pp. 30. 8vo. *Berlin*, 1866. **N. H. W. Maclaren.**

Stebbing (Edward Percy). A Note upon the "Bee-Hole" Borer of Teak in Burma (*Duomitus*). Pp. 19. 4to. *Calcutta*, 1905.

—— Departmental Notes on Insects that affect Forestry. No. 3. 8vo. *Calcutta*, 1906. **Author.**

Stebbing (Thomas Roscoe Rede). *See* **Maldive and Laccadive Archipelagoes.** Marine Crustacea : Isopoda.

Stichel (Hans). *See* **Berlin—Das Tierreich.** Liefg. 22. Lepidoptera : Heliconiidæ.

Stossich (Michele). Elminti trovati in un *Orthagoriscus mola*. Pp. 3, tav. 1. (Boll. Soc. Adriatica, xvii.) 8vo. *Trieste*, 1896. **N. H. W. Maclaren.**

Strachey (*Sir* Richard). Catalogue of the Plants of Kumaon and of the adjacent Portions of Garhwal and Tibet, based on the Collections made by Strachey and Winterbottom during the years 1846 to 1849 and on the Catalogue originally prepared in 1852. Revised and Supplemented by J. F. Duthie. Pp. vii, 269. 8vo. *London*, 1906. **Author.**

Sullivant (William Starling). Icones Muscorum, or Figures and Descriptions of most of those Mosses peculiar to Eastern North America which have not been heretofore figured. Pp. viii, 216; plates 129. Roy. 8vo. *Cambridge, Mass.*, 1864.

—— —— Supplement. [Ed. by A. Gray.] Pp. viii, 109; plates 81. Roy. 8vo. *Cambridge, Mass.*, 1874. **Dr. R. Braithwaite.**

Swainson (William) to Audubon (John James). (Hitherto unpublished Letters.) *See* **Deane (Ruthven).**

Sydney.

Australian Museum.

Catalogue of the Library of the Australian Museum. Second Edition. Compiled by S. Sinclair. Part III. Pamphlets. 8vo. *Sydney*, 1905.

Taschenberg (Ernst Otto Wilhelm). Beiträge zur Kenntniss ectoparasitischer mariner Trematoden. Pp. 49, Taf. 2. (Abh. naturf. Ges. Halle, xiv.) 4to. *Halle-a.-Saale*, 1879.

—— *Didymozoon*, eine neue Gattung in Cysten lebender Trematoden. Pp. 12, Taf. 1. (Zeitschr. f. ges. Naturwiss., Bd. 52.) 8vo. *Berlin*, 1879. **N. H. W. Maclaren.**

Tattersall (W. M.). *See* **Holt (Ernest W. L.).** Schizopodous Crustacea from the North-East Atlantic Slope. Supplement.

Tesch (J. J.). Die Heteropoden der Siboga-Expedition. *See* **Siboga-Expeditie**, Livr. 29.

Thellung (A.). *See* **Naegeli (Otto).** Die Flora des Kantons Zürich.

Thompson (D'Arcy Wentworth). *See* **Sea Fisheries.** North Sea Fisheries Investigation Committee. Report on Fishery and Hydrographical Investigations in the North Sea and Adjacent Waters.

Torino (Damián M.). Memoria presentada al H. Congreso de la Nacion. Vol. 3. 8vo. *Buenos Aires*, 1905.

Trautvetter (Ernst Rudolf von). Floræ Rossicæ Fontes. Pp. 342. (Acta Horti Petrop. vii.) 8vo. *St. Petersburg*, 1880.

'**Triton**,' Cruise of H.M.S. (Trans. Roy. Soc. Edinburgh, xxxii.) 4to. *Edinburgh*, 1883.

Pycnogonida. By P. P. C. Hoek.
Tunicata. By W. A. Herdman.
Pennatulida. By A. Milnes Marshall.
Asteroidea. By W. Percy Sladen.

Tschudi (**Ad.**). Die Blasenwürmer. Ein monographischer Versuch. Pp. 75; Taf. 2. 4to. *Freiburg-im-Breisgau*, 1837. **N. H. W. Maclaren.**

Turner (**Frederick**). Botany of North-Western New South Wales. Pp. 60; plate 1. (Proc. Linn. Soc. N. S. Wales, xxx. pt. 1.) 8vo. *Sydney*, 1905. **Author.**

United States Department of Agriculture (*con.*).
Division of Botany.
Contributions from the U.S. National Herbarium. Vol. X. Pts. 1, 2. 8vo. *Washington*, 1906. **B. Daydon Jackson.**

United States Geological Survey (*con.*).
Monographs. Vols. 47, 48. 4to. *Washington*, 1904–05.
47. A Treatise on Metamorphism. By Charles Richard van Hise. Pp. 1286; plates 13, figs. 32. 1904.
48. Status of the Mesozoic Floras of the United States. Second Paper. By Lester Frank Ward. Pp. 616; plates 119. 1905.

Van Hise. *See* **Hise** (**Richard Charles van**).

Vávra (**Wenzel**). *See* **Plankton-Expedition.** Die Ostracoden (Halocypriden und Cypridiniden).

Veitch (**James Herbert**). Hortus Veitchii. A History of the Rise and Progress of the Nurseries of Messrs. James Veitch & Sons, together with an Account of the Botanical Collectors and Hybridists employed by them, and a List of the most remarkable of their Introductions. Pp. 542. Illustrated with Fifty Photogravure Plates. 4to. *London*, 1906. **Jas. Veitch & Sons.**

Vejdovsky (**Franz**). Ueber einige Süsswasser-Amphipoden. III. Die Augenreduktion bei einem neuen Gammariden aus Irland, und über *Niphargus* Caspary Pratz aus dem Brunnen von München. Pp. 40, mit 2 Tafeln und 14 Textfiguren. (S.B. Königl. Böhm. Ges. Wiss. Prag, 1905.) 8vo. *Prag*, 1905. **Author.**

Versluys (**Jan**). *See* **Siboga-Expeditie.** Die Gorgoniden der Siboga-Exped. II. Die Primnoidæ.

Verson (**Enrico**). Zur Entwicklung des Verdauungskanals bei *Bombyx mori*. Pp. 78; Taf. 4. (Zeitschr. wiss. Zool. Bd. 82.) 8vo. *Leipzig*, 1905. **Author.**

Vialleton (**Louis**). *See* **Lortet** (**Louis**). Étude sur le *Bilharzia hæmatobia* et la Bilharziose.

Vierhapper (**Fritz**). Monographie der alpinen *Erigeron*-Arten Europas und Vorderasiens. Pp. 176; Taf. 6, Karten 2. (Beih. Bot. Centralbl. 2te Abt. xix.) 8vo. *Leipzig*, 1906.

Vormeng (**Carl**). Die Bandwürmer des Menschen nach den neuesten Forschungen. Inaugural-Dissertation. Pp. 32. 8vo. *Berlin*, 1867. **N. H. W. Maclaren.**

Waddell (Lawrence Austine). Lhasa and its Mysteries; with a Record of the Expedition of 1903–1904. Pp. xxii, 530; with 200 illustrations and 8 maps. 8vo. *London*, 1905. **Author.**

Wagner (M.). Psychobiologische Untersuchungen an Hummeln. I. (Zoologica, Bd. xix. Heft 46[1].) 4to. *Stuttgart*, 1906.

Wahlstedt (Lars Johan). Om Characeernas knoppar och öfvervintring. Botanisk Afhandling. Pp. 48. 8vo. *Lund*, 1864.

Walker (Alfred O.). *See* **Maldive and Laccadive Archipelagoes.** Marine Crustaceans: Amphipoda.

Walter (Emil). Untersuchungen über den Bau der Trematoden. *Monostomum trigonocephalum*, Rud., *reticulare*, van Ben., *proteus*, Brandes. Inaugural-Dissertation. Pp. 51; 3 Tafeln und 1 Textfigur. (Zeitschr. wiss. Zool. Bd. 56.)
8vo. *Halle-a.-Saale*, 1893. **N. H. W. Maclaren.**

Walter (Herbert E.). *See* **Brooklyn Institute of Arts and Sciences.** Cold Spring Harbor Monographs. VI. The Behavior of the Pond Snail (*Lymnæus elodes*, Say).

Ward (Lester Frank). Status of the Mesozoic Floras of the United States. Second Paper. Pp. 616, plates 119. (U.S. Geol. Surv., Monogr. 48.) 4to. *Washington*, 1905.

Warren (Ernest). *See* **Annals Natal Govt. Mus.**

Washington.

Carnegie Institution.

Publication no. 8. 8vo. *Washington*, 1905.

No. 8. FARLOW (WILLIAM G.). Bibliographical Index of North American Fungi. Vol. I. Part 1. 1905.

Watkin (Hugh R.). The Discovery and Transportation to St. Petersburg of the Berezooka Mammoth, translated and described in a Paper read before the Torquay Natural History Society. Pp. 20. 8vo. *Torquay*, 1906.

—— The White Winter Coat of Certain Creatures. Read July 11th, 1906, before the Torquay Natural History Society. Pp. 20. 8vo. *Torquay*, 1906. **Author.**

Weber (Carl Julius Ferdinand). De *Echinococco Hominis*. Dissertatio Inauguralis. Pp. 32. 8vo. *Berlin*, 1866.
N. H. W. Maclaren.

Weismann (August). The Germ-Plasm: a Theory of Heredity Translated by WILLIAM NEWTON PARKER and HARRIETT RÖNNFELDT. (Contemp. Science Ser.) Pp. xxii, 477, with 24 illustrations. 8vo. *London*, 1893.

West (George). A Comparative Study of the dominant Phanerogamic and Higher Cryptogamic Flora of Aquatic Habit, in Three Lake Areas of Scotland. Pp. 58, plates 55. (Proc. Roy. Soc. Edinb. xxv. pp. 967–1023.) 8vo. *Edinburgh*, 1905.

West (William) and **West (George Stephen).** A Monograph of the British Desmidiaceæ. Vol. II. Pp. x, 204; plates 33–64. (*Ray Society.*) 8vo. *London*, 1905.

Willis (John Christopher). *See* **Peradeniya:** Royal Botanic Gardens. Annals.

Wintons (A. L.). *See* **Moeller (Josef).** Mikroskopie der Nahrungs- und Genussmittel aus dem Pflanzenreiche. Zweite Auflage.

Wittrock (Veit Brecher). Catalogus Illustratus Iconothecæ Botanicæ Horti Bergiani Stockholmiensis; Notulis Biographicis adjectis. Pars II. Pp. xciii, 245; cum 151 tabulis. (Acta Horti Bergiani, Band iii. No. 3.)
4to. *Stockholm*, 1905. **Author.**

Wolfenden (Richard Norris). *See* **Maldive and Laccadive Archipelagoes.** Copepoda.

Wolff (Max). Das Nervensystem der polypoiden Hydrozoa und Scyphozoa. Ein vergleichend-physiologischer und anatomischer Beitrag zur Neuronlehre. Pp. 91, Taf. 5. (Zeitschr. f. allgem. Physiol. Bd. iii. Heft 3.) 8vo. *Jena*, 1903.
N. H. W. Maclaren.

Wood (John Medley). Natal Plants. Vol. IV. Parts 3 & 4; Vol. V. Part 3. 4to. *London*, 1905–1906. **Author.**

Woodward (Arthur Smith). On a Carboniferous Fish Fauna from the Mansfield District, Victoria. *See* **Melbourne:** National Mus. Memoirs, no. 1.

Woodward (Arthur Smith) and **Seward (Albert Charles).** Permo-Carboniferous Plants and Vertebrates from Kashmir. Pp. 14, plates 3. (Mem. Geol. Surv., Palæont. Ind., New Series, vol. ii. Mem. No. 2.) Fol. *Calcutta*, 1904.

Woodward (Bernard Barham). *See* **Sherborn (Charles Davies).** On the Dates of Publication of the Natural History Portions of the 'Encyclopédie Méthodique.'

Worcester (Dean C.). *See* **McGregor (Richard C.).** A Hand-List of the Birds of the Philippine Islands.

Wright (Herbert). Report of the Controller, Experiment Station, Peradeniya, for 1903. Pp. 44. (Circulars & Agric. Journ. Roy. Bot. Gardens, Ceylon, vol. ii. no. 18.) 8vo. *Peradeniya*, 1905.

—— Indian Corn (*Zea Mays*, L.) in Ceylon. (Circulars & Agric. Journ. Roy. Bot. Gardens, Ceylon, vol. iii. no. 5.)
8vo. *Peradeniya*, 1905.

—— Cocoa Disease in Ceylon. Pp. 4, plate 1. (Tropical Agric. & Mag. Ceylon Agric. Soc. Aug. 1905.)
4to. *Colombo*, 1905.

—— Historical Notes regarding Para Rubber in Ceylon and the East. Pp. 3; plate 1. (Tropical Agric. & Mag. Ceylon Agric. Soc. Aug. 1905.) 4to. *Colombo*, 1905.

—— Foliar Periodicity of Endemic and Indigenous Trees in Ceylon. Pp. 102; plates 6. (Ann. Roy. Bot. Gardens, Peradeniya, vol. ii. part 3.) 8vo. *Colombo*, 1905.

—— *Hevea brasiliensis* or Para Rubber; its Botany, Cultivation, Chemistry, and Diseases. Pp. viii, 106, Appendix xx; plates 28.
8vo. *Colombo*, 1905.

—— —— Second Edition. Pp. xiii, 179; plates 54.
8vo. *Colombo*, 1906. **Author.**

Wright (Herbert) and Bruce (Alexander). Para Rubber in Ceylon. Pp. 32. (Circulars & Agric. Journ. Roy. Bot. Gardens, Ceylon, vol. iii. no. 6.) 8vo. *Peradeniya*, 1905. **Authors.**

York, Eastleigh, Birmingham, and Cambridge.
Watson Botanical Exchange Club. Reports, Vol. II. No. 2. 8vo. *Cambridge*, 1906. **G. Goode.**

Zacharias (Otto). *See* **Archiv für Hydrobiologie und Planktonkunde.**

Zaczek (Johann). Die Trichinose. Inaugural-Dissertation. Pp. 31. 8vo. *Berlin*, 1868. **N. H. W. Maclaren.**

Zelinka (Carl). Die Gastrotrichen. Eine monographische Darstellung ihrer Anatomie, Biologie und Systematik. Pp. 178, Taf. 5. (Zeitschr. wiss. Zool. Bd. 49.) 8vo. *Leipzig*, 1889. **N. H. W. Maclaren.**

Zeller (Ernst). Ueber das encystirte Vorkommen von *Distomum Squamula*, Rud., im braunen Grasfrosch. Pp. 4, Taf. 1. (Zeitschr. wiss. Zool. Bd. 17.) 8vo. *Leipzig*, 1867.

—— Weiterer Beitrag zur Kenntniss der Polystomen. Pp. 37, Taf. 2. (Zeitschr. wiss. Zool. Bd. 27.) 8vo. *Leipzig*, 1876. **N. H. W. Maclaren.**

Zittel (Karl Alfred von). Gedächtnisrede auf Karl A. von Zittel, gehalten in der öffentlichen Sitzung der K.B. Akademie der Wissenschaften zu München zur Feier ihres 146. Stiftungstages am 15. März 1905, von August Rothpletz. Pp. 23. 4to. *München*, 1905.

Zoological Record. Vol. 41 (1904). 8vo. *London*, 1905.

Zschokke (Fritz). Erster Beitrag zur Parasiten-fauna von *Trutta salar*. Pp. 35, Taf. 1. (Verh. Naturf. Ges. Basel, viii.) 8vo. *Basel*, 1890. **N. H. W. Maclaren.**

Zürich.
Botanisches Museum der Universität, Zürich.
Mitteilungen XXXI.
Schinz (Hans). Die Myxomyceten oder Schleimpilze der Schweiz. Pp. 129. figs. 45. (Mitt. Nat. Ges. Winterthur, Heft 6.) 8vo. *Winterthur*, 1906.

—— Der botanische Garten und das botanische Museum der Universität, Zürich, im Jahre 1905. 8vo. *Zürich*, 1906. **Dr. Hans Schinz.**

DONATIONS IN AID OF PUBLICATIONS.

		£	s.	d.
1905.				
June 17.	Dr. Eric Drabble. Contribution in aid of colouring plate 50 of his paper: On the Anatomy of the Roots of Palms (Trans. 2nd ser., Bot. vol. vi. part 10)	4	10	0
Nov. 24.	Executors of the late G. B. Buckton. Contribution in aid of colouring 2 plates of his paper: Observations on some undescribed or little-known Species of Hemiptera-Homoptera of the Family Membracidæ (Trans. 2nd ser., Zool. vol. ix. part 9)	26	0	0
Dec. 28.	Prof. F. W. Oliver. Contribution in aid of two Woodbury-type plates of his paper: On the Structure and Affinities of *Stephanospermum*, Brongniart, a Genus of Fossil Gymnosperm Seeds (Trans. 2nd ser., Bot. vol. vi. part 8)	5	17	6
1906.				
April 26.	The Royal Society. Second grant in aid of Dr. G. Herbert Fowler's "Biscayan Plankton" (Trans. 2nd ser., Zool. vol. x.).	50	0	0

[*The following Obituary Notice was only received on the 27th September, after the foregoing pages were in type.*]

Walter Frank Raphael Weldon, the subject of the present memoir, was born on March 15th, 1860, and was educated at Caversham School and afterwards, during 1876 and 1877, at University and King's Colleges, London. In April 1878 he entered St. John's College, Cambridge, and studied Physiology and Zoology under Prof. Michael Foster and the late Francis Maitland Balfour. He obtained a first class in the first part of the Natural Science Tripos (under the old Statutes) in 1881 and proceeded to the degree of B.A. in the same year. In 1882 he was placed in the first class in the second part of the Natural Science Tripos, and after a period of study at the Zoological Station at Naples, was resident chiefly at Cambridge, where he was engaged in zoological research, and acted as a Demonstrator to Mr. A. Sedgwick and Assistant Lecturer in the Zoological Laboratories. He married in 1883 Florence Joy, the eldest daughter of William Tebb, Esq., of Rede Hall, Burstow, Surrey, and never was there a happier marriage. In November 1884 Weldon was elected to a Fellowship at St. John's College, and almost simultaneously was appointed University Lecturer in the Advanced Morphology of Invertebrata at Cambridge. In 1886, a year after his father's death, he went in company with his wife on a zoological expedition to the Bahamas, and returning to Cambridge at the end of the same year, resumed his work as University Lecturer. In 1888, on the completion of the Laboratory of the Marine Biological Association at Plymouth, Weldon was one of the first to make use of the opportunities offered for the study of English Marine Zoology, and having obtained leave of absence from Cambridge, he resided at Plymouth for two years, and there began the course of biometrical research which was the chief interest of the rest of his life. In December 1890 he was elected to the Jodrell Chair of Zoology in University College, London, in succession to Professor Ray Lankester; and in 1899, when the latter was appointed Director of the British Museum of Natural History, Weldon again succeeded him, this time as Linacre Professor of Comparative Anatomy at Oxford. For the next seven years he resided at Oxford, occupied with the duties of his chair and with a constantly increasing quantity of biometrical research. Though he was obviously straining his energies to the utmost his health and vigour seemed to be unimpaired, and it was a great shock to his many friends when they heard of his death, after a very short illness, on April 13th, 1906. He was elected Fellow of our Society, 4th June 1891, and of the Royal Society in 1890.

Such is a brief outline of the life of one of the most gifted of contemporary zoologists: it would take many pages adequately to

fill in the picture with an account of his scientific work and an appreciation of his loveable personality. A few salient features may be dwelt on here.

Professor Weldon was the eldest son (his younger brother Dante died in 1881) of the late Walter Weldon, F.R.S., distinguished both in Journalism and Chemical Science, well known for his invention for the recovery of Chlorine in the Leblanc Soda-process, and one of the founders of the Society of Chemical Industry. It was said that the most remarkable characteristic of the father was "the marvellous avidity and thoroughness with which he grasped any subject upon which he brought his mind to bear. A strong and active mind was allied with a constitutional power and capacity and love of work which it is the good fortune of few to possess." The qualities that brought distinction to the father were inherited in full measure by the distinguished son. In his earliest days at Cambridge Raphael Weldon (he was always called by the last of his Christian names) was remarkable, even among the brilliant company of young zoologists gathered there under Francis Balfour, for his unusual enthusiasm for Zoology, and his University career was, like the rest of his life, devoted to his favourite study. He was a vigorous member and supporter of the Cambridge University Natural Science Club, and one of his contemporaries records that he used, when an undergraduate, to maintain the superiority of intellectual over material pleasures. To those who did not know him this might savour of youthful pedantry, but it was a simple and unaffected statement of his real pleasure in life. Intellectual as he was, Weldon had nothing of the pedant or recluse about him, and was impatient of all affectation of superior wisdom. Among the many rare qualities combining to make up a charming personality, sincerity was perhaps the most conspicuous, and to perfect candour was added a certain whimsical humour which made his conversation peculiarly attractive. While holding fast to his ideal of intellectual pleasure, Weldon was eminently sociable and full of human sympathy. He loved to surround himself with friends, and from the early days of his residence at Cambridge his rooms or his house were a centre of hospitality and good fellowship. Never did he appear to greater advantage than when entertaining his friends. On such occasions conversation would turn mainly on subjects of zoological controversy, which Weldon would discuss with the most admirable vivacity and spirit. No subject, however abstruse, could be dull in his hands. He would keep a room full of zoologists in roars of laughter while he argued some highly technical point in racy and unconventional language, with a wealth of illustration and anecdote that gave inimitable charm and interest to his discourse. On such occasions, and they were frequent, one could see how genuine and spontaneous was his love of Science. To his mind it was a fertile territory, abounding in gladness and beauty, where there were no arid wastes and no

dreary and desolate places. In this happy view of his life's work he was doubtless assisted by an uncommon power of working hard without any feeling of laborious effort. A friend of his has remarked that he had, like his father, a great facility for extracting the kernel of a memoir or book without wading through a very large proportion of the words. He instinctively fastened upon what was essential, and made it his own, and would read through a surprising amount of difficult and often dry literature without any apparent effort. Moreover, he was an excellent linguist and could not only read but speak several languages with ease and fluency. The same faculties that made Weldon a brilliant conversationist made him a lecturer of exceptional merit. He had a strong dramatic instinct, and utilized it to the full in the lecture-theatre and class-room. Aided by a natural aptitude for drawing, he would develop a subject both by speech and by finished drawings on the black-board, till it seemed to grow under his hands, and the driest subjects of anatomy took life and became replete with interest. His lectures at University College attracted not only a large class of students but also many of his colleagues, and his public courses of lectures at Oxford were no less successful.

Weldon's zoological work falls naturally into two periods. Trained at Cambridge under Prof. Francis Balfour, he naturally came under the influence of the embryological and morphological school of thought then dominant not only in England but on the Continent. His earliest papers of importance were published in 1883. One, on the early development of *Lacerta muralis*, is a careful piece of embryological work, such as was produced in considerable quantity at Cambridge at that period. The other, on some points in the anatomy of *Phœnicopterus* and its allies, was the outcome of work carried on in the Zoological Society's Gardens.

For some years after taking his degree Weldon followed the prevailing trend of zoological thought, and hoped, as the best zoologists then hoped, that the chief problems of animal evolution would be on a fair way to solution as embryological evidence accumulated. With this object in view, he made frequent journeys abroad to collect embryological material or to study the development of some marine organism on the spot. His expedition to the Bahamas was made with the purpose of studying the development of the Tornaria larva of *Balanoglossus*. Between 1883 and 1889 he published several memoirs, all distinguished for careful and methodical observation and considerable originality in morphological speculation, but their contents need no special mention in this place. When he went to Plymouth in 1888 his purpose was to study the development of the Crustacea, and for more than a year he applied himself diligently to this work, though his memoirs on the renal organs of the Decapoda and the development of the Common Shrimp did not appear till 1891 and 1892. But

like some of his Cambridge contemporaries, he had become dissatisfied with the methods of zoological reasoning then in vogue. It was consistent with his sincerity of character and purpose that he could not accept conclusions based upon what seemed to him to be imperfect argument and insufficient evidence, and he found that the mode of argumentation commonly in use, though ingenious, was lacking in rigour of scientific proof. At this time a considerable body of young naturalists was collected in the Plymouth Laboratory, and discussions on the validity of the doctrine of Natural Selection were frequent. Weldon was ever a firm upholder of Natural Selection, and in these discussions took up an attitude of firm opposition to the theories of Eimer and the neo-Lamarckian school. At the same time he could not give unqualified assent to the brilliant speculations of Weismann, then at the height of their influence, finding them, like the rest of current morphological speculation, too vague and too deficient in rigorous demonstration. Being therefore dissatisfied with the methods he had hitherto employed, Weldon turned his attention to the works of Francis Galton, and on reading these more attentively than he had done before, was immediately attracted by the prospect of introducing exact mathematical proof into zoological argument. The writer well remembers his coming into the Plymouth Laboratory one morning, armed with Galton's 'Natural Inheritance,' the contents of which he forthwith proceeded to expound with his accustomed eagerness. He pointed out that since the time of the publication of the 'Origin of Species,' zoologists had blindly accepted Darwin's conclusions, but, with few exceptions, had neglected Darwin's methods. "Science," he said, "is measurement: Darwin made use of measurement, and if we are to make any progress his example must be followed." This was the turning-point of Weldon's career. With characteristic energy he proceeded to apply to animals the statistical methods used by Galton in anthropometric researches, and as he was engaged at the time with the development of the Shrimp, he chose this animal for his first essay in what he afterwards called Biometrics. Collecting large numbers of shrimps from three different localities, he found that the results of his measurements confirmed what Galton had established for man and domesticated animals, and, further, that the "probable error" of the same organ was different for the three groups of shrimps from Plymouth, Southport, and Sheerness*. In other words, the shrimps from these localities form three distinct races. Encouraged by the success of his first effort, Weldon set to work to prepare himself for extended investigations of a like nature. Finding at the outset that his knowledge of statistics was insufficient, he put himself through a course of mathematical study, and in a short time was fully equipped for the prosecution of higher statistical

* "The Variations occurring in certain Decapod Crustacea.—I. *Crangon vulgaris*," Proc. Royal Soc. vol. 47 (1890).

researches. A second paper on the Correlated Variations in *Crangon* appeared in 1893, and about the same time he became a member of a committee of the Royal Society formed for the purpose of "Conducting Statistical Enquiries into the Measurable Characteristics of Plants and Animals." In connection with this Committee, he began an investigation on the variability of the breadths of the frontal carapace in the common shore-crab, *Carcinus mænas*, and this led to what was probably the most brilliant of his discoveries. He found that the mean frontal breadth of crabs taken from Plymouth Sound was diminishing at a relatively rapid rate, and came to the conclusion that this diminution was due to the changed conditions of Plymouth Sound owing to the great increase of the population of the three towns discharging their refuse into a bay nearly completely closed by a huge artificial breakwater, and also to the large quantities of china-clay discharged into the Sound. To prove this, he undertook the most laborious experiment of keeping a large number of crabs in water in which a quantity of finely divided china-clay was kept suspended, and he found that the crabs with broader frontal carapaces, and therefore wider respiratory apertures, were choked by the china-clay and died, while those with narrower frontal carapaces survived. By a still more laborious experiment he showed that in a number of young crabs reared in clean water, and therefore protected from the pernicious effect of mud and china-clay in suspension, the mean frontal breadth was raised above that of wild crabs of their own size living in Plymouth Sound. This convincing experiment formed the subject of Weldon's brilliant Presidential Address to the Zoological Section of the British Association at Bristol in 1898; and it remains an almost unique instance of a clear demonstration of the operation of Natural Selection in actual progress, while it at the same time silenced those who objected that small and apparently useless variations could not be preserved by Natural Selection. What could seem more useless than a slight diminution of the breadth of the carapace of a crab? Yet a more extended knowledge showed that it is in fact useful under certain conditions and is preserved by Natural Selection.

At University College Weldon found a congenial spirit in Professor Karl Pearson, who, like himself, had been fired with enthusiasm for the statistical study of biological problems initiated by Galton, and the mathematical professor was soon able to render his colleague the most important assistance by the solution of the problem of dealing with the asymmetrical distribution of variations. They quickly became fast friends, and their cooperation has marked an epoch in statistical biological research.

In a short time Weldon, whose enthusiasm was contagious, had a group of young and ardent naturalists working under his direction, and in order to give expression to the new school of zoological thought thus growing up under his guidance, he initiated in 1901, in conjunction with Mr. Francis Galton, Professor Karl

Pearson, and Professor C. B. Davenport, a new journal, 'Biometrika,' to which he continued to contribute important statistical papers up to the time of his death. Unfortunately much of the work upon which he was engaged during the last few years remains unpublished. Much of it was of an exceedingly laborious and time-consuming nature. It would be difficult to give an idea of the technical difficulty and time required to collect the data for his paper on the study of Natural Selection in *Clausilia laminata*, published in the first number of 'Biometrika.' It involved the grinding down by hand of hundreds of fragile shells, and afterwards carefully measuring them. He continued these investigations amid much other work, from 1902–1906, and had prepared a number of sections for a similar paper upon snails of the genus *Helix*, but the work was left unfinished. He had been for the last four years deeply engaged in a controversy on the validity of Mendel's law, and many of his friends regretted that he took up from the first such an attitude of uncompromising opposition to what seemed to many to be a most promising instrument of research. But his attitude was hardly understood. He demanded more exact definitions and a more rigorous proof founded upon a larger number of instances than the adherents of Mendel were prepared to give in the earlier stages of the controversy; and when, true to his own principles, he put Mendel's hybridization results to proof, he found discrepancies which he was unable to reconcile by the exact statistical methods which he employed. He spared no pains to arrive at the truth, and instituted experiments on the hybridization of domesticated races of mice on a very large scale. Some of the results of these experiments have been published by his pupils Mr. E. A. Schuster and Mr. A. D. Darbishire; but the enquiry was still in progress at the beginning of the present year, and the data have been carefully collected and will form the subject of a posthumous memoir by Professor Karl Pearson.

Weldon had also projected and had written some part of a book on the Statistical aspect of Heredity and Variation, and it is hoped that the chapters left completed at his death may give a clue to his latest opinion on the subject.

These few fragments descriptive of an energetic scientific life will serve to show how great was the loss sustained by Zoology when so exact and yet so original an investigator was cut off in the fulness of his powers. Much as he had already done, Weldon had much more to accomplish, and he had set himself work from which results of the highest importance must have been derived. Beyond the loss to scientific thought there is the loss, to a large circle of friends, of one whose high character, affectionate and generous disposition, combined with wit and humour, leaves a void which cannot be filled. *Multis ille bonis flebilis occidit!* [G. C. B.]

INDEX TO THE PROCEEDINGS.

SESSION 1905–1906.

Note.—The following are not indexed:—The name of the Chairman at each meeting speakers whose remarks are not reported; and passing allusions.

PRINTED BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

Publications of the Society issued during the period, 31st July, 1905, to 31st July, 1906:—

Journal (Botany), No. 255–256, 20th Dec., 1905.
„ 259, 30th Sept., 1905.
„ 260, 23rd July, 1906.
„ (Zoology), No. 193, 21st Feb., 1906.
„ 194, 23rd July, 1906.

Transactions (2nd Ser. Botany), Vol. VII. Part III., April 1906.
„ IV., Sept. 1906.
„ (2nd Ser. Zoology), Vol. IX. Part X., July 1906.
Vol. X. „ IV., Nov. 1905.
„ V., Feb. 1906.

Proceedings, 117th Session, 1904–1905, October 1905.

List of [Fellows, Associates, and Foreign Members], 1905–190