

(3) Among the receipts of the past year the Council have to acknowledge the following subscriptions and donations:—£100 from Lord Revelstoke; £100 from Sir Henry Thompson; £100 from the Grocers' Company; £200 from the Fishmongers' Company (annual grant for five years); £500 from H.M. Treasury (annual grant for five years).

From annual subscriptions and compositions £143 was received, £61 interest on investments, and £150 for rent of tables and sale of specimens.

The expenditure, as shown in the Treasurer's account presented herewith, amounted to £2992, of which £398 was paid to Mr. Inglis for balance of his fees as engineer, £417 for structural alterations and additions, £112 for bait investigation, and £250 for a steam-launch.

The Association now has in hand, in cash and invested, £1398 2s. 11d.

The Council have great pleasure in acknowledging the generous assistance which has lately been afforded to the Association by the Fishmongers' Company, by Mr. J. P. Thomasson, M.P., and Mr. Frank Crisp.

The Fishmongers' Company, in addition to substantial grants which they have already made to the Association, have undertaken to contribute £400 per annum to the funds of the Association for a period of five years from the present date.

Mr. J. P. Thomasson has kindly offered a sum of £250, to enable the Council to retain the services of the Naturalist, Mr. J. T. Cunningham, for another year.

Mr. Frank Crisp has kindly given a sum of £120 (£60 per annum for two years) to meet the expenses of special investigations on the culture of sea fishes in inclosed ponds. The Council take this opportunity of placing on record their appreciation of the interest and confidence shown in the work of the Association by these liberal donations.

The thanks of the Association are due to Prof. Haeckel for a copy of his work on the *Siphonophora*; to Colonel Richardson, R.A., for a number of ichthyological works from the library of the late Sir J. Richardson; to Mr. J. W. Clark for back numbers of the Philosophical Transactions of the Royal Society and other books; to Messrs. J. and A. Churchill for the current numbers of the *Quarterly Journal of Microscopical Science*; and to Messrs. Agassiz, Giard, Marion, the United States Fish Commission, the Naples Zoological Station, the officers of the Norwegian North Atlantic Expedition, and other individuals and societies for copies of their publications.

The Council desire to express the indebtedness of the Association to the Council of the Royal Society for kindly permitting the Association to hold the periodical meetings of the Council and Association in their rooms.

In July and August 1889, the Council was in correspondence with the Fishery Board for Scotland and the Fisheries Department of the Board of Trade, with reference to the possibility of procuring scientific information on the alleged destruction of immature fish by beam trawling in deep waters.

Subsequently the Council determined to make an application to H.M. Treasury for a further grant of money in aid of special researches on food-fishes. The Chancellor of the Exchequer kindly consented to receive a deputation on the subject on May 15.

The Council regret to have to announce that Prof. Huxley, who since the foundation of the Association has been its President, has found it necessary to withdraw from the office which he has held with so much honour and advantage to the Association. The Council desire to express their warm appreciation of the eminent services rendered by Prof. Huxley to the Association, and their great regret that he should be unable to continue his office.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

VICTORIA UNIVERSITY.—Last Saturday was Degree-day; the ceremony, presided over by Principal Rendall, the Vice-Chancellor, took place in the Manchester Free-Trade Hall. In the course of his speech, the Vice-Chancellor gave the following details as to the progress of the University:—

"A three-fold scheme for certificates, technical, commercial, and literary, has replaced the narrower project for technical certificates alone, and will be the means of giving University direction and attachment to numerous organizations which have

hitherto lacked clearness of aim or recognition of results. The Manchester Chamber of Commerce has entrusted the examinations for its commercial certificate to the University. The local lectures scheme continues to thrive vigorously. In the last three sessions 21 courses, with an average attendance of 130, the large majority in or near Manchester, have been delivered under University auspices. The three colleges of the University are taking action, more or less concerted, for the establishment of day training colleges for primary teachers under the provisions of the new Education Code. Thus step by step the University is comprehending her mission and entering upon her heritage. Those who are forwarding the work may feel that impatience for quick returns which comes of convictions confident and energetic, but the observer and the historian will agree that in content and scope Victoria University has advanced with unparalleled rapidity. In all the colleges of the University building is in progress or in contemplation. At University College the Victoria Building for the arts department is advancing towards completion; at Yorkshire College funds have been raised for the erection of a medical department and other needed extensions; at Owens College further enlargement of the Medical School buildings is now under consideration."

As at Cambridge, the women students have done remarkably well this year, three out of four "first classes" in the B. A. honours schools and the Thomasson Prize for English Essay falling to their share.

ST. ANDREWS UNIVERSITY.—A Scholarship of the value of £30 a year has just been placed at the disposal of Prof. Percy Frankland at University College, St. Andrews University, by Miss E. F. Forster, of London. It is intended that the student holding the same shall devote the whole of his time to the prosecution of original research. The Scholarship, which will be known as "The Forster Research Scholarship," has been awarded for this year to Mr. John MacGregor, M.A.

#### SOCIETIES AND ACADEMIES.

##### LONDON.

Royal Society, June 12.—"On the Position of the Vocal Cords in Quiet Respiration of Man, and on the Reflex-Tonus of their Abductor Muscles." By Felix Semon, M.D., F.R.C.P., Assistant Physician in charge of the Throat Department of St. Thomas's Hospital, and Laryngologist to the National Hospital for Epilepsy and Paralysis, Queen Square. Communicated by Prof. Victor Horsley, F.R.S.

The final conclusions arrived at by the author are as follows:—

(1) The glottis in man is wider open during quiet respiration (inspiration and expiration) than after death or after division of the vagi or recurrent laryngeal nerves.

(2) This wider opening during life is the result of a permanent activity of the abductors of the vocal cords (posterior crico-arytæoid muscles), which therefore belong not merely to the class of accessory, but of regular respiratory, muscles.

(3) The activity of these muscles is due to tonic impulses, which their centres receive from the neighbouring respiratory centre in the medulla oblongata. It is very probable that these impulses rhythmically proceed to the respiratory centre from the stimulation of certain afferent fibres contained mainly, but not exclusively, in the trunks of the pneumogastric nerves, and that they are in the respiratory centre changed into tonic impulses. The regular activity of the abductors of the vocal cords during life, therefore, belongs to the class of reflex processes. The permanent half-contraction of these muscles, in which form their tonic innervation is manifested, can be further increased, in concord with the general laws of the mechanism of respiration, by either volition or other reflex influences.

(4) In spite of their extra-innervation, the abductors of the vocal cords are physiologically weaker than their antagonists.

(5) These antagonists, the adductors of the vocal cords, have primarily nothing at all to do with respiration, and ordinarily serve the function of phonation only. Their respiratory functions are limited to—

(a) Assistance in the protection of the lower air passages against the entry of foreign bodies.

(b) Assistance in the modified and casual forms of expiration known as cough and laughing.

Physical Society, June 6.—Prof. W. E. Ayrton, F.R.S., President, in the chair.—Mr. H. Tomlinson, F.R.S. read a paper on the effect of change of temperature on the Villari critical points of iron. This, he said, was a continuation of the paper he read before the Society on March 21, and the method employed was the same as then described (see *Phil. Mag.*, vol. xxviii, p. 394). Since then, however, he has made experiments at various temperatures up to 285° C., the temperature being determined from the resistance of a platinum wire whose temperature coefficient was carefully determined. The following table shows some of the results obtained with a well-annealed iron wire 1 mm. in diameter, which had been repeatedly heated up to 300° C., and cooled to the temperature of the room until the temporary permeability with various loads attained constant values at both temperatures.

Magnetizing force in C.G.S. units.	Load in kilogrammes for which permeability is the same as for unloaded wire at temperature				
	12° C.	76° C.	167° C.	244° C.	285° C.
2.84	4.7	5.0	5.3 and 12	5.7 and 10	None
3.70	2.5	3.2	3.6	4.2 ,, 11.5	4.7 and 9.9
4.8	1.8	2.5	2.7	—	3.1 ,, 12.3
7.69	None	None	None	None	None
10.40	"	"	"	"	"
15.32	"	"	"	"	"

Curves from which these numbers were obtained are given in the paper, and in these the load in kilogrammes, and percentage change of temporary permeability are plotted. From these curves and table it will be seen that if the first points in which the curves cut the load-line be considered, then at all temperatures the Villari values increase as the load decreases. If, however, the second points be taken, the critical values increase both with load and temperature. In both cases the Villari value is increased by rise of temperature. From the curves it follows that rise of temperature reduces the total variation of permeability producible by loading. A table showing the temporary permeability of the unloaded wire at the various temperatures accompanies the paper.—A paper on the diurnal variations of the magnet at Kew, by W. G. Robson and S. W. J. Smith, was communicated by Prof. Rücker. In some preliminary remarks the Professor pointed out the great advisability of having the results of magnetic observations at various Observatories reduced and published in the same manner, and for the same periods. In order that this may be effected, the methods of reduction must be trustworthy, but not very elaborate. The Greenwich plan is too laborious to be generally adopted, but the method suggested by Dr. Wild (*Rep. Brit. Ass.*, 1885, p. 78), in which the mean diurnal variation is obtained from measurements on five quiet days in each month, is feasible. With a view to further testing the trustworthiness of this method, the work described in the paper was undertaken. Mr. Whipple had made a comparison of the two methods for the years 1870-71-72, with the result shown in the following table:—

Minutes of arc.	
$K_s - K_w$	= 0.7
$G - K_s$	= 1.2
$G - K_w$	= 1.6

where  $K_s$  is the mean diurnal range at Kew as obtained by Sabine's method,  $K_w$  that obtained by Wild's method, and  $G$  that obtained at Greenwich by the Greenwich method. He also found that the mean hourly differences followed some definite law. The authors undertook the reduction of the Kew observations according to Wild's method for the years 1883, 1886-87; the first was chosen as being a year of maximum sun-spots. The results give—

Minutes of arc.	
1883 ...	$G - K_w$ = 1.5
1886 ...	$G - K_w$ = 1.2
1887 ...	$G - K_w$ = 1.9

There is thus a difference of nearly two minutes in the variations at the two places, and this cannot all be accounted for by the method of reduction. Another peculiarity is that the range, as calculated by Wild's method, is greater by about 0.5 than that obtained by the Greenwich method, although the latter includes days of moderate disturbance. The total range at both places has diminished by about 1.6 between 1883 and 1887. The

paper is accompanied by tables and curves plotted from the differences in the mean hourly readings at Greenwich and Kew for each of the above 6 years, and a marked similarity exists between all of them. The mean of the 6 curves differs in no case by more than 0.4 from the curve for any year. It is thus possible to calculate the Greenwich values from the Kew numbers; and as these latter are published about two years sooner than the former, this fact may be very important. Referring to the reduction of results, Prof. Rücker said that the Stonyhurst observers and Prof. Mascart were willing to adopt Wild's method; Falmouth, he hoped, would follow suit, and Greenwich had been asked to publish their results in both ways. Mr. Whipple said that, before recording-instruments were available, and the numbers were obtained from separate experiments, the labour involved was considerable, and a single large disturbance or magnetic storm might vitiate the result of a whole year's work. Methods were therefore adopted to eliminate these disturbances; of these, that used by Sabine may be particularly mentioned. Although declination records have now been obtained for a considerable number of years, the cause of the variations still remains unknown. They do not seem to be dependent on temperature or on astronomical facts. He considered it valuable to obtain magnetic data from different parts of the earth, but comparisons were only possible when all are published on the same plan. This, he hoped, would result from the efforts of Profs. Rücker and Adams. When this is accomplished, the observations on magnetic force will need treatment; this work will be laborious, and the aid of volunteers like Messrs. Robson and Smith would be of great service. Prof. W. G. Adams said he was glad to see the satisfactory nature of the work which had just been brought before the Society. Usually, the mass of figures to be dealt with was so large that the mere reduction was a great undertaking. If, however, the difference between results obtained by the Greenwich and Wild's method was not more than 0.4, it may be possible to make out the causes of the variations from observations reduced on Wild's plan. He himself would put more faith in horizontal force observations, and wished they could be worked out by some ready method. He hoped the one adopted in America, of obtaining mean curves by photography, might prove satisfactory. Prof. Perry asked if a machine could not be made to do the work. Mr. Whipple said such machines had been used by the Meteorological Office, but they were so elaborate and expensive that clerical work was just as cheap. The method of photographing mean curves had been tried at Kew, but it was open to the objection that accidental disturbances, such as those produced by the movement of iron in the vicinity and the approach of cabs, &c., were not eliminated. Mr. Boys, referring to the use of integrators, said that, for an harmonic analyzer, his disk-cylinder pattern was preferable to the ball-disk-cylinder integrators of J. Thomson, for it was much cheaper, and had less inertia. The President said the movement initiated by Prof. Rücker would be of great service if it resulted in the numbers obtained at the various magnetic Observatories being published in the same way. It was a great advantage to have such men, who were not permanently attached to an Observatory, to take up the subject and suggest improvements. The heads of such institutions were usually too much employed in making the necessary reductions to have time for devising improved methods. In his opinion, greater freedom should be allowed to the chiefs of Observatories, for it should be borne in mind that the object of observations is not to produce volumes of figures, but to increase our knowledge. Referring to the reduction of observations, he thought the voluntary services of senior physical students should be more generally accepted, and to this end he suggested that properly recommended persons should be allowed to spend some time in Observatories as honorary assistants. This would be of great use to the students themselves, and an advantage to the Observatories, for the reduction of observations could then be expedited. As regards the accidental disturbances referred to by Mr. Whipple, he contended that regulations should be adopted to render them impossible.

Zoological Society, June 17.—W. T. Blanford, F.R.S., in the chair.—Mr. Sclater exhibited and made remarks on a mounted head of a Pallah Antelope, obtained by Captain F. Cookson, on the Cunene river, in South-western Africa, which was distinguished by its black face from the ordinary form of the Cape Colony.—Mr. Sclater also exhibited a large photograph of Grévy's Zebra (*Equus grevyi*), taken from the specimen in the

Natural History Museum at Paris by Mr. Gambier Bolton.—A specimen of Pallas's Plover (*Aegialitis asiatica*), obtained in May last near Great Yarmouth, and now in the Norwich Museum, was exhibited; and a note upon its occurrence by Mr. T. Southwell was read to the meeting.—A communication was read from Prof. F. Jeffery Bell containing some notes received from Mr. Edgar Thurston, of the Madras Museum, on the habits of the Pennatulids of the genus *Virgularia*.—A communication was read from M. P. A. Pichot, containing exact particulars of the locality on the Lower Rhone in which the Beaver is still found in its native state.—Mr. W. Bateson read a paper on some cases of repetition of parts in animals, and exhibited a series of specimens illustrative of this subject.—Mr. Henley Grose Smith gave an account of the Diurnal Lepidoptera collected by Mr. W. Bonny, of the Emin Relief Expedition, on the river Aruwimi, Central Africa.—A communication was read from Mr. W. L. Distant, containing descriptions of some Hemiptera collected by Mr. W. Bonny during the same expedition.—A communication was read from Mr. H. W. Bates, F.R.S., on some of the Coleoptera collected by Mr. W. Bonny during the same expedition.—Mr. Herbert Druce read the descriptions of ninety-five new species of Lepidoptera Heterocera from Central and South America.—Mr. G. A. Boulenger pointed out the secondary sexual characters in the South African Tortoises of the genus *Homopus*.—A communication was read from Mr. W. L. Sclater, containing a series of critical notes on the Indian species of the family Muriidae.—A communication was read from Mr. J. T. Cunningham, containing some notes on the secondary sexual characters of the genus *Arnoglossus*. The author showed that the so-called *Arnoglossus laterna* is only the female of *A. lophotes*.—Mr. R. Bowdler Sharpe read the sixth part of his series of notes on the Hume Collection of Birds. The present communication treated of the Coraciidae of the Indian region, and contained descriptions of three new species.—A communication was read from Miss E. M. Sharpe, containing an account of a collection of Lepidoptera made by Mr. Edmund Reynolds on the rivers Tocantins and Araguaya, and in the province of Goyaz, Brazil.—Mr. Edmund S. Hall gave an account of the occurrence of a persistent right posterior cardinal vein in a Rabbit.—This meeting closes the present session. The next session (1890-91) will commence in November 1890.

## PARIS.

**Academy of Sciences, June 23.**—M. Hermite in the chair.—On the partial eclipse of the sun on June 17, by M. J. Janssen.—Theory of the motion of fluids near to the wide opening of a delivery pipe, where the liquid threads have not acquired their normal inequalities of velocity, by M. J. Boussinesq.—Comparison of the theoretical figure of a storm given in the *Comptes rendus* of June 9 with the facts known to navigators, by M. H. Faye.—The work and progress of the Arago Laboratory in 1890, by M. de Lacaze-Duthiers.—On the visible and photographic spectrum of the great nebula of Orion, by Dr. W. Huggins.—On the distribution of *Salmo quinnat* on the Mediterranean coasts of the south-east of France, by MM. A. F. Marion and F. Guitel.—On the glycolytic power of blood and of chyle, by MM. R. Lépine and Barral.—Observations of Brooks's comet (March 19, 1890) made at Bordeaux Observatory, by MM. G. Rayet, Picart, and Courty. Observations of position are given extending from May 19 to June 20, being in continuation of those published in the *Comptes rendus* of March 31, April 8, and May 19.—Elements and ephemeris of the new minor planet (293) discovered at Nice Observatory on May 20, by M. Charlois.—Partial eclipse of the sun of June 17, in the morning, observed at Nice, by M. Perrotin.—Observation of the eclipse of the sun of June 16-17, made with the Brunner equatorial of Lyons Observatory, by M. Gonnessiat.—On the partial eclipse of June 16-17 (Algiers Observatory), by M. Ch. Trépied.—The solar eclipse of June 17, by M. E. L. Trouvelot. (For eclipse observations see Our Astronomical Column.)—On the international zero of altitude, by M. Ch. Lallemand.—On a direct-reading dynamometer, by M. G. Trouvé.—Reciprocal action of alkaline haloid salts and mercurous salts, by M. A. Ditte.—On some phosphates of lithium, beryllium, lead, and uranium, by M. L. Ouvrard. A number of double phosphates formed by the action of molten alkaline phosphates upon the carbonates of lithium and glucinum and the oxides of lead and uranium are described; among them occurs a double phosphate of beryllium and sodium corresponding in composition with the recently discovered mineral

beryllonite.—Combinations of double chlorides of phosphorus and iridium with arsenious chloride, by M. G. Geisenheimer. By heating the constituents in a sealed tube to 250°, ruby-red prismatic crystals of  $2(\text{Ir}_2\text{P}_2\text{Cl}_{15})_2 \cdot 5\text{AsCl}_3$  are formed.—On the sub-fluoride of silver, by M. Guntz. The existence of a sub-fluoride of silver was indicated by the analyses of a precipitate produced on the negative pole when subjecting a hot saturated solution of silver fluoride to electrolysis, employing a very strong current and silver electrodes. The pure salt is obtained in quantity by heating finely divided silver with a saturated solution of silver fluoride on a bath to a temperature of from 50°-90°. Analyses of the product prove it to be the sub-fluoride of silver  $\text{Ag}_2\text{F}$ .—A contribution to the study of ptomaines, by M. Chésner de Coninck.—On the preparation of wine ferments, by M. A. Rommier.—On the sense of smell in star-fishes, by M. Prouho. The author concludes that star-fishes excited by the presence of a bait are guided by sensations perceived by the extremities of their arms. The sense of smell is not diffuse in star-fishes, but is localized in the limbs useless for locomotion at the back of the ocellary plate.—The photographic registration of the chlorophyll function by the living plant, by M. Timiriazeff.—On the hypersthene andesites and labradorites of Guadaloupe, by M. A. Lacroix.—On the vertical circulation in the deep ocean, by M. J. Thoulet.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Three Years in Western China: A. Hosie (Philip).—Encyclopædia of Photography, Part 1: W. E. Woodbury (Iliffe).—Advanced Physiography (Physiographic Astronomy): J. Mills (Chapman and Hall).—A Manual of Orchidaceous Plants, Part 6 (Veitch).—Text-book of Physiological and Pathological Chemistry: G. Bunge, translated by Dr. L. C. Wooldridge (K. Paul).—In Darkest Africa, 2 vols.: H. M. Stanley (S. Low).—The Aborigines of Tasmania: H. Ling Roth (K. Paul).—Ostéologie Ropuch (Bufo Laur.): Prof. Dr. F. Bayer (V. Praze).—Uhlonské Útvary v Tasmanii; Prof. Dr. O. Feistmantel (V. Praze).—Abhandlungen der Math. Naturw. Classe der K. B. Gesellschaft der Wissenschaften, 1889-90, vii. Folge, 3 Band (Prag).—Annales de l'Observatoire de Moscou, ii. Série, vol. 2, Livre 1 and 2 (Moscou).—Annales de l'Observatoire de Nice, Tome 3, Texte et Atlas.—Sun-dial, adjustable for all Latitudes (Philip).—A Theory of the Sun's Radiation of Heat: W. Goff (Stanford).—Publication of the Leander McCormick Observatory of the University of Virginia, vol. 1, Part 4, Double Stars 1885-86 (Virginia).—Mind and Matter: O. Barnard (J. Heywood).—Proceedings of the Society for Psychical Research, June (K. Paul).—Journal of the Royal Microscopical Society, June (Williams and Norgate).—Records of the Geological Survey of India, vol. xxiii. Part 2.—Annalen des K. K. Naturhistorischen Hofmuseums, Band 5, No. 2 (Wien, Holder).

## CONTENTS.

	PAGE
Life of Sedgwick. I. By Prof. T. G. Bonney, F.R.S. . . . .	217
Gérard's "Électricité." By J. J. T. . . . .	219
The Art of Paper-making . . . . .	220
Our Book Shelf:—	
Gresswell: "A Contribution to the Natural History of Scarlatina" . . . . .	220
Dallet: "Le Soleil; les Étoiles" . . . . .	221
Cortie: "Father Perry, F.R.S." . . . . .	221
Carus: "Prodomus Faunæ Mediterraneæ" . . . . .	221
Letters to the Editor:—	
Spiny Plants in New Zealand.—Geo. M. Thomson	222
Drowned Atolls.—P. W. Bassett-Smith; Captain W. J. L. Wharton, R.N., F.R.S. . . . .	222
The Essex Bagshots.—Dr. A. Irving . . . . .	222
A Remarkable Appearance in the Sky.—D. J. Rowan . . . . .	222
Darkest Africa. (Illustrated.) By J. S. K. . . . .	223
Problems in the Physics of an Electric Lamp. (Illustrated.) By Prof. J. A. Fleming . . . . .	229
Notes . . . . .	233
Our Astronomical Column:—	
Objects for the Spectroscope.—A. Fowler . . . . .	235
Annular Eclipse of June 17 . . . . .	236
Yarnall's Star Catalogue . . . . .	236
Photographs of the Surface of Mars . . . . .	236
Lightning Spectra . . . . .	236
The Marine Biological Association . . . . .	236
University and Educational Intelligence . . . . .	238
Societies and Academies . . . . .	238
Books, Pamphlets, and Serials Received . . . . .	240