ceased to possess the aptitude as a whole for receiving all kinds of impressions from without, and in fact it is this general aptitude that has rendered possible the evolution of the special senses in special centres. Thus the common origin of all the senses would seem to offer the readiest explanation of their occasional confusion even in the human brain itself, the highest development of all. Colour-hearing might in this way be regarded somewhat as a case of reversion or atavism.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 23.—"On Remnants or Vestiges of Amphibian and Reptilian Structures found in the Skulls of Birds." By W. K. Parker, F.R.S.

(1) *Jacobson's Organ.*—This remarkable structure, which must be looked upon as an accessory olfactory organ, is present in certain of the higher Vertebrata, or *Amniota.* It consists of a paired cavity, which early becomes separated off from the proper nasal chamber, and which opens into the mouth by the anterior incisive foramen. It is innervated by branches from the olfactory and trigeminal.

Jacobson's organs are largest in Snakes, Lizards, and Monotremes, and next in order come the Marsupials, Edentates, Insectivores, and the Mammalia generally. Their presence in Man is doubtful, and what has been described as a rudiment of them has probably quite another explanation.[1] They are not known to exist in Chelonians, Crocodiles, and Birds.

In the Snake and Lizard, these structures lie each in a little dish, formed by the vomer of that side, covered in by another vomerine bone—the septomaxillary. They are also protected at the opening of the capsule by a pedate tract of cartilage, derived from the alinasal fold, which, in the Snake, frequently becomes detached from its root. In low Mammalia there are several vomers, and in most of the lower Mammals a pair of small anterior vomers lie on the inside of Jacobson's organ, but the capsule itself is formed by a peculiar fold of cartilage—the recurrent cartilage,—which closes in upon itself, and unites its edges round the organ. As a rule, these "recurrent cartilages" retain their union with the alinasal folds, as in the Lizard; in the Rabbit (Howes) they are distinct, as in the Serpent.

Now in Birds these cartilages not unfrequently appear, but no Jacobson's organ has been found with them. The Birds whose vomerine region comes nearest to that of a low Mammal are the Turnicidæ, or Hemipods, and the great group of the Passerine birds (Coracomorphæ, or Ægithognathæ of Huxley). It is not uncommon for the "ox-faced" vomer of these birds to be formed of two pairs of bony centres, and these become not only fused together, but actually grafted upon the floor of the cartilaginous nasal capsule, in the same manner as is common in the lower kinds of Mammalia.

Remnants of the cartilaginous capsule of Jacobson's organs are found not only in the Hemipods and in the lower Neotropical Passerines (*Homorus, Synallaxis, Anæretes*), but also in some of the highest of the singing-birds—namely, the Wren (*Anorthura troglodytes*)—and also in some of the Woodpeckers (Picidæ), outside the Passerine Order.

In a paper on the "Skull in the Ostrich Tribe" (Phil. Trans., 1886, pl. 10, Fig. 14, *a.i.t.*), the present author figured and described, but did not then fully understand, a peculiar cartilage perched right and left upon the large vomer of the *Rhea.* He, however, has for a long time been satisfied that this is one of the vomerine or Jacobson's cartilages, and this view is strongly corroborated by the recent description of the palate of *Apteryx*, given by T. Jeffery Parker (Proc. Roy. Soc., February 23, 1888). Now if the figure of the transversely-vertical section through these cartilages and the crura of the vomer in the *Apteryx*, be compared with various figures in the present author's "Memoirs on the Mammalian Skull" (Parts I., II., and III., "Phil. Trans."), it will be seen that it so nearly corresponds with sections of the skull of the Pig, the Edentates, and the Insectivores, especially those taken just behind Jacobson's organ, that without explanation it would be impossible to tell which figure belonged to the Bird, and which to the Mammal.

(2) *Parasphenoid.*—This bone forms a large superficial basicranial beam in Ganoidei, Teleostei, Dipnoi, and Amphibia. It corresponds to the subcutaneous part of a dermal scute formed inside the skin of the mouth, developed for support to badly ossified endocranium.

The parasphenoid of the Frog is dagger-shaped, and reaches from near the foramen magnum behind, to the nasal capsule in front, the "guard" of the dagger supporting the auditory capsules. Now in Serpents only the *blade* is present; in Lizards only a very fine thread of bone representing the blade; in some, *e.g. Trachydosaurus rugosus* (Cyclodontidæ), even this is wanting. It is not present in those very amphibian forms, the Chelonians; and only a small remnant of the "guard" right and left can be found in Crocodiles, consisting of two "basitemporal" plates, soon covered over by the huge pterygoid.

In all Birds basitemporals are large, as large as in Frogs and Toads; this is equally true of the *Dinornis* and of the smallest Humming-bird. There is a tendency for them to break up into lesser bony parts; thus for a day or two in the chick there are two "basitemporal" and one "rostral" centre; but in several species of the Ranidæ, *e.g.* the Bull-frog, the point of the dagger-shaped bone is separately ossified, and remains distinct.

In the Paradoxical Frog (*Pseudis paradoxa*) there is no "handle" to the dagger; the same form of parasphenoid is common among the water-birds, *e.g. Alca, Uria.* This is an ossification which is the earliest to appear in skulls that take on any kind of ossification; it is also the first bone to appear in an embryo bird, as in the larval Frog.

(3) *Prenasal Rostrum.*—Scarcely any Urodeles, and only a few of the Anura, show any special elongation of the "intertrabecula" or prenasal rostral cartilage; this must have been very long in the Ichthyosauria, as in the Selachii, and as in the embryos of all Birds.

(4) *Palato-pterygoid arch or arcade.*—In the Frog, after metamorphosis, during which the hinge of the jaw becomes shifted far backwards, three regions may be distinguished in the forepart of this arch; thus the suspensorial part or pedicle is the ethmo-palatine, the anterior free spike the pre-palatine, and the hinder part which runs into the pterygoid is the post-palatine.

The anterior part of the pterygo-palatine arcade is distinct from the pterygoid in Urodeles, and the pterygoid in them is an outgrowth of the quadrate which grows forwards towards the palatine, but does not coalesce with it, except in *Ranodon sibiricus.*[1] The "post-palatine" tract of cartilage is developed as a distinct nucleus in the Axolotl (*Siredon*).[2]

The only Reptiles in which the author has discovered any distinct trace of the *endoskeletal* palatine is in the Green Turtle, in which it is very small (see *Challenger* Reports, vol. i. part 5, plate 12, Figs. 9, 9*a*, 9*b* : *e.p.a.*).

This endoskeletal cartilaginous palatine, with its peduncle and fore and hind ray or *crus*, appears in several kinds of birds, in addition to their normal *parosteal* palatine—a mere membrane bone, as in Reptiles and Mammals. This vestige or remnant remains in the adult; it is of no apparent use, and occurs in the Families in the oddest way; sometimes, however, it is present in all the members of some particular Family-group, as for instance in the Musophagidæ or plantain-eaters (*Musophaga, Schizorhis,* and *Corythaix*).[3] It is also found in the Oil Bird (*Steatornis caripensis*) and in the Green Tody (*Todus viridis*), and it is also well developed in *Scythrops* (see Linn. Soc. Trans., ser. 2 (Zool.), vol. i. plate 23, Figs. 3 and 4, *o.u.*).

In that nearly extinct Neotropical type, *Steatornis*, this curious partly ossified remnant has the three crura, all well marked, and their morphological meaning is evident; albeit the whole piece is so small and feeble that it can serve no purpose in the solid palate of that remarkable bird.

To show how unexpectedly this remnant exists, a list of the Birds in which it has been found in a segmented state as a distinct bony element of the face is added below; it often shows itself as a mere process of the ecto-ethmoid, but these cases are not included in the list.

[1] See Gegenbaur, "Ueber das Rudiment einer septalen Nasendrüse beim Menschen," *Morphol. Jahrbuch*, Bd. xi., 1885. At the time when the present paper was read, the author was not aware of Gegenbaur's conclusions with regard to the supposed rudiment of Jacobson's organ in Man.

[1] See Wiedersheim, "Kopfskelet der Urodelen," Leipzig, 1877, Plate 5, Figs. 69, 70.

[2] See W. K. Parker, "On the Skull of the Urodeles" (Phil. Trans., 1877, Plate 24, Figs. 1–3).

[3] See Reinhardt, "Om en hidtil ukjendt Knogle i Hovedskallen hos Turakoerne (*Musophagides*, Sundev)," Copenhagen, 1871, Plate 7.

Motacilla yarrelli
Budytes rayi } Motacillidæ.
Todus viridis. Todidæ.
Steatornis caripensis. Steatornidæ.
Schizorhis
Musophaga } Musophagidæ.
Corythaix
Dicholophus. Dicholophidæ.
Procellaria
Prion
Thalassidroma } Procellaridæ.
Diomedea, &c.
Larus, var. spec. Laridæ.
Tachypetes. Tachypetidæ.

Another more partial remnant is seen in the Coracomorphæ or Passerine birds generally, which together make up nearly half the number of known birds.

A distinct nucleus representing the post-palatine region of the Frog's skull reappears in the Crow and the Sparrow, and in all the Passerines, as far as they have been worked out. It lies outside the hinder part of the normal parosteal palatine bone, becomes a solid ear-shaped tract of hyaline cartilage, acquires its own osseous (endosteal) centre, and this, when ossified, coalesces with the normal palatine bone.

These facts, and many others that could be mentioned, make it evident that, in seeking for a clue to the uprise of the Feathered Fowl, we may leave out of immediate consideration all the existing types of Reptilia: ancient Amphibians, or Reptiles just rising out of Amphibian lowliness, are the forms that alone will help us in this search. We do get some light upon the Reptilian relationship of Birds, but it is at best a scattered light; the head of a Bird is like that of the *Ichthyosaurus* in its great facial elongation, the neck- and limb-regions of a Bird are those of a *Plesiosaurus*, whilst the hips and legs are like those of the Ornithoscelida.

But these are not all, or nearly all, the vestigial structures that may be seen in the Bird's skull, to say nothing of the skeleton generally;[1] they are sufficient, however, to justify the assumption that Birds arose, by secular transformation, either from the lowest and most ancient of the true Reptiles, or equally with Reptiles from archaic Amphibia, low in structure, but full of potential excellence, and ready, *pro re nata*, to become Reptile, Bird, or even Mammal, as the case might be.

[1] As regards the skeleton of the manus and pes, the indications of at least five carpals (two of these in some types undergoing further subdivision), three small additional rudiments of digital rays in the manus, five tarsals, and a rudiment of the fifth metatarsal, are all important facts bearing upon this subject.

Physical Society, March 10.—Prof. Reinold, President, in the chair.—Mr. G. L. Addenbrooke exhibited and described a compact form of reflecting galvanometer, lamp, and scale, which he has designed as a portable commercial instrument, and also a modified Post Office Wheatstone's bridge.—Mr. E. C. Rimington read a paper on the measurement of the power supplied to the primary coil of a transformer. The first part of the paper contains a proof of a formula given by Prof. Ayrton at a recent meeting of the Society of Telegraph-Engineers for measuring the power given to a transformer by using a Siemens's wattmeter, and the disadvantages of the method are enumerated. A method is then described in which a high-resistance dynamometer is used. One coil of the dynamometer is placed as a shunt to the primary coil, and the other as a shunt to a known inductionless resistance, R, placed in series with the primary. The time constants of the dynamometer coils are made equal by adding an inductionless resistance to the one having the greatest time constant. Thus arranged the difference of phase between the currents in the dynanometer coils is the same as that between the P.D. and current in the primary of the transformer. The mean power, p_m, is shown to be

$$p_m = \frac{K}{R} \delta (1 + \tan^2 \phi_1),$$

where $\frac{K}{R}$ is the constant of the dynamometer for watts, δ the reading of the torsion head, and ϕ_1 the lag angle of the currents in the coils of the dynamometer which can be determined from their time constant and periodic time. The best method of arranging the dynamometer in order that R may be as small as possible is discussed. Prof. Ayrton pointed out that the formula first referred to by the author was given to show *why a watt-meter should not be used*, and that the method suggested by Mr. Rimington was a modification of the well-known electrometer method, but with an additional serious objection, that the periodic time must be known. He also described a direct-reading method of using an electrometer, on ordinary transformer circuits, suggested to him by Mr. Sayers. Mr. Blakesley thought the above formula, given by Mr. Rimington, would only be true where there is no iron in the circuit. He described a method of determining the power by observations on two low-resistance dynamometers, one of which is placed in the primary circuit. Of the other dynamometer, one coil is placed in the primary and the other in the secondary circuit. The power is given by

$$p_m = A\alpha_1 r_1 + r_2 \frac{m}{n}, C\alpha_3$$

where r_1, r_2, m, n are the resistances and numbers of convolutions of the primary and secondary coils, A and C the constants of the dynamometers, and α_1, α_3 their reading. A geometrical construction from which the formula is deduced was given. Mr. Sumpner said all the formulæ at present obtained were founded on the assumptions that the induction coefficients of a transformer under working conditions are constant, but, in a paper to be brought before the Society shortly, he hoped to show these assumptions to be erroneous. In replying, Mr. Rimington said, if the periodic time was not known beforehand, it could easily be determined from the note given out by a telephone placed near the transformer.—On the magnetic circuit in dynamo machines, by Prof. W. E. Ayrton and Prof. J. Perry. An abstract was read by Prof. Perry. The authors have worked out a number of formulæ for dynamo machines, involving the thickness, t, of the armature winding, and α the highest permanent current density per square centimetre of cross section of that winding. One of them is

$$W = \frac{2vNt\alpha}{10^8},$$

where W = highest permanent output in watts, v = circumferential velocity, and N = total induction through the armature. As the winding is thin, $t\alpha^2 = q^2$, a constant. For the best modern machines, which do not get too hot, q has a value of about 288. It is shown that the best permanent output is a maximum when the magnetic resistance of the space occupied by the armature winding is equal to all the other magnetic resistance in the circuit, and the best machines are found to satisfy this condition. From this important result the characteristic of such a dynamo can be drawn with considerable accuracy. For small inductions the air resistance only need be considered, and a line drawn on squared paper connecting N and S′A′, satisfying

$$N = \frac{4\pi S'A'}{10} \div \frac{2(d + t}{a_2},$$

gives the first part of the characteristic, where S′A′ = ampere-turns, d = clearance, and a_2 = the area of the pole pieces exposed to the armature (increased by a fringe of 0·8 $(d + t)$ all round). From the maximum value of N (viz. $a_1\beta_1$) where a_1 = area of diametral section of iron in armature, and β_1 = maximum induction (17,000 to 18,000), find the value of S′A′ from the formula

$$N = \frac{4\pi S'A'}{10} \div \frac{4t}{a_2},$$

and plot the values of N and S′A′ as the co-ordinates of a point. A curve drawn through this point to touch the line first drawn, at a point corresponding with $N = \frac{1}{2}a_1\beta_1$ will not differ materially from the characteristic of the constructed machine.—A note on the employment of an electro-dynamometer for determining the difference of phase of two harmonic currents of electricity, by Mr. T. H. Blakesley, was taken as read. This is a claim of priority for a method published by the author in the *Electrician* of October 2, 1885, which has recently been described and claimed as the invention of Prof. Ferraris, in a paper communicated to the Royal Academy of Science of Turin. In a book on "Alternating Currents," published at the end of 1885, Mr. Blakesley shows how the method can be used for determining induction coefficients and capacities.

Chemical Society, March 1.—Mr. W. Crookes, F.R.S., in the chair.—The following papers were read:—The origin of colour and the constitution of colouring matters, by Prof. H. E. Armstrong, F.R.S. The majority of compounds, especially those of carbon, are colourless; and in the case of elements whose compounds are invariably coloured, the greatest diversity of colouring is often noticeable among the several compounds of one and the same element—as in those of chromium or manganese, for example : it is therefore clear that colour is in a high degree conditioned by special forms of intramolecular structure, and consequently that any attempt to determine the "origin of colour" must be based on a knowledge of the structure of coloured matters. For this reason it has become possible only within recent years to discuss the relation between colour and constitution, and, so far, the discussion has been limited to two papers by Graebe and Liebermann (*Ber. deut. chem. Gesellsch.*, 1868, 106) and by Witt (*ibid.*, 1876, 522) respectively. To illustrate the idea on which the argument in the paper is based, the author compares the unsaturated hydrocarbons with the paraffins. In the paraffins, which are singularly inert compounds, and all but colourless even in the infra-red and ultra-violet regions of the spectrum, the carbon atoms are united only by single affinities, and the remaining affinities are engaged by *monad* atoms ; the unsaturated hydrocarbons, however, are not only more reactive than the paraffins, but the beginnings of colour are manifest in them in regions above and below the visible spectrum, whilst they are conventionally represented by formulæ in which the carbon atoms appear as united by two or three affinities of each, typified by straight lines or dots. Within recent years, however, the idea has found favour that "affinity has direction," and the author would apply this hypothesis to polyad atoms generally ; and in formulating compounds in which such atoms are united by more than single affinites, would represent the polyad atoms as united by curved lines in order to suggest that the affinities are under strain in consequence of their being free to act only in certain directions. In the paper, the author cites a number of cases among inorganic compounds which he thinks afford evidence that the production of colour is dependent on special modes of atomic arrangement, and particularly on such modes of arrangement as involve the existence of a condition of strain in the resulting system, due probably to peculiarities in the affinity relationships of the constituent elements of the system which prevent complete mutual neutralization of the affinities. The occurrence of colour therefore is more frequently than not concomitant with a high degree of reactivity, the coloured compound being usually one of "high potential" or slight stability. Among carbon compounds there is no instance of a hydrocarbon being coloured, giving the term its conventional meaning ; and omitting nitro-compounds, there are very few exceptions to the rule that derivatives of hydrocarbons containing only monad radicles are colourless ; the exceptions, moreover, are of a very noteworthy character, being either *central* derivatives of anthracene, *i.e.* compounds formed by displacement of the hydrogen atoms of the central nucleus of anthracene—which although not coloured is significantly fluorescent ; or the monad radicle contains at its origin a radicle such as CO. Attention is then drawn to the quinones and their derivatives, Fittig's ketone formula being throughout adopted for these compounds. The constitution of the better-known dye-stuffs is then discussed, and the author is led to conclusions which in some cases are different from those hitherto accepted ; for example, the azo-dyes are formulated $O\smile C_6H_4\smile N.NHR'$ and $HN\smile C_6H_4\smile N.NHR'$; and rosaniline with its congeners, certain of the phthaleïns, and methylene-blue are also formulated on the quinone type. In the discussion on the paper, in which Profs. Debus, Rücker, and Dewar, Dr. Morley and others took part, Prof. G. C. Foster said that it appeared to him that the real question raised by Dr. Armstrong was whether a definite relation could be traced between chemical composition or chemical structure and the existence and position of absorption-bands in the spectrum of the transmitted radiation. The presence or absence of coloration, as it could be judged of directly by the eye, gave no conclusive answer to the question, for a substance might be as colourless as water, and still exert strong absorption in the ultra-red, or it might have strongly-marked absorption in the ultra-violet. But, more than this, a body might exert selective absorption within the visible spectrum, but if it happened to absorb two complementary colours it would be judged of by the eye as though it were destitute of selective absorption altogether. The subject, therefore, seemed to him to involve a systematic study of absorption-spectra.—Researches on chromorganic salts, Part II., by Mr. E. A. Werner.—Note on benzyldithiourethane, by Dr. A. E. Dixon.

Zoological Society, March 6.—Prof. Flower, F.R.S., President, in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of February 1888, and called special attention to some examples of a Finch from New Caledonia (*Erythrura psittacea*), and to five specimens of a Pheasant (*Phasianus principalis*) from Afghan Turkistan. The pheasants had been brought home and presented by Major Peacock, R.E., of the Afghan Frontier Commission, at the request of Sir Peter Lumsden, G.C.B., C.S.I.—The Secretary exhibited (on behalf of Lieut.-Colonel H. M. Drummond Hay) a specimen of the Desert Wheatear (*Saxicola deserti*), lately killed in Scotland.—A paper by Prof. G. B. Howes and Mr. W. Ridewood, on the carpus and tarsus of the Anura, was read. The authors recorded observations made upon thirty-seven genera and sixty species, in all stages of development, representatives of all but three or four less important families. The authors were at variance with previous writers in points which had necessitated a reconsideration of the morphological value of the leading elements of both carpus and tarsus. They had failed to discover, at any stage, a trace of a third proximal element in either fore or hind foot, while they showed that Born was in error in regarding the *naviculare* as the prehallux tarsal. In the hind foot they recorded the discovery of a fourth tarsal, and in the fore foot that of a fifth carpal, which latter in *Xenophrys* was bony. Consequent upon this they regarded the element hitherto held to be the fifth carpal as a postaxial *centrale ;* whence it followed that the Anura are, as a group, unique in the possession throughout of a double *centrale carpi*. The authors discussed the various changes undergone by the pollux and prehallux, and the several views concerning the morphological value of the latter. A second part was added, in which the peculiarities of the several families of the Anura were given in order, and the bearings of the structures in question upon classification briefly discussed. The Discoglossidæ were shown to combine most completely the least modified conditions of both fore and hind feet.—Mr. R. Bowdler Sharpe read descriptions of new species of birds, of which specimens had lately been received from the Island of Guadalcanar, Solomon Group, collected by Mr. C. M. Woodford. These were named *Astur holomelas*, *Astur woodfordi*, *Astur shebæ*, *Baza guadalcanarensis*, *Ninox granti*, *Graucalus hololius*, *Edoliisoma erythropygium*, and *Pomarea erythrosticta*.—Mr. W. R. Ogilvie Grant contributed a complete list of the birds obtained by Mr. Woodford on the Islands of Guadalcanar and Rubiana. These were altogether sixty-six in number, the new ones being *Nasiterna aolæ*, *Myzolema sharpii*, *Phlegœnas solomonensis*, *Ardeiralla woodfordi*, and *Nycticorax mandibularis*.

Entomological Society, March 7.—Dr. D. Sharp, President, in the chair.—Mr. J. H. Leech exhibited, and made remarks on, a number of butterflies forming part of the collection made for him last summer by Mr. Pratt, at Kiukiang, Central China. The specimens exhibited included *Papilio Macilentus*, hitherto only recorded from Japan, varieties of *P. Sarpedon*, and a supposed new species of *Papilio ;* a series of *Sericinus telamon ; Charaxes narcæus*, and var. *mandarinus ; Palæonympha opalina ;* new species of *Lethe*, *Apatura*, and *Neptis ;* and a series of *Argynnis paphia*, with the var. *valezina* of the female. Mr. Leech stated that all the females of *A. paphia* taken at Kiukiang belonged to the var. *valezina*, the typical form of the female being unknown there. Mr. Poulton expressed his interest in Mr. Leech's statement that *valezina* was the only form of the female of *Argynnis paphia* known at Kiukiang, and said he considered this fact would probably throw a new light on the question of the dimorphism of the species. Mr. Jenner-Weir said he had in the course of some years obtained a series of forms intermediate between the typical female and the variety *valezina*. Mr. H. Goss, Dr. Sharp, and Mr. McLachlan, F.R S., continued the discussion.—Mr. Champion exhibited, for Mr. J. J. Walker, R.N., about 950 species of Coleoptera, recently collected by the latter near Gibraltar. Mr. McLachlan called attention to the large number of water-beetles included in Mr. Walker's collection.—Mr. Verrall exhibited living specimens of *Aspidomorpha sanctæ-crucis*, from the caves of Elephanta.—Mr. Slater exhibited specimens of a species of weevil which had been doing much damage to maize sent to the Colonial Exhibition.—Mr. W. White read a paper entitled "Experiments upon the colour-relation between the pupæ of *Pieris rapæ*, and their immediate surroundings," which comprised a detailed account of a series of observations carried on at the author's instigation by Mr. G. C. Griffiths. The various experiments were intended to act as a test of the conclusions arrived at by Mr.

Poulton in his paper on the subject in the Transactions of the Royal Society; and to effect this object different and additional influences had been brought to bear on these pupæ, so that an analogy might be drawn between the two sets of results. Mr. Poulton, Lord Walsingham, F.R.S., Mr. Jacoby, Dr. Sharp, and Mr. White took part in the discussion which ensued.

PARIS.

Academy of Sciences, March 12.—M. Janssen in the chair.—Remarks accompanying the presentation of the second edition of his "Traité de Physique Mathématique," by M. H. Resal. To this edition have been added sections on mathematical optics and thermodynamics, enlarging the work from one to two volumes.—On the combination of measures of the same magnitude, by M. J. Bertrand. An attempt is here made to estimate the consequences of rejecting measures assumed to be less accurate as departing furthest from the mean in the doctrine of probabilities.—New theory of M. Lœwy's equatorial *coudé* and equatorials in general, by MM. M. Lœwy and P. Puiseux. An improved method is described for more accurately determining the constants both of bent and straight equatorials, with the most rapid processes for mounting and rectifying these instruments.—On phosphorus and phosphoric acid in vegetation, by MM. Berthelot and G. André. As a general result of their experiments, made especially on *Amaranthus caudatus*, the authors find that, after the normal flowering, the employment of phosphorous, and even to some extent of nitrous, manures seems almost, if not altogether, useless, whereas potassic manures may still be advantageously continued as long as vegetation lasts.—Classification of the Gasteropods, based on the various dispositions of the nervous system, by M. H. de Lacaze-Duthiers. This is a purely synthetic treatise, summing up the long and numerous analytical studies on the nervous system of various mollusks, such as Gadinia, Aplysia, Tethys, and many others described in the *Comptes rendus* and elsewhere. The object is to ascertain what data may be supplied by these different types of nervous systems for a physiological classification of the secondary groups of Gasteropods. Two sub-classes with five orders are proposed for the whole class.—On a general theorem of convergence, by M. J. L. Jensen. The studies undertaken by the author with a view to a generalization of the theory of convergence of a series with positive terms have led to an unexpected simplification of the present theory. It is shown that the criteria of Cauchy, of Duhamel and Raabe, of Bertrand, and others, may henceforth be treated summarily as simple corollaries of one general theorem.—On the measurement of magnetic fields by diamagnetic bodies, by M. P. Joubin. The author's renewed attempts to utilize the magnetization of diamagnetic bodies for measuring the intensity of a magnetic field seem to demonstrate the existence of several states of magnetic equilibrium in diamagnetic bodies. This unexpected result is in accordance with theory according to Duhem's calculations, as well as with the general considerations recently set forth by M. Brillouin.—On the magnetization of diamagnetic bodies, by M. P. Duhem. The grounds are explained which render highly probable the existence of several states of magnetic equilibrium for diamagnetic bodies placed in a given position and subjected to the action of given magnets.—A new eolipyle, by M. Paquelin. The apparatus here described has the advantage of working in any position without the risk of explosion, and consumes not more than 90 grammes of fuel in the hour.—Determination in wave-lengths of the two red rays of potassium, by M. H. Deslandres. This determination, made at the request of M. Lecoq de Boisbaudran, yields for the stronger ray 766·30, for the weaker 769·63, giving a mean 767·965, compared with 588·89 of the D_2 sodium ray, which served for the calculation of the constant.—On the decreasing solubility of the sulphates, by M. A. Etard. The sulphates of iron, cadmium, magnesium, lithium, rubidium, and potassium, as well as anhydrous selenious acid, all present the same phenomenon of decreasing solubility. But that of iron, like the previously described sulphate of copper, changes direction twice, first increasing and remaining constant, then decreasing; the complete series of transformations being accomplished between $-2°$ and $+156°$ C.—Action of roasting on several oxides and salts of manganese, by M. Alex. Gorgeu. The anhydrous protoxides heated briskly leave a red oxide; slowly roasted, so as to avoid incandescence, and then kept at a dull red until the weight of the residuum ceases to change, they yield a sesquioxide; lastly, when heated from 200° to 430° C., the oxidation of the MnO obtained at a high temperature is very slow, and appears not to go beyond the manganite $MnO_2 4MnO$, even after forty or fifty hours. Several other details are given of these interesting experiments.—On the collection of star-fish brought to Europe by the French Scientific Mission to Cape Horn, by M. Edmond Perrier. This collection comprises no less than 553 specimens, referred to 38 distinct species, of which 23 are new. This gives to the southern waters of the American continent a total of 57 species of these organisms.—M. J. Kunstler describes a new Foraminifer from the Arcachon basin.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

The Geological Evidences of Evolution: A. Heilprin (Philadelphia).—Age of Creation: W. J. Cassidy (Briggs, Toronto).—The Geological History of Plants: Sir J. W. Dawson (K. Paul).—A Treatise on Mine Surveying: B. H. Brough (Griffin).—Old and New Astronomy, Part 1: R. A. Proctor (Longmans).—Rainfall in the East Indian Archipelago, 1886: Dr. Van der Stok (Batavia).—Observations made at the Magnetical and Meteorological Observatory at Batavia, vol. ix. 1886: Dr. Van der Stok (Batavia).—Report on the Crops of the Year 1887 (Washington).—London Geological Field Class Reports, 1887 (Philip).—Morphologisches Jahrbuch, Eine Zeitschrift für Anatomie und Entwickelungsgeschichte, xiii. Band, 3 Heft (Leipzig).—Journal of the Chemical Society, March (Gurney and Jackson)—Journal of the Society of Telegraph-Engineers and Electricians, vol. xvii. No. 70 (Spon).—Notes from the Leyden Museum, October 1887 (Leyden).—Archives Italiennes de Biologie, Tome ix. Fasc. 2 (Turin).—Encyklopædia der Naturwissenschaften, Erste Abthg. 54 Lief., Zoologie, &c.; Zweite Abthg. 46 and 47 Lief., Chemie (Breslau).—Bulletin de l'Académie Royale des Sciences de Belgique, 1888, No. 1 (Bruxelles).

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