Its shortcomings led to the invention of another process by Gay-Lussac, known as the volumetric, or humid, method, which is much more accurate, and is now practised very generally on the Continent. Its principles were briefly glanced at. Its introduction, however, into the Indian Mints was not considered desirable by their assay officer for certain reasons, a few of which were given. The method of cupellation, therefore, being not accurate enough for the purposes of buying and selling bullion, and that by the French process being considered not well suited to Indian Mints, it became necessary to look out for and introduce into the Mints of this country a process more likely to answer all the ends in view.

This object was attained by the adaptation and introduction of the process now in use, viz. the "Chloride process of assaying silver.' Hitherto it had never been resorted to, except on a very small scale. Assayers appear to have shrunk from the manifest difficulties of manipulation in collecting, drying, and weighing the precipitated chloride of silver. The credit is due to Mr. James Dodd, a former Assay Master of the Calcutta Mint, of having so simplified, modified, and systematised the details of this method, as to render its application to the assaying of silver on a large scale easy and accurate. The principles, and an outline of the details of the process were then given, an understanding of some of the chief appliances and steps in the manipulations being assisted to by suitable photographs. The system of weights in use, and the quantity of the sample taken for assay, were also explained, as well as the points wherein this system might fairly be considered better suited to a Mint in India than the other methods.

In conclusion Dr. B. alluded to the vast amount of silver bullion which this process enabled the assay officers of the Indian Mints to deal with confidently and accurately during the past fifteen years. In one year alone, that of 1865-66, the importation of silver bullion reached to the immense amount of over fourteen millions sterling, so putting to a crucial test the system of assay used for its valuation.

## *SOCIETIES AND ACADEMIES*

### LONDON

Royal Society, January 12.—"On Fluoride of Silver," Part II., by George Gore, F.R.S. An exhaustive account of the behaviour of argentic fluoride in vessels of platinum, carbon, and various fluorides in contact with chlorine, bromine, and iodine at various temperatures. When argentic fluoride is completely decomposed by chlorine in platinum vessels at a red heat, the reaction agrees with the following equation :—

$$4\,Ag\,F + 4\,Cl + Pt = 4\,A\,G\,Cl,\ Pt\,F_4.$$

Vessels of cryolite and of fluor-spar were found incable of retaining argentic fluoride in a melted state. Other vessels were also made by melting and casting various mixtures of earthy fluorides at a high temperature; and although forming beautiful products, probably capable of technical uses, they were not capable of retaining silver fluoride in a state of fusion. Numerous vessels were also made of seventeen different fluorides by moulding them in the state of clay and baking them at suitable temperatures; these also were found incapable of holding melted fluoride of silver. Argentic fluoride was only superficially decomposed by chlorine at 60° Fahr. during thirty-eight days. When heated to 230° Fahr. during fifteen days in a platinum vessel in chlorine, it was very little decomposed. Chloride of silver heated to fusion in a platinum vessel in chlorine corroded the vessel and formed a platinum-salt, as when fluoride of silver was employed. An aqueous solution of argentic fluoride agitated with chlorine evolved heat and set free oxygen, in accordance with the following equation :—

$$8\,Ag\,F + 8\,Cl + H_2O = 5\,Ag\,Cl + 3\,Ag\,Cl\,O + 8\,H\,F + O,$$

or

$$7\,Ag\,Cl + Ag\,Cl\,O_3 + 8\,H\,F + O.$$

Dry hydrochloric acid gas completely decomposed argentic fluoride in a melted state, but only acted upon it superficially at 60° Fahr. A saturated aqueous solution of argentic fluoride was not precipitated by chloric acid. Perfectly anhydrous fluoride of silver was only superficially decomposed by contact with bromine in a platinum vessel during thirty-six days at 60° Fahr., or during two days at 200° Fahr. At a low red heat in vessels of platinum argentic fluoride was completely decomposed by a current of bromine vapour, a portion of its fluorine being expelled and a portion corroding the platinum and forming an insoluble compound of fluoride of platinum and bromide of silver. In carbon boats at the same temperature the whole of the silver-salt was converted into bromide, the boat being corroded and the fluorine escaping in chemical union with the carbon. The action of bromine on an aqueous solution of argentic fluoride was similar to the action of chlorine. A solution of argentic fluoride yielded copious precipitates both with hydrobromic and bromic acids. Under the influence of a temperature of 200° to 600° Fahr. in closed platinum vessels, iodine very slowly and incompletely decomposes argentic fluoride without corroding the vessels, and produces a feeble compound of argentic iodide, fluorine, and iodine, from which the two latter substances are expelled at a red heat. At a red heat in platinum vessels, iodine produces argentic iodide, and in the presence of free argentic fluoride corrodes the vessels in consequence of formation of platinic fluoride; iodine and fluorine pass away together during the reaction. In vessels of carbon at the same temperature, argentic iodide is formed, the vessels are corroded, and a gaseous compound of fluorine and carbon is produced. By treating an aqueous solution of argentic fluoride with iodine, similar results are produced as with bromine and chlorine; a similar solution yields copious precipitates both with hydriodic and iodic acids. A mode of analysis of iodine is also fully described in the paper. A known weight of iodine was dissolved in absolute alcohol, a strong solution of argentic nitrate of known strength added to it in proportions at a time with stirring until the colour of iodine exactly disappeared. The mixture was evaporated, the free nitric acid expelled by careful heat, and the residue weighed. The residue was then heated to fusion to convert the iodate of silver into iodide, and again weighed. Two experiments of this kind yielded accurate results, and the process was easy and expeditious.

January 19.—"On the Structure and Development of the Skull of the Common Frog (*Rana temporaria*)," by W. Kitchen Parker, F.R.S. At the close of my last paper, "On the Skull of the Common Fowl," I spoke of bringing before the Royal Society another, treating of that of the osseous fish. I was working at the early conditions of the salmon's skull at the time. I was, however, led to devote my attention to another and more instructive type early in the following year; for it was then (January 1869) that Professor Huxley was engaged in preparing his very important paper "On the Representatives of the Malleus and Incus in the other Vertebrata" (see Zool. Proc. May 27, 1869). In repeating some of his observations for my own instruction, it occurred to me to renew some researches I had been making from time to time on the frog and toad. The results were so interesting to us both, that it was agreed for me to work exhaustively at the development of the frog's skull before finishing the paper on that of the salmon. On this account Professor Huxley mentions in his paper (*op. cit.* p. 406) that he leaves the Amphibia out of his demonstration, and that they are to be worked out by me. The amount of metamorphosis demonstrable in the chick whilst enclosed in the egg, suggested a much more definite series of changes in a low, slow-growing Amphibian type. I think that this has been fully borne out by what is shown in the present paper.

The first of the ten stages into which I have artificially divided my subject is the unhatched embryo, whilst its head and tail project only moderately beyond the yelk-mass. Another stage is obtained by taking young tadpoles on about the third day after they have escaped from their glairy envelope; a few days elapse between the second and third stages, but a much longer time between the third and fourth, for the fourth stage is the perfect tadpole, before the limbs appear and whilst it is essentially a fish with mixed Chimæroid and Myxinoid characters. Then the metamorphosing tadpole is followed until it is a complete and nimble frog, two stages of which are examined, and then old individuals are worked out, which give the culminating characters of the highest type of Amphibian.

The early stages were worked out principally from specimens hardened in a solution of chromic acid; and the rich umber-brown colour of these preparations made them especially fit for examination by reflected light.

Without going further into detail as to the mode of working my subject out, and without any lengthened account of the results obtained, I may state that the following conclusions have been arrived at, namely, that the skull of the adult is highly compound, being composed of :—

1st. Its own proper membranous sac;

2nd. Of a posterior part which is a continuation, in an unsegmented form, of the vertebral column;

3rd. Of laminæ which grow upwards from the first pair of facial arches, and which enclose the fore part of the membranous sac, just as the "investing mass" of the cranial part of the notochord invests the hinder part;

3rd. The ear-sacs and the olfactory labyrinth become inextricably combined with the outer case of the brain.

And 5th. The subcutaneous tissue of the scalp becomes ossified in certain definite patches; these are the cranial roof-bones. Around the mouth there are cartilages like those of the Lamprey and the Chimera; but these yield in interest to the proper facial bars, which are as follows, namely:—

First pair the "trabeculæ."

Second pair the mandibular arch.

Third pair the hyoid arch.

And fourth to seven pairs; these are the branchials.

These are all originally separate pairs of cartilaginous rods; and from these are developed all the complex structures of the mouth, palate, face, and throat. The pterygo-palatine arcade is merely a secondary connecting bar developed, after some time, between the first and second arches.

Meckel's cartilage arises as a segmentary bud from the lower part of the second; and the "stylo-cerato-hyal," as a similar secondary segment, from the third arch.

By far the greater part of the cranium (its anterior two-thirds) is developed by out-growing laminæ from the trabeculæ, which after a time become fused with the posterior or vertebral part of the skull.

When the tadpole is becoming a frog, the hyoid arch undergoes a truly wonderful amount of metarmophosis.

The upper part, answering to the hyomandibular of the fish (not to the whole of it, but to its upper half), becomes the "incus," and a detached segment becomes the "orbiculare," which wedges itself between the incus and the "stapes." The stapes is a "bung" cut out of the "ear-sac." The stylo-cerato-hyal is set free, rises higher and higher, and then articulates with the "opisthotic" region of the ear-sac; in the toad it coalesces therewith, as in the mammal. The lower part of the hyomandibular coalesces with the back of the pier of the mandibular arch; and the "symplectic" of the osseous fish appears whilst the tadpole is acquiring its limbs and its lungs, and then melts back again into the arch in front; it is represented, however, in the Bull-frog, but not in the common species, by a distinct bone.

This very rough and imperfect abstract must serve at present to indicate what has been seen and worked out in this most instructive vertebrate.

"Modification of Wheatstone's Bridge to find the Resistance of a Galvanometer Coil from a Single Deflection of its own Needle." By Professor Sir W. Thomson, F.R.S. In any useful arrangement in which a galvanometer and a galvanic element or battery are connected through whatever trains or network of conductors, let the galvanometer and battery be interchanged. Another arrangement is obtained which will probably be useful for a very different, although reciprocally related, object. Hence, as soon as I learned from Mr. Mance his admirable method of measuring the internal resistance of a galvanic element (that described in the first of his two preceding papers), it occurred to me that the reciprocal arrangement would afford a means of finding the resistance of a galvanometer coil, from a single deflection of its own needle by a galvanic element of unknown resistance. The resulting method proves to be of such extreme simplicity that it would be incredible that it had not occurred to anyone before, were it not that I fail to find any trace of it published in books or papers, and that personal inquiries of the best informed electricians of this country have shown that in this country at least it is a novelty. It consists simply in making the galvanometer coil one of the four conductors of a Wheatstone's bridge, and adjusting, as usual, to get the zero of current when the bridge contact is made; with only this change of plans, that the test of zero is not by a galvanometer in the bridge itself showing no deflection; but by the galvanometer, the resistance of whose coil is to be measured, showing an unchanged deflection. Neither diagram nor further explanation is necessary to make this understood to anyone who knows Wheatstone's bridge.

**Chemical Society**, January 19.—Professor Odling, F.R.S., Vice President, in the chair. The following gentlemen were elected fellows:—R. Bannister, H. T. Brown, J. Moss, R. J. Moss, E. Potts. The following papers were read:—"On the action of sulphuric acid on the natural alkaloids," by Henry E. Armstrong. On heating narcotine with sulphuric acid, which had previously been diluted by its own volume of water over the water-bath, and subsequent addition of ammonia to the mixture, a body is obtained which shows at once the properties of dimethylnarcotine, the base which Matthiessen and Wright had obtained from narcotine by means of hydrochloric acid. The reaction takes place, therefore, according to the equation—

$$C_{22}H_{23}NO_7 + H_2SO_4 = C_{21}H_{21}NO_7 + CH_3HSO_4.$$

From this result the author concludes it becomes evident that Gerhardt and Laurent's view, who regarded this body as an amide, must be abandoned. On treating codeine in a similar manner, and dissolving the base obtained in hydrochloric acid, a crystalline hydrochlorate was obtained. An analysis of the product showed it to be hydrochlorate of codeine. The first action of sulphuric acid results, therefore, in the production of an isomeric codeine. By the further action of sulphuric acid, 1 molecule of water is removed from 2 of codeine—then 1 $H_2O$ from 1 codeine, and finally, apomorphine seems to be formed. On this last point, however, further evidence has yet to be awaited. "On the origin of nitrates in potable waters," by Ch. Ekin.—The author found nitric acid in the water of a spring which is very remote from any agency that could impart to it decaying animal matter. On closer examination, he found that the water in question had passed through a fossiliferous stratum. This observation necessitates a modification of the "previous sewage contamination theory."—"On an alkaloid from Cinchona bark, hitherto undescribed," by Dr. Howard. This new alkaloid was obtained from the mother liquors of quinine salts. It is a yellowish oil which cannot be sufficiently purified for analytical purposes. The formula of its platino-chloride corresponds with the formula assigned by Gerhardt to the anhydrous platino-chloride of quinine. Mr. Macleod exhibited an ingenious little contrivance by means of which eudiometer tubes which have lost the outer portion of their discharging wires may yet be made use of.

**Mathematical Society**, January 12.—Mr. W. Spottiswoode, F.R.S., President, in the chair. The Rev. J. Wolstenholme, M.A., Christ's College, and Mr. R. B. Hayward, M.A., late Fellow of St. John's College, Cambridge, were proposed for election. There was a large attendance of members to hear Prof. Peirce, of Harvard, give an account of the methods made use of in his "Linear Associative Algebra." The President conveyed to the author the thanks of the society for his interesting communication. Other papers communicated were "On Systems of Tangents to place Cubic and Quartic Curves," by Mr. J. J. Walker, M.A., and "On the Order and Singularities of the parallel of an Algebraical Curve," by Mr. S. Roberts, M.A. In the course of the evening Mr. Roberts stated the following construction as being mechanically more convenient than one discussed in a former paper "On the Pedals of Conics:"—In a plane, if a limited straight line, whose length is equal to the distance between the centre of two equal circles, moves with an extremity on each, the locus of any point rigidly connected with the line will consist of a circle, and a bi-circular quartic with a third node.

**Entomological Society**, January 23.—At the Annual Meeting this day held, Mr. A. R. Wallace, President, in the chair, the following gentlemen are elected to form the Council for 1871.—Messrs. Butler, Dunning, Fry, Grut, Higgins, M'Lachlan, Major Parry, Pascoe, E. Saunders, Stainton, S. Stevens, A. R. Wallace, and Professor Westwood. The following officers for 1871 were subsequently elected:—President, Mr. A. R. Wallace; Treasurer, Mr. S. Stevens; Secretaries, Messrs. M'Lachlan and Grut. Librarian, Mr. Janson. An Address was read by the President, which will be published *in extenso* in the Society's Proceedings.

**Ethnological Society**, January 24.—Professor Huxley, President, in the chair. The Rev. Dr. Steere read a paper "On the Tribes and Languages of East Africa." The author, who had resided for several years at Zanzibar, described in detail the Swahilis, a mixed race, half negro and half Arab, belonging to the Shafi school of Mahommedans. Many examples of their folk-lore were introduced, and a detailed description was given of the Swahili language. A comparison was instituted between the Swahili, Shambala, Yao, and Nyamwezi languages, which all belong to the great Bântu family. Mr. Hyde Clarke spoke upon this communication.—A paper was read "On the weapons and implements used by the Kaffir Tribes and Bushmen

of South Africa," by Dr. Carl L. Griesbach. The author described the primitive method of iron-smelting practised by the Kaffirs, and alluded to the knowledge of certain mixed metals, such as brass, possessed by some of the northern tribes. A description was also given of the native method of gold-washing, carried on in some of the tributaries to the Zambesi. The degraded state of the Bushmen was referred to, and it was remarked that although they are ignorant of iron-working, they yet possess some artistic taste. Among the South African implements attention was directed to the musical instruments, which the author considered to have been derived from the Arabs. Dr. Theophilus Hahn made some philological remarks upon this paper, and gave some illustrations of the Hottentot clicks. The President announced that this was the last meeting of the Ethnological Society as a distinct body, and read the terms of union whereby an amalgamation had been effected between the Ethnological and Anthropological Societies of London, under the common designation of "The Anthropological Institute of Great Britain and Ireland."

EDINBURGH

**Royal Physical Society**, January 25.—Mr. C. W. Peach, president, in the chair. The secretary exhibited a beautiful specimen of the snowy owl *Strix nyctea*, shot near Baltasound, Shetland, on the 24th of December. It was a female, and the remains of a dunin and a jack snipe were both found in its stomach. The facial disc and legs of the bird were pure white, the rest of the bird was whitish, barred all over with rich brown. Another specimen was seen in the same locality, probably the male bird. A curious specimen of a young rook was exhibited. It was of a uniform dull brown or ash colour, instead of the usual black colour, the bill being lightest coloured, and it was feathered down to the base of the bill.—Mr. G. F. Barbour, of Bonskeid, exhibited to the society a fine specimen of the spotted rail, *Crea porzana*. It was shot on the lands of Preston, near Linlithgow, in a bog on the hillside.—Note on the Nesting of the Kingfisher, *Alcedo ispida*, by Prof. Duns. The opening to the nest was twenty-two inches below the surface of the bank, and a little more than four feet above the water. The entrance to the nest was by a rounded passage, two inches wide at the front, increasing a little in size as it reached the oval chamber, or nest proper, and being only twenty-one inches long. The chamber was four inches broad, six long, and four high. After looking at the notices of the kingfisher's nest in the literature of ornithology, I find that the specimen before us sheds light on the following moot points:—1. The passage did not slope upwards, but was horizontal, the bottom being about half an inch below the bottom of the nest. "Instinct," says Montagu, "has taught them to have the entrance to their habitation ascending, by which means the filthy matter runs off." The matter referred to is the thin, watery fœces of the young birds, which soon becomes fetid. In this case the end indicated would be partially gained by the greater thickness of the small bones laid down in the passage than in the nest—the passage being thus brought to the level of the nest, and an imperfect kind of drainage supplied, by which, for a time, the watery fouling would be taken from the surface. 2. The hole was not the old hole of a water rat. 3. There were no traces of withered leaves or grass or feathers in the nest. The bottom was covered with the bones of minnows. The nest proper was perfectly dry, though the passage, especially at the edge of the nest, was wet and fetid. As the bones when disgorged must have been wet, it would appear that the pellets must have been scattered by the birds and left to dry before the eggs were dropped. 4. It is evident from this specimen that the bones of small fishes are as truly the lining of the nest as feathers are of the nests of many other birds.—"Note on the Plaice," *Platessa Vulgaris*, by Prof. Duns.—"Note on *Lithodes Maia*, fem.," by Prof. Duns. The specimen was taken at Elie, Fifeshire, in December last. It is a female. When received it was loaded with spawn, attached to branching tubes, situated beneath the abdominal plates; the size and arrangement of the abdominal plates, the presence and state of the ova, and the light shed by this specimen on the spawning time, of which Bell and others say they know nothing, deserve to be noted. *Lithodes Maia*, though occurring in the Firth, is no doubt one of our rarer crabs.—"Note on *Galathea strigosa*," by Prof. Duns, New College.—Mr. C. W. Peach exhibited *Antholithes* and its fruit (*Cardiocarpon*) with specimens of *Halonia*, *Flabellaria*, and other fossil plants, from the Coalfield near Falkirk.—C. W. Peach exhibited a large collection of fossil plants from the coal at the Cleuch No. 1 pit, and the brickwork near Falkirk, last summer. Amongst them was a series of *Antholithes Pitcairniæ*, some with its fruit, *Cardiocarpon*, attached, this being the first instance of the kind at present known. He stated that *Calamites*, associated with magnificent fronds of *Flabellaria Corassifolia*, were abundant. *Lepidodendron*, *Halonia*, *Ulodendron*, &c. &c., were much rarer; altogether, they showed that the flora of the coal period of Scotland was varied and of great beauty. He added that they were more interesting from the fact that several of them were generically and specifically identical with plants described in his "Acadian Geology," by Principal Dawson, found in the coalfields of Canada and America, even to the minute shells of *Spirorbis* still adhering to the fronds of *Flabellaria*.—"Notice of the Discovery of a new locality, near Edinburgh, of the Lower Carboniferous rocks, having fossils equivalent to the Burdiehouse and Wardie Series," by Mr. D. Grieve. Mr. Grieve read a notice of a new fossiliferous deposit discovered by him in certain shales and sandstones at Lochend, near Edinburgh, and which are situated on the east side of the loch. Mr. Grieve was led to make a search in this quarter from an indication given by Mr. Geikie, ten years ago, in his "Geology of the Neighbourhood of Edinburgh," that a continuity of the shales on the north side of the Calton Hill would likely be found between that place and Lochend, and which indication he had now verified Mr. Grieve described the shales as belonging to the Lower Carboniferous formation, and as being equivalents of the sandstones and shales of Burdiehouse, Wardie, and Granton. He obtained *Calamites* of larger size and better marked than those found in the other localities stated as being abundant in the sandstone; *Lepidodendra*—a *Lepidophyllum*, *Sphenopteris*, &c. Of fishes he had obtained a beautiful specimen of the genus *Palæoniscus*, also scales, teeth, and spines, besides coprolites, which are abundant; also numerous specimens of a small crustacean, identical with *Cypris Scoto Burdigalense*, or of an allied species.

GLASGOW

**Geological Society**, January 5.—Mr. E. A. Wunsch, V.P., in the chair. *Carboniferous Fossils.*—Mr. James Thomson read a paper on the occurrence of *Cœlacanthus lepturus* at Newarthill, and *Palæoniscus Wardii* at Possil. He briefly described the scales, fin-rays, and head-plates of *Cœlacanthus* which had been found in a detached form in the neighbouring coal measures, and which the examination of a nearly entire specimen from the Staffordshire coal-field had now enabled him to identify. It occurs in the upper members of the Carboniferous system in Scotland, in a shale overlying the ironstone of the Airdie coal-field. Both with regard to this and the other ichthyolite—the *Palæoniscus*—before them, he remarked that he had had these forms for years in his cabinet, unnamed; and it was only recently that *Palæoniscus Wardii* had been described, and named specifically after its discoverer in the Staffordshire coal-field, Mr. John Ward of Longtown. It is found in the Possil black-band ironstone, which is between four and five hundred fathoms below the position in which it occurs in Staffordshire, thus not only adding another form to the fauna of our Scottish coal-fields, but adding also to our knowledge of its range in time. The lower beds of the Ayrshire coal-field had also yielded some specimens of this fossil. Mr. Thomson then exhibited specimens of *Rhizodopsis sauroides*, *Amphycentrum granulosum*, and *Platysomus parvulus*, from the Staffordshire coal-field, observing that the scales of *Rhizodopsis* had been found in our Scottish coalbeds, but as yet no complete specimen of the fossil had thence been obtained. Mr. Thomson also exhibited specimens of *Oldhamia* from Bray Head, near Dublin. He described minutely the position of the beds in which these fossils are found, and complained that geological references are frequently so vague as to be of little real service to one going over the ground for himself. Two species of this fossil had been discovered, *O. antiqua* and *O. radiata*; and they were generally believed to have been zoophytes allied to the *Sertularia*. Their precise nature, however, is still matter of discussion. They possessed a special interest as being, with the exception now of *Eozoön Canadense*, the oldest distinct traces that had been found of life on the globe. Mr. Thomson further called attention to the wide unconformability presented by the Mountain Limestone near Dublin, resting, as it does, upon the Cambrian rocks on the north, and upon the granite on the south, side of the bay.

PHILADELPHIA

**Academy of Natural Sciences**, October 11, 1870.—Dr. Ruschenberger, president, in the chair. Mr. Thomas Meehan said he had noticed a singular habit in the common "Stink bug" of

gardens, *Reduvius novenarius*, Say, which might lead to some important physiological discoveries by those more closely devoted to entomological studies. Wondering what made some abrasion on the bark of a *Pinus cembra* on his grounds, he was attracted by a female insect of this species near it; and noticed that on the thigh of the middle leg the usual grey colour was of a polished black. Supposing that possibly the insect may have had something to do with the injury to the bark, through which the turpentine was oozing, he waited a few minutes to re-assure the insect—usually timid under observation—that there was no danger. It then went to work to take the turpentine with the heel of the tarsus of the fore leg, and place it on the thigh of the second leg. It took several dozen "heelsful," winding it round the gathering ball on the leg, as one would wind a ball of string. After it had collected together a ball of turpentine about the size of a pin's head, it gently wiped it off with the femora of the hind leg, and applied it to the anus, where it was very rapidly absorbed. It then walked very leisurely to the top of the nearest branch, when it flew away. This was in the end of September. He saw no more of these insects till a week afterwards, when he cut off a small branch on which was another female, and carried it to the pine tree, applying the branch to the stem so that the insect could walk on to it, without much suspicion of human agency in the matter. As soon as it got to the turpentine, it went through the same operation as the other one, taking two doses of it before it walked away; which it did leisurely, and with much apparent satisfaction. Up to this time he had not been able to find a male, so as to ascertain if it also had any similar use for turpentine.

Oct. 25.—"On the Stipules of Magnolia and Liriodendron," by Thomas Meehan. An examination of the stipules of *Magnolia* affords some highly interesting facts; most, or perhaps all of which are known to leading botanists, but which do not appear to be as generally known as they deserve to be; and which facts may have a more intimate bearing on many of the questions connected with the laws of development than is suspected. On the upper point of the scar next the leaf blade are two small articulation points, where the membranaceous stipules finally parted from the leaf. Examining a leaf before these stipules have fallen, the main veins forming the skeleton of the stipules are found connecting with these articuli, and spreading out, diverge downward toward the base of the leaf. I suppose no one of experience in living plants doubts the possibility of the adhesion of some parts and the separation of others, so as to make new parts or organs. If such is desired, I would refer to the *adhesion* of the carpellary leaves by their backs in the capsules of *Staphylia trifolia*; and for *separation* to the pinnate leaf often formed out of an entire blade in *Fraxinus excelsior*, *heterophylla*, and many other plants with entire leaves which often have pinnate ones amongst them. The author stated his opinion that the stipules of *Magnolia* are not formed like the stipules of most plants, which are perhaps leaf portions which have never been well developed, but rather are the tolerably well developed side pinnules of a trifoliate or deeply auricled leaf, which in an early stage had adnated with the petiole, and by their edges, and thus formed the stipular sheath we see. This ternate division of the leaf is a marked character in Ranunculaceæ, and with this exposition of a ternate type in Magnoliaceæ, its claim to a place in the Ranal alliance, strong as it always has been acknowledged to be, is still more strengthened. It is impossible to suppose that a so closely allied genus as *Liriodendron* should be founded on a different type from *Magnolia*. We shall see that only very slight causes, which we can well understand, have made some of the chief foliar distinctions, and the few which we cannot prove from actual facts, can be made almost certainties from parallel observations. The identity of type will in this way be manifest. There seems to be every evidence short of an actual witnessing of the fact, that the petiole in *Liriodendron* became adnate with the stem, and in this way the two lateral sections (stipules) were brought in contact with the stem with which they united. This would bring them nearer the sources of nutrition, and enable them to assume a more leaf-like and permanent character than if on the petiole. They become rather primary than secondary leaf organs, and this is just what we see them to be. Thus we may assume that *Magnolia* has typically a ternate leaf structure; that the stipules are the two lateral lobes which, by a peculiar process of adnation, became stipular sheaths after having been partially organised as leaf blade; and that *Liriodendron* differs from *Magnolia* only in possessing a greater power of adnation.

## BOOKS RECEIVED

ENGLISH.—A Dictionary of Science: G. F. Rodwell, new edition (E. Moxon and Co.).—The Earth, vols. 1 and 2: E. Réclus (Chapman and Hall).—Dr. Bevan on the Honey-bee, new and enlarged edition: W. A. Munn (J. Van Voorst).

AMERICAN.—Theoretical Chemistry, part 1: G. F. Barker, M.D. (C. C. Hatfield, New Haven.)

## DIARY

*THURSDAY*, FEBRUARY 2.

ROYAL SOCIETY, at 8.30.—On Linear Differential Equations: W. H. L. Russell, F.R.S.—Measurement of Specific Inductive Capacity of Dielectrics: J. C. Gibson and T. Barclay.—On the Uniform Flow of a Liquid: Rev. Canon Mosley, F.R.S.
SOCIETY OF ANTIQUARIES, at 8.30.—On Charters relating to Robertsbridge: C. S. Perceval, LL.D., Dir. S.A.
LINNEAN SOCIETY, at 8.—Natural History of Deep-Sea Soundings between Galle and Java: Capt. Chimmo, R.N.
CHEMICAL SOCIETY, at 8.—On the Development of Fungi in Potable Water: Dr Frankland.
LONDON INSTITUTION, at 7.30.—On the Action, Nature, and Detection of Poisons: F. S. Barff.
ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

*FRIDAY*, FEBRUARY 3.

GEOLOGISTS' ASSOCIATION, at 7.30.—Anniversary Meeting.
ROYAL INSTITUTION, at 9.—Polarisation of Light: W. Spottiswoode, F.R.S.
ARCHÆOLOGICAL INSTITUTION, at 4.

*SATURDAY*, FEBRUARY 4.

ROYAL INSTITUTION, at 3.—Laws of Life revealed in History: Rev. W. H. Channing.

*SUNDAY*, FEBRUARY 5.

SUNDAY LECTURE SOCIETY, at 3.30.—The Origin, Migrations, and Development of Remarkable Parasites: Dr. Cobbold, F.R.S.

*MONDAY*, FEBRUARY 6.

ENTOMOLOGICAL SOCIETY, at 7.—On the Early Development of the Sexual Organs in Insects, and its bearing on the Origin of Species: Mr. Lowne.
VICTORIA INSTITUTE, at 8.—Evidence of the Egyptian Monuments to the Sojourn of Israel in Egypt: Rev. B. W. Savile.
LONDON INSTITUTION, at 4.—On the First Principles of Biology: Prof. Huxley. (Educational Course.)
ROYAL INSTITUTION, at 2.—General Monthly Meeting.

*TUESDAY*, FEBRUARY 7.

ZOOLOGICAL SOCIETY, at 9.—Notes on some points in the Osteology of *Rhea Americana* and *Rhea Darwinii*: Dr. R. O. Cunningham.—On the Arctic collection of Birds presented by Mr. John Barrow to the University Museum, Oxford: J. E. Harting.
ROYAL INSTITUTION, at 3.—Nutrition: Dr. Foster.

*WEDNESDAY*, FEBRUARY 8.

GEOLOGICAL SOCIETY, at 8.
ROYAL MICROSCOPICAL SOCIETY, at 8.—Anniversary Meeting. Election of Officers and Council.
SOCIETY OF ARTS, at 8.—On Ornamentation considered as High Art: Dr. C. Dresser.
ARCHÆOLOGICAL ASSOCIATION, at 8.

*THURSDAY*, FEBRUARY 9.

ROYAL SOCIETY, at 8.30.
SOCIETY OF ANTIQUARIES, at 8.30.
LONDON MATHEMATICAL SOCIETY, at 8.
LONDON INSTITUTION, at 7.30.—On the Action, Nature, and Detection of Poisons: F. S. Barff, M.A., F.C.S.
ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

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