SCIENTIFIC SERIALS

In the *Journal of Botany* for January, there is no paper of special general interest, the illustration being that of a new British moss *Tortula inclinata*. Mr. J. G. Baker describes a number of new or little known capsular gamophyllous Liliaceæ; and Mr. F. E. Kitchener gives an "elementary proof of the rule for detecting spiral arrangement." The first article in the February No. is an illustration of how much yet remains to be done in completing the British flora, being a description with a plate of a British Dock, *Rumex maximus*, discovered by the Hon. J. L. Warren in the neighbourhood of Lewes, where it was recorded many years since, but not having been observed in the meantime, had been generally treated as an error. There is no other paper bearing specially on British Botany, but a very useful account of the Esparto-grass of commerce, by Mr. J. R. Jackson.

Astronomische Nachrichten, No. 1972. The elements of Henry's comet, 1873, by E. Weiss and Aug. Zielinsky, the following elements are given :—

	Weiss. Berlin Time.	Zielinsky. Paris Time.
T =	Oct. 1·80022	Oct. 1·765792
Π =	50° 8′ 18″·5	50° 18′ 42″·96
Ω =	176° 43′ 14″	176° 43′ 21″·88
i =	121° 28′ 58″·8	121° 27′ 48″·19
log *q* =	9·585297	9·5866441

A list of fifteen new nebulæ is given, which M. Stephan observed at Marseilles.

Poggendorff's Annalen der Physik und Chemie, No. 10, 1873.—We may first notice, in this number, some observations relating to phenomena of light.—M. Behrens contributes a paper on the production of coloured light through elective reflection. The reflected and transmitted light of opal and other bodies was examined with a micro-spectroscope; and it is shown that certain substances may have colour without absorbing light, and that the two spectra (from reflection and transmission, respectively) are exactly complementary of each other. This, he says, occurs more frequently than one might suppose.—Dr. Nöggerrath draws attention to the production of light in grinding of hard stones, as witnessed in the agate-works at Oberstein and Idar. In the case of all hard stones (which the workmen press with their hands against large grindstones revolving thrice in a second), a strong red light appears between the object and the grindstone, with a red halo and emission of sparks. Transparent stones, however, are lit up throughout with a beautiful yellowish-red light, like that of glowing iron, so that it seems as if the workman must burn his hands (though the rise of temperature was not above 10° or 12° R.). The author invites research in this direction, for which the works named present good opportunity.—The concluding portion of M. von Bezold's paper on the law of colour mixture and the physiological primary colours, is given; the author is led to some valuable deductions which we cannot here stop to particularise.—M. Valerius, in a note on binocular, as compared with monocular, vision, comes to the conclusion that the proportion of brightness of an object, looked at successively with both eyes, and with one, is nearly independent of the absolute amount of illumination: and with ordinary candle or gas flame, does not exceed 1·15. He afterwards found that his left eye was less sensitive than the right; had he used the latter, the proportion in question would be somewhat less. The measurements were made with Foucault's photometer.—M. Kundt contributes a paper on the vibration of rectangular, and especially of square, *air plates;* meaning, by an air plate, a thin layer of air enclosed between two solid plane plates applied to each other (it may be either in communication with the external air, or closed all round). He makes the vibration-forms visible by means of cork powder; and the present communication chiefly shows that the vibration-numbers observed in the entirely-closed air plates agree with those deduced from theory, to less than 1 per cent.—Dr. Hübener gives an account of researches on transpiration of salt solutions through capillary tubes. The velocity of outflow is found to be inversely as the equivalent weights; which may be explained (the author thinks) by the fact, that in compounds with high equivalent weight the molecules are larger than in those with low. If, then, equal weights of two salts of different equivalent weight be dissolved in a liquid, there will be present in the solution of the heavier salt larger but fewer molecules than in the other solution. Hence, in the solution of the first salt, the molecular surface in contact with the solvent will be less than in the second liquid; and the internal friction will be less; thus (other conditions equal), there will be greater mobility.—A paper by Dr. Dibbits discusses, at some length, the dissociation of ammonium salts in aqueous solution; the results detailed being both qualitative and quantitative.—M. Rammelsberg communicates a second note on natural compounds of tantalum and niobium; and Dr. Bender describes an ingenious method of determining the time of vibration of a material pendulum. The remaining matter does not specially call for notice.

SOCIETIES AND ACADEMIES

Royal Society, Feb. 5,—"On the Anatomy and Habits of the genus *Phronima* (Lattr.)." By Dr. John Denis Macdonald, F.R.S., Staff Surgeon R.N., Assistant Professor of Naval Hygiene, Netley Medical School.

Of all groups of Crustacea the Amphipoda would appear to exhibit the widest range, in the modification of their parts or organs, without obliterating the delicate lines of natural affinity running through them as a whole. This is well exemplified in the interesting paper of Dr. R. Willemoes-Suhm, naturalist to the *Challenger* Exploring Expedition, "On a new Genus of Amphipod Crustaceans" founded by him, and named *Thaumops*. This genus, although exhibiting many characters in common with *Phronima*, presents some striking points of difference traceable in the external jaw-feet, caudal appendages, the position of the generative bone, and certain particulars in its external anatomy.

During the exploratory voyage of H.M.S. *Herald*, in the S.W. Pacific, numerous species which I have always been in the habit of referring to the genus *Phronima*, were taken in the towing-net; and I might remark that the assumed parasitic habit of these creatures was never, at least, a prominent fact to me, they were so often taken either perfectly free, or tenanting a nidamental case. Those who, like Dr. Suhm, are acquainted with deep-sea dredging, are usually cautious how they refer the doubtful products to their proper habitat; whether it be the bottom that has been reached, or some zone of the watery space above. Indeed it is quite possible for the narrow area of the tallow-arming of the deep-sea lead to include fortuitously, and carry down *Phronima* or any other little crustacean naturally living near the surface; and contact with the bottom would finally press it into the tallow, so as to mislead the observer as to its true habitat. Conversely, in bringing up the dredge from a given depth, it may finally carry with it any more superficial objects casually lying in the track which it takes.

The author then describes a species of *Phronima* captured in lat. 30° 16′ S., long. 176° 27′ W.

The evidence of Dr. Willemoes-Suhm supports my own experience that there is no metamorphosis in this group; and as it is very probable that the history of the development of *Thaumops* would resemble that of *Phronima*, the following observations may be of some importance, as carrying the process a little further than it has perhaps yet been traced by him :—

In lat. 21° 0′ S. and long. 17° 45′ W. off the island of Ono, Fiji group, apparently the same species of *Phronima* as that above referred to was taken in the towing-net, but with the addition of a numerous progeny of young in a large gelatinous but tough nidamental case. This interesting nest was shaped like a barrel, but with both ends open, and the external surface was somewhat tuberculated and uneven. The wall of the tube presented numerous round and puckered openings, observing no very definite arrangement, but through which entering currents were observed to pass. These openings in general pierced the tuberculations, though not invariably.

An external membrane, with an internal lining, was distinctly visible, both seeming to be continuous at the rims of the tube. The space between these layers was filled up with a pulpy substance, in which scattered nucleiform bodies were detected with a higher power of the microscope.

In a subsequent commission on the North-American and West-Indian Station in H.M.S. *Icarus*, I have frequently captured "*Phronima* in its bay," as my messmates would say. In order to bring the swimmerets into full play, the animal protrudes its body tail foremost from the case, only calling into use the fine tips of the third and fourth pairs of thoracic limbs to hold fast its charge. When it fully retires into the case, the claws of the two posterior pairs of legs are pressed backwards against the lining membrane, so as still more effectually to secure its hold on the approach of danger.

Royal Society, Feb. 12.—"Note on the Synthesis of Formic Aldehyde," by Sir B. C. Brodie, Bart., F.R.S.

In a former note I communicated to the society the result of an experiment in which a mixture of equal (or nearly equal) volumes of hydrogen and carbonic oxide had been submitted, in the induction-tube, to the electric action. My expectation in making the experiment had been that the synthesis of formic aldehyde would be thus effected according to the equation $CO + H_2 = COH_2$. The only permanent gas, however, other than the gases originally present in the induction-tube, which appeared in the result of the experiment was marsh-gas. When a mixture of hydrogen and carbonic acid gas were similarly operated upon, the same hydrocarbon, together with carbonic oxide, was formed. I have now, however, succeeded, by a modification in the conditions of the latter experiment, in attaining the object which I originally had in view. Evidence of this is afforded by the following analysis:—The gas analysed was the result of submitting to the electric action equal volumes of hydrogen and carbonic acid. After removal from the gas of carbonic acid and carbonic oxide, and also of a trace of oxygen, 191·2 volumes of gas remained, in which were found at the conclusion of the analysis 2·6 volumes of nitrogen. Deducting this amount of nitrogen, 188·6 volumes of gas remain, containing the residual hydrogen in the gas, together with any gases besides carbonic oxide formed in the experiment. This gas was analysed by the addition of oxygen and subsequent detonation by the electric spark, the absorption of the carbonic acid by potash, and the removal of the oxygen over by pyrogallate of potash. The results of the analysis entirely concur with the assumption that the 188·6 volumes of gas were constituted of hydrogen, marsh-gas, and formic aldehyde in the proportions given below.

Hydrogen	183·2
Marsh-gas	0·2
Formic aldehyde	5·2
	188·6

The composition of 100 volumes of the gas being,

Hydrogen	97·14
Marsh-gas	0·10
Formic aldehyde	2·76
	100·00

Another experiment was attended with similar results, only that the proportion of marsh-gas was somewhat greater.

The result of this experiment may be considered to be given in the equation $CO_2 + 2H_2 = COH_2 + H_2O$. I have reason to believe that formic aldehyde is also formed in the reaction of hydrogen and carbonic oxide; and that the marsh-gas found (in both experiments) results from the decomposition of this substance, possibly according to the equation $2COH_2 = CO_2 + CH_4$. I do not now dwell upon this subject, as it is my intention very speedily to lay before the Society, together with other matters, the details of the various experiments which I have made in reference to it.

Geological Society Feb. 4.—His Grace the Duke of Argyll, K.T., F.R.S., president, in the chair.—The following communications were read:—"The Physical History of the Valley of the Rhine," by Prof. A. C. Ramsay, LL.D., V.P.R.S., vice-president. The author first described the general physical characters of the valley of the Rhine, and discussed some of the hypotheses which have been put forward to explain them. His own opinion was that during portions of the Miocene epoch the drainage through the great valley between the Schwarzwald and the Vosges ran from the Devonian hills north of Mainz into the area now occupied by the Miocene rocks of Switzerland. Then after the physical disturbances which closed the Miocene epoch in these regions the direction of the drainage was reversed, so that after passing through the hill-country between the lake of Constance and Basel, the river flowed along an elevated plain formed of Miocene deposits, the remains of which still exist at the sides of the valley between Basel and Mainz. At the same time the Rhine flowed in a minor valley through the upland country formed of Devonian rocks, which now constitute the Taunus, the Hundsruck, and the highland lying towards Bonn, and by the ordinary erosive action of the great river the gorge was gradually formed and deepened to its present level. In proportion as the gorge deepened, the marly flat Miocene strata of the area between Mainz and Basel were also in great part worn away, leaving the existing plain, which presents a deceptive appearance of having once been occupied by a great lake.—"On the Correspondence between some Areas of Apparent Upheaval and the Thickening of Subjacent Beds," by W. Topley, Geological Survey of England. The author referred to many instances in which beds have unequal development, being much thicker in some places than in others; and the main object of his paper was to show that such thickening and thinning of beds has an important effect in producing the apparent dip of overlying beds. The thinning of any one bed may have an appreciable effect in producing or increasing its own apparent dip; but where a whole series of beds thin constantly in one direction, the amount of the dip of one of the higher beds, due to the *sum of the thinnings of the underlying beds*, is often very considerable. It is generally supposed that the dip of any bed is due to great movements of the earth's crust; from the facts mentioned the author argued that our inferences as to such movements will vary according to the beds which happen to be exposed at the surface. It is evident, from the faults intersecting strata, that upheavals and disturbances have taken place; but unless we assume every bed to have been deposited on a perfectly horizontal plane, we cannot infer the amount of such upheaval from the present position of the bed. In all cases we must take into account the actual or possible thinning of underlying beds. The beds which support geological basins frequently thin towards the centres of those basins, thus producing, wholly or in part, the basined form of the strata. It was, however, shown that the beds of the basins themselves frequently thicken towards the centre of the basins.

Anthropological Institute, Feb. 10.—Prof. Busk, F.R.S., president, in the chair.—The second part of the paper "Explorations amongst ancient Burial Grounds, chiefly on the sea-coast valleys of Peru," was read by the author, Mr. Consul Thomas J. Hutchinson. The paper treated of the burial grounds from Lima northwards, as did the former part of the paper on those from Arica to Lima. Mr. Hutchinson described a burial place with the Aymara name of Parárá on the Oroya railroad at a station called Chosica, and at an elevation of only 2,750 feet above the level of the sea, and so named from its grinding stones used for bruising corn, numbers of which lie amongst the cenotaphs. Those were said by Prof. Forbes to be used for cooking purposes, because the Aymaras are stated to have occupied a part of Peru of which the minimum elevation is 10,000 ft., and therefore where the boiling of water is a difficult matter to accomplish. The flattened and elongated skulls mentioned by Dr. Tschudi and Prof. Forbes were touched upon—an illustration of one of these from an elevation of 10,000 ft. above the sea being given. Mr. Hutchinson recommended a further and more extensive exploration of the mounds and Huacas in Peru to illustrate the rich treasures of archæology with which that country abounds.—A joint paper by Mr. Tyrwhitt Drake and Mr. A. W. Franks was read, on skulls and implements from Palestine.

Photographic Society, Feb. 10.—James Glaisher, F.R.S., president, in the chair.—A special general meeting was held to decide whether two new laws, previously proposed, should be adopted, or whether the Council's amendment to appoint a committee to revise the laws generally be accepted. The Council's amendment was lost. The anniversary meeting of the Society was held afterwards, when the balance-sheet, showing an improved financial position, and the report of the Council, were read and adopted. The President and Council, interpreting the rejection of their amendment as a vote of want of confidence, then tendered their resignations, which were accepted.

MANCHESTER

Literary and Philosophical Society, Jan. 19.—Microscopical and Natural History Section.—Mr. Joseph Baxendell, F.R.A.S, vice-president of the Section, in the chair.—Mr. Joseph Sidebotham, F.R.A.S., read a paper no "The similarity of certain Crystallised substances to Vegetable forms." The author called attention to the formation of verdegris on insect pins, in old Entomological collections. This substance makes its appearance where the pins pass through the thorax of the insects, and in length of time grows into a considerable mass of flocculent matter, of a brilliant green colour, and often breaks up the insects and also destroys the pins. It consists mainly of acetate or formiate of copper in combination with fatty or oily matter. On examination of various specimens under the microscope, they were found to present a great variety of forms, filamentous and ribbon-like structure, often resembling various

fungi, in some cases so nearly, that it was difficult to believe that the fibres and fruit-like forms are not really organic bodies. The author expressed his opinion that these bodies were simply crystals, modified in their formation by the oil contained in the insects, with which the crystals are in some way combined. Some of the specimens exhibited were taken from insects collected twenty-five years ago.

LIVERPOOL

Geological Society, Feb. 12.—Mr. T. Mellard Reade, F.G.S. read a paper containing a series of novel investigations on the action of tides on the sea-bottom. Applying a formula used by civil engineers, the result of practical observation in tidal estuaries, to the observed currents at the surface at various points in the St. George's and English Channels, it was proved, by comparison with experiments instituted for ascertaining the moving powers of running water on materials of various specific gravity and bulk, that, conditions being otherwise favourable, tidal currents were capable of destructive erosive action on the sea-bottom. Mr. Reade then entered elaborately into the phenomena of the tides in the Irish Sea, in the English Channel, and surrounding seas, using Captain Beechey's admirable observations for this purpose. Mr. Reade infers from a consideration of a variety of circumstances that the materials of the Irish Sea bottom are principally composed of re-arranged glacial drift, either eroded off the bottom or off the coast by the sea itself, or poured into it by the many rivers in the north-west of England, south of Scotland, and west of Ireland, draining vast basins mostly covered by glacial clays and sands. These materials, notwithstanding the oscillatory character of the tidal streams, have in the main a slow, progressive motion down channel, and out as far into the Atlantic as the little Sole Banks. Clear cases of the erosive action of the water on the bottom were then given. It was shown that there are pits or gullies excavated in the bottom in both the English and Irish channels, and that these depressions have generally their major axes conformable in direction with the set of the stream tide; and that the contour lines of the bottom approximately follow the same direction. The most remarkable of these excavations is the North Channel Gulley, off the coast of Wigtonshire, twenty miles long, one mile wide, and from 400 ft. to 600 ft. deeper than the surrounding bottom, and which the strong tide existing there has either partially or wholly excavated, and now keeps open. In conclusion, Mr. Reade expressed his conviction that the diurnal and semi-diurnal movement of the tides, acting down to the profoundest depths of the ocean, accounts for the preponderance of life in it over that exhibited by the fauna of the Mediterranean.

EDINBURGH

Royal Society, Feb. 16.—Sir William Thomson, president, in the chair.—The president read obituary notices of deceased Fellows of the Society.—The following communications were read:—On the Kinetic Theory of the Dissipation of Energy, by Sir W. Thomson.—On the Electric Conductivity of Iron at a Low Red Heat, by Prof. Tait.—On the Stresses due to Compound Strains, by Prof. C. Niven, communicated by Prof. Tait.

GLASGOW

Geological Society, Jan. 15.—Mr. E. A. Wünsch, vice-president, in the chair.—Mr. R. L. Jack, of H.M. Geological Survey, read a paper on a Boulder-clay, with broken shells, in the lower valley of the River Endrick, near Lochlomond, and its relation to certain other glacial deposits in the same neighbourhood. The author stated that the elevation of Lochlomond above the sea is so trifling that there is no difficulty in classing it with the sea-lochs that indent the western Highlands. A depression of 20 feet, or the removal of the superficial deposits traversed by its short outlet, the Leven, on its way to the Clyde, would restore it to its former condition. He then called attention to a deposit which he had observed in the course of his work on the geological survey near the south-eastern angle of Lochlomond, and whose relation to the already-known members of the glacial series seemed to deserve particular attention. The deposit is a true typical till, in every respect similar to the old boulder-clay or till of the Lowlands of Scotland. In a matrix of stiff unstratified clay, brown in colour, like the subjacent Old Red sandstone rock, are scattered stones of various sizes, blunted, smoothed, and marked with striations in all directions, but most frequently in the direction of their longer axis. It presents, however, one remarkable peculiarity that distinguishes it from the common till—it contains worn and broken fragments of marine shells. Though he had not found any clear instance of an older deposit below this shelly till, he believed its place was above the old boulder-clay, and that it was also the product of land-ice. He believed the till to be the product of land-ice—the *moraine profonde* of a large glacier which filled up the lake, covered the islands, and climbed the rising ground between the Leven and the Endrick to the height of at least 320 feet. This glacier, in all probability, existed during the latter portion of the period which preceded the "great submergence" of the land.—Mr. John Young read a paper on the occurrence of a bed of highly indurated Sandstone, with water-worn quartzite pebbles, interstratified with the trap of the Campsie Hills. The bed is probably of lower carboniferous age, and indicates one of those periods of repose between the great outbursts of igneous rock matter of which the Campsie Fells are principally built up.

PARIS

Academy of Sciences, Feb. 9—M. Bertrand in the chair.—The following papers were read:—On *Balistique intérieure*, by General Morin. This was a paper on the various forces acting on a projectile whilst still in the bore of a gun.—On the devitrification of glass, by M. Eug. Peligot. The author decides that, contrary to the received opinion that this effect is due merely to a crystallisation of the glass, it is due to the formation of a definite silicate having a formula corresponding to that of a pyroxene.—On the action of water on lead, by M. Balard.—New clinical and experimental researches on the movements and repose of the heart, and on the mechanism of the passage of the blood through its cavities when in the normal state, by M. Bouillaud.—On the preservation of vines threatened by *Phylloxera*, by M. de la Vergne.—On the problem of three bodies, by M. E. Mathieu.—On the resistance of glass tubes to rupture, by M. L. Cailletet. The author finds that a tube stands pressure from the outside better than from the inside. The pressures, however, which a tube can stand from the inside are very great. One of 9 mm. internal diameter and 1 mm. thickness, containing 6·9 c.c., was submitted to an outside pressure of 460 atmospheres, without injury, and subsequently to an internal pressure of 104 atmospheres, when it burst.—On the use of a double refracting prism for determining the axes of ellipses, by M. Jaunetaz.—On some new bands produced in the absorption spectrum of chlorophyll by reagents containing sulphur, by M. J. Chautard.—On a new process for preserving wood, by M. Hatzfeld.—On the hardness and density of carbon obtained from pure sugar, by M. F. Monier.—On the flight of birds, by M. E. Bertin.—On an electric fire-alarm, by MM. A. Joly, and P. Barbier.—On the measurement of heat, by M. G. West.—On a case of monstrosity, &c., by M. Claudot.—Theorems concerning algebraic equations, by M. F. Lucas.—On the impossibility of certain double equations, by M. A. Genocchi.—On the conditions necessary for a conic with a curve of any order to have a contact of the fifth order, by M. Painvin.—On the chemical characteristics of the uredo of maize, &c., by M. Hartsen.—On the consecutive effects of the removal of the mammæ in certain animals, by M. de Sinéty.

CONTENTS

	PAGE
PHYSIOLOGY AT CAMBRIDGE	297
ATHENIAN TEXT-BOOKS OF SCIENCE. By G. F. RODWELL, F.C.S.	298
THE ACRIDIDÆ OF NORTH AMERICA	299
OUR BOOK SHELF	299
LETTERS TO THE EDITOR:—	
Simultaneous Meteorological Observations.—ROBERT H. SCOTT, F.R.S.; Brigadier Gen. A. J. MYER	300
Remuneration of the Contributors to Milne-Edwards' "Mission Scientifique au Mexique."—MILNE-EDWARDS	301
Animal Locomotion.—A. H. GARROD; ALFRED R. WALLACE, F.Z.S.	301
On the Variability of the Node in Organ-pipes.—HERMANN SMITH	301
Auroral Display.—W. H. WATSON	303
THE PHOTOGRAPHIC SOCIETY	303
NOTES FROM THE *Challenger*	304
THE COMMON FROG, X. By ST. GEORGE MIVART, F.R.S. (*With Illustrations*)	305
THE INDUCTION TUBE OF W. SIEMENS. By Sir B. C. BRODIE, Bart., F.R.S. (*With Illustration*)	308
RECENT RESEARCHES ON TERMITES AND HONEY-BEES. CHARLES DARWIN, F.R.S.; FRITZ MULLER	308
MARS. By Rev. T. W. WEBB, F.R.A.S.	309
NOTES	311
SCIENTIFIC SERIALS	314
SOCIETIES AND ACADEMIES	314