

extra-European. Hydrophilidae not having the same limitation in the two works, I take the Palpicorn families in which that group and the Sphaeridiidae are included. There are 22 genera in each catalogue, but Schaum and De Marseul each ignore a genus adopted by the other, and a third name, *Cyllidium*, is preferred by the French author to the earlier one of *Chætarthria*. As to the species, seeing that Schaum has about 1,580 in the families mentioned above, and De Marseul 2,640, it would not be easy to compare them in a definite form; but taking *Cicindela*, the second genus of the two catalogues, the first having only one species, which is, I conceive, a fair example of the others, if indeed it has not had more than its share of varieties elevated to the rank of species, we find the 26 species in Schaum identical in names with the same species in De Marseul, except two varieties or species, and a synonym given with a ? by Schaum, which is the right name according to De Marseul.

I would venture to suggest that the synonyms which look so formidable to some of our friends, are principally due to the writers of local faunas, or in some cases to specialists, and that such names have, as a rule, never been adopted, and practically offer no hindrance whatever to the naturalist. A species may be described by an author who is ignorant that it has been previously described, but this is an evil which it is sometimes impossible to avoid, as in the case of almost simultaneous publication; but in due time the later name is relegated to the list of synonyms and gives little further trouble. It does not seem to me that any change or additions to the present rules of nomenclature are needed. Naturalists very soon decide on the relative value of names, but always with due regard to the law of priority; it is a misfortune, perhaps, that this law is sometimes pushed too far, as in the case either of forgotten authors, or of doubtful descriptions. The alteration of trivial names from two authors using the same word is a case of very rare occurrence.

FRANCIS P. PASCOE

#### The so-called "Meteor-cloud" of Feb. 5

YOUR correspondent, Captain S. P. Oliver, appears to have been mistaken as to the character of the phenomenon seen by him on February 5, and noticed in NATURE (vol. ix. p. 313). At the hour he has indicated, the somewhat rare phenomenon an auroral arch was formed, which remained visible for about half an hour, and is doubtless the luminous "meteor cloud" seen by him. The description Captain Oliver has given of it is sufficiently accurate, though he does not mention that it drifted slowly southward, a well-known characteristic of the phenomenon. Its direction was of course at right angles to the magnetic meridian, and its position in the heavens, as seen from this locality, was more northward than that observed by your correspondent. During the whole time that I observed it, the arch crossed some portion of the constellation Ursa Major, the star  $\delta$  Ursæ Majoris being in its midst when first seen, and the entire arch having retreated southward as far as  $\zeta$  Ursæ Majoris before it disappeared. It was of uniform breadth and intensity, and spanned the sky from west to east (magnetic), passing not much to the north of the zenith. Although I have been fortunate enough to have seen auroral arches upon several occasions, and once succeeded in obtaining the spectrum, I have never seen a brighter or more complete arch than this one; but what made it quite unique, at least as far as my experience goes, was the fact that the ordinary aurora with a well-defined "dark segment" was visible in the north-north-west at the same time, from which, at an earlier period, brilliant streamers had proceeded. There were therefore two parallel arches of light at an interval of perhaps  $50^\circ$  from one another, which the slow movement of the upper one gradually increased. The night was remarkably clear, and the zodiacal light had been plainly visible earlier in the evening.

JOHN J. PLUMMER

The Observatory, Durham, Feb. 21

#### Aboriginal Australian Artists

I NOTICED, in one of your latest papers, that some of your readers doubted the ability of Australian, or other low savages, to sketch in the manner of the Vézère people, and I made a copy of a few sketches still found in this neighbourhood engraved on rocks. They consist chiefly of fishes, whales, birds, and a few men; the execution is not so good as when the figures are scratched on blackened bark. I also send you a photograph of a carving in fossil coral from New Guinea. H.M.S. *Basileisk* has

not long ago returned from New Guinea, and brought some splendid weapons, &c.; also one of the Papuan pigs, which they brought for our collection. It is the most intelligent pig I have ever seen, follows me like a dog, and goes up to the very top of the Museum building, which is about 80 feet high.

I noticed the, to me, wonderful remark about a scarcity of skeletons of large carnivora in European museums, and I am glad to say that we possess two tigers, two lions, wolf, hyæna, three grey seals, two large sperm whales, 70 and 35 feet in length, many small birds, dugongs, &c. &c. The sum total of our skeletons, all mounted, is more than 150; with few exceptions all articulated on the premises by one man, who has never been out of Sydney in his life. If our Government grant some extra money for cabinets, I think we shall be able to astonish the people on board the *Challenger* when they come here, because half our Australian fossils and minerals cannot be exhibited for want of the necessary cases.

GERARD KREFFT

P.S. The trustees have had so many applications for *Ceratodus* specimens, and they have been so often disappointed when exchanging them with other museums, that they have now determined to sell their duplicates in London to the highest bidders. Five of these fishes, in spirits (males and females) will be despatched to Messrs. P. W. Flower and Sons, and I hope that a good price will be obtained for them. Up to the present time all efforts to obtain more of the *Ceratodus* have been in vain, and I believe that they are not so common as some people think. Mr. George Masters has too much to do here; and besides, we have no funds, travelling being very expensive in the Wide Bay district, otherwise another Expedition would be sent by the Board. Mr. Masters knows how to catch them, and I hope that when the *Challenger* arrives he will be able to accompany a party from that ship to Gayndah.

#### Rainbow and its Reflexion

A FEW weeks ago I had the pleasure of seeing a rainbow and its reflexion, or at least a reflexion of one from the same shower at the same time, in smooth water.

The base of the bow in the cloud seemed but a few hundred yards from me, and the reflexion evidently did not belong to it, as the two bases did not correspond, the reflected bow lying inside the other, the red of the one commencing where the violet rays of the other disappeared.

Balbriggan, Ireland, Feb. 2

GEORGE DAWSON

#### Remarkable Fossils

THE letter by Mr. T. W. Cowan in NATURE, vol. ix. p. 241, confirms the truth of the statements contained in my "Appeal to our Provincial Scientific Societies" which appeared in NATURE, vol. ix. p. 162. Collections of the kind described by Mr. Cowan are "kicking" about the country in all directions, valued merely as temporary possessions by the owners, few of whom, as far as my experience goes, appear to possess sufficient public spirit or intelligence to realise their public and scientific importance; otherwise these collections would be more frequently localised and preserved for the district museum.

Jan. 31

S. G. P.

#### Volcanoes and the Earth's Crust

MR. HOWORTH, in NATURE, vol. ix. p. 201, advances the following opinions:—That volcanoes are found neither in regions of elevation nor of subsidence, but on the boundaries between them; that the great continents are on the whole rising, and the beds of the great oceans on the whole sinking; and that the centres of elevation are in the circumpolar regions.

It seems to me that the last two statements cannot be reconciled with each other. The southern hemisphere is for by far the greater part oceanic. According to Mr. Howorth, the ocean-beds are subsiding, and yet the southern circumpolar region contains a focus of elevation. Further: if volcanoes are not found in areas of elevation, and if the circumpolar regions are regions of elevation, what does he make of the volcanoes of Jan Mayen (between Norway and Spitzbergen), and of the Antarctic continent?

Were there any such laws of elevation and subsidence as Mr. Howorth maintains, the respective regions of elevation and of subsidence would have continued the same since the consolidation of the earth: but this is contradicted by the commonest facts of stratification, which show that elevation and subsidence have everywhere alternated with each other.

JOSEPH JOHN MURPHY  
Old Forge, Dunmurry, co. Antrim

### The Use of Terms in Cryptogamic Botany

As no specialist in Algology has replied to the inquiry of your correspondent "D. R.," in NATURE for January 15, I may be permitted to quote for his information the following from the article "Nucleus," in the "Treasury of Botany" from the pen of the author of the "Introduction to Cryptogamic Botany":—"In Algae the term is applied to the fructifying mass of the Rhodospirae, whether contained in a single cell or in a compound cyst or conceptacle, the word *nucleoli* being used when there is a group of nuclei." The instance alluded to by your correspondent is, unfortunately, not the only one in which the terminology of cryptogams is in a state of most perplexing confusion.

ALFRED W. BENNETT

### A Lecture Experiment

THE condensation of liquid in the form of vapour into minute globules, and the production of a shower of rain, may be very well illustrated for class purposes in the following manner:—

Place about an ounce of Canada balsam in a Florence flask, and let it boil. At the top of the flask clouds of globules of turpentine will be seen hovering about, altering in shape very much like sky-clouds, and the globules are large enough to be visible by the naked eye. If a cold glass rod be gradually introduced into the flask, these clouds may be made to descend in showers. By the adaptation of a lime-light the whole process could be shown on a screen.

LAWSON TAIT

### TODHUNTER ON EXPERIMENTAL ILLUSTRATIONS

Segnius irritant animos demissa per aures,  
quam quæ sunt oculis subjecta fidelibus, et quæ  
ipse sibi tradit spectator.

THE following is, as nearly as I can recollect, the substance of a few remarks which I felt myself compelled to make to my class in a recent lecture. I had exhibited and described Hope's apparatus for showing the maximum density point of water, and proceeded to say:—

Now that the freezing mixture has been applied, my assistant will from time to time record on the black-board the simultaneous indications of the two thermometers, and will recall our attention to the experiment as the critical period approaches. You must, however, in this form of experiment take for granted his fidelity and accuracy in reading and recording. By means of a somewhat cumbrous application of optical processes, it would be easy to project upon a screen images of the thermometers, in such a way that each of you might see for himself the course of the phenomenon. But the thermo-electric method, whose principle I have already explained to you, is at once far easier of application, and in its indications more directly expressive. This I will show on another occasion. For the present you must rely on the observations to be made for you by my assistant. Yet I have no doubt that all of you will allow that the exhibition of the experiment, even in this imperfect manner, wonderfully assists you in understanding its nature.

This leads me to mention that a very decided opinion against the use of experimental illustration has been recently pronounced by one of the most erudite and voluminous of British mathematicians; my own former tutor, Mr. Todhunter, whose name and many of whose

works must be familiar to most of you. Such a man speaks, deservedly with authority, on many points; and therefore his dicta upon a point with which he shows himself to be totally unacquainted are especially dangerous. And I feel that it is my duty to point out to you, and warn you against, errors or absurdities connected with physics, whenever they come from one whose statements are, on other grounds, worthy of attention. I shall not trouble you with the whole passage I refer to in Mr. Todhunter's "Conflict of Studies," but merely read to you a sentence or two of the most astounding part of it. I premise that though he is speaking of the teaching of physical science in schools, his observations apply (if they have any basis whatever) to science-teaching in general.

"It may be said that the fact makes a stronger impression on the boy through the medium of his sight, that he believes it the more confidently. I say that this ought not to be the case. If he does not believe the statements of his tutor—probably a clergyman of mature knowledge, recognised ability, and blameless character—his suspicion is irrational, and manifests a want of the power of appreciating evidence, a want fatal to his success in that branch of science which he is supposed to be cultivating."

Verbal comment on this would be altogether superfluous, and the only practical comment I am disposed now to make is to proceed at once to farther *experimental* illustrations of the subject before us.

P. G. TAIT

### POLARISATION OF LIGHT \*

V.

THE conversion of plane into circularly polarised light may also be effected by total reflexion. If plane-polarised light traversing glass be incident upon the inner side of the limiting surface at any angle at which total reflexion takes place, it may be considered as resolved into two plane-polarised rays, the vibrations of one being parallel and those of the other perpendicular to the plane of reflexion; and there is reason to believe that in every such case a difference of phase is brought about which for a particular angle in each substance (in St. Gobain glass it is  $54^{\circ} 30'$ ) it has a maximum value of one-eighth of a wave-length. And if the original plane of vibration be inclined at an angle of  $45^{\circ}$  to that of reflexion the amplitudes of the two vibrations, into which the reflected vibrations are supposed to be resolved, will be equal. A full discussion of the mechanical causes which may be considered to effect this difference of phase would carry us deeper into the more difficult parts of the Wave Theory than would be suitable in this place. But if we accept the fact that the above-mentioned effects result, when polarised light (whose plane of vibration is inclined at  $45^{\circ}$  to that of reflexion) is reflected at a proper angle; then the following construction will be readily understood. Take a rhomb of glass, *a, b, c, d*, Fig. 14, whose acute angles are  $54^{\circ} 30'$ ; a ray incident perpendicularly to either end will undergo two total internal reflexions at the sides, say at *p* and *s*, and will emerge perpendicularly to the other end. These two reflexions will together produce a retardation, as described above, of one-fourth of a wave-length. And if the ray be originally polarised and its plane of vibration be inclined

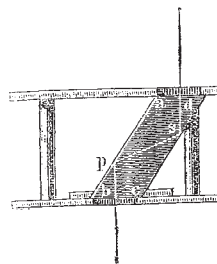


FIG. 14.

\* Continued from p. 285.