"9h. 13·5m. G.M.T. The broadening of the east ansa near its end is probably due to Tethys and Enceladus being on opposite sides of it near its east end. 9h. 22m. The east ansa seemed a little longer than the west, perhaps due to Tethys now following it. Dione was seen close to the east end."

With the other observations and remarks of M. Bigourdan I quite agree. The straightening of the northern edge of both ansæ has frequently been noticed by me both before and after May 20. So lately as June 3 both ansæ seemed broadest at a distance of three-fifths of their length from the ball, and the following ansa was almost detached from the ball, partly by the shadow thrown by the ball on it, and partly by the more elevated part of the middle ring concealing all within it in the neighbourhood of the ball. A. FREEMAN.

Murston Rectory, Sittingbourne, June 6.

Aurora.

THE aurora of May 18 was seen here. I first noticed it at 11 p.m. (Dublin time), and watched it until 1 a.m., though I did not see either the beginning or the ending. It extended from west-north-west to north-north-east, and had a general altitude of 30°, though occasional streamers reached beyond Polaris. It was moderately bright, but certainly not brilliant, and showed no colour. About 12 o'clock horizontal streamers began to show themselves like electric search-lights, and continued for some time, their appearance being accompanied by a lengthening upwards of the radial streamers. The air was slightly hazy, and there was much stratus about, with detached masses of cumulo-stratus coming up from the west. Wind-force 3 of Beaufort's scale; barometer 30·05, stationary.

JAMES PORTER.

Crawford Observatory, Queen's College, Cork, May 31.

The Atomic Weight of Oxygen.

I NOTICE that Lord Rayleigh gives the following summary of results on the atomic weight of oxygen :—

Dumas	1842	15·96
Regnault	1845	15·96
Rayleigh	1889	15·89
,,	1892	15·882

showing the remarkable fact that the atomic weight has been steadily decreasing for the last fifty years. I would suggest, as the explanation of this, that the increased population of the world, together with the great consumption of coal, have caused great wear and tear of these atoms, so that they are now mostly deficient in weight. It would seem, in fact, desirable that a Congress of chemists should be called to consider the question of providing for the renovation of the oxygen supply, and issuing trustworthy atoms of the standard weight, 16, as sealed patterns.

ROBT. LEHFELDT.

Firth College, Sheffield, June 3.

The Nitric Organisms.

I AM most reluctant to occupy any of your space with a claim to priority. A statement made on p. 137 of your last issue can hardly, however, be allowed to pass without notice. Dr. P. F. Frankland states in his lecture at the Royal Institution that the possibility of the existence of a nitric organism was foreshadowed by himself, and that this hypothesis has recently been confirmed by Winogradsky. He then describes the method adopted by Winogradsky for separating the nitric from the nitrous organism, and the chemical properties of the former. The fact that the existence of a nitric organism was proved in the first instance by myself, its separation from the nitrous organism effected, and its chemical behaviour studied, before any publication on the subject by Winogradsky, is *entirely omitted!* Frankland's statement of the case is the more remarkable as Winogradsky frankly admits in his paper that our results were nearly the same, and that his were published subsequently to my own.

R. WARINGTON.

Harpenden, June 10.

Carnivorous Caterpillars.

EVERY experienced breeder of Lepidoptera knows to his, or her, cost that many caterpillars are either habitually, or casually, carnivorous and cannibalistic.

Useful hints on this subject are given in Dr. Knaggs' "Lepidopterist's Guide" (Gurney and Jackson).

Lewisham, June 13. R. MCLACHLAN.

The Cuckoo in the East.

IN MAY 1887 I wrote to you that I had heard the cuckoo at Mussoorie. This year, on coming up here, I heard it at Doneira (about 2000 feet) and at Mamul (4000 feet). I have been here five days and have not heard it at all. There has been a deficiency of rain here, and it has been unusually hot. Both notes were very clear and distinct.

Dalhousie, May 22. F. C. CONSTABLE.

THE NEW LONDON UNIVERSITY.

WE have received for publication from the Association for Promoting a Professorial University for London the following proposals, adopted by the Association at a meeting held on Tuesday last :—

(1) It is desirable that there should, if possible, be one University in London.

(2) The objects of the University should be to organize and improve higher education and also to promote the advancement of science and learning.

It is desirable that the University be constituted on the following lines :—

(3) Subject to Clauses (9) and (12) the University to be governed by a Senate which shall ultimately consist of the Professors and a certain number of Crown nominees.

(4) The Professors to be nominated in the first instance by some independent authority, such as the Crown or the Commission contemplated in Clause (14), afterwards in such manner as the Senate may determine.

(5) The University to have power to absorb institutions of academic rank in London, which may be willing to be absorbed, due provision being made for protecting the interests of the teachers in such institutions, and for preserving the character of special trust-funds.

(6) The University to have the power of appointing Readers and Lecturers, either to supplement the teaching of the Professors, or to deliver graduation or other courses of lectures within the metropolitan area at such places as may be determined by the Senate.[1]

(7) The University to have power to grant degrees and to institute degree examinations. These examinations may, if found necessary, be different for those who have followed prescribed courses and for those who have not. Each Professor of the University to be *ex officio* an Examiner in the subject of his chair, but not necessarily to take part in every examination in that subject. Examiners, who shall not be Professors in the University, to be appointed by the Senate to take part in all degree examinations.

(8) The Professors, Readers, Lecturers, and other Teachers of the University to be grouped into Faculties, which shall have such consultative and administrative powers as shall be determined by the Senate.

[1] This side of the University work would probably include teaching of the following kinds :—

(*a*) Teaching, conducted in the University Buildings, supplementary to that of the Professors.

(*b*) Courses of instruction of a special or advanced character recognized by the University, *e.g.* of the type given by the German *Privat-Docenten*.

(*c*) Teaching of a more or less academic character conducted by lecturers appointed by the University at Institutions and Colleges, the objects or the standing of which render complete absorption into the University undesirable.

(*d*) Lectures at various local centres of the type known as "University Extension" lectures.

(*e*) Courses of lectures or occasional lectures by members of the University staff, or by other persons recognized by the University, for which a convenient centre might, with the co-operation of the Corporation of London and of the Mercers' Company, be found at Gresham College.

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(9) The Body of Graduates in Convocation assembled to have the power of appealing to the Privy Council, but to have no veto upon the action of the Senate. The Chairman of Convocation to be *ex officio* a member of the Senate.

The Medical Schools will probably require special treatment. Though they might advantageously hand over the teaching of pure science to the University, each school might retain control over its own teaching of medicine and surgery and over the funds devoted thereto.

(10) The Medical Faculty to consist of representatives elected by the Teachers in recognized London Medical Schools.

(11) The recognized Medical Schools to be determined in the first instance by the Commission referred to in Clause (14), but afterwards from time to time by the Senate, subject to appeal to the Privy Council.

(12) A certain number of the members of the Medical Faculty to be nominated University Professors in accordance with the provisions of Clause (4). The number of Medical Professors on the Senate not to exceed one-fourth of the total number of University Professors on the Senate.

(13) A teacher of pure science in a recognized Medical School to become a Member of the Faculty of Science, whenever the appointment to his post is entrusted permanently or *pro hac vice* to the Senate of the University.

(14) To facilitate in the first instance the organization of the University, it is suggested that a small and independent Commission of legal and educational authorities be appointed by Act of Parliament with full powers—

(*a*) To investigate and determine upon the claims of institutions wishing to be absorbed under Clause 5.

(*b*) To arrange for the proper disposal of the trust-funds of those institutions which may be absorbed, and to determine the conditions under which their property shall be vested in the Governing Body of the University.

(*c*) To arbitrate on all matters concerning the interests of existing teachers as affected by the action of Clause (5), and

(*d*) Generally to make such arrangements as may be necessary for the establishment of the University on the foregoing lines.

We are requested to add that the names of those desirous of supporting the Association will be received by any member of the Executive Committee,[1] or may be sent directly to the Secretary (Prof. Karl Pearson, Christchurch Cottage, Hampstead, N.W.). The Association already numbers some seventy members, including Profs. H. E. Armstrong, F.R.S., W. E. Ayrton, F.R.S., F. O. Bower, F.R.S., O. Henrici, F.R.S., E. Frankland, F.R.S., E. Ray Lankester, F.R.S., F. Max Müller, O. J. Lodge, F.R.S., Norman Lockyer, F.R.S., W. J. Russell, F.R.S., W. A. Tilden, F.R.S., H. Marshall Ward, F.R.S., Principals H. R. Reichel, W. M. Hicks, F.R.S., and C. Lloyd Morgan, besides many other names equally well known in literature, science, and art. A complete list will shortly be issued.

[1] This Committee at present consists of the following:—F. V. Dickins, G. Carey Foster, R. S. Heath, E. Ray Lankester, Karl Pearson, H. E. Roscoe, A. W. Rücker, T. E. Thorpe, W. C. Unwin, W. F. R. Weldon.

SUBDIVISIONS IN ARCHÆAN HISTORY.[2]

1. *Subdivisions based on Kinds of Rocks.*

WERNER'S idea that kinds of rocks and grade of crystallization afford a basis for the chronological subdivision of crystalline rocks is more or less apparent in nearly all attempts that have since been made to lay down the general subdivisions of Archæan terranes. The "fundamental gneiss" has gone to the bottom and the thinner schists to the top. There is a degree of truth in the idea. But the assumptions are so great that at the present time little reason exists for the earnestness sometimes shown by advocates of such systems. The idea has little to sustain it in the known facts of geology. The following are sufficient to decide the question.

According to the thorough petrological and geological study of the rocks of the Bernardston region by Prof. B. K. Emerson [1]—a region in the Connecticut valley, in the towns chiefly of Bernardston, Massachusetts, and Vernon, Vermont—there are the following rocks: granite, largely feldspathic; dioryte, so like intrusive dioryte that it had been pronounced trap; quartz-dioryte; granitoid gneiss faintly foliated with biotite and passing into the granite; hornblende schist; quartzyte; quartzyte prophyritic with feldspar crystals; staurolitic and garnetiferous mica schist; hydromica schist; argillyte; massive magnetite, making a bed of magnetite rock; along with coarsely crystalline limestone and quartzytic limestone containing Crinoids, Corals, and Brachiopods: all together making one series of rocks of later Devonian age. My own observations in the region confirm the conclusions of Prof. Emerson. Such facts prove, moreover, that "massive" as applied to crystalline rocks does not signify *igneous*. The granite is not eruptive granite, but part of a stratum which is elsewhere quartzyte, the quartzyte graduating into granite; the latter was never in fusion.

Again: on the borders of New England and New York there are schists of all gradations from massive Cambrian gneiss to Cambrian and Hudson River hydromica schist and argillyte, the age fixed by fossils. Becker reports similar facts from the Cretaceous of California. Such observations, and others on record, make it hazardous to pronounce any gneiss in an Archæan area "fundamental gneiss," or any associated slaty schist the younger of the two. It may be true; but it may not be. It is probable that the thin-bedded schists are absent from the older Archæan, but not that the thick-bedded and massive are absent from the later Archæan.

The little chronological value of kinds of crystalline rocks in the later Archæan comes out to view still more strongly if we consider with some detail the length and conditions of Archæan time.

The earth must have counted many millions of years from the first existence of a solid exterior, when the temperature was above 2500° F., to the time, when, at a temperature below 1000° F.—probably near 500° F., supposing the atmospheric pressure to have then been that of 50 atmospheres—the condensation of the waters of the dense aërial envelope had made such progress that an ocean, moving in tides and currents, had taken its place on the surface.[2] There were other millions afterward along the decline in temperature to the 180° F. mark—180° F. the mean temperature of the ocean—when, according to observations on living species, the existence of plants in the waters became, as regards temperature, a possibility;[3] and still other millions from the 180° F. mark to that of 120° F., or nearly, when marine animal life may possibly have begun its existence. And since cooling went on at a decreasing rate toward the end, time was also long from the 120° F. mark to that of a mean oceanic temperature of 90° F., or below it, when Paleozoic life found congenial conditions in the water. The mean temperature now is about 60° F.

[1] A description of the "Bernardston Series" of Metamorphic Upper Devonian Rocks, by Ben K. Emerson, *American Journal of Science*, III., xl., 263, 1890.

[2] R. Mallet estimated, in view of the density of the atmosphere—over 200 atmospheres to the square inch—that the first drops of water may have been condensed on the earth's surface when the temperature was that of molten iron.—*Phil. Mag.*, January 1880.

[3] They live now in waters having a temperature of 200° F., Brewer, at Pluton Creek, California; 185°, W. H. Weed, Yellowstone Park. Moreover germs of Bacilli have germinated after having been boiled for an hour.

[2] Reprinted from the June number of the *American Journal of Science*, rom advance sheets forwarded by the author. The paper is to be continued in the *American Journal of Science*.

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