less, and, there being no moon, the stars shone brightly. The atmosphere was beautifully clear, and the night was one of great quietude. At the above-named hour I went on deck, and at once observed a streak of white matter on the horizon bearing south-south-west. I then went on the bridge and drew the third officer's attention to it. In a few minutes it had assumed the shape of a segment of a circle measuring about 45° in length and several degrees in altitude about its centre. At this time it shone with a peculiar but beautiful milky whiteness, and resembled (only in a huge mass, and greater luminous intensity) the nebulæ sometimes seen in the heavens. We were steaming to the southward, and as the bank of light extended, one of its arms crossed our path. The whole thing appeared so foreign to anything I had ever seen, and so wonderful, that I stopped the ship just on its outskirts, so that I might try to form a true and just conception of what it really was. By this time all the officers and engineers had assembled on deck to witness the scene, and were all equally astonished and interested. Some little time before the first body of light reached the ship I was enabled, with my night glasses, to resolve in a measure what appeared, to the unassisted eye, a huge mass of nebulous matter. I distinctly saw spaces between what again appeared to be waves of light of great lustre. These came rolling on with ever-increasing rapidity till they reached the ship, and in a short time the ship was completely surrounded with one great body of undulating light, which soon extended to the horizon on all sides. On looking into the water it was seen to be studded with patches of faint, luminous, inanimate matter, measuring about two feet in diameter. Although these emitted a certain amount of light, it was most insignificant when compared with the great waves of light that were floating on the surface of the water, and which were at this time converging upon the ship. The waves stood many degrees above the water, like a highly luminous mist, and obscured by their intensity the distant horizon; and as wave succeeded wave in rapid succession, one of the most grand and brilliant, yet solemn, spectacles that one could ever think of was here witnessed. In speaking of waves of light I do not wish to convey the idea that they were mere ripplings, which are sometimes caused by fish passing through a phosphorescent sea, but waves of great length and breadth, or in other words, great bodies of light. If the sea could be converted into a huge mirror and thousands of powerful electric lights were made to throw their rays across it, it would convey no adequate idea of this strange yet grand phenomenon.

"As the waves of light converged upon the ship from all sides they appeared higher than her hull, and looked as if they were about to envelope her, and as they impinged upon her, her sides seemed to collapse and expand.

"Whilst this was going on the ship was perfectly at rest, and the water was like a millpond.

"After about half an hour had elapsed the brilliancy of the light somewhat abated, and there was a great paucity of the faint lustrous patches which I have before referred to, but still the body of light was great, and, if emanating from these patches, was out of all proportion to their number.

"This light I do not think could have been produced without the agency of electro-magnetic currents exercising their exciting influence upon some organic animal or vegetable substance; and one thing I wish to point out is, that whilst the ship was stopped and the light yet some distance away, nothing was discernible in the water, but so soon as the light reached the ship a number of luminous patches presented themselves, and as these were equally as motionless as the ship at the time, it is only natural to assume that they existed, and were actually in our vicinity before the light reached us, only they were not made visible till they became the transmitting media for the electro-magnetic currents. This hypothesis is borne out by the fact that each wave of light in its passage was distinctly seen to pass over them in succession, and as the light gradually became less brilliant, they also became less distinct, and had actually disappeared so soon as the waves of light ceased to exist."

THE NEW HYDROGEN LINES OBSERVED BY PHOTOGRAPHY, THE STAR LINES, AND THE DISSOCIATION OF CALCIUM[1]

IN the month of July, 1879, I published in the Reports of the Royal Berlin Academy of Sciences, some photographs of the spectra of Geissler tubes, filled with rarefied hydrogen. In these photographs are visible, besides the old well-known hydrogen lines, H, α, β, γ, δ, a great many other lines in the violet and ultra-violet at the extreme end, very thin and faint, but of a character very similar to the old well-known hydrogen lines. One of the most intense of these new lines coincided almost exactly with the H line (Fraunhofer) of the sun-spectrum.

I inclined to the idea that these new lines, whose wave-length I published six months ago, were real hydrogen lines, but an objection was made to the effect that the hydrogen employed would not have been quite pure. I will mention here that I got exactly the same lines with hydrogen of different sources.

I have recently repeated my experiments, and filled Geissler tubes with the purest hydrogen, developed by electrolytical decomposition. The photographs of the spectra of these tubes show nearly all the same lines as I have published, and I venture now to declare these new lines to be *real hydrogen* lines, so that this body, besides its four chief lines in the visible spectrum, has certainly five chief lines at least in the ultra-violet part.[1]

The wave-lengths of these new lines, which I have published in the Reports of the Berlin Academy, 1879, p. 590, are as follows:—

3968 bright lines coincident with H (Fraunhofer)
3887 ,,
3834 fainter lines
3795 ,,

The fifth line was not very distinct; its wave length, which I have not published till now, is nearly 3770.

I have received NATURE, which contains an abstract of Huggins's highly interesting paper read before the Royal Society on the photographs of the spectra of stars. Huggins gives a list of the wave-lengths of the dark lines he obtained in the ultra-violet part of the spectra of white stars, and I was much astonished to find that they corresponded almost exactly with my hydrogen lines above mentioned. I put here Huggins's and my own numbers together:—

Huggins's star lines in the ultra-violet wave-length.	My hydrogen lines in the ultra-violet wave-length
3968	3968
3887·5	3887
3834	3834
3795	3795
3767·5	3770

This conformity is so surprising that I venture the conclusion that the *chief lines of the spectra of white stars are hydrogen lines.*

Lockyer, whose admirable investigations I highly esteem, but with whose conclusions I cannot agree, regards the line 3968 (coincident with the calcium line H, Fraunhofer) in the star spectra as a calcium line, and deduces a dissociation of calcium from the fact that the second calcium line K is not visible in the star spectra. My opinion is that the line 3968 in the white star spectra is *not* a calcium, but a *hydrogen line*, and I base this theory on the fact that the well-known hydrogen lines in these spectra are much more intense and thicker than in the sun spectrum. I may point out that this line is not exactly, but very nearly, coincident with H (Fraunhofer); the first is a little less refrangible.

Lockyer supposes that calcium is also dissociated in the sun's atmosphere. He mentions the observation of Prof. Young, who observed the H seventy-five times and the K line only fifty times in the atmosphere of the sun. My opinion is that the so-called inversed H line, if visible without K in the chromosphere, is not the calcium line, but the fifth hydrogen line.

By Dr. H. W. Vogel, from the *Photographic News* of February 20.

[1] I have only five in my photographs, because I worked with glass prism and lenses, which absorb a good deal of the ultra-violet rays.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—In the event—which seems most probable—of the report of the Board of Natural Science Studies being adopted by the Senate, the Natural Sciences Tripos will, in and after 1881, be divided into two parts, each of which will include a practical examination, and will extend over five days. The names of those who have passed the first five days will be alphabetically arranged in three classes, although this part of the examination will be considered to test only the general proficiency of candidates in several branches of science. The subjects will be grouped thus: (1) Chemistry, (2) Physics, (3) Mineralogy, (4)

Geology, (5) Botany, (6) Zoology and Comparative Anatomy, (7) Physiology, (8) Human Anatomy and Physiology.

THE Cambridge Botanic Gardens Syndicate have procured plans for a Curator's House and Syndicate Office, to be placed adjoining and overlooking the entrance from Panton Street to the Gardens. Mr. W. M. Fawcett, the architect, estimates its cost at 620*l.*

A REAL compulsory matriculation examination at entrance is absolutely needed, otherwise those who are endeavouring vigorously to bring about improvements will find their life worn out in elementary teaching and examination. If Senior Wranglers can be spared to examine thousands of arithmetic papers and to lecture upon arithmetic in Cambridge year after year, it can be only because they too tamely continue to do it, finding that the Philistine spirit of modern days provides no better pay for them if they preferred higher work. Either this lecturing is superfluous, or their pupils have never been to a good school till eighteen. Why should any student be entered on the books of a university if he does not know at the least the elementary principles of number and of grammar?

A MEMORIAL is being signed in various parts of the country to the Vice-Chancellor of the University of Cambridge, praying that the Senate will grant to properly qualified women the right of admission to the examinations for University Degrees, and to the Degrees conferred according to the results of such examinations.

OXFORD.—The examiners in the Burdett-Coutts Geological Scholarship have elected Mr. H. N. Ridley, B.A., of Exeter College, to the vacant scholarship.

THE following science scholarships have been awarded, after examination in Chemistry, Physics, and Biology:—Mr. T. H. Walker and Mr. J. H. Makinder, from Epsom College, to Natural Science Studentships at Christ Church; *Proxime*, Mr. G. C. Chambres, from Dulwich College; Mr. Alfred Shacketon, from Bradford Grammar School, to a Natural Science Exhibition at New College.

DR. GLADSTONE, finding that several teachers were unable to obtain admission to the lecture delivered by him in the Board Room of the London School Board in October last, on the Apparatus for Illustrating Object Lessons, has consented to repeat the lecture at the following schools on the dates named:—Westmoreland Road, Walworth, S.E. (near Walworth Road Station), on Tuesday, March 2; Saffron Hill, Cross Street, Farringdon Road, E.C. (near Farringdon Street Station), on Tuesday, March 9. Each lecture will commence at 7.30 o'clock. The apparatus recommended and described by Dr. Gladstone are all of the cheapest and commonest kind, such as a clasp-knife, frame-saw, two tin basins, tobacco-pipe, magnifying glass, &c. Such lectures are well adapted to encourage the teaching of science in schools.

THE report drawn up by M. Paul Bert, acting as referee of the Parliamentary Committee of the French Chamber of Deputies on Primary Instruction, has been published as a separate volume, and is selling largely.

THE new law on the organisation of the Superior Council of Education in France has rendered this body a representative one. Not only the several academies, but also the several faculties have been invested with the right of appointing delegates. The Faculties of Sciences have resolved to send delegates to Paris, in order to hear the *profession de foi* of several candidates, and to interrogate them on their opinion on the different topics ventilated by teaching bodies. This example will be shortly followed by other faculties. M. Gerard, Professor of Philosophy to the Faculties of Nancy, having sent a circular summoning the Faculties des Lettres to send a delegate to Paris, their appointed meeting is to take place at Easter, during the usual holidays.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, February 5.—Wm. Carruthers, F.R.S., vice-president, in the chair.—Mr. Chas. Stewart exhibited and explained a stained micro-scopic section of the ovary of *Hyacinthus orientalis*, showing the intercellular network in the cells of the ovules. The nuclei before dividing increase in size, and there is a well-defined highly refractile fibrous network which becomes aggregated at opposite sides of the nucleus, forming two star-shaped masses connected by fine fibres; the latter rupture when the stellate masses, becoming rounded, form the nuclei of the two new cells.—Dr. Francis Day presented for inspection examples of Salmonidæ, some of which had been reared under natural and others under unnatural conditions. A *Salmo fontinalis* which had passed its existence in the Westminster Aquarium, had the head preternaturally elongated and a very narrow suboperculum, thus in striking contrast to examples reared from the same batch of imported eggs, and kept in a wild state in Cardiganshire.—Mr. R. Irwin Lynch brought under notice pods of *Acacia homalophylla*, wherein each end was attached by a very long and bright red funicle, which doubly folded on the sides of the seed. The funicle is supposed to be always detached with the seed, and from its brilliant colour to serve as an attraction to birds, and so assist in the dissemination of the plant.—Mr. A. Hammond drew attention to a larva of *Tanypus maculatus*. He mentioned that the coronet and appendages of the thoracic and anal regions had been said to be homologous with the respiratory organs of the larva and pupa of gnats, &c. This he doubted, inasmuch as the former originated from the ventral and not from the dorsal surface, as did the latter, and no trachea of any size could be traced in them. He also stated his opinion that the two oval bodies in the thorax attributed by De Geer to the air reservoirs were more probably salivary glands similar to those previously described by himself in the larva of the crane fly.—Mr. C. B. Clarke then gave an oral *résumé* of the order Commelynaceæ, which order he had lately worked out for De Candolle's "Prodromus." He defined the order by the position of the embryo, as not surrounded by the albumen, but closely applied to the embryostega, which is always remote from the hilum. An important auxiliary character is that the three segments of the calyx are always imbricated, so that one is entirely outside the two others. Mr. Clarke divides the Commelynaceæ into three tribes, as follows:—1. *Polliceæ*, fruit indehiscent; (2) *Commelynæ*, capsule loculicidal, fertile stamens 3-2; (3) *Tradescantieæ*, capsule loculicidal, fertile stamens 6-5. The author remarked on the character of the two ranked seeds on which the genus *Dichospermum* had been founded, but which character is exhibited in species of various genera. He also alluded to the manifest and important change of colour in the petals of several of the Commelynaceæ (*Aneilema versicolor*, to wit), where from a bright yellow when fresh, they become of a deep blue when dry.—The Secretary afterwards read a paper on the Salmonidæ and other fish introduced into New Zealand waters, by H. M. Brewer, of the Wanganui Acclim. Soc., N.Z. The author herein gave data concerning the British salmon (*S. salar*), Californian salmon (*S. quinnat*), trout (*S. fario*), sea trout (*S. trutta*), American charr (*S. fontinalis*), perch (*Perca fluviatilis*), tench (*Tinca vulgaris*), Prussian carp (*Carassius vulgaris*), cat fish (*Pimelodes catus*), white fish (*Coregonus albus*), and lastly a New Zealand fish called by the natives Upukororo.

Physical Society, February 14.—Annual General Meeting, Prof. W. G. Adams, president, in the chair.—The President read the report for the past year, which showed that the position and prospects of the Society are in every way satisfactory, and that more papers were communicated during last year than on any previous year.—The following list of Council and Officers was elected for the ensuing year, and votes of thanks were given to the President, the Lords of the Committee of Council on Education, and to the Treasurer, Demonstrator, and Secretaries. President: Sir W. Thomson, LL.D., F.R.S. Vice-President (who has filled the office of President): Prof. W. G. Adams, M.A., F.R.S. Vice-Presidents: Prof. R. B. Clifton, Dr. Huggins, Lord Rayleigh, Dr. Spottiswoode. Secretaries: Prof. Reinold, and W. Chandler Roberts, F.R.S. Treasurer: Dr. Atkinson. Demonstrator: Prof. Guthrie; and Members of Council: Captain Abney, Walter Bailey, M.A., J. H. Cotterill, F.R.S., Dr. Warren de la Rue, Major Festing, R.E., Prof. G. C. Foster, Prof. Fuller, Dr. J. Hopkinson, Dr. Shuster, G. Johnstone Stoney, F.R.S. Honorary Member: J. E. R. Clausius. —After this business the meeting resolved itself into an ordinary one, and the following New Members were elected:—Senor Roig y Torres, of Barcelona, Mr. Mollison, Mr. Hare, Mr. J. C. Lewis, Miss Caroline Martineau.—A paper on a quartz and Iceland spar spectroscope, corrected for chromatic aberration was then read by Dr. W. H. Stone; the spectroscope consists of two Iceland spar prisms and a quartz train. It differs in no respect from those ordinarily made, except in the fact that the object glasses of the telescope and collimator are doublets with a positive lens of quartz and a negative of Iceland spar. The latter has a dispersive power so far greater than that of quartz that an approximation to achromatism may be easily obtained.