

Mr. Woodworth, "and at corresponding seasons is known for other islands of the Pacific, though the worms have not everywhere been identified. Powell speaks of them in the Gilbert Islands, where they are known to the natives as *te nmatamata*, and Codrington gives a detailed account for Mota in the Banks Islands, where they are known as *un*. Brown mentions the annual occurrence of a palolo on the east coast of New Zealand, and the *wawo* of Rumphius, which occurs at Amboyna, in the Moluccas, is doubtless the same. Seeman mentions the occurrence of the worm in the New Hebrides, and it is known in Fiji and Tonga. It is reasonable to suppose that a systematic search would show the palolo, or some allied form, to have a wider distribution in the coral-reefs of the Pacific than has been as yet recorded. That the annelid is best known from Samoa and Fiji is accounted for by these groups of islands having been most visited and longest inhabited by whites."

We reproduce Mr. Woodworth's figure of the complete worm.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Glasgow University Court has appointed Mr. Frederick Soddy to be lecturer on physical chemistry for five years from October 1 next.

DR. K. ZINDLER and Dr. J. A. Gmeiner have been appointed ordinary professors of mathematics in the Universities of Innsbruck and Prague respectively.

THE authorities of Yale University announce that, in succeeding Prof. J. J. Thomson as Silliman lecturer, Prof. C. S. Sherrington, F.R.S., will treat of "The Cardinal Features of the Integrative Action of the Nervous System" in a course of ten lectures commencing Friday, April 22.

THE preamble of the Victoria University of Manchester Bill has been found proved by Lord Balfour, acting chairman of committees of the House of Lords, and the Bill will be reported to the House for third reading. The Bill is promoted to give effect, so far as Manchester is concerned, to the decision of the Privy Council dissolving the Victoria University as originally constituted of the Owens College, Manchester, University College, Liverpool, and the Yorkshire College, Leeds, and to the grant of charters for the creation of separate universities in each of the three centres. Under the provisions of the present Bill Owens College is incorporated with the Victoria University of Manchester, and the property and liabilities of the college are transferred to the university.

THE Johannesburg correspondent of the *Times* reports that the Transvaal Technical Institute was formally opened on Tuesday in the presence of the Governor and the Lieutenant-Governor of the colony. The institute is intended to be the nucleus of the future university which, in the opinion of the commission appointed by the Government to gauge the needs of the community in the matter of technical education, will ultimately be found necessary for the Transvaal. The institute as now inaugurated has absorbed the Kimberley School of Mines, which for eight years has covered the third and fourth years' courses prescribed by the Cape University for obtaining a degree in this subject. In view of the exceptional opportunities afforded at Johannesburg for mining engineering, arrangements are on foot to enable students of the Royal College of Science and other home institutions to proceed to the Transvaal for a year's post-graduate study.

In the House of Commons on Monday Sir J. Gorst invited a statement from the secretary to the Board of Education with regard to the physical condition of the children in the elementary schools. In the course of his reply, Sir W. Anson said that the committee of inquiry on physical deterioration began to sit last winter, and they found that the British Association had appointed a committee, of which Prof. Cunningham was chairman, to inquire into the same subject. The committee put itself in communication with the committee of the British Association, which met them in a most cordial spirit. Prof. Cunningham gave evidence, and the scheme already outlined by the British Association

committee was sent to the College of Physicians and the College of Surgeons. The College of Surgeons sent back word that they cordially approved of the proposed scheme, that there should be a regular survey of the population of the United Kingdom—of the agricultural and working population and of the children in the schools, and that means should be taken to ascertain their physical condition at the school age. It was hoped that by proper management it might be possible to cover the whole of the United Kingdom in ten years, so that there might be a complete survey of the United Kingdom in the course of every ten years.

LAST week we directed attention to the fact that the Goldsmiths' Company had decided to give up the Goldsmiths' Institute at New Cross at Michaelmas next. The company has now offered to hand over the whole site of the institute (about seven acres), together with its buildings, equipment, and apparatus complete, to the University of London for the purpose of promoting university work in South London. The Senate of the University has resolved, subject to the satisfactory settlement of administrative details, to accept the company's offer. It is estimated that after making due allowance for depreciation, the value of the site, buildings, and equipment cannot be less than 100,000*l.* Some three acres of the site are covered by buildings, leaving four acres uncovered which have been available for recreative purposes. The annual endowment provided by the Goldsmiths' Company, originally fixed at 5000*l.* a year, has grown to about twice that sum. Following so soon upon Sir Donald Currie's splendid gift, of which particulars were given in the last issue of *Nature*, there would really seem to be a new era opening for the University of London. It must not, however, be lost sight of that handsome as these two bequests are, they are alone quite inadequate to the great needs of a university equipped and staffed in a manner becoming to the University of London, the metropolis of the empire. It is greatly to be desired that the large minded generosity of Sir Donald Currie and of the Goldsmiths' Company will be immediately emulated by other wealthy individuals and corporations.

A BILL to amend the laws relating to education in Scotland, and for other purposes connected therewith, was introduced in the House of Commons on Monday by Mr. Graham Murray, and passed the first reading. The existing system in Scotland encourages the tendency of educational institutions to overlap, and leads to some waste of resources. In the field of primary education the School Boards have done excellent work, but for secondary and technical education the School Board area is too small. The area which has now been selected for educational purposes is the district area; but the great burghs, Edinburgh, Glasgow, Dundee, and Aberdeen, are to be dealt with exceptionally. There is to be a School Board elected for every district in a county. The number of members which each Board is to have will be fixed by the Scottish Education Department. The boards are to be public authorities for all branches of education, and they are to be elected on the county council franchise and the burgh franchise. In order to foster local interest in education every school is to have local managers, who, however, are not to be allowed to appoint or dismiss teachers or to borrow money. To private venture schools the boards are to be at liberty to give aid out of the rates, if they desire to do so; they are to be absolutely free agents in the matter. With regard to the financial proposals of the Bill, the various Imperial contributions are to be pooled; all the grants will go into one education fund. In order to remove some of the objections to the retention of the Scottish Department in London it is proposed that there shall be constituted by Order in Council four provincial councils which will meet in Edinburgh, Glasgow, Aberdeen, and Inverness. It will be the duty of these councils to deal with any matters referred to them by the department.

THE Military Education Division of the War Office has issued rules which will for the future regulate the appointment to commissions in the army. The rules will not apply to candidates for admission to the Royal Military Academy and Royal Military College until after the competitive examination of June, 1905. In order to show that they have attained a fair standard of general education, all

candidates for appointment to commissions will be required to obtain either a "leaving" certificate or a "qualifying" certificate. A "leaving" certificate is one including the same subjects as a qualifying certificate, and granted by a recognised body to candidates not less than seventeen years of age who have attended three years' continuous teaching, with satisfactory conduct, in a properly inspected school. A "qualifying" certificate is one covering two classes of subjects. All candidates must qualify in the subjects of class i., viz. English, English history and geography, and elementary mathematics. Candidates must qualify in two of the subjects of class ii., viz. science, French or German, Latin or Greek. The expression "science," the rules state, means so far as a leaving certificate is concerned, "such combination of experimental or natural science as the Army Council may approve, provided always that the sciences recognised shall have been taught in a sufficiently extended course, including a due amount of laboratory or field work." Any leaving certificate accepted must certify that the candidate has taken a sufficient course of elementary geometrical drawing and practical geometry, and also an elementary course of practical measurements. Leaving certificates will be accepted from the Oxford and Cambridge University examining bodies, the University of London, the Scottish Education Department, and such universities in Great Britain as undertake to issue a certificate satisfying the required conditions. The same bodies will hold examinations periodically at which candidates who desire to obtain qualifying certificates may present themselves.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 3.—"The Spectra of Antarian Stars in Relation to the Fluted Spectrum of Titanium." By A. Fowler, A.R.C.S., F.R.A.S.

The distinguishing feature of the spectra of the Antarian stars (Secchi's third type) is the system of apparently dark flutings, sharp towards the violet and fading off towards the red end of the spectrum. The principal flutings are well seen in Antares, but they are more strongly developed in the spectra of  $\alpha$  Herculis and  $\alpha$  Ceti, in which stars additional details are also seen. These flutings have not hitherto received a definite chemical interpretation, and it has been uncertain, owing to the possibly misleading effects of contrast, whether the spectrum was to be regarded as one consisting wholly of absorption flutings fading towards the red, or as one partly consisting of emission flutings fading in the opposite direction.

The purpose of the present communication is to state the nature of the evidence which indicates that the spectrum is essentially an absorption spectrum, and that the chief substance concerned in the production of the flutings is titanium, or possibly a compound of that element with oxygen.

The flutings in question come out in the arc spectrum of titanium oxide, if the precaution be taken to provide a liberal supply of material and to use a very long arc, taking care also that the image of the "flame" is projected on the slit of the spectrocope. They are also seen in the arc spectrum of the chloride under similar conditions. Numerous lines accompany the flutings produced in this manner, and some of the details are consequently masked or not recognised without careful study of the photographs. So far the flutings have not been very successfully produced in the oxyhydrogen flame; they are visible in the flame spectrum of the fumes from the chloride, but their observation is difficult on account of the bright continuous spectrum. The best representation of the flutings has been obtained by passing a spark, without jar, through the fumes of oxychloride which rise from the chloride of titanium on exposure to air. In these circumstances the lines which appear are not numerous, and some of the secondary flutings which are masked by lines in the spectrum of the flame of the arc are readily detected, in spite of the continuous spectrum which is also present.

The wave-lengths of the heads of the principal flutings are 6162.5, 5604.5, 5447.0, 5241.0, 5167.5, 4955.1, 4761.6 and 4584.3, and it is found that these agree within the

possible limits of error with eight of the ten principal bands recorded in the stars by Vogel and Dunér.

The origin of the two outstanding bands at 5862 and 6493 has not yet been ascertained, but in the case of the remaining flutings the evidence for titanium is enormously strengthened by a discussion of their structure and by extending the comparison further into the violet. Photographs of the stellar spectra, especially those of  $\alpha$  Ceti and  $\alpha$  Herculis, show that some of the principal flutings are composite, Dunér's band 10, for example, containing, according to Sidgreaves, four distinct flutings separated by intervals of about 44 tenth-metres, each of which is weaker than the one which precedes it on the more refrangible side. A precisely similar structure is found in the case of the titanium flutings, and a comparison of wave-lengths indicates that the various components occupy the same positions as those in the stars, so far as the available measurements permit the test to be applied.

The table of wave-lengths given in the paper shows that the details of the titanium flutings are reproduced with remarkable fidelity in the stellar spectra, and more especially in  $\alpha$  Ceti. There is some uncertainty in connection with the complicated groups of flutings and lines extending from 5598 to D, which need further investigation in the stellar spectra with instruments of greater dispersion, but the general agreement is such as to leave no reasonable doubt that titanium is the main factor in the production of the dark flutings which characterise the Antarian group of stars.

This explanation of the dark flutings suggests that the appearance of bright flutings in the Antarian spectrum arises chiefly from effects of contrast. It does not, of course, exclude the possibility of the presence of bright flutings, such as might be indicated by local brightenings which are not exactly in coincidence with the edges of dark flutings.

"An Inquiry into the Nature of the Relationship between Sun-spot Frequency and Terrestrial Magnetism." By C. Chree, Sc.D., LL.D., F.R.S.

(1) The formula

$$R = a + bS \dots\dots\dots (1),$$

where R is some magnetic quantity such as the amplitude of the diurnal oscillation of the needle, a and b constants, and S sun-spot frequency (after Wolf and Wolfer), was first applied by Wolf to the mean declination range throughout the year.

The present paper is entirely devoted to the connection between sun-spot frequency and terrestrial magnetism. It deals with data from Milan (1836-1901), Greenwich (1841-96), Pawlowsk and Katharinenburg (1890-1900), Batavia (1887-98), and Mauritius (1875-90). It aims at ascertaining wherein the results in my previous paper (*Phil. Trans.*, A, vol. ccii. p. 335) are peculiar to the station or period dealt with.

It investigates what differences may exist between the sun-spot connection on ordinary days and on magnetically quiet days, and what differences arise when one applies (1) to the mean of the differences between the absolutely highest and lowest daily readings, instead of to the range of the mean diurnal inequality. It also considers various measures of the magnetically disturbed character of the year, and their relation to sun-spot frequency.

There seems a general tendency for  $b/a$  to increase as we pass from a quantity, such as the range of a diurnal inequality, which is comparatively independent of disturbances, to a quantity such as the mean absolute daily range which is largely dependent on disturbances. Formula (1) becomes, however, less and less strictly applicable, the more disturbed the magnetic quantity to which it is applied. When we consider quantities such as the mean of the twelve monthly ranges (maximum and minimum for the month), or the annual range (maximum and minimum for the year), we find large differences between observed values and those calculated from (1).

In the case of ranges from mean diurnal inequalities for the year, the agreement between observed and calculated values is about equally good at Pawlowsk, Katharinenburg, Batavia, and Kew. In the case of declination, the mean difference between observed and calculated values is about