

it is not now considered necessary to observe many stars fainter than magnitude 8 on the meridian; the positions of fainter stars are obtainable by photography with lenses of wide angle.

Observations with the Cookson floating zenith telescope now cover a period of nineteen years, which is the period of the great lunar nutation term. Dr. J. Jackson is discussing the observations, to deduce a new value for the coefficient of this term; it appears that the adopted value $9.210''$ will not be altered by more than $0.002''$. The Gerrish drive, installed last year on the 28-inch equatorial, has worked very well. 300 binaries were observed during the year, of which 56 were separated by less than $\frac{1}{2}''$.

The determination of stellar parallaxes by photography with the Thompson equatorial has proceeded at an accelerated pace, 1508 parallax plates having been taken, and 651 plates measured.

The determination of the 'colour-temperatures' of stars has been continued with the 30-inch reflector. The observation of 24 stars selected as standards has been completed; these are now available as a base to which other stars can be referred. The absolute temperatures of the standards are now being found by comparison with an arc lamp, which in turn will be compared with a gas-filled lamp already calibrated at Utrecht.

The astrographic equatorial, which had been sent to Siam for the solar eclipse, was remounted in July. Some renewals in the bearings and accessories were satisfactorily carried out by Messrs. Grubb, Parsons and Co. The Greenwich astrographic zone, decl. 64° to 90° , is being re-photographed for the determination of proper motions by comparison with the earlier plates; the motions of 14,500 stars between 64° and 72° have now been published.

The sun was photographed on 270 days at Greenwich; plates taken at the Cape and Kodaikanal will render the record complete. The spot activity is definitely on the wane; there were, however, large spots in November and December. A spectrohelioscope has been lent to the Observatory by the Mount Wilson Observatory; it has been mounted in the south attic of the new building. A survey of the

sun's disc in H_α light is made daily, when weather permits. Special attention is paid to the radial velocities of dark markings near sunspots.

Spot numbers for the whole disc, and for the central zone, are supplied regularly to Zurich for incorporation in the bulletin that is issued there under the auspices of the I.A.U.

The mean temperature of the year was 51.0° , which is 1.5° above the 75-year average; the extreme values were 90.5° on Aug. 31, and 25.4° on Mar. 20; both dates are unusually late for the extreme readings. The rainfall was 25.43 inches, which is 1.19 in. above the average. The winter was a stormy one, and the mean daily air movement, 289 miles, is 5 miles above the average. The highest daily value was 847 miles on Dec. 7; the highest hourly value 62 miles on Jan. 12, which also had the greatest pressure, 38 lb. per sq. ft.

The following are the mean values of the magnetic elements for 1929, obtained at Abinger; Decl. $12^\circ 35.8' W.$; Hor. Force 0.18555; Vert. Force 0.42918; Dip $66^\circ 37.2'$. It is noted in the report that a more precise instrument for determining the vertical force and dip was lent by the National Physical Laboratory; it revealed a small systematic error in the values given by the dip inductor; the error was 0.00010 in Vert. Force, $0.3'$ in Dip.

The performance of the Shortt clocks continues to be satisfactory; in the sidereal clock No. 3 an invar bob was substituted for the type-metal one; the latter contained lead, and a certain amount of settling appears to have gone on, causing an increase of losing rate. This increase still goes on with the new bob, but at only half the former rate.

Rhythmic time signals from the Observatory are distributed by the wireless station at Rugby at 10 h. and 18 h. These, and the signals sent to the Post Office and the B.B.C., are controlled by the clock Shortt No. 16.

The following are the mean amounts by which the time signals from other stations are late on Greenwich: Paris 0.044 sec.; Nauen 0.006 sec.; Annapolis (near Washington) 0.007 sec.; Bordeaux 0.035 sec. These are after corrections for lag and time of travel have been applied.

A. C. D. CROMMELIN.

An Early Letter from Darwin to Owen.

THE letter printed below was bought at Sotheby's in March of this year for the Fitzwilliam Museum, Cambridge, by some friends of that institution. It was written rather more than two months after Darwin's return in the *Beagle*. The fossil vertebrates referred to in the letter were sent to the Royal College of Surgeons. Darwin wrote to Owen, who was five years his senior, as a young man addressing a more experienced and older colleague: later the two became friends and Owen visited Down in 1848. Twelve years later, in a letter to de Quatrefages, Darwin wrote: "I have been atrociously abused by my religious countrymen; but as I live an independent life in the country, it does not in the least hurt me in any way, except indeed when the abuse comes from an old friend like Professor Owen, who abuses me and then advances the doctrine that all birds are probably descended from one parent" ("More Letters of Charles Darwin", vol. 1, p. 202). Reference is made to Darwin's attitude towards Owen in a note printed at the head of a letter to Hugh Falconer (1863) on page 226 of vol. 2 of "More Letters".

Darwin settled at Cambridge on Dec. 10, 1836: he was at first a guest in the home of the Henslows, and later went into lodgings at a house in Fitzwilliam Street, on which a tablet has been fixed. The letter

was written as from Christ's College, though he was presumably not actually in residence there.

A. C. S.

Decemb 19th (1836)

My dear Sir,

I have just written and will send it the same time with this, a letter to Sir Ant: Carlisle. I have done exactly as you recommended me. I thought myself compelled to fix on the British Museum in preference to that of Paris because I was carried on board a King's Ship; and the public collection of the country certainly has claims on me. If the collection had been made entirely at my own expense, that is on board a Merchant vessel, then I should not have hesitated in making a different choice. I quite agree with you that the British Museum ought to make returns when it has the power. I suppose you could not venture to propose another set for Paris. Their value would be so much more in that collection than in the British Museum. I ought to make up my mind to give my own set to Paris; but I confess I should be grieved to lose my trophies. I should feel like a knight who had lost his armorial bearings. If the Council should not choose to go to the expense necessary for making all the casts; it was suggested to me here, that the

College might pay the price of forming the casts, and the public bodies purchase the models, but I think you will agree with me, that if this can be avoided, it will be better. With respect to great head of the Rodent, I certainly feel inclined to run the risk of taking a cast, because the models will be more generally useful, even in case the head itself should be injured or destroyed. But I am sure after the kind and effectual manner with which you have entered on this affair I cannot do better than follow your advice. I, at one time, began to think that the fossil bones would be as troublesome to me and as of little service as some other branches of my collection are likely to be. But now I look back to the trouble I took in procuring them with great satisfaction. I do assure you I feel very grateful to you for having given me such good assistance. I have scarcely begun to unpack my cases; in the course of a week I shall have every thing open, and I already know of one very large bone (of a Mastodon ??) which I will forward to the College. When separating the animals in spirits, I will put by any that I think will interest you. And it will be a great pleasure to me if I chance to possess anything which will be of use to you in your numberless investigations.

Believe me, my dear Sir,

Your very truly obliged
CHAS. DARWIN.

Christ Coll :
Cambridge.

To Richard Owen, Esq^r
Royal College of Surgeons,
Lincoln's Inn Fields.

Biochemical Studies of Spike Disease of Sandal.

MR. M. SREENIVASAYA and Mr. B. N. Sastri have continued their very detailed investigations into the spike disease of sandal (*Santalum album* L.), and their latest results are to be found in the *Journal of the Indian Institute of Science*, vol. 12A, Part 17, pp. 233 to 252 (1929). Leaf-juice from a sandal tree infected with the spike disease hydrolyses more soluble starch than does the corresponding healthy juice. This is due to a higher concentration of the enzyme and to the presence of activators such as phosphates and amino acids. The pH of spiked leaves is lower than that of healthy leaves, and approaches the optimum for diastatic activity. More potato starch is, however, liquefied by the healthy leaf extract than by the diseased extract for equal weights of sugar produced, thus suggesting a qualitative difference between the two diastase extracts. It should be remembered that Dr. L. C. Coleman found that there was lower diastatic activity in spiked leaves than in healthy leaves, and therefore the results here reported might be interpreted as showing that the diastase content of diseased tissue fluctuates within the same limits as does that of healthy tissue.

The chemical composition of leaf and stem tissue fluids has also been investigated. The spike-diseased leaf contains more nitrogen, maltose, and reducing sugars and less ash (particularly calcium) than the healthy leaf. The stem fluids of spike-diseased trees are richer in nitrogen, phosphorus, and calcium than those of healthy plants, and there is a steep gradient of calcium concentration between the stem and leaves.

The seasonal variations in composition of healthy and partially spiked leaves of the sandal tree have been studied by Mr. A. V. Varadaraja Iyengar (*Jour. Ind. Inst. Sci.*, vol. 12A, Part 20, pp. 295-305). Season

was found to affect the chemical composition of the leaves of both healthy and spiked plants in the same manner. The following relative differences were observable in all seasons—the diseased sap had less dissolved matter, less osmotic pressure, a greater electrical conductivity, more moisture, ash, and nitrogen contents, less calcium, and was more acid than healthy sap.

These detailed studies on sandal spike from the Indian Institute of Science have considerable significance, for it has recently been shown by Mr. M. J. Narasimhan (*Phytopathology*, 18, pp. 815-817; 1928) that inclusion bodies similar to those which characterise certain virus diseases are present in leaf tissues of spiked plants. This, along with the work of Dr. L. C. Coleman on transmission, suggests that the malady is caused by a virus. We have thus a mine of detailed information on the chemistry of a diseased host which we can use in the elucidation of the problem of the nature of a plant virus.

University and Educational Intelligence.

ABERYSTWYTH.—Dr. C. D. Forde, formerly of the Department of Geography, University College, London, has been appointed to succeed Prof. H. J. Fleure in the chair of geography and anthropology at the University College of Wales, Aberystwyth. Dr. Forde has just returned from the University of California, where he held a fellowship from the Commonwealth Fund, and received the degree of doctor of philosophy for his researches among the Hopi Pueblo Indians of North Arizona.

CAMBRIDGE.—The following have been appointed members of the Committee for the Natural Sciences Tripos for the year 1930-31: Prof. A. Hutchinson (chairman), Prof. T. M. Lowry, Mr. H. Thirkill, Dr. W. H. Mills, Mr. A. Wood, Mr. E. Cunningham, Mr. F. T. Brooks, Mr. T. C. Nicholas, Mr. J. T. Saunders, Dr. Dean, Sir Frederick Gowland Hopkins, Prof. J. Barcroft.

The General Board recommends that a University demonstratorship in pharmacology be established in the Faculty of Medicine.

Mr. Stanley Baldwin was installed as Chancellor of the University on June 5 and in the course of his address announced that the gift from the Rockefeller Foundation had been made available through the completion of the collection of a sum which was made a condition of the grant. The total sum required for the University Library and for research work was £1,179,000. The Rockefeller Foundation had promised £700,000 conditional on the balance being raised by the end of 1931. This balance has now been raised.

Honorary degrees were conferred by Mr. Baldwin after his installation on the following, among others: Prof. A. Einstein, of Berlin; Prof. Max Planck, of Berlin; Sir John Rose Bradford, president of the Royal College of Physicians; and Sir James Colquhoun Irvine, principal and vice-chancellor of the University of St. Andrews.

LIVERPOOL.—Among the honorary degrees conferred on June 5 were the following: Doctor of Laws, Mr. R. L. Mond, honorary secretary to the Davy-Faraday Research Laboratory of the Royal Institution; Doctor of Science, Prof. G. Barger, professor of chemistry in relation to medicine in the University of Edinburgh.

LONDON.—Applications are invited for the Graham Scholarship in Pathology, value £300 per annum, in the first instance for two years, founded under the