We cannot close these notes without saying a word in commendation of the excellence of most of the catalogues, especially those of Ceylon and the Cape of Good Hope.

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IPECACUANHA CULTIVATION IN INDIA

THE following note is from a letter which I have received from Mr. Gammie, who has charge of the cinchona plantations of the Bengal Government at Darjeeling. The facts are of considerable biological interest, as showing that amongst closely connected forms, which can scarcely be distinguished by palpable morphological differences, there may yet be unobvious constitutional distinctions which in the struggle for existence may determine the survival and ultimate dominance of some one form in particular.

The facts are also perhaps interesting in another way. To any one who will be at the pains to turn up vol. vii. of NATURE, p. 6, it will be amusing to see the sequel which the chance of circumstance has brought to one branch of a long-burnt-out controversy.

W. T. THISELTON DYER

Royal Gardens, Kew, December 13

"I don't think I ever told you the final results from our ipecacuanha-growing experiments, but do so now.

"Our original stock of plants came from Kew and Edinburgh—the great majority from Edinburgh. The few plants from Kew differed a good deal in appearance from the Edinburgh lot, which, again, differed greatly from each other. All the Kew plants were of one sort, which we named, from the start, the Kew variety. It was rougher in the leaf than the Edinburgh sorts, and not so strong-growing while under glass.

"After we had satisfied ourselves that we could make nothing of ipecacuanha, from a commercial point of view, we put all the plants out in the open, under shade, and let them take their chance. By this time we had all the sorts mixed up together; and as we had originally at least ten Edinburgh plants for each one of the Kew sort, and the Edinburgh lot had, besides, been much the stronger growers under glass, the Kew plants formed less than 5 per cent. of the whole. But very soon the Edinburgh sorts began to disappear, until, in the course of a year or two, there was not a single plant of one of the Edinburgh varieties alive, whilst almost every plant of the Kew variety lived. Of it, at the present moment, we have a good stock, and in one place, at 1400 feet elevation, under the shade of living trees, we have plants, which were put out many years ago, in the most perfect health, but unfortunately their growth has been so slow as to render the prospect of any profitable return from them almost hopeless. Still it strikes me that, in places geographically better situated for ipecacuanha-growing than Sikkim, this particular variety may succeed, although other sorts may have failed. Probably our ipecacuanha experiments may prove another instance of the folly of giving up the cultivation of new crops as hopeless until the most exhaustive experiments have been carried out. It may be that there are even hardier varieties of ipecacuanha than the 'Kew variety' to be found."

SUNSPOT OBSERVATIONS IN HUNGARY[1]

THE Observatory, of which the first volume of Publications is now before us, was founded by Cardinal Haynald in 1878 in connection with the archiepiscopal gymnasium at Kalocsa in Hungary. Preliminary geodetic operations, of special importance as supplying an independently determined point of reference for the Hungarian survey, with the examination and adaptation of instruments, cost much time and labour; so that only a fragmentary part of the energy of the establishment has hitherto been available for purely astronomical work. The Director, however, Dr. C. Braun, has wisely embraced the rule of concentration which governs most successful campaigns, and is hence enabled to present, in lieu of a multitude of scattered and perhaps useless observations, the connected results of four years' solar study, unpretending in aim, but thoroughly well executed, and developed with much clearness and not a little originality. The time, it is true, has somewhat gone by for visual solar work of the kind here described; and Dr. Braun, like all other astronomers, is getting ready his camera. Still, it is well worth while to consider what has been learned—even at a somewhat disproportionate cost of labour—by graphical delineation pursued through fifty consecutive solar rotations.

The instrument employed was the smaller of two excellent Merz refractors possessed by the Kalocsa Observatory. It is of four Paris inches aperture, is equatorially mounted, and appears to possess uncommonly fine definition. To its eye-end was fitted an apparatus invented and constructed by Dr. Braun himself, by means of which an image of the sun 22 centimetres in diameter was projected, after total reflection from a right-angled prism, upon a sheet of drawing-paper. In this way nearly 5000 drawings of spots were executed during the years 1880 to 1884. For their reduction two expeditious methods—one graphical, the other computative—were devised; and the resulting heliographical latitudes are rendered strictly comparable with those derived by English observers, through the application of a small correction due to a difference in the adopted elements of the solar rotation. Now that sunspot observations have become cosmopolitan, it seems indeed a pity that there should not be unanimity on this point among astronomers. Dr. Braun conforms, however, to the solar prime-meridian chosen at Greenwich, so that the longitudes given in his maps practically coincide with Greenwich longitudes.

The highest grade of accuracy was not aimed at in these observations. Their object was the collection of materials for studying the processes of spot-formation and the relation of spots to prominences, with side-glances towards a possible, but every year less and less probable, transit of "Vulcan." The determination of the solar rotational elements, or of the minute changes of latitude of spots, was left to observers provided with the means of executing refined micrometrical measurements. Nor was the estimation of maculated area attempted. Yet with all these limitations, much of interest remains to be gathered from the paper before us.

The results are portrayed in fifty maps, each representing the aspect of the sun's surface between the parallels of 40° north and south, during one synodical rotation. The indication of the solar meridians which on successive days were central at mean mid-day (Kalocsa time) renders it easy to trace the fluctuating appearance of the actual visible disk throughout each period. The maps further contain two long sinusoid curves—one denoting the heliographical latitude of that point on each meridian of which the position-angle on the east limb was 90°, the other showing the latitude of the points similarly situated on the west limb. Hence the position-angle of any given spot as it traversed either edge of the sun can at once be deduced—a datum obviously much facilitating inquiries into the connection of spots with prominences.

To each map corresponds a table, in which, besides the heliographical position of each spot, something of its history and peculiarities is set forth—the number of times it was observed, the epochs of its appearance and disappearance, with a general description of its size and shape. Especial interest attaches to a table in which Dr. Braun

[1] "Berichte von dem Erzbischöflich-Haynaldschen Observatorium zu Kalocsa in Ungarn." Von Carl Braun, S. J. (Münster i. W.: Aschendorff, 1886.)

has separately collected particulars of sixty-one spots, held, with more or less of probability, to have presented themselves afresh after making the circuit of the sun, and hence to be available as guides to the period and law of its rotation. From these data he constructed a curve (Plate XVI. Fig. 2) showing the variations in the rate of spot-displacement with varying latitude, the perfect symmetry of which on either side of the sun's equator testifies to the absence of any systematic difference in this respect between the hemispheres. From the curve were derived three distinct formulæ of the solar rotation, all fitting perfectly with the observations within the parallels of 30°, but diverging widely in their results for high latitudes. For example, No. I. gives for the region close to either pole a period of just 33 days; No. III. of a little over 40; No. II. of 55·8 days. From Carrington's formula, Dr. Braun deduces a polar period of 30·86 days; Faye's implies one of 32; Spörer's actually reverses the direction of change beyond the spot-zones, indicating a recovery of velocity towards the far north and south, and a period, in latitude 90°, of no more than 25·1 days—about the same which prevails in parallels of 10°. It may be worth remarking, as at least a coincidence, that almost precisely this rate of motion was inferred by Father Secchi (very doubtfully, it is true) from observations of relatively stable prominences near the pole. Nevertheless, a survey of the discrepancies tabulated by our author can hardly fail to inspire a profound distrust of empirical formulæ, and still more of the risky process termed "extrapolation."

The swiftest-moving spot noted by the Kalocsa observers was situated 1° 20′ north of the equator; its estimated daily displacement of 868′ bringing about the completion of its circuit in 24·88 days. The most sluggish was in south latitude 29° 38′, and gave a period of 26·5 days. As might have been expected, considerable irregularities are apparent; yet not more than might reasonably be set down to uncertainties of observation. A much higher degree of accuracy must, however, be reached before the mean rate of motion proper to each parallel can be at all satisfactorily ascertained. This mean rate is itself, in Spörer's view, subject to cyclical change; and his observations during the years 1861-1871, as compared with Carrington's during seven preceding years, disclosed persistent differences not easily accounted for. Dr. Braun's results, on the other hand, agree quite as well as could be expected with those of the English observer. A further complication is introduced by what may be called the individual caprices of spots. Each spot has probably a velocity of transport peculiar to itself, depending upon the circumstances of its origin; this velocity is certainly subject to accelerations connected with the processes of its development. These accelerations (for the change of motion is always in a *forward* direction) are shown, in Prof. Spörer's recent communication to the Physical Society of Berlin, to be very considerable; they are beyond question highly significant; yet they emphasise our disadvantage in being compelled to rely upon such unstable phenomena for all our knowledge regarding that most important datum—the rate of the sun's revolution on its axis.

The Kalocsa solar observations were made at a critical period. They cover the whole of the prolonged maximum which culminated near the close of 1883, and disclose or confirm very satisfactorily some of its characteristics. Dr. Braun has depicted in a remarkable curve the progressive changes in the mean latitude of the spot-zones during the years 1880-84. Their continuous approach to the equator at once strikes the eye; but superposed upon the line of uniform descent is a series of minor oscillations with a period of about a year, and an amplitude of fully 2°, which seem too regular and strongly-marked to be the mere effect of accident. This feature is quite novel and deserves attention.

The general rule that the long series of spots comprised within each cycle break out first in high latitudes, and become extinct close to the equator, was first observed by Carrington, and may now be regarded as fully established. Ordinarily, the maximum occurs when the mean latitude of the zones is 16° or 18°, the energy of the disturbance diminishing as they close further in. But the retarded character of the recent crisis was significantly attested by the fact that it did not reach its height until the closing in had proceeded much further than usual. In 1882, when the maximum was due, the average latitude of spots was (from Dr. Braun's curve) about 16°; whereas, at the close of 1883, when the maximum actually occurred, it was no more than 11°. It would seem as if the punctual and duly prepared completion of the outburst had been frustrated, and its stored-up energy spent upon an abnormal protraction of the maximum.

It might even be said that the perturbation thus indicated affected chiefly, or solely, the southern hemisphere of the sun. Although the respective sum-totals of spots observed at Kalocsa north and south of the equator eventually almost exactly balanced each other, large temporary discrepancies were manifest. The northern hemisphere displayed in 1880 an excess of activity, still more conspicuous in the ensuing year. Southern spots, on the contrary, outnumbered northern in 1882 to the extent of 8 per cent., and in 1883 in the proportion of nine to five. Dr. Braun adds the remark that each hemisphere would almost seem to have completed its cycle of change independently of the other, the northern maximum having occurred late in 1881, while the southern was postponed for two further years. The cause of perturbation should, in this view, be localised in the southern hemisphere.

A. M. CLERKE

NOTES

ON November 10 last, an important meeting of intercolonial delegates was held at the rooms of the Royal Society, Sydney, for the purpose of forming an Australasian Association for the Advancement of Science. There were delegates from all the principal scientific Societies of Australia, and they seem to have had no difficulty in arriving at a decision on the questions they had met to discuss. On the motion of the chairman, Mr. Russell, it was agreed that an association of the scientific Societies of Australasia should be formed under the name of "The Australasian Association for the Advancement of Science." It was also resolved that the rules of the British Association should be adopted, and that the first meeting of the Australasian Association should be held in Sydney in the first week of September 1888. This date was fixed because it will be the hundredth anniversary of the foundation of the colony of New South Wales.

Mr. H. N. RIDLEY, of the British Museum, intends to make an expedition to the island of Fernando Noronha for the purpose of investigating its natural history. The funds for the expedition have been supplied by the Royal Society, and Mr. Ridley hopes to be able to start at the end of February. The marine flora and fauna were collected by the *Challenger* Expedition, but owing to the fact that the island is a Brazilian penal settlement, no naturalists have hitherto been permitted to make collections therein. The Trustees of the British Museum have obtained from the Emperor of Brazil the necessary permission for Mr. Ridley's exploration of the island, which, from what little is known of it, and from its geographical position, promises to be of exceptional interest from a natural history point of view.

THE death is announced, at Victoria, British Columbia, of Dr. W. F. Tolmie. Dr. Tolmie's name has been favourably known to ethnologists for many years in connection with his researches respecting the Indian tribes of British Columbia and