It is not possible to modernize these backward countries in a short time, and the process, though justified on economic and commercial grounds, may be far from beneficial. One feels that the "infiltration" of Europeans that is really needed is not that of the commercial or military types, but that of scientific men and Christian missionaries, who are committed to the international point of view and have no reason for seeking profit at the expense of the people. In particular, the medical missionaries, as I have observed them in many parts of the world, represent genuine progress and enlightenment, whatever we may think of their theological dogmas. Scott, commenting on the work of Petrie and his associates, says: "I would emphasize the immense value of their work from every point of view, for the direct alleviation of suffering, for the betterment of understanding between the nations represented on either side, and on the highest spiritual grounds."

Scott records that he left the country with real regret, having received much kindness at the hands of the people, coming to regard many of them with affection. Also, although his collections were very extensive, the insects numbering about 27,000 specimens, it was obvious that there was very much more to be done, awaiting new collectors and new opportunities.

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REPORTS

THE ROYAL OBSERVATORY, GREENWICH[1]

THIS year's report of the Astronomer Royal refers to the work of the Royal Observatory during the period May 1, 1941–April 30, 1942. London suffered few air attacks during this time, and no further damage to the observatory has occurred. Daylight observing is still carried on at Greenwich, but the larger instruments will, of course, remain dismantled for the duration of the war.

The public time service continues to function from two out-stations, each maintaining, in case of breakdown at the other, a complete time service involving transit observations, clock maintenance and transmission of time signals to the Post Office of the B.B.C. The Rugby vernier signals, which are the precision British time signals, have up to the present normally been transmitted from Station B, since the clocks at station A are mounted in temporary fashion and suffer from serious mutual interference. During the year, however, the three free-pendulum clocks and a quartz clock at station A have been remounted in a specially constructed building, and it is hoped that their behavior will now be sufficiently improved to allow this station to share regularly in the transmission of the rhythmic signals. The published corrections to the Rugby signals and to foreign signals are now based on some or all of nine clocks—seven Shortt clocks and two quartz oscillators—mounted in various parts of the country. By working on a "mean clock" and by making certain changes in the routine of signal transmission, a distinct advance has been made in the precision of the Rugby signals, the value of which as a day-to-day frequency standard has thereby been increased. Accurate allowance for land-line lag is now made before each signal is transmitted. Comparison of the signals against the clocks, or of one clock against another, is now facilitated by the use of thermionic panel units which eliminate the variation of lag inevitable with mechanical relays. Intercomparison of the clocks has shown that in the matter of small erratic changes of rate even the best free-pendulum clocks are inferior to quartz clocks.

The Chronometer Depot has settled down into its new quarters, and repair, rating and issue of chronometers and watches to the Royal Navy have continued without interruption. A vibration machine constructed in the observatory workshop has been brought into use for testing aircraft watches under service conditions. Tests of the effect of magnetic fields of strengths up to 8.5 gauss on the rates of chronometers and watches have been instituted, no doubt with war conditions in mind, and are now nearing completion.

The last report of the observatory stated that work with the Airy transit circle had been terminated after ninety years continuous observation. Since then, news has been received of the destruction of Poulkovo Observatory during the bombardment of Leningrad. This will be such a serious loss to fundamental positional astronomy that observations are to be resumed with the old Greenwich instrument on a restricted program, including particularly transits of the sun. Minor damage to the housing of the instrument has therefore been made good, the instrument has been overhauled, and work will be resumed shortly. Analysis of previous observations with this instrument arranged according to wind direction shows that declinations south of the zenith are measured larger by about 0.10″ when the wind is northeast than when it is southwest. The observations of latitude variation had already given a similar result. This agreement shows the advisability in positional astronomy of applying locally determined latitude variations so as to eliminate spurious annual terms due to systematic sea-

[1] From *Nature*.

sonal fluctuations in wind direction. The division errors of the fixed circle of the new reversible transit instrument show on analysis a cyclic error, recurrent every $2\frac{1}{2}°$, which may reach 0.19″; thus emphasizing the need of determining the division error of each graduation.

The photoheliograph observations show that the expected decline in solar activity continues, though there have been four notable periods of resuscitated activity. Of the four big spot groups the area of which exceeded 1,000 millionths of the hemisphere, two exhibited bright eruptions in Hα light which were later followed by great magnetic storms on the earth. Assuming that the magnetic storms were caused by solar corpuscles emitted at the time of maximum intensity of the chromospheric eruptions, the mean time of travel of the particles is calculated as 20 hours.

The Nautical Almanac Office continues its essential work. Last year's report referred to the destruction by fire of the type and plates for most of its publications: during the early part of the year under review printing delays due to this circumstance and to a change of printing contract caused a dangerous accumulation of arrears. The Nautical Almanac for 1942 was in fact not published until November 3, less than two months before the date to which it refers, but the arrears are being wiped off so satisfactorily that the 1943 edition appeared on April 3. The failure of communications with many of the other ephemeris offices has led to a small increase of computational work; but duplication is avoided so far as possible by interchanging information with such of the offices as are still free to collaborate. The war has hastened a decision which would have been reached in any event, namely, to abandon the indiscriminate provision of occultation reduction elements. The observations for 1938 and 1939 show that the majority of the computed reduction elements are never in fact used, owing to the particular occultation not being observed; and of the remainder most are used once only. In the future the office will do the individual reductions for all observations actually made, provided that observers will do that portion of the reduction depending solely on their position and that of the star. A revision of the Air Almanac has recently been planned in conjunction with the Air Ministry: the effect will be to redistribute the data on the two pages allotted to each day, one of which now becomes a "night" page and the other a "day" page. The change should result in greater simplicity in use, at the expense of a slightly larger page. The present R.A.F. Star Charts are based on a recent investigation carried out by the office on the optimum method of identification of the stars used in aerial navigation.

The Magnetic Department of the observatory, in addition to the regular daily observations of the magnetic elements, is at present engaged in preparing charts for the Admiralty showing the iso-magnetic lines in declination, horizontal intensity, inclination and vertical intensity. The declination charts, of which the previous edition was published in 1937, are now ready; those for H and dip, for which the previous editions are dated 1922, are well advanced. Vertical-intensity charts are a novelty.

Features of the year's weather observed at Greenwich include a very wet August (4.146 in.) followed by an unprecedented lack of rain in September and October, during which only 1.41 in. fell. The winter was conspicuous for cloudiness, the sunshine recorded being only 55 per cent. of the average, and for consistently low temperatures in January and especially in February, which had a record number of days (twenty-six) on which temperatures below freezing were recorded.

Visitors to Greenwich Park will miss the famous 24-hour clock dial at the shattered main gates of the observatory, and the daily fall of the time ball; but the familiar domes are still there, though somewhat perforated, and the Wren building still stands guard over the all too characteristic bend in the river. Meanwhile, as the familiar, never-failing "six-pips" testify, the work of the Royal Observatory goes on.

SPECIAL ARTICLES

THE EFFECT OF HUMIDITY ON BETA STREPTOCOCCI (GROUP C) ATOMIZED INTO AIR

MICROORGANISMS in atomized droplets pass through a critical period in changing from an aqueous to an atmospheric state of suspension. The duration of this transient stage naturally depends upon air humidity. Sampling methods, adequate for studying subsequent mortality of residual organisms in static experimental atmospheres, may yet be too coarse for distinguishing such effects.

In the development of a dynamic method for study of disinfection of atomized air-suspended microorganisms, some eighty experiments in design of apparatus, development of techniques and exploration of bacterial behavior have been performed. An experiment consisted of two or more runs in altered atmospheres, each run involving six simultaneous volume and settling samples from two consecutive atmospheric exposures.

Confusion reigned until lethal effects of humidity changes in exposure chambers were evaluated. Their magnitude had not been suspected. High humidity