effects of varying temperature on the rate of pocket watches.

The main fact to be noticed in connection with these early trials is that they settled the lines on which future tests have been made. The qualities demanded now are, as they were then, smallness of daily rate, uniformity of rate in different positions of the balance, and constant rate within a considerable range of temperature. The number of variables is small, and wherever chronometer testing is carried on, little change has been made in the manner of conducting the test. Details vary at different observatories, but one general practice is pursued. For a certain number of days constituting "a period," the watch is kept in a vertical position with pendent up, or to the right, or left, and horizontally, with dial up or down. Further the watch is submitted to varying temperature, generally covering about 50° F. in the whole, and throughout the several "periods" the daily rate is determined by comparison with a clock regulated to Greenwich Mean Time. The relative excellence of the instrument tested in shown by assigning marks for its performance in each period, and herein there is room for the exercise of individual judgment in deciding relative merit. One authority may consider the elimination of temperature effects of more importance than smallness of rate, and give higher marks accordingly. To secure accurate adjustment for "positions" may seem to some the most desirable qualification.

M. Gautier hints that steps might be taken with advantage to secure greater uniformity among different observatories. But the system of awarding marks is of no great importance, for a good watch comes so near perfection that it will take nearly the maximum of marks, however they are divided. M. Gautier remarks that a comparison between the trials at Kew and Geneva shows that the results are in close agreement, and that this conclusion is warranted is proved by the fact that the best watch at Geneva, tested by the Kew system of marks, would have 95·9, while the best at Kew was assigned 96·1 marks.

At Geneva, to within the last few years, the total number of marks that could be earned was 300, of which 100 were assigned to steadiness of daily rate (m); 100 to uniformity of rate in different positions (p); 70 for excellence of temperature compensation (c); and 30 for smallness of variation (r) throughout the test. At the same time limiting values are assigned to m, p, c, and r, which may not be exceeded without loss of certificate. These several maximum values are shown in the expression from which is computed the number of marks to which the watch is entitled.

$$N=(0^s{\cdot}75-m)\,400/3+(2^s{\cdot}50-p)\,40+(0^s{\cdot}20-c)\,350+(5^s{\cdot}00-r)6.$$

If any one of these terms is negative the watch fails to meet the test, but it can be withdrawn, corrected by the maker, and re-submitted to test in those particulars in which it failed, but the opportunity of competing for the highest places in competitive tests is denied to such watches. Later, the number of marks was increased to 1000, but the two scales are not directly comparable, for the conditions of test have been made more severe. The variation from daily rate must not exceed 0·5 sec. in any one test, the rate in different positions is reduced from 2·5 sec. to 2·0 sec., and in other respects the demand for greater accuracy is on the same scale.

It is gratifying to know that the improvement in manufacture has more than kept pace with the requirements for test, and that M. Gautier is able to report that the highest excellence yet attained was exhibited by the chronometers of 1914. This also is the experience of Kew, where of sixty-two watches submitted to trial, forty-eight were awarded more than 90 per cent. of the maximum marks. Of even greater significance is the increasing certainty of manufacture. The writer of this article has long held that after a certain high standard has been reached, the maker must depend upon some lucky accident for pre-eminence. He is unable to explain the cause of superiority, and though he may take equal care he cannot repeat his success. But when we find that the Kew record is held by M. P. Ditisheim, of Chaux-de-Fonds, with a score of 96·1, and the same maker is able to secure the first four places in a competition of unusual severity, it is evident that chance is fast being eliminated. Such improved workmanship demonstrates the success that has attended the scheme of annual competition, originated with the view of encouraging the Swiss watch manufacture. The number of watches submitted for test is not large, about 200 per annum, but a healthy competition has raised a high standard of excellence, and taught the public what to expect.

Besançon leads the way in France. The method of test varies slightly from that of Geneva, but the details only concern the expert. The point we would make is that such establishments are eminently useful and instructive. By advertising widely what has been accomplished they make the public dissatisfied with inferior workmanship, and they offer opportunities for the careful maker to gain recognition for his work. A standard of accuracy is set up that encourages the public distribution of time signals, and promotes a smoother working of national life.

FREDERICK MANSON BAILEY, C.M.G.

THE death of Frederick Manson Bailey, C.M.G., the veteran Colonial Botanist of Queensland, which was announced in the last issue of NATURE, will be felt as a great loss to Australian botany. He inherited his botanical tastes from his father, John Bailey, who emigrated to South Australia in 1838, the family having conducted the business of nurserymen and seedsmen in London for many years. F. M. Bailey helped his father for a time in the nursery business at Adelaide, which he established on resigning the position of Government botanist—to which post he was appointed on his arrival in South Aus-

tralia—but he did not seriously take up horticulture again until he landed at Brisbane in 1861 after a spell of gold-digging in Victoria and farming in New Zealand. He then established a seed business in Brisbane, a venture, however, attended with no great measure of success owing to financial conditions in Queensland, but his real opportunity came in 1875, when the Queensland Government appointed a committee to inquire into diseases affecting live stock and plants, and he was chosen to investigate the botanical problems involved. In connection with the duties of this appointment he travelled far and wide throughout the State, and gained that extensive knowledge of the flora of Queensland which enabled him to make his numerous and valuable contributions to Queensland botany.

His earlier work was mainly connected with the native grasses of Queensland, which formed the subject of many articles valuable to the botanist and agriculturist alike. He was next appointed to the charge of the botanical section of the Queensland Museum, and in 1881 was made Colonial Botanist, the post which he held until his death. The duties of this post, which were very congenial to him, he discharged with conspicuous ability and untiring devotion, and, during the times of depression when the post was abolished, he continued his work unpaid until, as a result of general protest, he was reinstated in his former position.

The distinction of C.M.G. conferred upon him in 1911 was a fitting recognition of the value of his botanical and agricultural services to Queensland. His contributions to botany embrace the purely systematic as well as the economic aspects of the subject. Another subject to which he paid particular attention was the medicinal uses of plants.

Among his more important publications must be mentioned "The Flora of Queensland" in seven volumes; "The Handbook of the Ferns of Queensland"; a sketch of the "Economic Plants of Queensland"; "Plants reputed Poisonous and Injurious to Stock"; "Queensland Woods"; "Queensland Grasses," etc.

Bailey also devoted much time and attention, especially in later years, to the study of fungi and algæ, and until a few days before his death he was a regular contributor of critical specimens to the National Herbarium at Kew, which has been greatly enriched, as regards the Queensland flora, by the specimens he so generously presented.

NOTES.

WE see from the Transactions of the Royal Scottish Arboricultural Society (of which he is the honorary editor) that Dr. A. W. Borthwick, lecturer in forest botany in the University of Edinburgh, has been appointed by the Board of Agriculture for Scotland to be the advisory officer of the Board for forestry in succession to the late Dr. John Nisbet.

WE learn that the nineteenth International Congress of Americanists, which was to have been held in Washington in October next, and which was postponed in consequence of the war, is, according to present arrangements, to take place at Washington on December 27–31 next, in conjunction with the anthropological section of the Pan-American Scientific Congress, the American Anthropological Association, the American Historical Association, the American Folk-lore Society, and the Archæological Institute of America.

THE autumn meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers on September 23 and 24, when the following papers may be expected to be read and discussed:—Influence of oxygen on some properties of pure iron, W. Austin; note on the carburisation of iron at low temperatures in blast-furnace gases, T. H. Byrom; influence of heat-treatment on the specific resistance and chemical constitution of carbon steels, Prof. E. D. Campbell; effect of chromium and tungsten upon the hardening and tempering of high-speed tool-steel, Prof. C. A. Edwards and H. Kikkawa; phosphorus in iron and steel, Dr. W. H. Hatfield; the magnetic transformation of cementite, Prof. K. Honda and H. Takagi; sulphur in malleable cast-iron, R. H. Smith; iron and nitrogen, Prof. N. Tschischewski.

THE council of the Iron and Steel Institute gives notice that at the forthcoming meeting of the institute the following new rule for addition to the existing by-laws will be submitted:—"In the event of a state of war existing between Great Britain and any other country, or State, all members, honorary members, and honorary vice-presidents who shall be subjects of such enemy country, or State, shall forthwith cease to be members, honorary members, or honorary vice-presidents of the institute, but they may, if the council thinks fit, be reinstated after the termination of the war."

THE Royal Aero Club announces that the British height record for pilot alone has been granted to Mr. H. G. Hawker, the National Physical Laboratory having reported that the barograph and chart used by the aviator on June 6 showed that the height attained was 18,393 ft. The previous best record was that of 14,920 ft., accomplished by Eng.-Lieut. E. F. Briggs, now a prisoner in Germany.

WE deeply regret to record the death in action at the Dardanelles, on August 10, of Second Lieut. H. G. J. Moseley, Trinity College, Oxford, son of the late Prof. H. N. Moseley. Lieut. Moseley was formerly lecturer and demonstrator in physics at the University of Manchester, and holder of the John Harling fellowship for research.

WE much regret to learn that Capt. T. P. Black, 9th Sherwood Foresters, registrar of University College, Nottingham, was killed at the Dardanelles between August 7 and 11. He was for a time assistant in physics at the Durham College of Science, Newcastle-upon-Tyne, removing in 1907 to University College, Nottingham, to fill a similar position. In 1911 he was appointed registrar of the college.

WE note, with regret, the death, on August 28, at the age of fifty-six years, of Mr. Henry Crookes, the eldest son of Sir William Crookes. He was an asso-