the colour test for nitrites. It is thus clear that the two processes of bleaching carrotene, namely either by oxygen or by nitrogen peroxide, are quite distinct. It is assumed that the same holds good in flour and that artificially bleached flour, in which normally about one-third of the colouring matter has been destroyed by bleaching, and naturally aged flour are not quite the same thing.

It is shown by Dr. Monier-Williams that unbleached flour, stored in small bags, as is customary in the retail trade, gradually loses its colouring matter, and at the same time picks up nitrites, which in time may amount to 1·4 parts of $NaNO_2$ per million. This is much the same quantity as is present in the freshly milled bleached flour typical of the London mills,[2] which, although it loses further colouring matter on storage, does not absorb any more nitrite. Actually after two months' storage bleached and unbleached flours are practically identical. Samples of very heavily bleached flours had altered after two years' keeping, so that they then only contained about as much nitrite as ordinary unbleached flours kept for a few months.

The interesting conclusion is drawn that under ordinary conditions of storage there is an approximate figure towards which the nitrite content of all samples, whether highly bleached or unbleached, will eventually converge.

With the cooperation of Mr. Kirkland, Dr. Monier-Williams has tested the baking qualities of some heavily bleached flours. Mr. Kirkland reports that all the loaves were of excellent quality, and had no remarkable taste or smell. The one exception—flour containing 100 times the usual quantity of nitrite—gave a loaf which did not rise so well and possessed a somewhat rancid, oily taste.

Leaving any ethical considerations as to the propriety of bleaching flour entirely out of account, this report serves to establish conclusively that there is no scientific evidence that bleaching by means of traces of nitrites is injurious and it is now proved that the presence of traces of nitrites in stored flour is a natural course of events.

REEVES'S NIGHT MARCHING WATCH.

MESSRS. C. F. CASELLA AND CO., LTD., have submitted a "night marching watch," designed by Mr. E. A. Reeves, and costing 2*l.* 15*s.* This is an ingenious device intended to help travellers to know their bearings when moving at night, provided that they are able to recognise the brighter stars. The stars made use of are Aldebaran, Rigel, Sirius, Procyon, Regulus, Denebola, Spica, Arcturus, Antares, Altair, Fomalhaut, Capella, and, of course, by day the sun. The positions of these, together with the days of the months, are printed on a ring outside the watch face, but under the watch glass, and capable of being turned by the bezel (which unfortunately is smooth instead of being milled) so as to bring the date against the hour XII. Then the hour on the watch face under any star's position when multiplied by two is the time measured from noon to this star's meridian passage. A rectangular mark of luminous radium paint carried on the star rim is then set to this doubled time, and the watch is ready for use with that star.

The hour hand carries a luminous projection which rides over the edge of the star rim, and as this hand rotates in the watch twice as fast as the earth rotates or the star appears to go round, the angle between the two luminous marks already described as subtended at the centre of the watch, is double the hour angle of the star. But the angle at the centre is double the angle subtended by the same arc at a point on the circumference, and therefore these two marks will subtend the star's hour angle at any point on the circumference on the other side of the watch. A luminous arrow-head is therefore placed upon the edge of the glass, which is capable of being turned round without turning the bezel. When the arrow mark is removed from the other two, and the watch face is inclined roughly to the colatitude with the first-named luminous mark at the upper side, and then turned in azimuth until a line passing through the arrow and the other mark is directed towards the star, then the first luminous mark as seen from the arrow will be in a southerly direction.

As is usual with astronomical things, there are certain cases where the rules have to be turned inside out (as, for instance, when a star crosses the meridian to the north), and these are explained in the pamphlet. Unfortunately this pamphlet is ambiguously worded, and anyone not understanding the principle would have great difficulty in finding out what to do. The question which must occur to anyone at all familiar with the night sky is this: Has not ingenuity been misplaced? Even if the pole star be not visible, there is very little doubt, at least in the northern hemisphere, where it is. In the southern hemisphere, it is true, there is a great blank in the polar region, but it does not take long to learn the relations of the conspicuous southern stars to the pole. While therefore some people might like to use the watch and enjoy the use of it on account of its ingenuity, others might prefer in practice to do without.

THE VEGETATION OF THE TRANSCASPIAN LOWLANDS.

DR. O. PAULSEN has published an English edition, revised and corrected by Dr. W. G. Smith, of Edinburgh, of his important memoir on "The Vegetation of the Transcaspian Lowlands." This memoir forms the first part of the biological section of the botanical results of the second Danish Pamir expedition—the systematic part of the botanical results having been already published as the examination of the various natural orders was completed—and contains 279 pages, with 79 illustrations, and a map of the area studied. After describing the situation and boundary of the region examined, together with the general geological and climatic characters of Transcaspia, the author deals in considerable detail with the vegetation, which he classifies under the headings of five distinct plant-formations. These formations are the riverside thickets (bushland) and four types of desert formation (salt, clay, sand, and stone deserts).

The second half of the memoir is devoted to an extremely interesting account of the various biological types of growth forms. The author follows Raunkiaer's system according to which the plants are arranged in classes depending upon the way in which they live through unfavourable seasons, special emphasis being laid on the degree and kind of protection afforded to the dormant shoot-tips. Of the 768 species listed, nearly half are annuals which live through the hot, dry summer as seeds, having flowered during the rainy period; trees and shrubs are few and small chiefly tamarisks, Calligonum (Polygonaceæ), and shrubby Papilionaceæ (especially Astragalus); the Compositæ of the Transcaspian flora include 103

[2] In other districts where a very white flour is required a stronger bleach is often adopted.

species: Chenopodiaceæ 94, Papilionaceæ 85, Cruciferæ 51, Gramineæ 44, Boraginaceæ 42. Interesting comparisons are drawn between the Transcaspian flora and the floras of various other regions, desert and otherwise, with reference to the proportional representation of the families and also of the biological types. The memoir concludes with detailed notes on the structure and biological adaptations of various Transcaspian species investigated by the author.

F. C.

THE "AEROSCOPE" KINEMATOGRAPH HAND CAMERA.

AN interesting demonstration of the greatly extended adaptability of kinematographic apparatus was given by Mr. Kasimir Proszynski at a meeting of the Royal Photographic Society on Tuesday, February 18. In introducing the "Aeroscope" hand camera, the lecturer made some general remarks dealing with the problem of flicker, the presence of which, more or less pronounced, has been of considerable trouble to producers of moving pictures. He stated that up to the present time it had been generally understood that the suppression of flicker was in some manner due to the phenomenon of persistence of vision, which, according to the experiments of Helmholtz and other investigators, continues about one-seventh of a second after the light impression has ceased.

Mr. Proszynski considers this idea a mistaken one, and by means of a series of diagrams and demonstrations with the lantern he made out a strong case for his view that flicker is due to the slightly varying lengths of time during which the light from each picture is transmitted to the screen through the openings in the sector shutter. If the opaque portions of the shutter are not all exactly equal, the eye, being extremely sensitive to slight *variations* of illumination, receives the impression of alternating light and darkness corresponding to the difference between the angular size of the blades of the shutter sectors. From this point of view the flicker should be completely eliminated by using any simple shutter with four, three, or even two wings, the essential feature being that the wings must all be very accurately made of the same size. Various forms were shown in the lantern projector; in practice the three-bladed sector shutter is found most suitable.

Another feature embodied in the "Aeroscope" camera is its adaptability for use without a tripod stand, thereby greatly extending the scope of its usefulness to the portraying of scenes quite inaccessible to the ordinary camera requiring a steady support. The camera is fitted with self-contained mechanism for driving the film, consisting of a small air motor, driven by compressed air stored in four steel reservoirs held in the camera body. These cylinders can be recharged by means of a cycle pump to a pressure of 400 lb. per sq. in. The motor is fitted with a governor for keeping the motion of the mechanism uniform, and a lever control on the exhaust for securing different values of this motion to suit different subjects.

The chances of injurious vibration during the exposure of the film are very neatly minimised by the introduction of a heavy gyrostat wheel in the end of the camera box; this is also driven from the air motor.

A series of beautiful pictures of scenery, including animals and moving water, taken by Mr. Cherry Kearton in North America, was sufficiently convincing as to the efficiency of this novel method of animated picture photography.

C. P. B.

THE NATIONAL PHYSICAL LABORATORY.

WITH the view of raising funds to complete the additions now in progress at the laboratory, the executive committee of the laboratory last autumn appointed a funds committee, with Sir W. H. White as chairman, and entrusted it with the task of appealing for support to persons interested in their national work.

This work was commenced at Teddington in the year 1901; the great need of an institution such as the laboratory and the importance of its work have been amply demonstrated by its rapid growth. The original buildings comprised Bushy House, granted by the Crown, and an additional building for the engineering department. The wide scope of the work at the present time will be sufficiently indicated by an enumeration of the various buildings, and a brief indication of the purposes for which they are intended.

(1) Bushy House, providing accommodation for administration offices and for divisions dealing with electrical units and standards, general electrical measurements, thermometry, optics, and tide-prediction.

(2) Engineering building, for general engineering research and tests, with additional accommodation for aeronautical investigation, and for the examination of road materials (Road Board Laboratory).

(3) Metallurgy building, for investigations into the properties of metals and alloys.

(4) Electrotechnics building, equipped for researches connected with electricity, and for the testing of alternating- and direct-current instruments of all kinds, as well as of material for electrical purposes; also for photometric work, especially the standardisation of sources of light.

(5) Metrology building, for measurements of length, end gauges, cylindrical gauges, screw gauges, tapes and wires for survey work, &c., the standardisation of weights, and the testing of measures of area and volume, glass vessels, &c.

(6) William Froude National Tank, for experiments on models of ships.

(7) Observatory Department. This section of the work has been housed at Kew Observatory, and includes the testing of thermometers, optical instruments such as telescopes, binoculars, sextants, theodolites, &c., watches, chronometers, and many other types of instruments.

To provide for the research work which is continuously in progress, and occupies perhaps two-thirds of the time of the scientific staff, generous assistance has been afforded by many private individuals, by the City companies, and by all the great technical institutions, some of which have made annual grants for this purpose for many years past.

Some three years ago it was evident that further buildings were needed at Teddington. The accommodation for the metallurgical work was then quite inadequate, while the office and administration rooms were entirely unsuited to their purposes. The library had long overflowed the small room allotted for its use ten years ago. The arrangements for the receipt and dispatch of goods remained much as at the beginning, and it had become increasingly difficult to deal with the apparatus and material sent for test.

Moreover, the optical and thermometric test work at Kew has quite outgrown the opportunities for test at the old observatory, and modern demands require a revision of the methods and appliances available for the work. In addition, a scheme has been approved by the Royal Society and the Government for setting free the observatory for meteorological observations