

that the average size of 1060 men, measured at Seoul in January 1897, by Mr. A. B. Stripling, was height 5 ft. 11 $\frac{1}{4}$ in., chest-measurement 31 in., and circumference of head 21 $\frac{1}{2}$ in. The maximum figures were respectively 5 ft. 11 $\frac{1}{4}$ in., 39 $\frac{1}{4}$ in., and 23 $\frac{1}{4}$ in. The physique is generally good, and the people possess many amiable qualities. The total population is estimated at from 12,000,000 to 13,000,000. Most of the people are very poor, and have no inducements to thrift; any wealth they may gather is at the mercy of the official class, who are mainly, if not entirely, responsible for the miserable condition of the country. Under the just rule of the Russians in Eastern Siberia, Mrs. Bishop found the Korean emigrants happy and enterprising, making good profits from their farms and inhabiting comfortable houses. Given good government, people and resources being as they are would ensure prosperity to Korea. Into the tangled political history of the unhappy country we cannot enter here, nor can we refer to the many curious customs, ceremonials and beliefs, which are set forth at considerable length. These, perhaps, constitute the most valuable part of the book, for Mrs. Bishop caught Korea in an interesting transition period, when the old subjugation to China was being repudiated for ever, and reforms of many kinds were being introduced. The Altar of the Spirits of the Land, at which the ceremony of repudiation was carried out, is shown in Fig. 2. Few contrasts are more striking than that presented by Seoul at her first and at her last visit; when the filthy chaos of huts surrounding the palace gave place to well-ordered streets of good houses. The problem of the fourfold influence of Russian, Chinese, Japanese and European interests is very well handled. Of the industries of Korea the most interesting is the cultivation of gin-seng, the description of the processes employed in the manufacture of the dried root being, we believe, the fullest yet published.

The future of Korea is still uncertain, but it is bound to play a prominent part in the politics of the Far East; and this book will hold a place as a valuable work of reference for many years to come.

HUGH ROBERT MILL.

ASTRONOMICAL RESULTS FROM THE CAPE OBSERVATORY.¹

THESE three volumes, issued under the superintendence of Dr. Gill, form in some respects a very remarkable production. Not so much on account of the very numerous observations, whose discussion furnishes forth these weighty books, as by reason of the widespread assistance rendered by many astronomers, whose energies Dr. Gill has quickened, whose results he has collected, stamped with his own individuality, and incorporated in the "Annals of the Cape Observatory." There are very few instances in which the director of an observatory has been willing to take up a laborious piece of work at the suggestion of an astronomer, however eminent, go through the wearisome task of making the observations, and then be willing to hand over his results to an independent authority for final discussion or criticism. It is this quality of self-abnegation, which strikes us as so complete and worthy of imitation. We congratulate Dr. Gill on his tactful skill, by which he

¹ "Annals of the Cape Observatory." Vol. iii. The Cape Photographic Durchmusterung. Vol. vi. Solar Parallax from Heliometer Observations of Minor Planets. Vol. vii. Solar Parallax from Observations of Victoria and Sappho. (London: Published by order of the Lords Commissioners of the Admiralty, 1896.)

has emerged from his self-imposed task, without friction with his collaborators, and been able to present to the world, in a complete form, the result of a scheme which he carefully planned and carried to a successful issue. We think it an especial merit in Dr. Gill's work, that he has perceived the value of strengthening his heliometer observations by combining with them the results made with similar instruments elsewhere. It was quite within his power and instrumental means to have derived the solar parallax from observations of the asteroids made solely at the Cape Observatory. Other observers could have done the same work, but separate discussions, made at irregular intervals and under varying conditions, do not possess the proportionate authority that attaches to one discussion made with several instruments on a combined plan. Moreover, one feels that the last word has been said, for some years at least, on this subject of solar parallax, by means of heliometer observations.

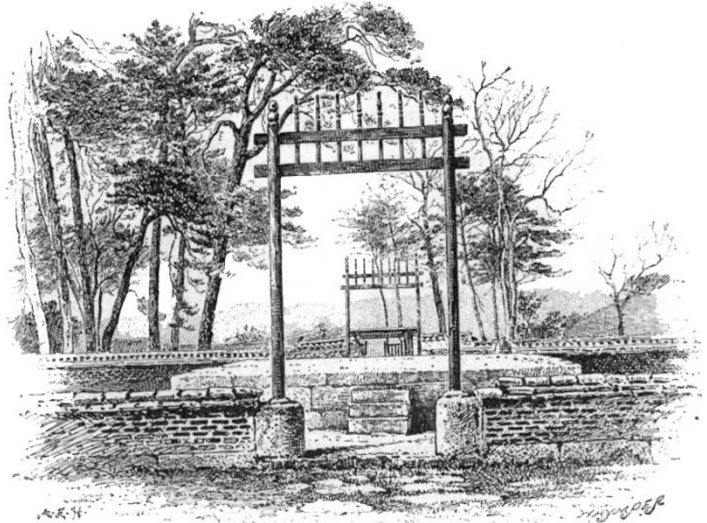


FIG. 2.—Altar of the Spirits of the Land.

Every observer must feel that, singly, he cannot do more than has already been done collectively. There can be no temptation to repeat the work. Consequently the owners of this class of instruments are freed from this particular investigation, for which the heliometer seems especially well fitted, and are at liberty to pursue other inquiries with advantage. It might be worth while just to mention, that to get the full power of a heliometer a considerable number of meridian observations is necessary. In this case some thousands came under the discriminating examination of Prof. Auwers. To use this mass of observations on one series of measures would be extravagant, but when combined with all the heliometer observations in a final inquiry, this cost of time and labour is disregarded, since they contribute to the increased accuracy of so large a body of measures. It is a true economy which Dr. Gill has practised, and the success which has followed it will bear much fruit in the future.

In the inquiry from which the solar parallax is deduced, we notice that no less than six observatories have contributed heliometer measures. Besides that of the Cape, we have New Haven (Yale College), Leipzig, Göttingen, Bamberg, and the Oxford Radcliffe Observatory, all furnishing measures of some or all of the three planets, Iris, Victoria, and Sappho, from stars in a previously selected zone, through which the planets passed. Several have further assisted by making a careful triangulation of the selected stars. The position

of these stars has been determined at "all the principal observatories," to use Dr. Gill's phrase, who apparently grew tired of enumerating all the institutions to which he is indebted for the completeness of this section of the work. The final value of the coordinates has been made the subject of a discussion by Prof. Auwers, which may well form a model for similar inquiries, and will be carefully studied by the professional astronomer engaged in similar work. Into minute details which arise in this section, as well as in the use and reduction of the heliometer measures themselves, it is impossible to enter here with sufficient fullness to make the involved process at all clear. The whole interest centres in the nicety with which small residuals are treated. For a similar reason it would be impertinent to offer any criticism which would imply that we have given to the volume the same anxious study and consideration which the combined authors have devoted to their subject. Dr. Gill has supported himself by the ablest authorities in meridional astronomy, his own experience with the heliometer to which he has devoted years of study in perfecting the mechanical arrangements and details is profound, and we have no doubt that we have here all that can be effected by sagacity and experience in deriving the best results from observations which are as perfect as we yet know how to make them. The final outcome of the observations which, in their main intention, were devoted to deriving the value of the solar parallax may be thus presented.

Heliometer observations of	{	Iris, discussed by Dr. Elkin..	8 ^h 8120 ± 0 ^o 0090
		Victoria ,,	Dr. Gill ... 8 ^h 8013 ± 0 ^o 0061
		Sappho ,,	Dr. Gill ... 8 ^h 7981 ± 0 ^o 0114
Meridian observations of	{	Iris ,,	Dr. Auwers 8 ^h 771 ± 0 ^o 130
		Victoria ,,	Dr. Auwers 8 ^h 845 ± 0 ^o 051
		Sappho ,,	Dr. Auwers 8 ^h 626 ± 0 ^o 118

The mean value from the heliometer measures is 8^h8036 ± 0^o0046, while the meridian observations give 8^h806 ± 0^o030, but for reasons stated, Dr. Gill is inclined to adopt as a final value 8^h802 ± 0^o005. Though this result of itself would be a satisfactory outcome, the accuracy of the observations permits some other astronomical constants to be derived, either directly or through their relations with other known constants. The Victoria observations give with some confidence the mass of the

$$\text{moon} = \frac{1}{81702 \pm 0094}$$

For other constants, such as the nutation, it is necessary to assume the luni solar precession. The value adopted is 50^o367 ± 0^o004, but the source from which it is obtained is not very clearly stated, neither is the epoch to which it refers. Apparently it is taken from Newcomb's discussion in the *Astronomical Journal*, No. 359; but in that paper we have not been able to find this particular value, nor the probable error with which it is accompanied. With this value of the precession, however, and the exact amount is immaterial for this purpose, the constant of nutation is 9^o2068, and pursuing the same line of inquiry the constant,

$$\frac{C-A}{C} \text{ (employing the ordinary notation), is}$$

0^o0032825. Adopting Clark's value for the equatorial radius of the earth, the aberration constant is found to be 20^o467 ± 0^o012. Here as elsewhere the most probable value of the solar parallax is assumed 8^h802.

The remaining volume, which contains the southern "Durchmusterung," between the limits -18° to -37° declination, is in its way quite as remarkable as the two volumes which we have been considering. Herein we have the first-fruits of the application of photography to the determination of star positions on a large scale. The old and the new methods are brought sharply into contrast. One would naturally like to institute a comparison between the time necessary for the production of these

zones, and that required for similar work, either at Bonn or Cordova. But such a comparison is not easy, nor probably would it be fair. The plates that were taken at the Cape were measured at Groningen. Much time must have been lost in correspondence and in settling the details of a new method. Experience had to be acquired in the most suitable methods of measuring with new and untried apparatus. Prof. Kapteyn was necessarily occupied by his University duties, and could only devote his leisure to the preparation of the catalogue—a leisure which he gave unstintingly; and Dr. Gill is to be congratulated on the good fortune that supplied him with so able and willing a coadjutor.

The plates were taken with a rapid rectilinear Dallmeyer lens of six inches aperture and fifty-four inches focus. During the course of the work this lens was re-polished, and a portion of the work duplicated with a second lens; but allowing for all interruptions, the work that was begun on April 15, 1885, was finished in December 1890, with the result that the whole sky was photographed from the South Pole to -10° declination. The free area of each plate was five degrees square, more than 600 being required to cover this portion of the heavens once, without any duplication. At first, when plates were rather slow in action, an hour's exposure was given; but this time was subsequently reduced to about thirty minutes. It is instructive to notice that many plates on a first examination had to be rejected, owing to the fainter stars not having impressed themselves on the film, on account of mist, dewing of the objective, or bad definition. "The more thorough examination necessarily made by Prof. Kapteyn in course of measurement, brought to light a good many more plates which it seemed desirable to re-photograph, so that some of the areas have been photographed three, four, and even five times." Such a report will not be very satisfactory reading for those engaged on the "Carte du Ciel."

The measurement was effected in a manner that necessitated very small corrections to the original readings, in order to obtain the approximate star places, referred to the equinox of 1875; indeed, Prof. Kapteyn says that the coordinates read from the instrument might have been entered directly in the catalogue. We can form a tolerably accurate notion of the time occupied in measuring the plates, for it is stated that on good rich plates two assistants could measure 300 to 400 stars in an hour. Probably 200 would represent the average, and since this portion of the catalogue contains 152,598 stars, we have about 750 hours of actual measurement for one complete examination. Such a rapid collection of results needs no comment. The average distribution of the stars throughout the whole area is possibly of greater consequence than the actual number measured. Of course, the number to a square degree varies very much in different parts of the sky. In the sparsest parts, that is, in Galactic Latitude about -70°, this number falls to 6.28, rather less than in Argelander; but a comparison of mean results with other zones gives the following numbers.

Cape Photographic Survey ...	25.43	stars to square degree.
Bonn N. Durchmusterung ...	15.19	" "
Schönfeld ...	18.21	" "
Thome ...	56.1	" "

The arrangement of the stars in the catalogue, and the degree of accuracy aimed at, is the same as in the familiar Bonn work, namely one-tenth of a second of time in R.A., and a tenth of a minute of declination. A comparison between the places here given with those of other catalogues shows that the probable error of a photographic determination contrasts most favourably with that derived from other processes. This is clearly shown by the following table.

Authority.	Prob error in a.	Prob error in δ.
Argelander .. - 2 to + 38	± 0.70	± 25.4
Schönfeld ... - 2 to - 23	0.38	9.6
Cordova ... - 22 to - 32	0.42	13.8
Cape Photog. ... - 19 to - 38	0.27	2.6
Lalande (1880)... + 1 to + 5	0.224	2.4

We do not propose in this place to follow Prof. Kapteyn in his discussion of the magnitudes assigned in the work, and his comparison with the visual magnitudes recorded by other observers. The section is very interesting and likely to lead to much discussion, owing to the curious fact disclosed, that while this catalogue is poorer in number of stars in the poor regions of the sky, it is at the same time richer in the rich regions, than is the catalogue of Schönfeld, from which fact Prof. Kapteyn concludes that the stars in the Milky Way are generally more chemically active than the stars in the other regions of the sky.

W. E. P.

NOTES.

REFERRING to our inquiry (p. 488) as to disturbances of terrestrial magnetism during January and February, Dr. C. Chree writes from the Kew Observatory as follows:—"With the exception of some small movements on the 10th, our magnetic curves were very quiet from January 1 to 14; but thereafter there was a disturbed time, lasting over January 15 to 21. The disturbance was greatest from the 15th to the 18th—when it was well marked—less on the 19th and 20th, and still less on the 21st. The 22nd and 23rd were very quiet days. The rest of January was quiet generally, with a few small movements. February was quiet up to the 10th, with the exception of some slight movements on the 5th. From February 11 to 16 there was a moderately disturbed time; on the 20th and 21st there were some smaller movements. It was then quiet to the end of the month. 'Quiet' is, of course, only a relative word; there is seldom a day in which some slight movement, beyond the mere diurnal inequality, is not visible. In the case of the disturbances on January 15-21 and February 11-16, it was rather a case of numerous well-defined oscillations than of sudden comparatively isolated movements of a conspicuous character."

A CONFERENCE of the International Aeronautical Commission opens to-day at Strassburg, and will continue for several days. Among the experiments to be performed during the meeting is the graduation of thermographs down to -200° C. by means of a jet of liquid air procured by the Linde method. Dr. Hergesell, the president of the conference, will present a report upon the thermometric experiments already referred to in NATURE (p. 470). M. Besançon will send up a balloon of twelve hundred cubic feet capacity, equipped with meteorograms, which it is estimated will attain an altitude of about twenty thousand feet. Several members of the Paris Academy of Sciences have signified their intention to attend the conference.

THE Paris correspondent of the *Times* reports that at Monday's sitting of the Academy of Sciences the question of the French national time was introduced by M. Bouquet de la Grye, the president of the Paris Geographical Society and a member of the Section of Navigation and Geography. The fact was recalled that on February 24 the Chamber of Deputies passed without discussion and on a show of hands a Bill providing that French national time should be advanced by 9 minutes 11 seconds, which was tantamount to the adoption of the meridian of Greenwich by France. The Bureau des Longitudes has, however, sent a protest to the Minister of Education, and the protest has been forwarded to the President of the Senate. M. Bouquet de la Grye asked the Academy to refer the whole question to the joint Sections of Astronomy and Navigation to

be reported upon. This motion was supported by M. Janssen and adopted after some explanations from M. Berthelot and M. Bertrand, the two permanent secretaries.

It is announced that the Russian Government has decided to adopt the metric system.

A FRENCH ironclad launched a few days ago was christened the *Lavoisier*.

PROF. J. E. KEELER has been elected director of the Lick Observatory, in succession to Prof. E. S. Holden.

THE current number of the *Proceedings of the Royal Society* contains an obituary notice of Pasteur by Prof. Percy Frankland, F.R.S.

MR. A. D. BERRINGTON is on the point of retiring from the post of chief inspector of fisheries and assistant secretary to the Board of Trade. Among the fishery inspectors who preceded Mr. Berrington were Mr. Frank Buckland and Prof. Huxley.

THE Public Buildings Expenses Bill, providing 2,250,000*l.* for new public buildings in London, passed through Committee of the House of Commons on Tuesday. Included in the expenditure authorised by the Bill is a grant of 800,000*l.* for buildings in connection with the Science and Art Museum at South Kensington.

A SWEDISH scientific expedition to Klondike, conducted by Dr. Nordenskiöld, arranged to leave Stockholm on March 23. Dr. Nordenskiöld will be accompanied by Dr. Gunnar Andersson, professor at the Stockholm High School, and four other persons. The expedition is expected to be absent about two years. Immediately after its return the expedition will make known the results, not only in Sweden, but also to scientific societies in other countries.

It is reported that Herr J. Stadling, who accompanied Herr André's expedition to Spitsbergen in 1896, has been appointed by the Swedish Anthropological and Geographical Society to undertake a search through Siberia in order to make inquiries as to the fate of Herr André's balloon expedition. For this purpose Herr Stadling has received the Vega stipendium from the Society. He will start with a companion from Stockholm early in April, and the journey will last probably until January next.

A COMMITTEE has been appointed by the Home Secretary to inquire into the extent to which water gas and other gases containing a large proportion of carbon monoxide are being manufactured and used for heating, lighting and other purposes, and the dangers which may attend such manufacture and use. The committee is composed of Lord Belper (chairman), Mr. H. H. Cunynghame, Dr. Parsons, Dr. Haldane, and Prof. Ramsay; with Mr. J. Pedder, of the Home Office, as secretary.

AT the meeting of the Manchester Literary and Philosophical Society on Tuesday, the President presented the Wilde medal for 1898 to Sir Joseph Dalton Hooker, G.C.S.I., F.R.S.; the Dalton medal to Dr. Edward Schunck, F.R.S.; and the Wilde premium for 1898 to Mr. John Butterworth. The Wilde lecture, "On the Physical Basis of Psychological Events," was afterwards delivered by Prof. Michael Foster.

THE British Association Committee of the Ethnographical Survey is desirous to obtain the services of qualified observers in numerous parts of the United Kingdom, for the purpose of inquiring into all or any of the following subjects: (1) physical types of the inhabitants; (2) current traditions and beliefs; (3) peculiarities of dialect; (4) monuments and other remains of ancient culture; (5) historical evidence as to continuity of race-