4. The shelter of the observer can then be quite detached from and independent of the telescope.

In the description of the floating polar axis referred to above, I mention its suitability for that disposition where one large and one small mirror is used.

My reason for not then mentioning the second disposition (that in which two large plane mirrors are used, one of these being perforated) to which this polar axis is most particularly adapted, was fear of stepping too far at once, as, apart from the additional difficulty of making a large plane perforated mirror, there seemed to me to be an element of risk and uncertainty in its use. After reading this article by M. Lœwy, I think there may not be much in my objections, but I cannot quite satisfy myself. In dealing with the support of the large plane mirror in the disposition that I allude to in the description of the polar axis, I contemplated such an arrangement for it as I have in use with my three-foot mirrors, this answering, as far as I have been able to see, perfectly, in eliminating flexure, and as the back of this large plane mirror would never wholly leave its supports, there would not be any fear of flexure here; the other mirrors offer no difficulty as they are practically as in an ordinary *Newtonian* telescope. The support of the large plane perforated mirror, when used for any latitude higher than 45°, is not easily obtained; it must rest on a rim touching the face all round, hence unless it could be hung up from the back in some way it might bend down and spoil the *image*.

It may be that the slight angle it would make would not bring in flexure of an injurious kind, and this could be determined by actual experiment beforehand, but at present it is an open question.

If it is not a difficulty, then I should agree with M. Lœwy that this is the best disposition for many reasons—it dispenses with the supports of the small mirror that cause diffraction rays, not objectionable to the observer except on bright objects, but very much so in a photograph, where they can impress themselves from an eighth or ninth magnitude star with any exposure that would be used for a nebula; it gives better support to the concave mirror: difficulties in connection with the reversal of the instrument do not come in with such force, and, most important of all, with such a polar axis as I have described, the focal plane might be kept very close behind the large perforated mirror, giving advantages of the greatest importance from many points of view.

The covering of the mirrors by a plate of glass has already been suggested and tried, but in a way that determined nothing. It is a capital thing to do; only experiment could really decide. Certainly flexure could be got over by air pressure, and it would be worth any trouble to get it, if not injurious to the image.

Ealing, August A. AINSLIE COMMON

Earthquakes in Japan

IN the one hundred and seventy-first volume of the "Konrui Shinko-Kushi," one of the oldest and finest works on Ancient Japan, there are tables giving the number, intensity, and remarkable characteristics of all the earthquakes which occurred in Japan between the years 416 and 886 A.D. Unfortunately, the few extant copies of this most important compilation are all more or less in a fragmentary condition. It is, however, evident from the context that the author intended to, or actually did, enumerate many more of these natural phenomena, and it is highly probable that many of his original notes have been lost with the rest; but even as it stands the work is of undoubted importance, now that the Seismological Society of Japan has been doing all in its power to bring forth the ancient records which refer to the great earthquakes of the past. As every one knows, Japan is the very hearth of earthquakes; in 1854 more than 60,000 people lost their lives in consequence of one of these great terrestrial catastrophes, and it has been calculated that from ten to twelve earthquakes, each lasting several seconds, occur every year, besides numerous others of too slight a nature to be worthy of remark.

The earthquakes mentioned in the work under consideration begin with that which took place in the fifth year after the coronation of Inkio Tenno (A.D. 416), and end with the one in the fifth year of Koko Tenno (A.D. 886). Earthquakes occurred during this period of 470 years on 640 days, but that by no means gives the probable total. It seems that those which are noted on the 640 days were all of sufficient importance to deserve particular mention. The great care taken by the compiler in his tables is evident from the fact that the exact date and time of each earthquake is given. Kiyoto was then the capital of Japan, and most of the earthquakes mentioned took place in the then Imperial City, 626 out of the total 640. Those not felt in Kiyoto are spoken of only when unusually intense, in which case the exact locality and amount of damage caused are given. Quite recently the vernacular Japanese press, in consequence of some lately published returns bearing on the subject, has devoted considerable attention to investigating the annals of the "Konrui-Shinko-Kushi," in hopes of being able to ascertain if earthquakes of certain intensity recur at certain periods, in fact, they have attempted to prove that earthquakes run in well-defined cycles. This is by no means a novel nor even very modern idea. Wernich, in his "Geographische-medicinische Studien," says that severe earthquakes occur in Japan every twenty years. In a footnote he adds:—"I am unable to adduce any natural or physical proofs in behalf of this hypothesis. And yet the Japanese earthquakes can be very readily explained by the theory of 'periodical phenomena.' They are commonest at the times of the highest tides, and in the months of January, April, and October."

Whatever may be the truth of the suppositions and theories, the Japanese journals, both the scientific and the dailies, have gone to work by accepting the periodicity of these phenomena. Taking ten years as the divisor, they divide the time between A.D. 628 (when the records begin to be more trustworthy) and A.D. 886 into twenty-six periods. The following table is the result:—

Periods	Earthquake days	Periods	Earthquake days	Periods	Earthquake days
1	0	10	6	19	3
2	3	11	5	20	56
3	0	12	29	21	39
4	1	13	3	22	18
5	2	14	0	23	104
6	15	15	11	24	87
7	1	16	22	25	95
8	0	17	10	26	100
9	3	18	9		

It is very evident from the foregoing that the records are far from being as exact as could be desired with regard to the earlier centuries, or else that the physical condition of the country in 886 was totally different from that of 628 A.D. But to return to the table, it will be seen that the intervals between the periods in which earthquakes were most frequent are as follows:—40 years between the 2nd and 6th periods, 60 years between the 6th and 12th, 40 years between the 12th and 16th, 40 years between the 16th and 20th, and 30 years between the 20th and 23rd. Acting on the supposition that one period of unusual frequency of earthquakes has been left unrecorded, the average length of the intervals is estimated at 35 years. Following the author's explanatory notes, a still more correct table can be deduced, by means of which the cycle of earthquake intensity is finally put at 33·3 years. A further deduction is made that earthquakes of a disastrous nature occur once every 59 years, so the next great catastrophe may be expected in 1913.

As the notes of the compiler give the date of each earthquake between the above-mentioned years, it appears that earthquakes used formerly to be most frequent in August, most severe in May and November, and followed or preceded by violent hurricanes, electric storms, and the like in January; 55 per cent. of all Japanese earthquakes occurring during the warm season.

Yokohama F. WARRINGTON EASTLAKE

"Udschimya sericaria," Rond., a Fly Parasitic on the Silkworm

I HAVE been engaged during the past year in tracing the life-history of *Udschimya sericaria*, Rond., and have succeeded in making it out completely. I send you a short account of it, hoping that it may not be entirely uninteresting to your readers. As you are no doubt aware, in Japan and China the maggot of this fly does great damage every year to the larvæ and pupæ of the silkworm, sometimes 80 per cent. of the caterpillars and pupæ being killed. The knowledge of its life-history would therefore be of great economic interest as furnishing the scientific basis for guarding against this parasite. Strange as it may seem, no one has, however, until recently, made any systematic observations on the matter.

In 1874 my father, Mr. N. Sasaki, who was the first to study this insect, found its larva in the main trunk of the trachea of the silkworm, just inside the stigma, and finally concluded that the