along this line.' Even in mathematics too little of the available material has been critically examined to make it possible to write a complete and trustworthy history, but the sudden prominence of Japanese activity and power gives unusual interest to any facts relating to the thought and scientific development of this country.

The 2,000 mathematical works in the royal library of Tokio, some of which date back to 1595, are a sufficient guarantee of high esteem for mathematical knowledge. As the Japanese mind is very practical and shows little aptitude for the abstract and philosophical, it is to be expected that their mathematical achievements are in very close touch with practical problems and are foreign to those fields of mathematics which border on philosophy. The determination of the area of the circle in terms of its diameter is one of the most important of these practical problems and the Japanese took especial interest in developments which were useful to obtain an approximate solution of this problem.

Such a solution is equivalent to an approximate determination of the ratio between the diameter and the circumference of a circle. This ratio, known as the Ludolphian number, plays such a prominent rôle in the development of mathematics that so eminent a mathematician as Glaisher has remarked that its history is almost identical with the history of mathematics. The approximate value of this number can be most readily obtained by infinite series, and this is the method which the Japanese employed as early as the seventeenth century. In doing this they used the binomial theorem for fractional exponents as early if not earlier than Newton did. One of the proudest triumphs of this master mind was, therefore, achieved independently by the race whose recent marvelous progress has been attracting universal attention.

One of the other prominent discoveries of Newton, viz., the infinitesimal calculus, seems also to have been discovered independently by the Japanese, although the evidence on this point is not conclusive. It is, however, certain that the Japanese were not far behind the Europeans in their mathematical attainments during the latter part of the seventeenth century. Since then they have not made the rapid progress which Europe has witnessed as a result of the work of Euler, Lagrange, Cauchy and Gauss. They did not have any such leaders, and hence their advanced mathematics was practically neglected.

Within recent years there has been a great advance in mathematical instruction. A large number of students are debarred from the upper classes of the higher institutions on account of their lack in mathematical training. There seems to be a very widespread feeling that the educational system is mostly in need of improvement along the line of mathematical instruction and the efforts towards progress along this line exhibit Japanese vigor and courage. It will probably require a number of years before much will be accomplished in higher mathematics.

The most surprising fact about Japanese mathematics is that, while the most elementary parts were regarded as common property, the more advanced results were regarded as secrets which should be communicated to a very few. In fact, an oath of secrecy was required of those who wished to hear lectures on advanced mathematics. European history furnishes a parallel to this in the Pythagorean school, but it is so totally different from the modern spirit that its existence 2,000 years after Pythagoras was unexpected. Fortunately all this has recently changed to such an extent that a history of Japanese mathematics could be published a few years ago. A small part of this has been translated into English.[2]

G. A. Miller.

Stanford University.

PROPOSED MAGNETIC AND ALLIED OBSERVATIONS DURING THE TOTAL SOLAR ECLIPSE, AUGUST 30, 1905.

In response to my appeal for simultaneous magnetic and allied observations during the coming total solar eclipse, cooperative work

[2] Tsuruichi Hayashi, 'A Brief History of the Japanese Mathematics,' *Nieuw Archief voor wiskunde*, 1904, pp. 296–324; 1905, pp. 325–361.

will be conducted at stations distributed practically along the entire belt of totality and also at outside stations, nearly every civilized nation participating.

These observations will afford a splendid opportunity for further testing the result already obtained. All those who are able to cooperate are invited to participate in this important work.

The scheme of work proposed embraces the following:

1. Simultaneous magnetic observations of any or all of the elements according to instruments at the observer's disposal, every minute from August 29, 22 h., to August 30, 4 h., Greenwich mean, astronomical time.

[To insure the highest degree of accuracy attainable, the observer should begin work early enough to have everything in complete readiness in proper time. See precautions taken in previous eclipse work as explained in *Terrestrial Magnetism,* Vol. V., page 146, and Vol. VII., page 16. *It is essential, as shown by past experience, that the same observer make the readings throughout the entire interval.*]

2. At magnetic observatories, all necessary precautions should be taken so that the self-recording instruments will be in good operation not only during the proposed interval, but also for some time before and after, and eye readings should be taken in addition wherever it be convenient.

[*It is recommended that, in general, the magnetograph be run on the usual speed throughout the interval, and that, if a change in the recording speed be made, every precaution possible be taken to guard against instrumental changes likely to affect the continuity of the base line.*]

3. Atmospheric electricity observations should be made to the extent possible by the observer's equipment and personnel at his disposal.

4. Meteorological observations in accordance with the observer's equipment should be made at convenient periods (as short as possible) throughout the interval. It is suggested that, at least, temperatures be read every fifth minute (directly after the magnetic reading for that minute).

5. Observers in the belt of totality are requested to take the magnetic reading every fifteen seconds during the time of totality and to read temperatures as frequently as possible.

6. At those stations where the normal diurnal variation can not be obtained from self-recording instruments, it is desirable to make the necessary observations for this purpose on as many days as possible before and after the day of the eclipse, and to extend, if possible, the above interval of observation. In general, those who will have self-recording instruments have decided to run them for at least eight days before and after the day of the eclipse.

It is hoped that observers will send full reports of their work to me as soon as possible for incorporation in the complete monograph on this subject to be published by the Carnegie Institution of Washington.

L. A. BAUER.
DEPT. TERRESTRIAL MAGNETISM,
CARNEGIE INSTITUTION,
WASHINGTON, D. C.,
July 15, 1905.

NOMENCLATURE AT THE VIENNA INTERNATIONAL BOTANICAL CONGRESS.

AN international botanical congress was held at Vienna, Austria, June 11–18, 1905, under the presidency of Professor Julius Wiesner, of the University of Vienna, and a number of vice-presidents selected from the delegates from various countries. Between five hundred and six hundred persons were in attendance. After addresses of welcome by scientific and governmental Austrian officials, the congress divided into two sections, holding sessions, (1) for the general business of the congress and the reading of scientific papers, and (2) for the discussion of the special subject of botanical nomenclature, which had been arranged in advance on the basis of a vote by members of an international commission, appointed at the botanical congress held at Paris in 1900. The procedure had been capitally organized by Professor John Briquet, director of the botanical garden of Geneva, and reporter general of the