

value of systematic research in engineering works. For example, in the heat treatment of steel, no amount of rule-of-thumb or the possession of an expert eye could ever ensure uniformity in results which vary enormously with but slight alterations in temperature; some system of pyrometry is called for as a protection against failures. The president suggests the establishment of an engineering research committee with a view to coordinate the work, to prevent overlapping, to ensure the carrying out of individual researches to absolute results, and to publish such results. In time the committee would acquire so large an accumulation of data as to make it the first source upon which the public would draw for information as to any research already effected, and as to the possibilities of extending research on lines which might seem to require investigation. The success which has attended the engineering standards committee might be regarded as holding out possibilities of success for an engineering research committee.

THE Cambridge University Press will publish shortly a book on "Rubber and Rubber Planting," by Dr. R. H. Lock, dealing with the history of the use and cultivation of rubber, its botanical sources, the botanical physiology of rubber and latex, the diseases, chemistry, and manufacture of rubber, and with rubber planting.

THE April edition of the catalogue of second-hand scientific instruments which are for sale or hire at the establishment of Mr. Charles Baker, 244 High Holborn, London, W.C., has reached us. The list includes some 2000 items, and an examination of the catalogue shows that customers can obtain second-hand practically every class of scientific instrument. Every instrument in the second-hand department is guaranteed to be in adjustment.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR MAY :—

- May 1. 20h. 24m. Mars in conjunction with the Moon (Mars $0^{\circ} 48' S.$).
4. 12h. om. Venus in conjunction with the Moon (Venus $1^{\circ} 26' N.$).
5. 9h. om. Jupiter stationary.
7. 10h. 35m. Saturn in conjunction with the Moon (Saturn $6^{\circ} 20' S.$).
10. 21h. 19m. Neptune in conjunction with the Moon (Neptune $5^{\circ} 21' S.$).
12. 9h. om. Uranus stationary.
13. 17h. om. Venus stationary.
18. 3h. om. Mars in perihelion.
23. 10h. 23m. Jupiter in conjunction with the Moon (Jupiter $4^{\circ} 56' N.$).
25. oh. 50m. Uranus in conjunction with the Moon (Uranus $3^{\circ} 38' N.$).
29. 1h. om. Saturn in conjunction with the Sun.
30. 15h. om. Venus at greatest brilliancy.
31. 2h. 25m. Mars in conjunction with the Moon (Mars $3^{\circ} 9' S.$).
31. 6h. 31m. Mercury in conjunction with Saturn (Mercury $2^{\circ} 4' N.$).

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THE SUN'S POLAR AND EQUATORIAL DIAMETERS.—The *Annales de l'Observatoire Astronomique de Ló-se* (China), tome vi., contains three parts, the second of which is devoted to an account of a photographic study of the polar and equatorial diameters of the sun as deduced from observations made during the period of 1905–10. The investigation was carried out by Le R. P. S. Chevalier, S.J., and had for its first object the discovery, if possible, of variations in the mean diameter of the sun. The results obtained may be briefly summarised as follows :—There is a difference between the polar and equatorial diameter, the former diameter being the greater of the two. This difference does not seem to be constant, and the variations indicated cannot, according to the author, be attributed to errors of observation, and, so far as he can see, must be due to the sun itself. Here are the values for each of the six years :—

Year	Pol.-Equat.
1905	... +0.07"
1906	... +0.17"
1907	... +0.31"
1908	... +0.29"
1909	... +0.13"
1910	... +0.17"
Mean	... +0.19" \pm 0.015".

With regard to the value of the mean diameter, he obtains $31' 59.93''$, which differs somewhat from that usually adopted, namely $31' 59.26''$, on the authority of Dr. Auwers, after a series of measures with the heliometer. While Chevalier points out that there is evidently a systematic error in one of the two sets of measures, and it may be in the photographic series, but he has not been able to trace it, yet, he asks, is it quite certain that it is excluded from the heliometric series, these measures all being made with instruments of the same type and short focal lengths?

UNITED STATES NAVAL OBSERVATORY.—We have received a copy of the annual report of the Naval Observatory for the fiscal year 1912. This modest and admirably concise account of the year's work of three active and important departments, corresponding to our Greenwich and Kew observatories and the Nautical Almanac Office, merely forms appendix No. 2 to the annual report of the chief of the Bureau of Navigation. The department of the Nautical Almanac, under the direction of Prof. W. S. Eichelberger, U.S. Navy, who represented the observatory at the Congrès International des Ephémérides Astronomiques, held at Paris in 1911, has expressed, under authority of the U.S. Congress, its willingness to adopt the programme of exchanges of data recommended at the Paris meeting. Particulars are given of various significant changes it is proposed to make in the American Ephemeris and Nautical Almanac, beginning with the edition of 1916. Considerable progress appears to have been made in the adoption of the Sperry gyro-compass in the U.S. Navy; six battleships and two submarines are supplied with sets, and ten additional sets have been ordered. The ordinary magnetic compass is still retained in ships fitted with gyro-compasses. We are informed that the noon signal has been transmitted by radio-telegraphy to ships at sea since so long ago as January, 1905. Special attention is being devoted to making improvements in the instruments of nautical astronomy. Among a long list of novel apparatus we note that a gyroscopic artificial horizon has been tried.

DISTRIBUTION OF SPECTROSCOPIC DOUBLE STARS.—In the April number of *L'Astronomie*, Prof. P. Stroobant, of the Observatoire Royal de Belgique, using Campbell's second catalogue of spectroscopic binary stars, published in 1910, shows that representatives of this class of stars are most abundant in the neighbourhood of the Milky Way—a similar result to that already found by E. Zinner for variables of the Algol type, to which the spectroscopic doubles bear a strong analogy. Stroobant shows that in this condensation the stars in question obey the law of distribution found by Pickering for the helium stars, being almost precisely proportional to the number of class B stars amongst the binaries.

JADE IN CHINESE SECULAR LIFE AND RELIGION.¹

THE sumptuous monograph on the Bishop collection in New York entitled "Investigations and Studies in Jade" is so rare as to be inaccessible, and consequently there is room for another work on the subject. The authorities of the Field Museum of Natural History of Chicago were well advised to entrust the Blackstone expedition to Tibet and China to Dr. B. Laufer, and to encourage him to describe the jade objects he collected in a comprehensive monograph. As a matter of fact, his specimens largely supplement, and only slightly duplicate, the wonderful collection in New York, as most of them were exhumed from ancient graves, whereas the majority of the specimens in the Bishop collection are modern. Similarly, his monograph supplements the other; he does "not deal with jade for its own sake, but as a means to a certain end; it merely forms the background, the leading motive, for the exposition of some fundamental ideas of Chinese religious concepts which find their most characteristic expression and illustration in objects of jade."

The oldest Chinese term for jade is just as general and comprehensive as our word, and includes nephrite, jadeite, bowenite, and occasionally serpentine, &c.; at present only the first two are acknowledged as true jade by the Chinese. The jades of the Chou and Han dynasties are made of indigenous material from the Shensi province, but the supply was exhausted long ago, and about the beginning of the Christian era Turkestan became the chief source for the supply of jade to China, Yünnan and Burma also contributing later. The importance of the trade in jade can be realised when one remembers that "for the last two millenniums Turkestan has furnished to China the greater supply of her jade, wrought and unwrought, and the most colossal boulders of the mineral were constantly transported from Khotan to Si-ngan-fu and Peking, over a trade route unparalleled in extent and arduousness in Europe, and requiring a four to six months' journey."

In dealing with stone implements, Dr. Laufer points out that none of Palæolithic type have as yet been found; all are polished, they are found scattered in certain parts of the country, and are generally scarce. In the present state of our knowledge it is not justifi-

able to speak of a Stone age in China, and still less of a Stone age of the Chinese, since at the time when they were settling and spreading they were already in possession of metal implements. Four centuries ago Chinese antiquaries spoke of "thunder-axes," and in the eighth century they were described as "stones of the God of Thunder"; sometimes they were made of jade.

The ancient spade-shaped stone implements of the Kolarian-Mon peoples were reproduced in jade and bronze in the Han period, but in the earlier Chou period there was a bronze currency of similar shape. The first sovereign of the Han dynasty (B.C. 206-195) announced his accession to the throne by sacrificing to heaven an engraved jade tablet, a custom which continued for a thousand years or so; these writing tablets were developed from the ancient bamboo slips or wooden splints which served as writing material before the invention of paper.

There is a correlation between the jade objects used in nature-worship and those buried in the graves of the Chou era. Heaven, earth, and the four quarters were six cosmic powers or deities, and the jade carv-

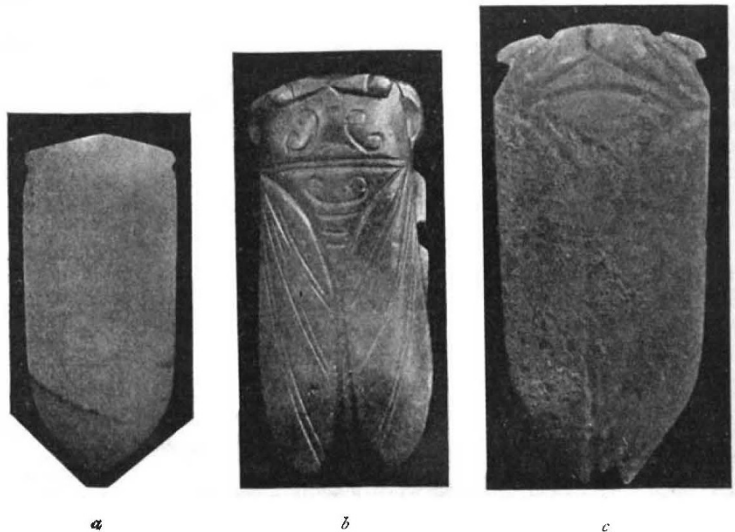


FIG. 1.—*a*, Plain type of tongue-amulet; *b*, tongue-amulet carved in shape of realistic cicada—upper face; *c*, tongue-amulet showing conventionalised form of cicada. From "Jade: A Study in Chinese Archaeology and Religion."

ings serving their worship were nothing but the real images of these deities under which they were worshipped. Anthropomorphic conceptions are lacking in the oldest notions of Chinese religion, and therefore no anthropomorphic images are known. The shapes of these images are geometric in design: a jade disk, round and perforated, representing heaven, a tube surrounded by a cube earth, a semicircular disk the north, &c.

In addition to the use of jade in religious worship its employment in coins, seals, and personal ornaments is fully dealt with, and a very interesting account is given of the various kinds of jade amulets for the dead, other objects being buried besides these. The belief prevailed that jade had the property of preserving the flesh of the body and keeping it from decay, and it was also believed that immortality could be obtained by eating from bowls made of a marvellous kind of jade called "the perfection of jade." Among the amulets worn by the corpse, those placed on the tongue were the most important, and were shaped in the outline of that organ; many are in the form of a cicada, doubtless as an emblem of resurrection; indeed, the

¹ Field Museum of Natural History, Anthropological Series, Publication 154. "Jade: A Study in Chinese Archaeology and Religion." By B. Laufer. Pp. xiv+370+68 plates. (Chicago, 1912.)