discovered in 1850, 1858, 1866, 1873, 1880, 1888, and 1895, although it was missed in 1903. Its orbital eccentricity is exceptionally small, and its perihelion distance (1·7) great. It is also remarkable as being the first comet of which the periodicity was determined, by Goldschmidt, directly, by calculation, without comparison with the elements of earlier comets.

A number of observations are also published, the magnitude being generally estimated as about 10. Dr. Schiller recorded it at Bothkamp on November 10 as diffused, having a suspicion of a tail, in p.a. 300°, and a granulated nucleus of magnitude 9·8. Dr. Ristenpart, on November 11, saw no tail, but an eleventh-magnitude round nebulosity of 1 diameter with a central condensation. Dr. Cerulli announces that he discovered the comet on a plate taken on November 8.

A SYSTEM OF STANDARD WAVE-LENGTHS.—No. 3, vol. xxxii., of the *Astrophysical Journal* contains a list of forty-nine secondary standard wave-lengths published under the auspices of the International Union for Solar Research.

The increased accuracy of modern research necessitated the measurement and adoption of a standard system, and to this end three independent observers were asked to determine the wave-lengths of the forty-nine iron lines now published. From the results secured for each line a mean value has been adopted, and will in future be used in solar work; the wave-lengths range from λ 4282·408 to λ 6494·993, and wave-lengths measured in this system should be designated in future by using the symbol "I.A." The primary standard is the wave-length of the red cadmium line adopted at a previous conference.

In the same journal Prof. Kayser publishes standards of third order of wave-length on the international system, determined from the arc spectrum of iron between λλ 4118 and 6494; he intends extending the measurements to λ 7900. He finds that some of the secondary standards still contain errors of from 0·004 to 0·005 A. A comparison with Rowland's wave-lengths of the solar spectrum gives differences varying irregularly between 0·15 and 0·22 A., but by subtracting about 0·19 A. from Rowland all measurements can be reduced to the international system with sufficient accuracy. Prof. Kayser tabulates about 370 wave-lengths, and gives the intensity, the probable error, and the respective differences from Rowland and the observers who made the measurements for the secondary standards, viz. Fabry and Buisson, Eversheim, and Pfund.

THE RADIAL VELOCITY OF SIRIUS.—A most exhaustive discussion of the radial velocity of Sirius is published by Herr W. Munch in No. 4455 of the *Astronomische Nachrichten*. Herr Munch measured a large number of plates taken at Potsdam during the period 1901–10, and his thorough discussion takes up the whole of a double number of the journal. It includes, *inter alia*, the errors introduced by the measuring screw, by the different widths of the measured lines, by the possible uncertainty as to the purity and wave-lengths of some of the lines, &c. Besides several lines of yet unknown origin, he finds in the spectrum of Sirius those due to Cr, Fe, H, Mg, Ni, Sc, Ti, V, Y, and Zr, and, possibly, La and Mn.

For the mean velocity of the centre of the Sirian system referred to the sun he tabulates a series of seventeen values ranging from −8·0 (March 17, 1907) to −14·1 (April 4, 1906), the mean value being −10·3 km., with a mean probable error of ±0·4 km. Omitting the observations of 1906 and 1908, which gave abnormally large values, the mean radial velocity becomes −9·8 km., with a mean probable error of ±0·3 km.

"ANNUAIRE DU BUREAU DES LONGITUDES, 1911."—The *Annuaire* for 1911 published by the Bureau des Longitudes contains the usual astronomical tables, ephemerides, &c., and also tables relative to metrology, moneys, geography, meteorology, and statistics: this year the tables of chemical and physical data are omitted, as also are matters referring to the sundial, solar physics, and the minor planets.

The special articles, four in number, are very interesting; the first deals with the sixteenth conference of the International Geodetic Association, which was held in London, and in the second M. Bigourdan publishes a great deal of interesting information concerning the total eclipse of the sun which will take place on April 17, 1912, and will be visible in France for a few seconds.

MAGNITUDE OF NOVA SAGITTARII, No. 2.—A telegram from Dr. Ristenpart, Santiago, announces that on November 7 the magnitude of Nova Sagittarii (96.1910) was 9·9 (*Astronomische Nachrichten*, No. 4456).

AGRICULTURAL RESEARCH IN JAPAN.[1]

THE Japanese have entered the field of agricultural investigation with characteristic energy and thoroughness, and have shown a lively appreciation of the fact, not always realised elsewhere, that the principles underlying an agricultural problem must first be studied before the problem itself can be solved. Some of the special features of Japanese agriculture present highly important problems, the development of which will be awaited with much interest.

The present volume of the Journal of the College of Agriculture contains, in the two parts already published, four papers, of which three deal with silkworm problems. Mr. K. Toyama reports studies on the red worms occasionally appearing among the progeny of the normal black worms, and hitherto regarded in a general way as sports. In 1905 he obtained some red worms, and studied their behaviour on crossing. The results showed that the phenomena are really Mendelian, black being dominant over red; the red worms uniformly yielded red offspring, while the matings of the blacks resulted in the production of one red to three blacks. Prof. C. Sasaki deals with jaundice of the silkworm, a disease prevalent in all silkworm countries, and frequently found in Japan. The worms lose their appetite, weaken, and finally die; the skin loses its firmness and becomes soft and weak, while polyhedral bodies appear in the blood and various tissues. Evidence is adduced that the disease is caused by a streptothrix found in the blood of affected worms. The polyhedral bodies may, however, arise from other causes such as a small dose of formalin, interruption of respiration, or attacks of maggots, and are probably to be ascribed to the degeneration of the contents of the nucleus. The same author has also solved an interesting problem that has hitherto been overlooked. Silk fishing lines, commonly known as "Tegusu," are largely employed by the Japanese fishermen, but no one has up to the present found out any more about their origin than that they are imported from southern China. The Chinese writers say that some wild silkworms found in Yoko on the leaves of camphor trees and Foushu (*Liquidambar formosana*) are the source. In April, when the worms are mature, they are dipped in vinegar, and then filaments 7 or 8 feet long and golden-yellow in colour are taken from their bodies. Prof. Sasaki made a journey in southern China, found the worm, and determined it as the larva of *Saturnia pyretorum*, Westwood. He has also introduced it into Formosa.

Mr. S. Kusano has a paper on chemotactic and similar reactions of the swarm spores of myxomycetes, Æthalium, Stemonitis and Comatricha being investigated. In general, these organisms feed mostly on rotten wood or leaves, and there is evidence that they can digest bacteria. It appears also that they can themselves be devoured by infusoria. Wood attacked by them was found to be acid. The swarm spores showed marked chemotaxis, being attracted by acids, repelled by alkalis, and unaffected by neutral, non-poisonous substances. A consideration of the phenomena from the dissociation hypothesis indicates that the H- and OH-ions are in all cases the stimulating components, the OH being much the more effective, and active even at a dilution of N/10,000. The attraction of the H-ion reaches a maximum at N/600; in higher concentration the acid repels and injures the organism. H-ions act beneficially in several ways; they promote germination of the spores, and then attract them to the place where food material occurs. An interesting physiological point was noticed. The spores germinate much more readily in contact with moist air than when thrown on to water; in the latter case they do not appear to be wetted very quickly.

[1] Journal of the College of Agriculture, Imperial University of Tokyo, vol. ii., Nos. 1 and 2.