reasonable and often correctly applied Scotch verdict of "not proven."

IN the annual address, delivered lately by Colonel J. Waterhouse, President of the Asiatic Society of Bengal, and now printed, he speaks highly of the work done by Indian museums and kindred institutions. He says they are exerting "a great educational influence" on "the teeming masses" of India. Native visitors are beginning "to take a really intelligent interest in the collections." Colonel Waterhouse urges that the work of local museums should be confined to the illustration of local products. If objects from other districts are admitted, the name of their place of origin should, he thinks, be distinctly marked upon them, and they should be kept apart from the local collections.

THE U.S. Department of Agriculture has issued an elaborate Report on the English sparrow (*Passer domesticus*) in North America. The Report has been prepared, under the direction of Dr. C. Hart Merriam, ornithologist to the Department, by Mr. Walter B. Barrows, assistant ornithologist. Dr. Merriam claims that it is "the most systematic, comprehensive, and important treatise ever published upon the economic relations of any bird." The new immigrant into the United States is accused of an enormous number of offences; and no one who studies the evidence brought together in this Report will be disposed to say that his evil deeds have been exaggerated. The climatic and other conditions of America have suited the sparrow to perfection, and he has exercised freely all his powers of doing mischief. The evidence set forth relates to the importation, spread, increase, and checks on the increase of the bird; the injury done by him to birds, blossoms, and foliage; the injury to fruits, garden-seeds, and vegetables; the injury to grain; and the relations of the sparrow to other birds, and to insects. All sorts of suggestions for the destruction or abatement of the nuisance are carefully considered. There is also interesting evidence as to the sparrow in Europe and Australia.

A PAPER upon the atomic weight of magnesium and the properties of the pure metal obtained by distillation *in vacuo* is communicated to the current number of the *American Chemical Journal* by Messrs. Burton and Vorce, of Cleveland, U.S. When an attempt is made to distil magnesium in an ordinary hard potash glass tube it is found that the vapour of the metal attacks the glass in a remarkable manner, a black voluminous substance being formed which evolves a spontaneously inflammable gas on treatment with an acid. This black substance is, in fact, magnesium silicide, Mg_2Si, and the explosive gas silicon tetrahydride, SiH_4. When the silicide is brought in contact with dilute acid there remains, after the liberation of silicon hydride and conversion of the magnesium into a salt of the acid employed, a quantity of a yellow substance which possesses the properties of the lower oxide of silicon described by Mabery. Hence it is not possible to use tubes entirely of glass for the distillation of magnesium. But by lining the interior of the heated portion of the tube with an inner tube of thin sheet-iron, magnesium not alloying with iron, the distillation can be conducted with perfect safety. The magnesium was packed in the iron tube in the form of small pieces of ribbon, and the iron tube then placed in an outer glass tube closed at one end and about twice the length of the iron tube. The other end was afterwards drawn out and connected with a Sprengel pump, and the tube exhausted. The apparatus was then laid in a combustion furnace and the tube heated, the closed end near which the iron tube and its magnesium contents had been placed being heated much more strongly than the end nearest the pump. When the iron tube became heated to bright redness the magnesium commenced to volatilize and sublime into the relatively cooler portion, forming at first a black mirror of silicide upon the glass, which protected it from further corrosion. After continuing the heating for about an hour in the case of the distillation of about ten grams of metal, the gas was shut off, and the whole allowed to cool very slowly so as to prevent fracture of the glass, the vacuum being maintained as perfect as possible until quite cold. The distilled magnesium was similarly redistilled three times, the product of the fourth distillation alone, in which no traces of impurities could be detected by analysis, being employed in the atomic weight determinations. The magnesium was generally deposited in the form of a thin crystalline bar of pure white metal which readily separated from the coating of silicide, but in certain of the distillations beautiful isolated crystals of considerable size were formed. Weighed portions of the metal thus purified were converted to the nitrate by means of purified nitric acid diluted with water also specially purified and recently redistilled in a platinum apparatus. The nitrate was then ignited to oxide, first over a sand-bath, and finally to constant weight at the highest temperature of a muffle furnace. From the relation between the weights of metal taken and oxide produced in ten experiments, the mean value of the atomic weight of magnesium if $O = 16$ was found to be $24 \cdot 287$; if $O = 15 \cdot 95$, $Mg = 24 \cdot 211$. The highest value found when $O = 16$ was $24 \cdot 304$, and the lowest $24 \cdot 271$. The crystals of magnesium obtained during the distillation were very perfect hexagonal prisms showing no planes but those of the primary prism ∞P, primary pyramid P, and basal plane oP. From measurements of the angles the axial ratio $a : c = 1 : 1 \cdot 6202$, which agrees tolerably well with the ratio given by Des Cloizeaux from the measurement of crystals obtained by Dumas in 1880. Magnesium is therefore isomorphous with zinc and beryllium, which latter metal it very closely resembles in its angular measurements and the ratio of its axes. In case of Zn, $a : c = 1 : 1 \cdot 3564$, and for beryllium, $a : c = 1 : 1 \cdot 5802$.

THE additions to the Zoological Society's Gardens during the past week include two Oak Dormice (*Myoxus dryas*), Central European, presented by Lieut.-Colonel G. M. Cardew; a Vulpine Phalanger (*Phalangista vulpina* ♂) from Australia, presented by Mrs. Waterson; a Silver-backed Fox (*Canis chama* ♂) from South Africa, presented by Captain H. D. Travers, R.M.S. *Tartar*; a Great Kangaroo (*Macropus giganteus* ♀) from Australia, presented by Mr. Henry Irving, F.Z.S.; a Ring-necked Parrakeet (*Palæornis torquatus* ♂) from India, presented by Mr. Arthur O. Cooke; a West African Love Bird (*Agapornis pullaria*) from West Africa, presented by Mrs. Fell; a Chinese Bulbul (*Pycnonotus sinensis*) from China, presented by Lieut.-General Sir H. B. Lumsden, K.C.S.I., F.Z.S.; three Common Peafowl (*Pavo cristatus* ♂ ♀ et juv.) from India, presented by Mrs. Francis Leighton; a Common Kestrel (*Tinnunculus alaudarius*), British, presented by Mr. C. Ashdown, F.Z.S.; a Loggerhead Turtle (*Thalassochelys caouana*) from the Atlantic Ocean, presented by Miss Beatrice Fort; a Grey Monitor (*Varanus griseus*) from the Sahara Desert, presented by Dr. John Murray; a Hawk-headed Parrot (*Deroptyus accipitrinus*) from Brazil, deposited; a Vociferous Sea Eagle (*Haliaëtus vocifer*) from West Africa, a Red-crowned Pigeon (*Erythrænas pulcherrima*) from the Seychelles, purchased; a Japanese Deer (*Cervus sika* ♂), two Bennett's Wallabys (*Halmaturus bennetti* ♂ ♂), a Vulpine Phalanger (*Phalangista vulpina* ♂), a Peacock Pheasant (*Polyplectron chinquis*), a Swinhoe's Pheasant (*Euplocamus swinhoii*), four Spanish Blue Magpies (*Cyanopolius cooki*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on June 12 = 15h. 24m. 22s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 40°7	—	White.	15 12 57	+56 43
(2) G.C. 4234	—	Bluish.	16 39 51	+24 0
(3) x Serpentis	4	Reddish-yellow.	15 43 48	+18 29
(4) δ Boötis	3	Yellow.	15 11 6	+33 44
(5) α Coronæ	2	Bluish-white.	15 30 0	+27 5
(6) W Cygni	Var.	Reddish.	21 31 53	+44 53

Remarks.

(1) This is a long white nebula in Draco which was described by Sir John Herschel as "a superb ray nebula." The G.C. description is: "Considerably bright; very large; very much extended in the direction 155°; at first very gradually, then pretty suddenly brighter in the middle, where there is a nucleus." In Herschel's 20-foot reflector it was seen to be 7½′ long. The spectrum of the nebula has not been recorded.

(2) This is one of the planetary nebulæ, and according to Dr. Huggins its spectrum shows the three bright lines usually seen in nebulæ. He also noted that F was the faintest line, and that there was a faint continuous spectrum. The spectrum was re-observed by Vogel in 1872, and he observed two additional lines near wave-lengths 518 and 554. It is important that these lines should be confirmed, and comparisons made with the flutings of carbon and manganese at 517 and 558 respectively. The existence of these lines will further tend to prove the connection between comets and nebulæ, for two bands in these positions have frequently been observed in cometary spectra. It is not improbable that a third cometary band, near λ 468, may also appear in the nebula, as a line near that position (λ 470) has been recorded by Dr. Copeland and Mr. Taylor in other nebulæ. Unfortunately, a rather large aperture is required for this observation; with a 10-inch refractor I have not been able to more than glimpse the additional lines seen by Vogel. The G.C. description of the nebula is: "A planetary nebula; very bright; very small; round; disk and border." It is not advisable to employ a cylindrical lens in searching for faint lines, even though the nebula is a small one.

(3) Vogel describes this star as a fine one of Group II., but Dunér states that the bands are narrow, 4 and 5 being little more than lines. He also notes that the spectrum approaches Class II.*a* (Group III.). It is therefore probable that the spectrum is an intermediate one, and will show some of the lines characteristic of Group III. Any differences in these lines, either in positions or relative intensities, from those seen in stars like the sun, should be noted, as they will form valuable criteria for the subdivision of the Class II.*a* stars of Vogel into two groups—one of increasing temperatures (Group III.), and the other decreasing (Group V.).

(4 and 5) The first of these has a spectrum of the solar type, and the second one of Group IV. (Gothard). The usual observations are required in each case.

(6) The range of this variable is very small—5·8–6·2 at maximum to 6·7–7·3 at minimum—and it will be interesting to observe if any changes in spectrum take place at maximum similar to those which occur in stars of greater range with the same type of spectrum. The general spectrum is a "very fine" one of Group II., but so far no variations with change of magnitude have been noted. The period is given by Gore as 120–138 days, and there will be a maximum about June 21.

The Spectrum of Comet Brooks (*a* 1890).—I made further observations of this comet on June 6 and 7, and found that it had become considerably brighter since my last observation (Nature, vol. xlii. p. 112). The tail was also slightly extended. The principal spectroscopic change noted was a diminution in the brightness of the continuous spectrum relatively to the carbon flutings, making the latter more distinct. There was no change in the positions of the bands, and as the comet has now passed perihelion, it is not likely that it will go through any of the higher-temperature stages. As its distance from the sun increases, it should be observed for the cooler stages. The first decided change, according to Mr. Lockyer's investigations, should be the replacing of the present "hot carbon" spectrum for that of "cool carbon," the criterion for which is a fluting near λ 483. This, again, should be replaced by a spectrum consisting mainly of a line in the position of the chief nebula line (λ 500).

In connection with the observations of the comet, I have also made observations of the spectrum of the nebula G.C. 4058 (see notes for June 5). I found that the spectrum of the nebula was irregularly continuous, with a very decided maximum of brightness coincident with the carbon fluting near λ 517. There were also other brightnesses, the positions of which are not yet determined. The whole spectrum is strikingly similar to that of the comet, and as the two objects are not far removed from each other, this is a good opportunity for observers to satisfy themselves that comets and nebulæ are intimately connected.

A. Fowler.

The Planet Uranus.—M. Perrotin, of Nice Observatory, has made some observations of dusky bands on Uranus, similar to those that are seen on Jupiter (*Vierteljahrsschrift des Astronomische Gesellschaft*). The following are some values found for the position-angle:—

1889 31 May	... ...	° 13
,,	... ...	35
1 June	... ...	20
7 ,,	... ...	30

The mean value is 24°·5, or about 10° from the plane of the orbit of the satellites, from which it would appear that the plane of the Uranian equator differs little from the trend of the satellites. M. Perrotin also found that the direction of the bands, according to repeated measures, coincided with the longest diameter. The bands do not appear always to have the same aspect, but vary in number and in size in different parts of the surface. This unequal distribution will, it is hoped, afford a means of accurately determining the time of rotation. The oblateness deduced from the measures is said to be not less than $\frac{1}{20}$.

Mr. Tebbutt's Observatory.—We have received the Report of this Observatory for the year 1889. A considerable amount of extra-meridian work has been done during the year, observations having been made of some minor planets, phenomena of Jupiter's satellites, and occultations of stars by the moon. Barnard's comet (*a* 1889) and Davidson's comet (*d* 1889) were observed on eight occasions, and Brooks's comet (*e* 1889) on two occasions. The comparison observations that were made have been reduced, and sent to *Astronomische Nachrichten*. Brorsen's periodical comet was carefully searched for, with the help of Dr. Lamp's ephemeris, on December 21 and 25, 1889, and again on January 18, 20, and 22, but without success. Comparisons have been made, both of η Argûs and R Carinæ, with the neighbouring stars, and it is noted that the former star has not sensibly varied in its lustre since the announcement of its sudden increase of magnitude between April 1887 and May 1888. A satisfactory determination of a maximum of the latter star was made in June 1889, and its period determined as 312 days.

New Asteroid.—A minor planet of the 13th magnitude was discovered by M. Charlois at Nice on May 20. This brings the number up to (298).

CORAL REEFS AND OTHER CARBONATE OF LIME FORMATIONS IN MODERN SEAS.[1]

The vast organic accumulations known as coral reefs are, undoubtedly, among the most striking phenomena of tropical oceanic waters. The picturesque beauty of coral atolls and barrier reefs, with their shallow placid lagoons, and their wonderful submarine zoological and botanical gardens, fixed at once the attention of the early voyagers into the seas of equatorial regions of the ocean. Questions connected with the peculiar form, the structure, the origin, and the distribution of these great natural productions have, from the very outset, puzzled and interested all those who delight in the study of natural things. In this communication we propose to point out and discuss some of the more general phenomena of oceanic deposits, with special reference to the functions of corals and other lime-secreting organisms, and the accumulation of their dead shells and skeletons on the floor of the great oceans.

Coral reefs are developed in greatest perfection in those ocean waters where the temperature is highest and the annual range is least. It may be said that reefs are never met with where the temperature of the surface water, at any time of the year, sinks below 70° F., and where the annual range of temperature is greater than 12° F. Bermuda, which is the coral island the farthest removed from the equator (lat. 32° N.), and one or two other outlying reefs, may be, in a sense, exceptions to this

[1] Paper read on December 2, 1889, before the Royal Society of Edinburgh, by John Murray, LL.D., Ph.D., and Robert Irvine, F.C.S.