Rhinoceros (*Rhinoceros lasiotus* ♂) from India, two Punjaub Wild Sheep (*Ovis cycloceros*) from North-West India, received in exchange.

OUR ASTRONOMICAL COLUMN

THE INFLUENCE OF PHASE ON THE BRIGHTNESS OF THE MINOR PLANETS.—Dr. G. Müller gives an interesting discussion in the *Astronomische Nachrichten*, Nos. 2724-2725, of the variations in brightness of seven of the minor planets. The determinations of the magnitudes of these objects were made by means of a photometer, on Zollner's principle, attached either to the Steinheil telescope of the Potsdam Observatory, of aperture 135 mm. aperture, or to the Grubb equatorial of 207 mm. aperture. The result of these observations seems to show that there is a real connection between the phase of these planets and their apparent brightness, and that Lambert's law of phase brightness does not apply to them. Dr. Müller further divides the planets he has observed into two classes. In the first class, which embraces Vesta, Iris, Massilia, and Amphitrite, the changes in brightness are only perceptible as the planet approaches opposition; in the second, which contains Ceres, Pallas, and Irene, the changes in brightness seem to be co-extensive with the changes of phase. The planets of the first group thus correspond in their behaviour to the planet Mars, and Dr. Müller thinks we may fairly infer therefrom a similarity in their physical condition to that of the ruddy planet. The planets of the second class would appear, on the other hand, to give a light curve similar to that given by our moon, or rather perhaps by Mercury; it is therefore not improbable that they bear more resemblance in their physical constitution to that body.

COMET FABRY.—The following ephemeris by Dr. S. Oppenheim is taken from the *Astronomische Nachrichten*, No. 2722:—

For Berlin Midnight

1886	R.A. h. m. s.	Decl. ° ′	Log *r*	Log Δ	Brightness
May 3	5 1 16	7 33·1 S.	9·9351	9·2358	381·4
5	6 16 8	22 59·4	9·9617	9·4446	195·2
11	7 3 53	30 30·4	9·9877	9·5698	97·3
15	7 34 43	34 18·8	0·0130	9·6758	53·2
19	7 55 56	36 29 6	0·0373	9·7632	31·8
23	8 11 35	37 53·6	0·0606	9·8364	20·4
27	8 23 52	38 53·2	0·0828	9·8992	13·8
31	8 34 0	39 39·2 S.	0·1041	9·9528	9·8

The brightness on 1885 December 1 is taken as unity.

BARNARD'S COMET.—The following ephemeris by Dr. H. Oppenheim (*Astr. Nachr.*, No. 2714) is in continuation of that given in NATURE for April 1, p. 518:—

Ephemeris for Berlin Midnight

1886	R.A. h. m. s.	Decl. ° ′	Log *r*	Log Δ	Brightness
May 6	1 41 34	39 23·5 N.	9·6858	9·8894	155
10	1 50 59	36 42·5	9·7087	9·8125	199
14	2 8 29	31 42·6	9·7429	9·7266	253
18	2 35 41	23 16·9	9·7828	9·6374	318
22	3 13 3	10 16·3 N.	9·8242	9·5619	371
26	3 58 59	6 32·5 S.	9·8648	9·5291	359

The brightness on 1885 December 5 is taken as unity.

THE APPLICATION OF PHOTOGRAPHY TO ASTRONOMY.—In Appendix III. to the "Washington Observations for 1882," Prof. Harkness, U.S N., commenting on the difficulty of preventing the solar rays from disturbing the adjustments of a meridian instrument employed in observing the sun, points out that photography seems to afford an escape from the difficulty. He suggests that a transit-circle might be so constructed that its eye-piece could be readily removed, and a sensitive photographic plate inserted just behind its wire system. Then with the eye-piece in position stars can be observed, and the instrumental constants determined in the usual way; while at noon a photographic plate can be inserted, and an instantaneous exposure will suffice to give an image of the sun with the transit and declination wires of the instrument imprinted upon it. The position of the sun's centre relatively to these wires having been measured, this, together with the instrumental constants, the circle-reading and the sidereal time of exposure will give an exact determination of the sun's right ascension and declination. As the instruments will be exposed to the sun's rays only for a few thousandths of a second, no disturbance of its constants can, Prof. Harkness thinks, arise from that cause; and the results, in his opinion, would probably be superior in accuracy to any hitherto obtained by the usual methods.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 MAY 9-15

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on May 9

Sun rises, 4h. 20m.; souths, 11h. 56m. 16·3s.; sets, 19h. 33m.; decl. on meridian, 17° 25′ N.: Sidereal Time at Sunset, 10h. 43m.

Moon (at First Quarter on May 11) rises, 9h. 12m.; souths, 16h. 58m.; sets, 0h. 36m.*; decl. on meridian, 16° 37′ N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury ...	3 46 ...	10 19 ...	16 52 ...	5 51 N.
Venus ...	3 0 ...	9 4 ...	15 8 ...	0 0
Mars ...	12 40 ...	19 34 ...	2 28* ...	9 52 N.
Jupiter ...	14 21 ...	20 39 ...	2 57* ...	2 50 N.
Saturn ...	7 1 ...	15 13 ...	23 25 ...	22 50 N.

* Indicates that the setting is that of the following morning.

Occultation of Star by the Moon (visible at Greenwich)

May	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
15	θ Virginis	4½	2 42	3 36	93 309

May h.
13 ... 16 ... Jupiter in conjunction with and 0° 25′ north of the Moon.

Variable Stars

Star	R.A. h. m.	Decl. ° ′		h. m.	
ζ Geminorum ...	6 57·4	20 44 N.	May	9, 21 30	*m*
			,,	14, 21 40	*M*
S Cancri	8 37·4	19 27 N.	,,	12, 22 56	*m*
R Ursæ Majoris ...	10 36·6	69 22 N.	,,	12,	*M*
δ Libræ	14 54·9	8 4 S.	,,	9, 2 30	*m*
U Coronæ	15 13·6	32 4 N.	,,	13, 21 17	*m*
R Draconis	16 32·4	67 3 N.	,,	10,	*m*
U Ophiuchi	17 10·8	1 20 N.	,,	10, 11 58	*m*
		and at intervals of 20		8	
X Sagittarii	17 40·4	27 47 S.	May	12, 2 20	*m*
			,,	15, 0 0	*M*
W Sagittarii ...	17 57·8	29 35 S.	,,	11, 2 30	*m*
R Lyræ	18 51·9	43 48 N.	,,	13,	*M*
T Aquarii	20 43·9	5 34 S.	,,	15,	*m*
δ Cephei	22 24·9	57 50 N.	,,	10, 21 30	*m*

M signifies maximum; *m* minimum.

Meteor Showers

Amongst the secondary radiants active at this time are the following:—From Lynx, R.A. 123°, Decl. 40° N.; near δ Libræ, R.A. 223°, Decl. 10° S.; from Delphinus, R.A. 304°, Decl. 7° N.; near ζ Cygni, R.A. 320°, Decl. 18° N.; near κ Andromedæ, R.A. 354°, Decl. 41° N.

BIOLOGICAL NOTES

THE HYMENOPTERA OF THE HAWAIIAN ISLANDS.—In the *Proceedings* of the Literary and Scientific Society of Manchester (vol. xxv. pp. 123-183) is a valuable contribution on the Hymenopterous insect-fauna of the Hawaiian Islands, by the Rev. T. Blackburn, B.A., who resided there for many years, with a short introduction and annotations by Mr. P. Cameron. Eighty-four species are catalogued or described, but Mr. Blackburn says he has taken over 100. The greater part of the species appear to be strictly autochthonous. Of the *Anthophila* (or bees) there are 14 species (excluding the introduced honey-bee), and it is curious that 10 of these belong to 1 genus—*Prosopis*. Of the *Fossores* there are 35 species, and here again there is a paucity of genera, for 19 are included in *Odynerus* and 11 in *Crabro*. Of *Heterogyna* (ants) are only 10 species; and about 25 species of the various parasitic and hyper-parasitic groups. No indication of any of the phytophagous forms occurs in the paper. Before Mr. Blackburn went to the Hawaiian Islands the insect-fauna was almost unknown, so far as what may be termed the

more occult (and therefore the chief) portion of it. Most of what had hitherto been discovered resulted from the casual visits of entomologists (not always trained to the subject). In Coleoptera alone he discovered about 430 species, of which nearly four-fifths appear to be strictly endemic, which is certainly noteworthy in considering the fauna of an insular group of volcanic origin. The minority of more recent "introductions" look largely in the direction of Western North America, with a sprinkling of Polynesian or Australian forms. The Rev. Mr. Blackburn's Hawaiian discoveries in entomology have an important bearing on the selection of naturalists to accompany exploring and other expeditions. A trained observer knows where and how to look, even if in doubt as to what he may find, and is always rewarded by new discoveries. An untrained hand scampers over the country, and, with every desire to distinguish himself, comes back and complains of the barrenness of the land.

VEGETABLE PARASITES OF CODFISH.—Some years ago Prof. Farlow called attention to the presence of a red fungus which was destructive to the dried codfish of the American fisheries (NATURE, vol. xxiii. p. 543). Since then Dr. E. Bertherand has given an account of poisoning which had occurred among the French troops at Algiers, caused, it was believed, by eating dried codfish, which had a vermilion hue owing to the presence of a fungus described by M. Mégnin in the *Revue Mycologique* (vol. vi. p. 114) as *Coniothecium bertherandi*. Specimens of fish with the same colour were also met with at Bordeaux and Dieppe, these latter presumably from Newfoundland. It would appear probable that Mégnin's fungus is the same as that originally described by Farlow as *Clathrocystis rosco-persicina*, Cohn.[1] In addition to this species, however, Farlow has described another parasitic form on the cod, *Sarcina morrhuæ*, which name had to yield in priority to *S. litoralis* of Poulsen, found on mud near Copenhagen, and which has lately been recognised by Saccardo and Berlese as occurring on codfish from Algiers. These botanists seem to think the *Coniothecium bertherandi* identical with *Sarcina litoralis*, and this latter to be but a condition of *Beggiatoa rosco-persicina*; but although they are found in company Farlow sees no good reason to think they belong to the same species. It is curious the form should occur in regions so far apart as New England, Algiers, and salt-marsh mud in Denmark, and it suggests the idea that salt may be the means by which the disaster is spread. Still another species, called *Oidium morrhuæ* by Farlow, by forming small brown spots on the surface of the dried codfish injures its sale, and has been found not only in New England, but also at Algiers.—(W. G. Farlow, *Bull.* U.S. Fish Commission, i. p. 1, February 8, 1886.)

SUPERIMPOSED STAMENS.—Mr. Thomas Meehan suggests a new interpretation for the appearance of superimposed stamens. Stamens are by most, if not by all botanists, regarded as exogenous lateral outgrowths from a caulome, in which latter there has normally been an arrest in its axial development. Stamens, however, occasionally will spring from the inner base of petals, and Mr. Meehan would account for this by taking the petal as the analogue of a leaf on an elongated branch, and the stamen as the development of an axial bud to the petal. "Branching and articulated stamens are frequent in those families that have these organs springing as it were from an axial bud at the base of the petal, as in a diminution or suppressed secondary branch we might expect them to do." In illustration of this idea Mr. Meehan refers to the flowers of *Mahernia verticillata*, Cav., a well-known Byttneriaceous plant from the Cape of Good Hope. The genus is separated from Hermannia chiefly by a cup-shaped gland at the middle of the stamen. A comparison with the axial development of the inflorescence shows the stamen to be formed on precisely the same plan, Mr. Meehan thinks, as the biflowered peduncle. This latter is simply a diminutive branchlet; after forming one node the longitudinal development becomes nearly arrested, and there is a short pediceled flower, then the bud in the axil of the bracteolate leaflet pushes up and over this, giving rise to the longer-stalked flower. So in the development of the stamen, a bud arises in the axil of a petal, the common peduncle is represented by the filament, and the cup-like gland at the middle stands for the bracteole of the bipedicels. Here one of the flower-buds wholly disappears, the innermost becomes the upper part of the filament, the real node may be at the connective, and then the theoretical floral leaves proceed to form the anther. The incised bract is reduced to the fringed cup-like gland from which the stamen proper springs, and he concludes from a survey of the whole subject that in many cases superimposed stamens are the development of theoretical axial buds at the base of the petals, and not the result of an interposition of an extra whorl of leaves for which there seems no warrant in phyllotaxy. It will be seen that even on this explanation the true stamen is phyllomic; the fact that foliage leaves often have stipules ought not, in a consideration of this interesting subject, to be overlooked. Mr. Meehan's observations may throw some light on the herotaxy of the floral organs.—(*Proc. Acad. Nat. Sci.*, Philadelphia, 1886, p. 9).

STRUCTURE OF LINGULA PYRAMIDATA.—From a very important memoir on the structure of this species by Dr. H. G. Beyer, we condense the following. In 1870, when Mr. Dall was studying the species of Lingula, he separated those species which he found provided with raised fulcra for the attachment of certain muscles, forming a median septum or one or two divaricating septa on the other valve, and formed for them the genus Glottidia. All of the known species (four to six in number) are exclusively to be found in American waters, while not a single species of Lingula has been found to occur in America. While the true Lingulas are almost always attached to a fixed rock or stone, Glottidia attaches itself, if at all, only when adult, and usually to a very small pebble or bit of shell. As to the structure of the shell, the author confirms in great measure the observations of Gratiolet, but describes the cuticle as a thin homogeneous layer, and immediately beneath it, sometimes aggregated in clusters, sometimes arranged in linear series, and at other times again irregularly scattered, he found a series of little round bodies, staining with hæmatoxylin, homogeneous, and without nuclei; these are regarded as homologous if not analagous to the bodies occurring within the organic septa in the shell of the Testicardine Brachiopods. Immediately adjacent to the cuticle and this layer of bodies comes a broad layer of horny substance and internally a thin calcareous layer, and these horny and calcareous layers alternate with each other in a number varying with the age of the animal. Towards the periphery the cuticle and horny layer alone are found, and these join the supporting layer of the mantle margin. A very intimate structural relationship exists between the body-wall, the mantle, and the peduncle. It seems doubtful whether the structures described by Vogt, Owen, Hancock, and others as muscles are in reality muscular in character. All the true muscles are smooth muscle-fibres, but other so-called muscles seem to be rather mesenchymatous supporting substance, lacking contractility, but perhaps possessing elasticity. The author's observations on the vascular system confirm rather the views of Shipley, Schulgin, and Morse than those of Hancock, and no central propelling organ over the posterior slope of the stomach was on transverse sections found. The number and division of the nervous ganglia indicated by Hancock for Waldheimia seem to be the same in Lingula, though Hancock's views have lately been criticised by Van Bemmelen. Hancock's details as to the reproductive organs are in great measure confirmed. Three excellent plates of anatomical details accompany this memoir.—("Studies from the Biological Laboratory, Johns Hopkins University," vol. iii. No. 5, March 1886.)

THE CUCKOO.—In the note on the cuckoo in the Biological Notes of April 1 (p. 519, line 6 from bottom), *January* was inadvertently printed for *June*.

[1] *Bacterium rubescens*, Lank.

NOTE ON EARTHQUAKES IN CHINA[1]

I HAD prepared for presentation to the Seismological Society of Japan a tabulated account of earthquakes that have been recorded in Chinese annals for the past thirty-seven centuries, but it was destroyed by fire during a riot last winter, and with the paper were destroyed also the works from which the seismic facts were derived. Perhaps, however, some general remarks which those records suggest may not be devoid of value.

Nothing can be inferred anent the relative frequency and destructiveness of earthquakes in ancient and modern times from Chinese history; from the earliest recorded earthquakes of Mount Tai in Shantung 1831 B.C. to the commencement of the

[1] Communicated to the Seismological Society of Japan by D. J. Macgowan, M.D.