habits. He established a fish-farm on his own estate, and watched over it for many years. He divides his subject into five parts. In the first place, he discusses the fish supply of Bengal, and in doing so shows that the supply is frequently not equal to the demand—a fact due chiefly to the absence of skilled fishermen. And so it happens that at various seasons breeding and unmatured fish are brought to market to meet the demand. The second chapter treats of the best food for fish; the third of hatching and breeding, and the proper precautions to be taken at those times. The fourth part deals with the question from a commercial and speculative point of view. A little capital, the author says, if wisely invested in pisciculture and in fisheries produces a greater return than in any other industry; for while, as Prof. Huxley says, an acre of land will produce in the year a ton of grain or two or three hundredweight of meat, the same extent of water in a good fishing-ground will yield a greater weight of fish in a week. The author begs of his countrymen to pay attention to this much neglected subject; he puts his practical experience before them, and thinks, that in a country like Bengal, where fish forms a large portion of the dietary of the people, it is a pity that more is not known of this subject. One of the most valuable portions of this little work is the fifth, in which he gives a scientific description and classification of almost all the known fish in the waters of Bengal, with their Bengalee equivalents.

THE additions to the Zoological Society's Gardens during the past week include two Stock-Doves (*Columba œnas*), British, presented by Lieut.-Colonel W. G. Dawkins; a Gayal (*Bibos frontalis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

DISTRIBUTION OF THE SUNSPOTS OF 1886 AND 1887.—Prof. Spoerer points out in a short note in the *Astronomische Nachrichten*, No. 2828, that the predominance of the southern hemisphere over the northern as to the numbers and areas of sunspots which they have displayed has continued throughout the two years just past. It would seem, indeed, as if the maximum for the southern hemisphere had fallen later than for the northern, for after the last return of the great group of November 12–25, 1882, the latter hemisphere became comparatively quiescent for a considerable time, and from that date the predominance of the southern hemisphere has been almost uninterrupted, the displays it exhibited during the latter part of 1883 and the earlier months of 1884 being so considerable and so numerous as to make the date of maximum the same for the sun as a whole as for the southern zone. So in the decline since the maximum, not only has the mean spotted area of the northern hemisphere been scarcely more than half that of the southern, but the running down in latitude has been more marked in the former than the latter. Thus in 1884, the northern zones above lat. 25° were already free from spots, whilst in the south the zone 25° to 30° was still occupied. In 1886 spots had ceased to be seen in the zones north of N. lat. 20°, but were still seen in the corresponding southern belt; whilst in 1887 they had almost vanished from the zone N. lat. 15° to 20°, though still fairly numerous at a like distance from the equator on the other side. The actual distribution of the spots is shown by Prof. Spoerer in the following table:—

Year.	+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°	−25°	Totals. N.	Totals. S.
1886	17	30	40	14	50	45	68	47	5		101	215
1887	2	22	15	14	19	56	27	14			53	116

THE TOTAL ECLIPSE OF THE MOON, JANUARY 28.—By the kindness of Dr. E. Lindemann we are enabled to give the following further list of occultations observed during the total eclipse of the moon on January 28:—Amherst, U.S., 7; Clinton, U.S., 3; Copenhagen, 25; Harvard College, U.S., 23; Madrid, 20; Montreal, 6; Moscow, 15; Nice, 24; Princeton, U.S., 8; Toulouse, 13; Utrecht, 15; Washington, 11; West Point, U.S., 2. The weather was also favourable at the Birkdale Observatory, Southport, and at Berlin and Dun Echt; but at the last two Observatories, and also at Lord Rosse's, the occultations were not observed. The sky was cloudy at Herény, O'Gyalla, Quebec, Rió Janeiro, Stockholm, and Vienna.

SPECTROSCOPIC DETERMINATION OF THE ROTATION PERIOD OF THE SUN.—Mr. Henry Crew, Assistant in Physics at the Johns Hopkins University, has recently published (*American Journal of Science*, February 1888) a series of observations made with a fine Rowland grating of 14,436 lines to the inch, of the relative displacement of certain lines in the solar spectrum, as given by the opposite limbs, with a view to determine the rotation period of the sun. The result which he obtained from 455 settings in the course of observations ranging over four months and a half, gives, for the mean equatorial velocity, $v' - v'' = 2{\cdot}437 \pm {\cdot}024$ miles per second, corresponding to a true period of 25·88 days. But an unexpected and remarkable circumstance was brought out by the investigation, in that the observations seemed to show a gradual *increase* of daily angular motion with higher heliographical latitude, whilst, as is well known, Carrington found a *decrease* of such motion for the spots. Mr. Crew gives for the equation of this change—

$$v = 1{\cdot}158 \cos \chi^\circ (1 + 0{\cdot}00335 \chi^\circ),$$

whence we have for the daily angular motion of any point in the reversing layer—

$$\theta = 794' (1 + 0{\cdot}00335 \chi^\circ),$$

whilst Carrington obtained for the sunspots—

$$\theta = 865' (1 - 0{\cdot}191 \sin^2 \chi^\circ).$$

The greatest irregularities in the value of $v' - v''$ occurred between the latitudes 15° and 25°, *i.e.* in the chief spot zone.

It should be added that different lines gave different values of $v' - v''$, with nearly as large a range as the different latitudes did, but there appeared to be no connection between the order of the velocities and the order in which the elements causing the lines observed are generally supposed to be distributed in the solar atmosphere. The double line, 1474 K, of which one component is due to iron, and the other is the line of the corona, gave no evidence of variation in width on one limb, as compared with the other, so if the two lines be produced by absorption from different layers, those layers cannot be drifting with respect to each other at a higher rate than one-third of a mile per second.

The spectrum of the fourth order was used throughout. Attempts were made to measure the relative displacement of the D_3 line, as given by opposite limbs, but with this dispersion the definition was not sufficiently good to permit satisfactory measures of the line to be made.

NEW MINOR PLANET.—A new minor planet, No. 273, was discovered on March 8, by Herr Palisa at Vienna. This is Herr Palisa's sixty-first discovery.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 MARCH 25–31.

(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 March 25

Sun rises, 5h. 51m.; souths, 12h. 5m. 54·3s.; sets, 18h. 20m.: right asc. on meridian, 0h. 19·4m.; decl. 2° 6′ N. Sidereal Time at Sunset, 6h. 34m.

Moon (Full, March 27, 22h.) rises, 15h. 12m.; souths, 22h. 28m.; sets, 5h. 29m.*: right asc. on meridian, 10h. 43·4m.; decl. 10° 51′ N.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	5 10 ...	10 27 ..	15 44 ...	22 40·8 ...	9 9 S.
Venus ...	5 10 ...	10 23 ..	15 36 ...	22 36·7 ...	9 59 S.
Mars ...	20 12*...	1 34 ...	6 56 ...	13 46·0 ...	8 10 S.
Jupiter ...	23 54*...	4 6 ...	8 18 ...	16 18·6 ...	20 25 S.
Saturn ...	11 54 ...	19 53 ...	3 52*...	8 7·6 ...	20 48 N.
Uranus...	19 12*...	0 47 ...	6 22 ...	12 58·8 ...	5 32 S.
Neptune..	7 49 ...	15 30 ...	23 11 ...	3 44·1 ...	18 6 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich).

March.	Star.	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image. ° °
28 ...	80 Virginis ...	6 ...	19 49 ...	20 43 ...	10 230
31 ...	η Libræ ...	6 ...	1 20 ...	2 30 ...	61 234