

picking up food for them, calling them together on the approach of danger, and even "brooding" them at night. A case was communicated to him a few years since by Dr. James Gale, in which a turkey cock incubated six fowl's eggs during the whole period, successfully producing three chickens, and continuing to treat them with all the care of a hen. The hen turkey with which he had been mated was unfortunate in her brood, and this circumstance appears to have impelled him to take possession of the fowl's eggs. Besides the fact that in a considerable number of species the male not only takes his turn at incubation, but continues, equally with the female, to feed the young after they have left the nest, we have the case of the male emu, who performs the task of incubation alone. The male ostrich, too, as observed in a semi-domestic state, undertakes a large, and sometimes it would seem the entire, share of nidification. When the pair of Apterix in the Zoological Gardens nested, the male alone sat assiduously during fifteen weeks on the two eggs, which, however, proved infertile. A correspondent from Melksham also records a case in which a bantam cock brought up a brood of chickens, the mother having died when they were two days old. Mr. Hyde Clarke quotes instances of similar care bestowed by male dogs and cats in Turkey on the young.

THE curious case of the emu is described in a letter from Mr. Alfred Bennett, who had an opportunity of watching the habits of this bird, which was, during several seasons, successfully bred by his father in Surrey. The hen bird, says Mr. Bennett, begins to lay about the end of October or beginning of November, and as each brood consists of twenty eggs or more, laid at intervals of two days, the process takes about six weeks. Before it is completed, the cock bird begins to sit. The eggs laid subsequently are deposited by the hen by the side of her mate, who puts out his foot and draws them under him. As soon as the eggs begin to hatch it is necessary to isolate the hen, as she fights furiously with her mate, and would to all appearance kill the chicks if she were allowed to get at them. The whole of the tending of the young is performed by the male bird.

AN opah, or king-fish (*Zeus luna*), which is an exceedingly rare fish, was recently captured off the Shetland Islands and brought to the Colonial and Indian Exhibition for inspection. The specimen, which is in perfect condition, measures about 5 feet in length, and weighs 160 pounds. The colours of the sides and back are dark green intermingled with gold and purple, while the irides are red. The opah seems to possess peculiar migratory propensities, being found at various parts, even in Eastern seas. The habits of this fish seem to be little known, but Mr. W. August Carter, of the Colonial and Indian Exhibition, states that, according to inquiries and investigations he has made, the opah varies its diet according to the locality it inhabits, and that when visiting the British Islands it feeds chiefly upon herrings and cuttlefish.

IN one of the Courts of the Colonial and Indian Exhibition is a very fine raven, presented by the Maclaine of Lochbuie. This bird, on account of its sagacity, creates much amusement and interest amongst visitors. On being fed it partakes of so much of the food as it requires, then hides the remainder in certain parts of its habitat beneath pieces of paper and other articles that happen to be about. As many as four hiding-places are made use of by the raven for storing its food, which it exhumes when desirous of feeding. It is a curious fact that the raven only resorts to such stratagems when being watched by the public, at other times this sagacious bird consumes its meals in their entirety at one time.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. Albert Thorne; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. S. R.

Hicks; a Prairie Wolf (*Canis latrans* ♀) from Winnipeg, presented by Mr. Gerald F. Talbot; a Common Fox (*Canis vulpes*), British, presented by Mr. A. Browning Priestley; a Brown Bear (*Ursus arctos*) from Asia, presented by Capt. Asher Smith; a Stein-bok Antelope (*Neotragus tragulus*) from South Africa, presented by Mr. W. J. Robertson; two Violaceous Night Herons (*Nycticorax violaceus*) from South America, presented by Dr. A. Boon, F.R.C.S.; a Mona Monkey (*Cercopithecus mona*) from West Africa, a Grey Squirrel (*Sciurus cinereus*) from North America, a Greater White-crested Cockatoo (*Cacatua cristata*) from Moluccas, deposited; six — Souseliks (*Spermophilus* —), five American Flying Squirrels (*Sciuropterus volucella*) from North America, two Glass Snakes (*Pseudopus pallasi*) from Dalmatia, purchased; two Mule Deer (*Cariacus macrotis* ♀ ♀), a Yak (*Poepbagus grunniens* ♀), four Long-fronted Gerbilles (*Gerbillus longifrons*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

METHOD OF CORRECTING FOR DIFFERENTIAL REFRACTION IN DECLINATION.—Mr. McNeill, of the College of New Jersey, Princeton, has published in the *Astronomische Nachrichten*, No. 2735, a method of correcting micrometer observations for refraction which was devised originally for the diagonal-square micrometer, but is applicable also to the ring micrometer and others of the same class. In this method the correction to the difference of declination is not determined separately, but the true difference is directly determined, the corrections being applied to the logarithms in the course of the computation. Mr. McNeill shows that if we apply the number given by

$$M\kappa(\tan^2 \zeta \sin^2 q + 1)$$

to the logarithm of the half chord traversed by the star, and the corresponding number deduced from

$$M\kappa(\tan^2 \zeta \cos^2 q + 1)$$

to the logarithm of the apparent distance, measured on a circle of declination, from the point of reference in the micrometer, the result obtained will be the true distance corrected for refraction. In the above expressions *M* is the modulus of the common system of logarithms, *κ* the constant of differential refraction, *ζ* the true zenith distance, and *q* the parallactic angle. It is then only necessary to tabulate the expression

$$M\kappa\{\tan^2 \zeta \cos^2(\rho - q) + 1\}$$

with arguments *ρ - q* and *ζ*, adding subsidiary tables giving barometer and thermometer factors, in order to obtain the quantities required (by making *ρ* alternately = 90° and = 0°) to correct the micrometer observations for differential refraction in declination. This Mr. McNeill has done, and his tables will doubtless be of much use to observers using the class of micrometer to which the method is applicable.

NEW MINOR PLANET.—A new minor planet, No. 259, was discovered by Prof. C. H. F. Peters, Clinton, New York, on June 28. Minor planet No. 253 has been named Mathilde.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 JULY 11-17

(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 July 11

Sun rises, 3h. 58m.; souths, 12h. 5m. 12'6s.; sets, 20h. 12m.; decl. on meridian, 22° 6' N.; Sidereal Time at Sunset, 15h. 30m.

Moon (three days after First Quarter) rises, 15h. 49m.; souths, 20h. 38m.; sets, 1h. 22m.*; decl. on meridian, 15° 14' S.

Planet	Rises		Souths		Sets		Decl. on meridian
	h.	m.	h.	m.	h.	m.	
Mercury	...	6 17	...	13 51	...	21 25	... 17 0 N.
Venus	...	1 32	...	9 30	...	17 28	... 20 42 N.
Mars	...	11 8	...	17 2	...	22 56	... 1 59 S.
Jupiter	...	10 31	...	16 42	...	22 53	... 1 22 N.
Saturn	...	3 30	...	11 39	...	19 48	... 22 25 N.

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

Occultation of Star by the Moon (visible at Greenwich)

July	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
17 ...	B.A.C. 7097 ...	6 ...	h. m. 3 44 ...	h. m. 4 55 ...	130° 32'

Variable Stars

Star	R.A.		Decl.		h. m.
	h.	m.	°	'	
U Cephei ...	0	52'2 ...	81	16 N. ...	July 13, 23 52 m
U Libræ ...	14	34'0 ...	17	10 S. ...	15, 0 M
δ Libræ ...	14	54'9 ...	8	4 S. ...	17, 22 14 m
U Coronæ ...	15	13'6 ...	32	4 N. ...	15, 0 40 m
U Ophiuchi ...	17	10'8 ...	1	20 N. ...	12, 1 26 m
and at intervals of 20 8					
X Sagittarii ...	17	40'4 ...	27	47 S. ...	July 17, 2 0 M
W Sagittarii ...	17	57'8 ...	29	35 S. ...	16, 0 0 M
U Sagittarii ...	18	25'2 ...	19	12 S. ...	16, 2 0 m
R Lyræ ...	18	51'9 ...	43	48 N. ...	13, 0 M
T Sagittarii ...	19	9'7 ...	17	10 S. ...	12, 0 M
R Sagittarii ...	19	10'0 ...	19	30 S. ...	12, 0 M
δ Cephei ...	22	24'9 ...	57	50 N. ...	15, 3 0 M

M signifies maximum ; m minimum.

GEOGRAPHICAL NOTES

THE report published by Lieut. von Nimptsch, of the German army, gives some very interesting details of the journey he made with Herr Wolf, a traveller in the service of the Congo Free State, and which has resulted in the discovery of a river likely to be of material value to traders with the Congo. The Congo, in its course from the south-east, makes a very wide bend to the north, and then descends again to the Atlantic, a very large tract of country being embraced in this curve. Within this is the River Kassai, which Lieut. von Nimptsch regards as being "of even greater importance to commerce than the Congo itself." Describing their journey he says that, as far as Luebu, the Kassai flows through wide plains, well adapted for cultivation and pasturage, and forests of palms and gutta-percha trees. There are many villages on the banks, and the travellers met with great civility in all of them save one, the inhabitants of which fled at their approach. "One tribe," adds Lieut. von Nimptsch, "was remarkable for its joviality. The natives accompanied the steamer in their canoes, and when we could, organised dances and songs in our honour." There is a great deal of ivory all along the Kassai, and large pieces of the finest quality were readily given in exchange for empty boxes and tins. They discovered several affluents of the Kassai, and they calculated that they were navigable for a distance of 250 miles. "But the most important affluent," the report goes on to say, "is that which Herr Wolf explored in the steamer *Vorwärts* during the months of February and March. He ascended this stream to a distance of 430 leagues from its mouth, and one of its northern affluents brought him to within a week's march of Nyangwé. He might have gone still further had his steamer not met with an accident, for there are no cataracts in this river. All this network of navigable water, extending over more than 3000 miles, is most admirable, and in future it will be possible to travel eastward from the Atlantic, reaching Nyangwé and then Lake Tangyuteka by leaving the Congo at the mouth of the Kassai, without being obliged to ascend the whole of the former stream, thus avoiding the Stanley Falls."

A TELEGRAM from Zanzibar, of the 30th ult., states that Dr. Fischer had returned there. He has not succeeded in rescuing Herr Junker, the African traveller, who, when last heard of, was in the region north of Uganda.

A VERY interesting discussion which took place at the St. Petersburg Society of Naturalists after the reading of a paper by Prof. Beketoff on the South Russian steppes as compared with those of Hungary and Spain is now summed up in the *Memoirs of the Society* (vol. xxv. 2). The Russian steppes between the Pruth and Don, although belonging to the great "steppe region" of Grisebach, differ, however, from the remainder of the region inasmuch as they support agriculture without irrigation. They are akin, in this relation, to the Hungarian *pueblas*. Being comparatively well watered, they belong more to Europe than to Asia, while those beyond the Don and the Volga bear a

truly Asiatic character. As to the *desiertos* of Spain, they are more akin to the deserts of Africa than to the steppes of either Central Asia or Europe; they have, however, some likeness to those of Transcaucasia. As to the causes of the want of forests in the Russian steppes, Prof. Beketoff explained it by the circumstance that, being covered with salt-clays, after the emergence from the sea, they were, first, inappropriate to the growth of forests. As the surface, however, lost by and by its salt and became covered with grasses, masses of ruminants were attracted into the region, and these ruminants prevented the appearance of trees, destroying them as soon as they appeared; the climate being most unfavourable for the spreading of forests, the ruminants were also an important factor in the prevention of their appearance. The American buffaloes are an instance of the same influence. Dr. Woeikof fully confirmed the view taken by Prof. Beketoff, but pointed out that the burning of the steppes by man played also a most important part in the prevention of the appearance of forests. In America he was told of several instances where the trees began to grow as soon as the burning of prairies was stopped. Cattle are surely a great enemy of appearing forests. The very dry season of 1857 partly destroyed the cattle in Texas, and partly compelled to send it away to the mountains, and immediately the *Mesquita* began to spread in the prairies. It had time to take root before the cattle were brought back, and now it grows freely. The same has been seen on the *llanos* of Venezuela. The continuous wars and requisitions have led to a notable diminution of cattle, and now we do not find the boundless steppes of former times; there are at least bosquets of trees. Mr. Jonas supposes that this change has even slightly modified the climate. Prof. Soyvetoff supported the same views, pointing out that cattle are an enemy not only of forests, but also of the grass covering of the steppes. He mentioned an instance of a large estate of 800,000 acres of virgin steppes in Taurida, where nearly half a million of sheep are grazing. The grass vegetation on these steppes has become strikingly poor, so that the cattle-owners calculate that for each sheep they must have 4.6 acres of grazing-land, 21.6 acres for each head of horned cattle, and 27 to 32 acres for each horse. The black-earth soil, when continually trampled on by the sheep, hardens as well as a clay soil would harden; the soil is thus no more aerated, and becomes unable to support a rich grass vegetation.

THE *New York Times* announces that Lieut. Schwatka, the Arctic explorer, has accepted a commission from that paper to explore the southern coast of Alaska and to attempt an ascent of Mount St. Elias, the highest peak on the North American continent. Mr. William Libbey, Professor of Geography at Princeton College, has undertaken the charge of the scientific portion of the expedition, which left Port Townsend on the 14th inst.

THE three papers contained in the current number of the *Proceedings of the Royal Geographical Society* are of exceptional value and interest. Mr. James W. Wells describes the physical geography of Brazil in its broad features. He shows that the idea fostered by most maps that Brazil is a very mountainous country is wholly erroneous, and that it is mainly a vast plateau, excavated into numerous valleys by denudations, with relatively few purely mountain chains. As shown by the map accompanying the paper, the four main physical features of the country are (1) the vast, low-lying, flat plains of the Amazons, and the flat, grassy plains of the Paraguay; (2) the elevated highlands that extend over the greater part of the empire; (3) the higher lands constituting the watersheds of the principal rivers; and (4) the groups of mountain ranges consisting of primitive rocks of purely upheaved strata. Mr. Wells then takes the three great hydrographic sections of Brazil, and treats of each in turn. Mr. Hosie describes one of the many journeys which he made through South-Western China while residing as agent at Chungking, the particular journey selected being one which carried him over new ground. A map which is appended shows the vast area covered by Mr. Hosie in his various journeys throughout Sze-chuan, Yunnan, and Kweichow provinces, and the very interesting observations on trade, present and prospective, in these regions show that his commercial duties have not been forgotten in the ardour of exploration. Mr. Bourne writes a paper on Diego Garcia, the principal of the Chagos Islands, which have recently received much attention on account of their position near the Red Sea route to Australia. The writer visited this remote spot to study the fauna and flora, and to make a collection of the corals of this part of the Indian Ocean.