

galerita) from Australia, presented by Miss Amy M. Dundas; three white-tailed Gaus (*Connochates gnu*, ♂ ♀ ♀) from South Africa, deposited; a Burchell's Zebra (*Equus burchelli*, ♀), two Silver-backed Foxes (*Canis chama*), a Cape Bucephalus (*Bucephalus capensis*) from South Africa, a Salvin's Amazon (*Chrysotis salvini*) from South America, purchased; four Upland Geese (*Bernicla magellanica*) from the Falkland Islands, received in exchange; four Coypus (*Myopotamus coypus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET HOLMES (1892 III.).—This comet has now become rather a difficult object, but the following ephemeris may be useful for those employing large instruments:—

12h. Paris Mean Time.		R.A. (app.)			Decl. (app.)	
1893.		h.	m.	s.	°	'
March 16	.....2	55	29	0	+ 35	27 53
17	.....	57	16	1		30 43
18	.....2	59	3	5		33 33
19	.....3	0	51	1		36 23
20	.....	2	38	9		39 13
21	.....	4	27	0		42 2
22	.....	6	15	3		44 51
23	.....3	8	3	8	35	47 40

THE SIZES OF JUPITER'S SATELLITES.—M. J. J. Landerer describes in the *Comptes Rendus* some experiments made to test the accuracy attainable in measuring the diameters of satellites by their shadows cast on the primary. He took a finely-ground glass plate and blackened it, leaving a space in the middle representing the appearance of Jupiter with its bands and small black spots representing shadows. He then placed it at a distance of 314 m., illuminated it by a suitable light from behind, and sketched the disc through the telescope used for the actual observations. With some practice it was found possible to draw such spots correctly to within one-tenth per cent. M. Landerer then applied his method to the satellites themselves, and found the following numbers for their radii:—0.0199, 0.0184, 0.0435, and 0.0419. The number of observations was twenty-six for the first satellite, seventeen for the second, thirty for the third, and twenty-two for the fourth. The commonly accepted numbers, obtained by micrometric measurements of the bright satellites, are 0.0291, 0.0259, 0.0431, and 0.0367.

OBSERVATIONS OF THE ZODIACAL LIGHT.—In No. 3155 of the *Astronomischen Nachrichten* Mr. Arthur Searle gives an account of the experimental work he and Prof. Bailey have been carrying on with respect to the best methods of making and recording observations of the zodiacal light. Owing to the prevalent use of electric light in the neighbourhood of Harvard College Observatory, the observations were made at some distance away. The general mode of defining the position of the zodiacal light up to the present has been by drawing its outline on a star atlas exactly as it appeared in the sky at the time of observation. The great drawback about this method is that in the majority of cases the zodiacal light has no definite outline, but gradually decreases in brightness as one recedes from the axis of the figure, eventually fading imperceptibly away. That this is so is the general idea and is backed up by observations, but it is also true that the contour, so to speak, of the luminous figure is sometimes sharper at some places than at others. Instead of outline drawings these observers have substituted contour lines in which the degree of light represented by each contour is stated; the latter is accomplished by selecting a portion of the sky "unaffected by the zodiacal light, but of equal brightness with those portions traversed by the contour line." This region would naturally lie near the Milky Way and its situation is defined by the stars in the vicinity. To complete the record the geographical position of the observer's station and the time of observation should be included in the statement. In addition to the contour lines two other suggestions are put forward, (1) that the axis of brightness should be indicated by a line, and (2) that should there be distinctly observed by any chance two cones of light, an outer and an inner, such a distinction should be shown in the record by drawing a boundary between them.

WEINEK'S LUNAR ENLARGEMENTS.—Since the appearance of the magnificent enlargements obtained by Dr. Weinek from the Lick Observatory negatives, many details of surface structure have been brought to light which have up till now evaded even the aided eye. These details, consisting as they do of winding rills, valleys, and hair-like markings, appear quite sharp and distinct in contrast with the larger surface features, and it is this fact that has caused some uncertainty about their being actual features on the lunar surface. Every one acquainted a little with photography knows that a photograph loses in sharpness the more it is enlarged, and it is here very curious to find a picture after being twenty times enlarged with minute details quite crisp and sharp, and the larger portions quite fluffy, as is the case in the enlargement of Vendelinus, taken on August 31, 1890. As Mr. Elger remarks (*Observatory*, March), "if these curious markings represent actual features on the moon's surface, ought they not to be easily seen in any good telescope that shows the formation and its principal details with far greater sharpness than the twenty-times enlarged negative, and many small craters, &c., in addition which are scarcely traceable upon it? One does not understand why this should not be so, unless these objects make an impression on the sensitive plate that they fail to do on the retina, which is hardly likely to be the case." M. Faye, in *Comptes Rendus* (No. 9) for March, when referring to these enlargements, says that several members, MM. Fizeau, Mascart, and Cornu included, reserved their opinions on the interpretation of these markings, which seemed to be the results of retouching. "Certain vermiculees appearances," says he, "show a clearness which is strictly in contradiction with the very general 'estompée' appearance of the lunar cliché."

"L'ASTRONOMIE" FOR MARCH.—The March number of this magazine commences with some observations of Jupiter made at the observatories in Juvisy, Bruxelles, and in Spain during the past year. The numerous drawings which accompany the observations impress one with the incessant change that is taking place in the dense atmosphere, while the large red spot was as usual seen ploughing its way apparently through one of the dark belts. The period of rotation of this spot seems to have suffered a retardation during the last twelve months, as will be seen from the following table, which we take the liberty of producing here:—

h. m. s.			h. m. s.		
1879	...	9 55 35.7	1886	...	9 55 40.1
80	...	35.0	87	...	40.1
81	...	36.1	88	...	40.2
82	...	37.2	89	...	40.3
83	...	38.1	90	...	41.5
84	...	39.2	91	...	42.2
85	...	40.1	92	...	39.3

M. Guillaume, of the Lyons Observatory, contributes some interesting notes on the appearances of Saturn's rings during the same year, at which time it will be remembered we were lying nearly in its plane. Besides the drawings showing the general features of the planet, there are some illustrating the different degrees of luminosity observed at various parts of the ring itself. "The Circulation of Winds at the Surface of the Globe" is the title of an article by M. A. Duponchel, in which he gives as an introduction a brief historical account of the early hypotheses; while M. Flammarion gives us the fifth chapter on "Comment Arrivera la fin du Monde," dwelling for the most part on the destructive forces at work on the earth's surface.

BERMERSIDE OBSERVATORY.—In the advertising sheets of the *Observatory* for March we are sorry to see the following notice:— "On sale (the owner giving up astronomical work) the 3-foot Common reflector, with or without dome, complete, in perfect order. Mirror by Sir H. Grubb. Full particulars on application to J. Gledhill, Bermerside Observatory, Halifax."

GEOGRAPHICAL NOTES.

A TELEGRAM from Port Stanley announces the return of the Dundee whaling ships to the Falkland Islands (see NATURE, p. 282) on their way home. In the two months during which they were absent it is improbable that high latitudes were reached, but it is evident that a cargo was rapidly obtained, although it is not reported whether the species of whale hoped for was found.

THE Geographical Studentship at Oxford lately held by Mr. Grundy has been awarded to Mr. W. H. Cozens-Hardy, New

College. Mr. Cozens-Hardy has already made some interesting journeys in Montenegro and the neighbouring little-known parts of the west coast of the Balkan Peninsula which he intends to study further.

THE expedition of M. Delcommune by Lake Tanganyika appears to have been the most successful of all those sent out by the Katanga Company, as its leader has returned to Leopoldville, and will soon reach Europe to recount his experiences. The expeditions of Captain Stairs and Captain Bia, although successful in reaching their destination, were unfortunate in losing their leaders, and all the parties suffered terribly from sickness and famine. One of the interesting circumstances of these expeditions is the fact that a bronze tablet commemorating the death of Livingstone has been fixed to the tree at Old Chitambo's, where the great traveller died. This tablet was sent out in duplicate by Mr. A. L. Bruce of Edinburgh, son-in-law of Dr. Livingstone, through Mr. Arnot, who being unable to reach Chitambo's himself, entrusted one of the tablets to Captain Bia, by whose party it was placed in position.

MR. MACKINDER's educational lectures, of which the eighth was delivered in the hall of the University of London on Friday night, continue to be well attended. The subject of the lecture was the Alps as a factor in European history, and the series of fine maps specially prepared for projection by the lantern enabled the development of the historical argument to be followed from point to point.

THE March number of the *Scottish Geographical Magazine* contains a valuable note by Prof. Mohn on the climate of Greenland, in which he epitomises his discussion of Dr. Nansen's results, published in a recent *Ergänzungsheft of Petermann's Mittheilungen*, and corrects it by the record of Peary's work. The isotherms (reduced to sea-level) run parallel to the coast, the interior being coldest at all seasons; 30° F. compared with 26° on the coast for January, 30° as compared with 50° for July, and on the average for the year the centre of the land is probably about -10°, while the coast has the temperature of 30°.

THE CHATHAM ISLANDS AND AN ANTARCTIC CONTINENT.

AT the last meeting of the Royal Geographical Society Mr. H. O. Forbes discussed the question of the former extension of an Antarctic continent in relation to certain observations made during a recent visit to the Chatham Islands. The whole surface of these islands, especially Wharekauri and Rangiauria, is covered with a bed of peat in places over forty feet in depth—deeper in the northern part than in the southern—traversable in safety only by those acquainted with the country; for to the inexperienced eye there seems in most places no difference in the surface which can carry with safety both horse and rider, and that on which the lightest-footed pedestrian cannot venture without being engulfed. The surface of some of the larger and wetter depressions in the ground was covered with a brilliant-coloured carpet of luxuriant mosses, emitting an aromatic fragrance, spread out in artless undesigned parterres of rich commingled green, yellow, and purple, and endless shades of these, warning the traveller of the existence of dangerous bogs beneath, and brightening miles of treeless moorland, which, but for those floating gardens, would be uninviting and uninteresting. In many places all over the island this great peat-moss is on fire, and has for years been smouldering underground, or burning in the exposed faces of the great pits which have now been burnt out. Dr. Dieffenbach mentions these fires at his visit in 1840, and states that the combustion had begun before 1834. They appear to have been burning in one part or another of the island ever since Dieffenbach's visit. A peculiarity in the main island that strikes the visitor very early is the occurrence of many lakes and tarns. These lakes are, for the most part, on the eastern side, at the back of the low hills facing Petre Bay. The largest is fifteen miles long, over forty miles in circumference, and about ten and a half miles broad at its widest part.

Mr. Forbes's object in visiting the islands was to look for the remains of a fossil bird, fragments of which had been sent to him in New Zealand. There he discovered in considerable numbers, and found that the bird was no other than a species of *Aphanapteryx*, a large and remarkable member of the rail family, which lived contemporary with the celebrated dodo in

the Island of Mauritius, and was very similar to one of the extinct flightless birds of that island. Here was the only place in the world where it was known to exist, and where it had with the dodo preserved its fading race down to about two hundred years ago, when both of them passed away and perished for ever from among living things. In the Chatham Islands the remains of the *Aphanapteryx* were found in kitchen middens of the Morioris, showing that in this region of the world also it had survived down to comparatively recent date, just as the moa had in New Zealand.

In the Chatham Islands there still live several types of flightless birds scarcely represented elsewhere, except in widely separated oceanic islands. To account for their distribution it is necessary to reason backwards to former distributions of land and sea. The occurrence of similar forms in the three southern continents and in the islands which lie between them is most easily explained by a former Austral continent of considerable northern extension. The outlines of this continent it is of course impossible to trace with anything approaching to accuracy till we are in possession of a larger number of soundings. But it is not unlikely that the great meridional masses of land—or world ridges—which are probably of primeval antiquity extended to meet prolongations northward of the Antarctic continent. There is some evidence that the direct union of South Africa with the other continents was not for so prolonged a period as the others. The presence of the *Aphanapteryx* and other ocydromine birds both in the Mascarene and in the New Zealand continental Islands supports other evidence pointing to an extension of that area south by Marion and Kerguelen Islands, and of New Zealand south, or of the Antarctic land north, by way of the Macquarie, Auckland, and Antipodes Islands. It is interesting to observe that the great Pacific trough to the east of the longitude of New Zealand extends far south into the Antarctic region.

It is not necessary to suppose that all the southerly extending arms were connected contemporaneously with an Antarctic continent. It is impossible to account for the presence, for instance, of some South American forms in Australia and not in New Zealand; of Mascarene forms in the New Zealand region and not in Australia, or in Africa, or elsewhere, while we are unacquainted with the orography, the rivers and mountain barriers, of the submerged southern continent; and its various commissures may have been open at one time and closed at another. As there are, moreover, abundant evidences of great volcanic action over all the region, in New Zealand, South America, Mascarenia, and the Antarctic Islands, the permutations and combinations of the ups and downs of these lands, the openings and closings of the gates, paths, or stepping-stones, are beyond our computation.

The deductions as to an Antarctic continent, made on biological grounds, are supported by the depth of the circumpolar sea, so far as it is known. The submarine plateau of the Austral land slopes northward all round the shores of the known lands more gently than is the case along any other coast, and this would seem to indicate that, if elevated, the land would form in great extent a continuation of the three primal ridges of the globe southward, coalesced and spread out round the Pole, with, between these arms, the terminations of the great and permanent ocean troughs. How far these hypotheses—which are but a restatement, in great measure, of the investigations and conclusions of many distinguished naturalists, geologists, and geographers may be substantiated or refuted by future discoveries it is difficult to say; but the discovery of these interesting *Aphanapteryx* bones on the Chatham Islands must always remain an important factor in the solution of this question.

There was an animated discussion.

ARCHÆOLOGICAL WORK IN AMERICA.

IN his report, just issued, on the Peabody Museum of American Archæology and Ethnology, Prof. Putnam is able to record the results of a very exceptional amount of useful work. This is due to the fact that while the officers of the Museum have discharged their usual duties many special archæological and ethnological researches have also been carried on with a view to the collection of material for the Chicago Exhibition. Prof. Putnam says:—

Never before has such an extensive field of anthropological research been covered in two years' time, and it is desirable to place on record what has been accomplished. In the north,