

off Cape Horn, purchased; an Upland Goose (*Bernicla magellanica*) from the Falkland Islands, a Mute Swan (*Cygnus olor*) European, received in exchange; a Mouflon (*Ovis musimon*), four Shaw's Gerbilles (*Gerbillus shawi*), four Barbary Mice (*Mus barbarus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE MELBOURNE OBSERVATORY.—On September 2 last Mr. Ellery, the Government Astronomer, made his annual report to the Board of Visitors to the Observatory. This report shows that with his staff a great amount of work was got through, the following being a brief summary:—With the meridian circle 3590 observations for Right Ascensions, and 2233 for N. P. D. were made, these numbers including the observations for the places of the guide stars used in the astrographic operations. The great telescope, owing to the demands on the staff for the astrographic work, has not been much in use, the routine work having been dropped altogether. It is pleasing to hear that a good start and considerable progress has been made in the part allotted to them in the photographic chart and catalogue of the heavens. Up to June 30, 278 plates had been exposed, excluding a great number obtained for purposes of testing adjustments, &c., although Mr. Ellery remarks that the weather since May was anything but inviting for such work. With the photoheliograph 201 sun pictures were obtained. The observations and records relating to terrestrial magnetism, meteorology, and intercolonial weather service, and time distribution have been continued as usual with satisfactory results. In the seventh paragraph of the report Mr. Ellery informs us of the necessity that has arisen for the reduction of expenditure. Mr. White, the chief assistant, and Mr. Moerlin, the second assistant, were both called upon to retire on September 30, having attained the age of sixty years, both a considerable loss to the observatory, having served there thirty-one and thirty years respectively, and Mr. Ellery found it necessary to close the observatory workshop, and dispense with the mechanic. In a re-organisation of the duties it will be necessary, he says, to put in abeyance observations with the great reflector, reduce meteorological work, including some photographic registration, stop ordinary extra-meridian observation, except the most important, reduce publications and issue of weather charts, and generally to limit operations to the most important and urgent kind. Such a reduction as this after so many years of smooth working and the loss of two such experienced and efficient officers must fall heavily on Mr. Ellery's shoulders, but we are glad to hear that the new scheme is now in working order. We hope to hear also that Mr. Wallace's services have been retained for the astrographic chart, as Mr. Ellery says in a supplementary report that without him this undertaking will have to be dropped.

NATAL OBSERVATORY.—Just as in his former report, Mr. Nevill, the Government Astronomer, is indebted to several ladies for assistance in the observatory, without whose aid he says the numerous astronomical and meteorological computations and reductions could not have been carried out (Report of the Government Astronomer for the year ending June 30, 1892). Again, he urges the necessity of removing the transit to another position, this instrument being so close to the equatorial that only one of them can be used at a time. Besides the usual observations for the comparison of the declinations deduced from observations made at observatories in both hemispheres, by a comparison (Talcott's method) of the zenith distances of northern stars and southern circumpolar stars, the work for determining the latitude of the observatory has been brought to a conclusion and awaits publication. The work, comparing the Greenwich lunar observations from 1851–1888 with the basis of Hansen's Lunar Tables, comprising a discussion of four thousand observations, has been completed, and auxiliary tables, founded on the corrections thus deduced, are now being formed. Several observations of Mars were made to determine the distance of the sun, and these are at present being reduced.

THE BIELIDS OF 1872, 1885, AND 1892.—In "Our Astronomical Column" on p. 451 we referred to a note by M. Bredichin on the Bielids, in which he said that from observations made last year it seemed very probable that the densest part of this swarm had undergone perturbations,

amounting to a recession of the ascending node of nearly 4°, due to the proximity of the planet Jupiter. In the current number of *Astronomische Nachrichten*, 3156, he further suggests that the swarm has undergone a separation, perhaps into many parts, an analogous case of such a separation having occurred in the comet 1889 I. The force which accomplishes this division he denotes by I. at the commencement of separation and assumes that its direction coincides with the line of the radius vector, being positive and negative when directed towards and from the sun. Denoting by R the radius of the earth at the time of the meeting with the swarm, and the common radius vector, v the true anomaly of this radius in the original orbit, and v_1 that in the derived orbit; representing the angle between this common radius vector and the tangent to the original orbit by β , and with any one on the derived orbit by β_1 , he deduced the following values for the elements of the three orbits, where m is the value of the velocity of commencement for one second of time:—

	Comet.	I.	II.	III.
T	1859 390 G.M.T.	1872 986	1885 983	1892 976
π	109° 50' 4	108° 55' 0	108° 45' 3	108° 59' 2
Ω	246 1 3	—	—	—
i	12 22 0	—	—	—
log a	0 54950	0 55149	0 54833	0 55050
log e	9 87711	9 87788	9 87668	9 87750
log q	9 94123	9 94087	9 94138	9 94103
U	6 672	6 718	6 645	6 695
log R	—	9 99395	9 99397	9 99426
log r	—	9 94216	9 94156	9 94146
v	—	+ 5° 48' 0	- 3° 34' 0	3° 3' 0
v_1	—	+ 6 43 4	- 2 28 9	- 3 54 2
β	—	87 30 5	91 32 0	88 41 4
β_1	—	87 6 5	91 4 2	88 19 3
I	—	- 0 0099	- 0 0116	- 0 0095
m	—	292m.	342m.	279m.

COMET IOLNES (1892 III).—M. Schulhof's ephemeris for this comet gives for the ensuing week:—

1893.	12h. Paris Mean Time.			Decl. (app.)
	R.A. (app.)	h.	m.	
March 23	3 8 3 8	...	...	+35 47 40
24	9 52 5	...	...	50 28
25	11 41 4	...	...	53 16
26	13 30 5	...	...	56 3
27	15 19 8	...	...	35 58 49
28	17 9 3	...	...	36 1 34
29	18 58 9	...	...	4 10
30	3 20 48 7	...	...	36 7 2

PROF. HALE'S SOLAR PHOTOGRAPHS.—Among the latest advancements in obtaining photographs of the sun, including simultaneously the chromosphere, faculae, spots, &c., Prof. Hale has distinguished himself especially in this direction. With regard to the method which he adopts, M. Janssen communicates to the *Comptes Rendus* for March 6 (No. 10) a few words. I ask the Academy, he says, "la permission de lui faire remarquer que le principe de cette seconde fente a été très nettement indiqué par nous dans les Communications faites à l'Académie en 1869, et, avec plus de détails, dans une Communication faite au Congrès de l'Association britannique tenu à Exeter la même année."

GEOGRAPHICAL NOTES.

THE recognition accorded to geography in the University of Cambridge is not confined to the lectureship. The subject of the English essay proposed for competition this year by members of the University is announced as "The influence exercised upon British literature by the geographical features of the country." Probably "conditions" would convey the meaning better than "features," but apart from such detail, the subject is one likely to turn the attention of competitors to a much neglected matter—the geography of their own country.

THE survey of Greece is being actively carried on by the Austrian Government surveyors, who undertook the work in 1889. The primary triangulation is already completed, and while filling in the topographical details of the provinces of Thessaly and Albania the survey officers will be accompanied

by an Austrian botanist and geologist from whose studies much new information is expected:

ONE of the interesting minor results of M. Dybowski's recent journey from the Mobangi to the Shari was the discovery that the natives of that part of the Sudan use chloride of potassium instead of chloride of sodium to season their food. They carefully select plants which on burning yield an ash containing a minimum of carbonates, and extract their "salt" by boiling water, subsequently filtering and evaporating the solution.

DR. A. GLOY has recently published a very interesting discussion of the population of Schleswig-Holstein, tracing its distribution to the character of the land. In order to represent graphically the cause and effect on the same paper, the various agglomerations of people from single cottages to towns of over 2000 inhabitants, are shown by dots of increasing size on a geological map. It thus becomes apparent that the population is arranged so that the fertile fenlands and clay ridges which run from north to south are relatively thickly peopled, while the belt of sandy and barren soil separating them has few houses except along its boundaries. The type of dwelling in rural villages is also found to vary, showing a clear relation to the former extension of the Slav tribes westward before the time of Teutonic predominance.

In a careful study of the political divisions of the earth, Dr. A. Oppel has come to the conclusion that about 1,700,000 square miles are uninhabited or ownerless, about 5,000,000 square miles more without settled government, and the remaining 45,000,000 square miles are occupied by definite states. He recognises seventy-five such states, but most of them are of such insignificant superficial extent that the eighteen largest make up 87 per cent. of the whole area.

FLIES AND DISEASE GERMS.

AS we become more intimately acquainted with the nature of pathogenic micro-organisms, the manner in which their distribution takes place also becomes more intelligible. For several years past, through researches made by Grassi, Cattani, and Tizzoni, it has been known that flies are capable of disseminating cholera bacteria. These authors placed minute quantities of these bacilli on to the bodies of flies and found that after carefully preserving them under a glass shade in diffused daylight for an hour and a half and longer, when introduced into sterile culture media these flies gave rise to typical cholera growths. These results have quite recently been confirmed by Simmonds. Further experiments on the part played by flies in the propagation of disease germs have been made by Celli, who fed flies with the sputum from phthisical patients, also with pure cultivations of the typhoid bacillus, of anthrax, and other organisms. The particular microbes experimented with were afterwards demonstrated in the excreta of these flies, partly by microscopic examination and partly by direct inoculation into animals. The latter method was especially successful in the case of the anthrax and tubercle bacilli. A paper which has just appeared by Sawtschenko in the *Centralblatt für Bakteriologie*, vol. xii. p. 893 ("Die Beziehung der Fliegen zur Verbreitung der Cholera") contains an account of some experiments which the author has made on the fate of cholera bacilli when introduced into flies. The flies used in these investigations were (1) the common small house-fly and (2) a much larger variety, which, from the description given, would seem to answer to our so-called "blue-bottle fly." It was further marked by its rapid flight, its rare occurrence within doors, by feeding on all manner of decaying substances, besides being frequently found on articles of food of all kinds. These flies were placed in shallow dishes containing a few drops of broth infected with cholera bacilli, after which they were removed and fed on raw meat or sterile broth. In some cases the excrements of cholera patients were substituted for the cholera cultures. It would appear very difficult to keep flies alive in captivity, for the healthy as well as those experimented upon died in nearly all cases after twenty-four hours; in only very few instances was it possible to preserve them four days. Not only were the excreta of the flies carefully examined for cholera bacilli, but in

many cases the whole contents of the abdominal cavity were removed with all the proper antiseptic precautions, and inoculated into culture tubes. This latter practice was adopted in order to satisfactorily dispose of all suggestion of the presence of cholera germs in the excreta being due to their accidental contamination from the feet of the flies themselves. In all cases cholera bacilli were found, both in the alimentary tract and in the flies' excreta. Moreover, guinea pigs inoculated with cultivations of cholera microbes obtained from the former died quite as rapidly as when inoculated with ordinary cholera cultures, thus showing that their virulence had not been impaired through residence in the fly's body. In the intestinal tract of those flies fed with cholera excreta, not only were cholera bacilli found, but also other organisms resembling the vibrio Metschnikowi Gamaleia, and which on inoculation into guinea-pigs and pigeons killed them in twenty-four hours. Similar results were obtained when the vibrio was separated out directly from the cholera excreta and inoculated into these animals. Thus in this case also the virulence of the organism had undergone no abatement during its sojourn in the fly's alimentary tract, thus fully confirming similar results with other organisms obtained by Celli. Sometimes enormous numbers of cholera bacilli were found in the alimentary tract of flies after seventy-two hours, in spite of their having been fed after the first infection with nothing but sterile broth, with the object, if possible, of washing out the bacilli. Sawtschenko makes the alarming suggestion that the bacilli may very possibly be able, under suitable conditions of temperature and nourishment, to multiply within the bodies of flies, in which case the latter must not only be regarded as dangerous carriers of infection, but as a hot-bed for the preservation and further multiplication of cholera bacilli.

SCIENTIFIC SERIALS.

American Journal of Science, March. The specific heat of liquid ammonia, by C. Ludeking and J. E. Starr. The liquid ammonia used in the experiments was found to contain 0.3 per cent. of moisture, and on spontaneous evaporation to leave only a trace of residue. The specific heat was measured by Regnault's method, the liquid being enclosed in a steel tube of 16.122 cc. capacity, stoppered by a steel screw. The mean value for the specific heat deduced from two series of experiments was 0.8857. —A short cycle in weather, by James P. Hall. If a diagram is drawn exhibiting the changes of daily mean temperature in New York city for a few months it will be discovered that these fluctuations occur every three or four days, on an average, but that some have much greater amplitude than others. In the course of four weeks, perhaps, there will be only two or three conspicuous rises and falls. Upon further scrutiny there will be observed a tendency in these more prominent features of the curve to repeat themselves at intervals of about 27 days. That these and kindred oscillations in New York city are, in the main, representative of temperature changes over the greater part of the United States becomes evident on comparing temperature curves taken at Utah, St. Paul, St. Louis, and New York respectively. A conspicuous rise of temperature at New York is apt to be a day or two behind that at St. Louis, fully two days behind St. Paul, and sometimes nearly a week behind Utah. Mr. Hall attempts to find a relation between this 27-day period and the sun's rotation, which takes place in about the same time. —Kilauea in August, 1892, by Frank S. Dodge. The chief object of interest on the floor of Kilauea was the lava lake of Halema'uma'u, whose surface was found to measure 12.1 acres, which is much larger than any lake in recent years. The lake is nearly circular in form, its longest diameter being 860 feet, and the shortest 800 feet. The lava was about three feet below the rim on an average. Frequent breaks occurred in the rim, from which large flows took place, in some cases covering several acres of the floor. One large flow on the night of August 25th covered about one-third of the floor, and raised its level from one to four feet. The lake was at times very active, with fountains playing over its surface in every direction, as many as fifteen being counted at one time by a careful observer. Small fountains were always to be seen in some locality, and the whole surface was marked by long irregular seams always in motion. —Also papers by Messrs. Chamberlin, Darton, Upham, and Winslow, and the Address delivered