just published will make Fellows of the Soclety proud of their Fellowship, and will arouse a spirit of emulation among chemists in many parts of the world.

STUDENTS of meteorology will be glad to know that three important essays on Australian weather have, by the generosity of the Hon. Ralph Abercromby, been brought together and published in book form. The first essay, on "Moving Anticyclones in the Southern Hemisphere," by Mr. H. C. Russell, F.R.S., was originally read before the Royal Meteorological Society, and published in the Society's *Journal*. The leading fact brought out in this paper is that Australian weather south of lat. 20° S. is the product of a series of rapidly moving anticyclones, which follow one another with remarkable regularity, and are the great controlling force in determining local weather. These anticyclones travel eastward at the average rate of four hundred miles per day, and they do so with such regularity that the prospect is held out of weather predictions being made some weeks in advance, or even for longer periods. The second essay in the volume is the one, by Mr. H. A. Hunt, on "Southerly Bursters," which won the prize offered by the Hon. Ralph Abercromby. This essay was noted in NATURE in January 1895 (vol. li. p. 230). The third essay, which is also by Mr. Hunt, has for its subject "Types of Australian Weather." This discussion throws much new light upon the source of the greater part of Australian rain, and at the same time forms an important contribution to the study of weather in the southern hemisphere generally. The volume containing these essays is published by Mr. F. W. White, Sydney.

THE additions to the Zoological Society's Gardens during the past week include four Malabar Squirrels (*Sciurus maximus*) from Southern India, presented by Mr. W. J. Stillman; two Sclater's Curassows (*Crax sclateri*) from Minas Geraes (Brazil), presented by Mr. E. Sumead; a Temminck's Stint (*Tringa temminckii*), British, presented by Mr. E. C. Sprawson; a Golden Eagle (*Aquila chrysætus*) from Spain, presented by Mr. F. Leathly Holt; three Common Blue-birds (*Sialia wilsonii*) from North America, presented by Mr. A. T. Binny; two Stone Curlews (*Œdicnemus scolopax*), British, presented by Mr. W. J. Kidman; two Common Blue-birds (*Sialia wilsonii*) from North America, presented by Mr. Percy Cockshut; three Common Adders (*Vipera berus*), British, presented by Mr. A. Old; three Peruvian Snakes (*Tachymenis peruviana*) from Peru, presented by Mr. A. H. Jamrach; a White-browed Amazon (*Chrysotis albifrons*) from Honduras, purchased; a Wapiti Deer (*Cervus canadensis*, ♀), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

LUNAR PHOTOGRAPHS.—Prof. Weinek, whose artistic skill in the enlargement of lunar photographs cannot but be admired, and who has co operated with the staff of the Lick Observatory in reproducing from their negatives the more interesting features of the moon, has recently made a further contribution to the Vienna Academy of fifteen enlargements of certain details on the lunar surface, as seen at the third quarter. Also, Aristarchus and Herodotus have been drawn with the shadows thrown on the western side as a companion picture to an earlier enlargement in which the shadows are thrown to the east. Dr. Weinek now takes the opportunity of calling attention to the fact that, in many instances, his drawings, indicating the existence of minute detail, have been confirmed by Dr. Gaudibert from optical examination of the moon itself. This remark refers to drawings from original negatives taken both at the Lick and Paris Observatories. The differences between the photographic reproductions and Schmidt's map are admitted, and according to the description furnished by Dr. Gaudibert, it is a little difficult to explain some of the omissions from this well-known authority.

DISTRIBUTION OF BINARY-STAR ORBITS.—Miss Everett gives in *Monthly Notices*, June 1896, pp. 462-466, the results of an attempt to discover if the planes of the orbits of binary stars have any relation to the plane of the Milky Way. To do this, the most accurate values of the elements of fifty-five orbits were taken, and from these the galactic longitudes and latitudes of the poles of the orbits were calculated and tabulated. Gould's value of the position of the galactic northern pole was assumed, viz. R.A. 12h. 42m. 4s. (190° 31′), Decl. +27° 16′ (Epoch 1890). This gives the obliquity of the central line of the Galaxy as 62° 7′, and the position of the ascending node is at R.A. = 18h. 42m. (280° 31′), from which the galactic longitudes are reckoned. On examining the tables, it appears that equal surface zones contain nearly similar numbers of orbit poles, and it is concluded that there is no decided tendency on the part of the poles of the orbits to favour any special region of the celestial sphere, and hence that the planes of the orbits cannot be regarded as having any definite relation to the mean plane of the Galaxy.

COMET 1890 VII.—The orbit of this comet, which was first seen by Dr. Spitaler of Vienna, while searching for one recently discovered by M. Zona of Palermo, has been submitted to a thorough examination by the original discoverer, with the result that the period of six and half years has been confirmed. Consequently, its return to perihelion may be looked for next spring, and Dr. Spitaler has prepared ephemerides to facilitate its search. The most favourable time for observation will be next month, when the comet will be in opposition, but the theoretical brilliancy will be only about one-fourth that possessed at the time of discovery in 1890. The considerable southern declination of the comet will render its detection in these latitudes still more difficult. The next return in 1903 will be still more unfavourable, and though 1909 may offer good chances for observation, the error of position will be larger. Dr. Spitaler thinks that the ephemeris he has prepared for this return is trustworthy to about five minutes of R.A. and forty minutes of Declination.

PHOTOGRAPHY OF SOLAR CORONA.—Count de la Baume Pluvinel has recently discussed the conditions necessary for successfully obtaining photographs of the corona (*Bulletin de la Soc. Ast. de France*, July 1896). The difficulty of the problem lies in the varying intensity of the several parts of the corona, the delicate details being lost in long exposures on the inner region, while in short exposures the outer corona is almost absent. During the eclipse of April 1893, the author attempted to determine the best value of the "photographic action" necessary for depicting the coronal structure without allowing the light from the surrounding sky to produce any deteriorating effect. The term "photographic action" is defined as being proportional to the product of the intensity of the image and the duration of exposure, and is accepted as being constant within certain limits. For this purpose he employed a compound camera having nine object-glasses, with apertures varying from 5 mm. to 155 mm., and average focal length of 1·5 metres. The time of exposure for all was 230 secs., and consequently the photographic action had values varying from 0·24 to 250. From the various photographs obtained he concluded that, for that particular climate (Joal) a photographic action of about 4 was best. From other photographs taken in Brazil, he recommends a value of 10 to be used in future eclipses, this value to be diminished or augmented as the sky light is greater or less than that in 1893. The above law of photographic action ceases to hold beyond certain limits; as the intensity of the light decreases, the time of exposure must be enormously increased, and this fact has led the author to suggest a method of photographing the corona without an eclipse. It involves the design of a telescope with such a ratio between aperture and focal length that the sky illumination will be too feeble to affect the plate, while the slightly greater intensity of the corona will allow of its being photographed with a long exposure.

NANSEN'S POLAR EXPEDITION.

DR. NANSEN arrived at Vardö, Norway, on Thursday, August 13, after an absence of three years. A Reuter telegram says that he left the *Fram* with a companion on March 14, 1895, in lat. 84° N., in order to push further north into the Polar Sea than the *Fram* could penetrate. The expedition accomplished its object in traversing the Polar Sea to a point north of the New Siberia islands. The most northerly

point attained was lat. 86° 14′, which is nearly 200 miles further north than had previously been reached. No land was sighted north of 82°. Dr. Nansen and his companion then went south to Franz Josef Land, where they passed the winter, subsisting on bears flesh and whale blubber. Here they fell in with the *Windward*, of the Jackson-Harmsworth expedition, which brought them to Vardö. It is expected that the *Fram* will eventually arrive at Spitbergen.

With most commendable enterprise, the *Daily Chronicle* published on Saturday, August 15, Dr. Nansen's own narrative of his expedition, telegraphed from Vardö. The narrative is in the highest degree interesting, as well as a striking testimony to the hardihood and indomitable spirit of Dr. Nansen and Lieut. Johansen, who for seventeen months, cut off from all means of retreat, travelled over nearly 700 miles and carried on polar explorations. The telegram published in the *Daily Chronicle* is abridged below; and we are glad to express our acknowledgments to that newspaper for the opportunity afforded us of placing before the readers of NATURE the salient points in this account of Dr. Nansen's explorations of polar regions.

The *Fram* left Jugor Strait August 4, 1893. We had to force our way through much ice along the Siberian coast. We discovered an island in the Kara Sea, and a great number of islands along the coast to Cape Cheljuskin. In several places we found evidences of a glacial epoch, during which Northern Siberia must have been covered by inland ice to a great extent.

On September 15 we were off the mouth of Olenek River, but thought it too late to go in there to fetch our dogs, as we would not risk losing a year. We passed the New Siberian Islands on September 18.

On September 22 we made fast to a floe in latitude 78° 50′ N., and longitude 133° 37′ E., and allowed the ship to be closed in by the ice.

As anticipated, we were gradually drifted north and north-westward. The sea was up to ninety fathoms deep south of 19° N., where the depth suddenly increased, and was from 1600 to 1900 fathoms north of that latitude. This will necessarily upset all previous theories based on a shallow Polar Basin. The sea-bottom was remarkably devoid of organic matter. During the whole drift I had good opportunities to take a series of scientific observations—meteorological, magnetic, astronomical, biological soundings, deep-sea temperatures, examinations for salinity of the sea-water, &c. Under the stratum of cold ice-water covering the surface of the Polar Basin, I soon discovered the warmer and more saline water due to the Gulf Stream, with temperatures from 31° to 33°. We saw no land, and no open water, except narrow cracks, in any direction.

As anticipated, our drift north-westward was most rapid during the winter and spring, while northerly winds stopped or drifted us backwards during the summer. On June 18, 1894, we were on 81° 52′ N. lat., but drifted then southward only. On October 21 we passed 82°. On Christmas Eve, 1894, latitude 83° N. was reached, and a few days later 83° 24′, the farthest north latitude previously reached by man.

As I anticipated that the *Fram* would soon reach her highest latitude to the north of Franz Josef Land, and that she could not easily fail to carry out the programme of the expedition, viz. to cross the unknown Polar Basin, I decided to leave the ship in order to explore the sea north of her route. Lieut. Johansen accompanied me. On March 3 we reached 84° 4′ N. Johansen and I left the *Fram* on March 14, 1895, at 83° 59′ N. lat., and 102° 27′ longitude East of Greenwich. Our purpose was to explore the sea to the north, reach the highest latitude possible, and then go to Spitzbergen *viâ* Franz Josef Land, where we were certain to find a ship.

On March 22 we were on 83° 10′ N. lat. The ice now became rougher, and the drift contrary. On April 3 we were at 85° 50′ N., constantly hoping to meet with smoother ice. On April 4 we reached 86° 3′ N., but the ice became rougher, until on April 7 it got so bad that I considered it unwise to continue our march in a northerly direction. We were then at lat. 86° 14′ N.

I then made an excursion on *ski* further northward in order to examine the possibility of further advance, but I could see nothing but ice of the same description, hummock beyond hummock to the horizon, looking like a sea of frozen breakers, the whole time. We had had a low temperature during nearly three weeks; it was in the neighbourhood of 40° below zero. On April 1 it rose to 8° below, but soon sank again to 38°. The minimum in March was 49° and the maximum 24°. In April the minimum was 38° and the maximum 20°.

On April 8 we began our march towards Franz Josef Land. On April 12 our watches ran down, and we were after that date uncertain of our longitude, but hoped that our dead reckoning was fairly correct. We expected daily to find land in sight, but we looked in vain.

On May 31 we were in 82° 21′ N.; on June 4 in 82° 18′ N.; but on June 15 we had been drifted north-west to 82° 26′. No land was to be seen, although, according to Payer's map, we had expected to meet with Petermann Land at 83° N. These discrepancies became more and more puzzling as time went on.

We did not reach land until August 6, at 81° 38′ N. lat. and about 63° E. long. This proved to be entirely ice-capped islands. In our "kayaks" we made our way westward in open water along these islands.

On August 12 we discovered land extending from south-east to north-west. The country became more and more puzzling, as I could find no agreement with Payer's map. I thought we were in a longitude east of Austria Sound; but if this were correct, we were now travelling straight across Wilczek Land and Dove Glacier, without seeing any land near us.

On August 26 we reached a spot in 81° 13′ N. and 56° E., where we wintered. The spring came with sunshine and much open water to the south-west, and we hoped to have an easy voyage to Spitzbergen over floe ice and open water. On May 19 we were at last ready to start, and came to open water on May 23, in 81° 5′ N., but we were retarded by storms until June 3. A little south of 81° we found land extending westward, and the open water reached west-north-west along its north coast. But we preferred to travel southward over ice through a broad Sound. We came on June 12 to the south side of the islands, and found much open water, trending westward. We sailed and paddled in this direction in order to proceed across to Spitzbergen from the most western cape, but Payer's map is misleading.

We left Franz Josef Land in the *Windward* on August 7, and had a short and very pleasant passage, thanks to the masterly way in which Captain Brown brought his ship through the ice, and thence in the open sea to Vardö.

BACTERIA AND CARBONATED WATERS.

THE new methods of bacteriological research were early called into requisition to determine what hygienic importance from a bacterial point of view could be ascribed to the gaseous aëration of water.

A large number of experiments have from time to time been carried out, and various points of interest have been investigated, but nevertheless considerable divergence of opinion exists as to the precise hygienic value with which the carbonation of water can be credited.

Some authorities state that in such waters the number of bacteria steadily declines, whilst others again have observed as distinct a multiplication of the bacteria present.

The possibility of these two contingencies is, however, quite conceivable without necessarily impugning the accuracy of the results obtained in either case. In the first place it must be remembered that widely different types of water serve for the manufacture of artificial aërated waters, the bacterial contents of which are likewise widely divergent both qualitatively and quantitatively.

Here, then, in the first instance is a source of discrepancy, for the behaviour of bacteria in carbonated waters, as also under other conditions, primarily depends upon the particular varieties of bacteria which have to be dealt with.

It has been shown that whereas some bacteria rapidly disappear in aërated waters, others again are endowed with fabulous powers of multiplication and longevity.

Thus in one instance a sample of carbonated water was found to contain, one hour after its manufacture, 8350 microbes per cubic centimetre; these figures rose, however, after the lapse of 210 days, to the considerable number of 212,400 per c.c.; later on, however, at the end of 428 days, there were only 46 per c.c.

Again, as regards the duration of vitality of ordinary water microbes under these circumstances, we read of as many as 91 being found per c.c. in a sample of water which was considerably more than two years old.

It is obvious, therefore, that as regards the bacterial contents