and, from a mountain 2,000 feet high, sighted land towards the west-north-west, extending to lat. 83° 7′.

Ancient Eskimo remains were traced on the west side of Smith Sound up to lat. 81° 52′ N. From that position the wanderers had evidently crossed the channel at its narrowest part to Greenland. The most diligent search was made further north, but no trace of them discovered.

Six musk oxen were shot at the *Alert's* winter quarters, and three half way between her position and that of the *Discovery*, while fifty-four were shot near Discovery Bay. The ermine was seen, and owls were found on the Greenland shore opposite the *Discovery's* quarters, the young ones on their appearance being mostly devoured by wolves. The remaining items in the *Alert's* game list at her northern station show seven hares and ninety birds of different kinds, the latter shot only in July. The birds certainly do not migrate beyond Cape Joseph Henry, lat. 82° 50′ N. Very few besides those accounted for by the sportsmen passed the *Alert*. Very few seals were seen north of Cape Union, and no bears, dovekies, or looms, it is stated, ever reach the Polar Sea. Water animals were notably absent, and it is surmised that those that do visit the Arctic Sea come from the south. Among other birds visiting the country, but not advancing beyond the point mentioned, are the knots. Although no nests or eggs were found, the young in all stages of growth were obtained. Amongst the flora described by the parties from the *Alert*, were the saxifrage, sorrel, and dwarf oak, and late in the summer a few poppies were met with.

In the neighbourhood of the *Discovery's* winter quarters a seam of coal of good quality and readily worked, was discovered by Mr. Hart, naturalist; but, unfortunately, not before the present summer, otherwise it might have been of service during the winter, when the allowance of that article on board was necessarily kept as low as possible. Capt. Feilden obtained some fine fossil corals at the extreme northern hills. Very large collections of natural history subjects have been made by the naturalists, assisted by one and all of the officers and crew. The dredge and trawl were used on several occasions with great success. The observations on the physics and meteorology of the Arctic Regions are likely to prove of the greatest value when published. It will be remembered that during the stay of the *Polaris* in the north, the prevailing wind was from the north-east; during the present expedition scarcely any easterly wind was noticed at all, the prevailing wind, like the prevailing current, coming from the west.

All the *Polaris's* cairns were visited. At the boat depôt in Newman's Bay a box chronometer by Negus, New York, was found to be in perfect order after an exposure of four winters; it has since been keeping excellent time on board of the *Discovery*. Some wheat sent out in the *Polaris* in order to ascertain whether it would deteriorate when exposed to extreme cold, has been grown successfully under a glass shade by Dr. Belgrave Ninnis.

A magnificent series of photographs has been brought home, a selection of which will no doubt be published, and afford some idea of the strange scenery to be seen in these inhospitable regions.

Such is a brief summary of the results obtained by this latest Arctic expedition, but at what expense of hard work and suffering it is difficult for those who read the narrative to realise. The labour which had to be undergone would have been trying enough to perfectly healthy men, but unfortunately the dreaded scourge of Arctic explorers, scurvy, broke out among them. No expedition could have been better provisioned, but in spite of every precaution all the sledge parties suffered most severely. Notwithstanding this, every one worked determinedly and cheerfully. Only three seamen, however, died of scurvy, and only one death was the result of frostbite, that of Niels Christian Petersen, the interpreter of the expedition.

The ice in the Polar Sea remained firm until July 20, when there was a movement, increasing with each tide. On the 31st the *Alert* succeeded in leaving her winter quarters, and, after many struggles with the ice, joined company with the *Discovery* on August 12. Lady Franklin Bay remained closed until the 20th, when, a chance occurring, both ships were pushed into the ice, and succeeded in crossing. After this date the same kind of battle and slow progress took place daily between the ships and the ice, as during the passage north every inch gained being of importance as the ice closed in the rear. As the season advanced, or rather slipped away, many were the fluctuations in the social barometers as hopes and fears rose and fell, for it was not until September 9, the very last of the season, that the mouth of Hayes Sound was crossed, and the expedition again rejoiced in "open water."

The *Alert* reached Valentia on the 27th ult., and both ships arrived at Queenstown on the 29th. On Monday they left for Portsmouth, where they arrived on Wednesday morning. "It goes without saying" that everywhere officers and men have had the heartiest welcome, though no heartier than they deserve.

OUR ASTRONOMICAL COLUMN

μ Doradûs.—This star, which was called a fifth magnitude by Lacaille at the end of 1751, and a sixth by Brisbane, was observed by Moesta from February, 1860, to January, 1861, of 8·9m. or 9m. only. Perhaps one of our southern readers will put upon record the actual magnitude of this star, the period of which, as Moesta remarked, would appear to be one of considerable length. Position for 1877·0 in R.A. 5h. 5m. 52s., N.P.D., 151° 58′.

Southern Double-Stars.—(1) α Centauri.—Measures of the angle of position and distance of this star, taken in the course of the ensuing year or two, will materially contribute towards defining within narrow limits the elements of the orbit. Even in Powell's last orbit, which was founded upon measures to January, 1870, the peri-astron passage (1874·2) is certainly too early, though each successive calculation of elements from Jacob's first has assigned a later date; it probably occurred in 1875.

(2) p Eridani also deserves close attention from the astrometer in the other hemisphere. There must be a great change in angle since the epoch of the last-published measures. The position (1877·0) is in R.A. 1h. 35m. 7s., N.P.D. 146° 49′.

The Intra-Mercurial Planet Question.—If in the general formula obtained by M. Leverrier, and given in last week's Nature, we put $k = -1$, the solution, which gives for the sidereal period as referred to the node 27·964 days semi-axis major 0·180, and synodical period 30·282 days, accords with Stark's observation on October 9, 1819, one of the most definite upon record, besides representing, as well as the solution with $k = 0$, the five data upon which M. Leverrier has relied in deducing the formula. In this case we have—

$$v = 285°·76 + 12°·873724j - 10°·8 \cos v.$$

Stark's observation was published in his "Meteorologisches Jahrbuch," 1820. Under date, October 9, 1819, he says:—"At the same time there appeared, at a distance of 12′ 28″ from the southern limb of the sun, and 4′ 58″ from the eastern limb, a black, well-defined nuclear spot, which was perfectly round and of the size of Mercury. At 4h. 37m. this nuclear spot was no longer present, and I found also later on the 9th, as well as on the 12th, when the sun next came out, no trace of this spot." The observation was probably made about noon at Augsburg, which was one of Stark's usual hours for examining the sun's disk—corresponding to October 8, at 23h. 16m. Greenwich time. For this time the above formula gives $v = 16°·9$,

and the earth's heliocentric longitude being 15°·3, the inferior conjunction of the assumed intra-Mercurial body with the sun would have occurred on the morning of Stark's observation.

THE FOURTH COMET OF 1857.—The best determined period of revolution of a comet, exceeding in length the period of the comet which appears to be associated with the August stream of meteors, is that of the fourth comet of 1857, discovered by Prof. C. H. F. Peters at Albany, U.S., on July 18, by Dien, at Paris, on the 27th, and by Habicht at Gotha, and Donati at Florence on the 30th of the same month. It was observed with the great refractor at the observatory of Harvard College till October 21. These dates include an interval of from about one month before to two months after the perihelion passage, or an arc on the orbit of 145°. A very complete discussion of the observations was made by Dr. Axel Möller, whose masterly investigations relating to the motion of Faye's comet have led to such accurate prediction of its apparent track in the heavens at recent returns; the period he assigns is 234·7 years. A similarly rigorous calculation led Dr. Hans Lind to a revolution of 243·05 years, and there are ellipses of nearly the same length of period by other computers.

If we examine the path of this comet through the planetary system we soon discover that it passes near to the orbit of Venus. Employing the elements of Axel Möller, a strict calculation shows that in heliocentric ecliptical longitude 24° 54′, the distance between the two orbits is less than 0·023 of the earth's mean distance from the sun. It may therefore be reasonably concluded that it is to an actual near approach of the comet to Venus about this point that the present form of orbit is due. The comet's perihelion distance is 0·747, the aphelion distance 75·35.

BIOLOGICAL NOTES

POCK-LYMPH.—The efficacy of pock-lymph has been attributed by several observers to the presence of small organisms of the nature of Micrococcus. M. Hiller has recently studied this subject (*Centralblatt für d. Med. Wiss.*), and from 6,840 separate inoculations, he finds that the degree of activity of the lymph and the proportion of micrococci present do not correspond; on the one hand, the development of the organisms was often at its greatest when the action of the lymph was falling off, and on the other, lymph was often active, though no bacteria were perceptible in it. Fresh diluted lymph having been put in vertical tubes in a freezing mixture, and slowly thawed after freezing, the upper half gave on inoculation, 41·4 per cent. positive results, the lower half, 63·8 per cent. It appears from this that the poison is associated with the solid constituents more than with the liquid. Boiled lymph was, without exception, inoperative. The addition of 1 to 4½ per cent. carbolic acid merely weakened the contagiousness of pock-lymph, while addition of glycerine left it unaltered. Strong dilutions weakened the action, while condensations exalted it; with evaporation, the percentage of favourable cases was increased about a half. In coagulated parts produced in the lymph, the active element was present in great quantity. Perfectly dried lymph is also active in high degree; hence we may infer that the communication of pox may occur by means of the crust and scurf of pustules which are rubbed off and float in the air. Inoculation with the blood of persons that were successfully inoculated proved inoperative; so also were the fresh contents of the bladders, seven days after inoculation. It is inferred that the cow-pox ferment is not contained in the blood, or not in the active state; and that very probably, also, the blood is not itself the seat of fermentation and reproduction of the poison.

ALGOID SWARM-SPORES.—If vessels of water containing algæ are placed in a room where they are lighted only on one side, swarm-spores are generally found to collect at the side turned towards the window, more rarely on the opposite side. If they are present in considerable number, they often become arranged in peculiar cloudy forms; network, rays, tree-like branched figures, &c. The phenomenon has been frequently studied, and has been always regarded as an action of light, causing the living swarm-spores to move towards it or withdraw from it. After a long investigation of the phenomena, M. Sachs has come to a different conclusion. He considers that these groupings of zoospores are not phenomena of life, inasmuch as quite a similar process is found to occur with emulsions of oil in alcohol diluted with water; also that the light either does not at all participate in the action, or does so only indirectly, for all the phenomena may be reproduced in darkness. The accumulation of spores and the cloud-like figures are rather due to currents produced by differences of temperature in the water. M. Sachs's experiments are described in *Flora*, 1876, No. 16.

DISEASES GERMINATED IN HOSPITALS.—Several observers have remarked on the presence of globules of pus and microscopic algæ in the air and on the walls of hospitals. Some interesting facts of this order have recently been communicated to the French Société de Biologie, by M. Nepveu of the laboratory of La Pitié. A square metre of the wall of a surgery-ward, having been washed, after two years without washing, the liquid pressed from the sponge (about 30 gr.) was examined immediately after. It was somewhat dark throughout and contained micrococcus in very great quantity (fifty to sixty in the field of the microscope), some micro-bacteria, a small number of epithelial cells, a few globules of pus, some red globules, and lastly a few irregular dark masses and ovoid bodies of unknown nature. The experiment was made with all necessary precautions; the sponge employed was new, and carefully washed in water that was newly distilled. Facts like those referred to make it easy to comprehend how the germs of a large number of diseases occur in the air of hospitals, and how the latter may readily become centres of infection. The same conditions, though in less degree, may sometimes be met with in private life.

MARINE MOSSES.—M. Gisard lately showed to an audience at the Congress of learned societies at the Sorbonne, specimens of marine mosses growing on a madrepore placed in an aquarium, since January, 1872. They produce every year, in spring, phenomena of fructification, consisting of urns of a superb nacreous colour, growing at the ends of beautiful green filaments, then becoming detached and rising to the surface of the water. He cited the following fact as showing the vitality of certain marine plants. On May 13, 1875, a parcel of algæ which had been taken from an aquarium and dried several months in the sun, was placed in sea-water, and developed a magnificent green plant of ribbon form. In February and March, 1876, there were formed on the border of the ribbon sparse filaments carrying rounded urns of variegated colour, which became detached, and rose to the surface, giving rise to green plants.

NOTES FROM ST. PETERSBURG.—At the last meeting, October 18, of the Zoological Section of the St. Petersburg Society of Naturalists, Prof. Wagner gave some information as to his recent researches made in the Solovetsky Bay of the White Sea. The special aim of them was to throw some light on the causes which determine the use in certain organisms, as for instance the hydroids, of two different modes of reproduction, sometimes by gemmation, and sometimes with the help of special organs. Without coming to any decided conclusions (the researches having to be continued) M. Wagner pointed out, as one possible cause of this difference, the influence of different nutrition which generally so greatly influences the reproductive functions. M.