aspect may exhibit a greater abundance of species, though less well developed, from the continuous play of spores—and rain—upon the trunk.

Of north and south positions the same may be said, *i.e.* the south is sheltered from fierce, cold north winds, yet open to warm, rain-depositing winds. Again, once established, cryptogams flourish on the southern aspect best owing to its sunny character. North winds blow when spores are not so abundant, and the same applies to boisterous east winds, though these are short-lived.

Apart from wind dispersal of spores, vegetative reproduction tends to favour the same situations, south or east, for south-west winds bring moisture, and, when not laden with poisonous substances, are beneficial; but long-continued wind tends to drive plants to the east side, and absence of sun from north to south.

The causes inducing birds to nest preferably on the eastern and southern sides of hedges (and trees, to some extent) are much the same, *i.e.* protection from wind and the greater safety of a leeward position and amount of sunlight; but in their case, also, there is light dispersal. There is a shadow on the leeward side of hedges for a great part of the day after the early dawn, and this enables birds safely to go in and out without being observed.

The western side presents fewer convenient nesting sites, the branches of hedges being generally bent over from west to east, as seen best on the west coast, affording a better harbour on the east. The south and east face early dawn longest, and this is the favourite season of the birds. At any rate, their song is richest between 4 and 8 a.m. The north and west are open to bright sun but during the colder part of the day.

As to the actual distribution of nests, the same positions noticed by Lieut.-Colonel Tull Walsh are favoured by birds in Leicestershire, Shropshire, Surrey, amongst other counties, and seem to be more or less general. The need for studying cryptogamic distribution in relation to wind in connection with the extinction of plants led me to formulate the conclusions noted. It is interesting to observe that they are directly analogous to the position of birds' nests in hedges. Hence the parallel drawn.

A. R. HORWOOD.

Leicester Corporation Museum, December 22.

Studies in Polychæt Larvæ.

MAY I make use of your columns to correct an error in my "Studies in Polychæt Larvæ" in a recent number of the *Q.J.M.S.*? The specimen there described as a young *Odontosyllis* sp. I have since found to be in reality a fully grown *Exogone*. I have been unable to identify it with any known species, but as dorsal natatory setæ are quite well known in specimens of *Exogone* of this size, the conclusions drawn from this specimen are of no value.

With regard to the last section of the same paper, it has lately come to my notice that de Saint-Joseph has shown Claparède and Mecznicow's so-called *Spionid* larva, in which there are no provisional setæ, to be the larva of the aberrant worm *Saccocirrus*, and not of one of the *Spionidæ*. There is, then, no known exception to the rule that free-swimming *Spionid* larvæ bear provisional setæ.

F. H. GRAVELY.

5 Silver Street, Wellingborough, December 27, 1909.

Cross-fertilisation of Sweet-peas.

I HAVE recently seen two further reiterations of the statement that the sweet-pea is invariably self-fertilised, a statement which I think is often based on an opinion of Charles Darwin's. It may therefore be worth while placing on record an observation made by me in 1907, when examining daily and closely a large quantity of sweet-peas. While *Apis mellifica* failed entirely to open the flower, it was done perpetually by *Megachile willughbiella*, and there was not the least doubt about the cross-fertilisation being effectively brought about by this bee. The point has probably been noted before, but it is worth recording once more in view of the repetition of statements as to the self-fertilisation of sweet-peas.

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A Supposed New Mineral.

WHEN we wrote recently (*NATURE*, October 28, 1909) about a supposed new mineral from Co. Antrim, we were led to believe that the specimen we had received was from the basalt—our information, in fact, was that "a very big pocket of it" had been found in that rock, but the exact locality could not be ascertained at that time, the finder having left home.

We now hear that this gentleman cannot remember where he got the specimen. It certainly cannot be traced to the basalt, and as its composition is unlike that of any known mineral, it seems highly probable that the substance is an artificial product.

RICHARD J. MOSS.

HENRY J. SEYMOUR.

Laboratory, Royal Dublin Society,
December 23, 1909.

THE HEART OF ANTARCTICA.¹

IMEDIATELY after the arrival of the British Antarctic Expedition of 1907-9 in New Zealand the attempt was made in *NATURE* (April 1, 1909, vol. lxxx., p. 130) to estimate its scientific results from the information received by cable. The full details now supplied show that the estimate then made in no way exaggerated the greatness of its achievements. The full story of the expedition, told in these most interesting and beautifully illustrated volumes, shows that its great success was due to careful and scientific foresight in equipment, to the determined and uttermost use of the equipment and staff, and to daring in the field, carried sometimes to the verge of recklessness, but saved from accidents by sound judgment and cool courage.

The main purpose of the expedition was to reach the South Pole, and as that object required an advance into the heart of Antarctica, no better route could have been selected. There can be little doubt that the expedition would have been completely successful and reached the Pole but for the accidents to the ponies. Four of them died in the winter quarters, one from eating some poisoned shavings, and three from eating sand—perhaps due to the craving of horses for salt, that may not have been adequately allowed for in their food. The most irreparable accident was the loss of the last pony during the southern sledge journey by its fall into a crevasse on the Beardmore Glacier. The sledge party was thus deprived of an important part of its reserve food, and the accident was especially annoying, as the pony was to have been killed that night. The horse meat was not a complete success, as it brought on dysentery. Sir Ernest Shackleton explains this somewhat unexpected result by the meat being poisoned by a toxin of exhaustion. As the symptoms of fatigue can be transmitted by inoculation from a tired to an untired dog, the suggestion sounds probable.

The work is prefaced by an admirable introduction by Dr. Mill on previous Antarctic work. The first volume describes the equipment, the vain attempt to land on the eastern side of the Great Ice Barrier, the establishment of headquarters on MacMurdo Sound, and the winter's work there. The motor car proved of great service around the station, but though it ran well on smooth sea ice, it would have been of no use on the soft surface of the Barrier.

The great sledge journey to the south was, therefore, dependent upon the ponies; and these did their work well. The sledging party consisted of Sir Ernest Shackleton, Adams, Wild, and Marshall, with

¹ "The Heart of the Antarctic. Being the Story of the British Antarctic Expedition, 1907-9." By Sir E. H. Shackleton, C.V.O. With an Introduction by Dr. Hugh Robert Mill. Vol. i., pp. xlviii+372; 132 plates. Vol. ii., pp. xvi+419; 141 plates, 3 maps. (London: W. Heinemann, 1909.) Price, 2 vols., 36s. net.

four sledges, each hauled by a pony. The explorers made a quick journey southward until the mountain wall which forms the western boundary of the Ross Sea and of the Great Ice Barrier curved eastward and lay across the route to the Pole. The mountain scarp is breached by a valley occupied by the Beardmore Glacier, which offered a difficult route to the plateau, and up it the explorers forced their way. After many narrow escapes from crevasses, the expedition attained the plateau and marched southward across it until the exhaustion of their food compelled them to turn back at a point only ninety-three miles from the South Pole. No scientific advantage would have been gained by traversing the remaining distance, and, considering the small reserve supply of food, the risks that had been accepted were, if anything, unduly high.

This magnificent sledge journey has practically demonstrated that the South Pole is on a high plateau, which is bounded to the north by a continuation of the mountain scarp of South Victoria Land, and that this scarp trends eastward towards Graham Land.

The second important achievement by the expedition was the daring sledge journey by Prof. David and Messrs. Mawson and Mackay to the South Magnetic Pole. This great feat was all the more remarkable as not one of the three members had any previous Arctic or Antarctic experience. Prof. David's party had to haul its own sledges, make double journeys over most of the way, and work on half rations almost from the first day. They successfully sledged along the coast of Victoria Land, and then up the Larsen Glacier and over the inland ice to the South Magnetic Pole. They ran great risks from crevasses, and had to incur the added danger of not being found by the *Nimrod* on their return to the coast. Had they been delayed a few days they must have missed the ship, and their only chance would then have been to wait until the sea again froze over and they could sledge back to winter quarters.

The scientific results of the expedition are unquestionably of the highest importance. It found that, as was suggested in NATURE in 1901, the mountains of South Victoria Land curve eastward, so that the South Pole stands on a high plateau, of which the scarp facing the Pacific trends towards Graham Land. The structure of the mountains of Graham Land and of South Victoria Land is very different; hence we must expect either a continuation of the fold line of Graham Land between the great scarp of Antarctica and the South Pacific coast, or else that the eastward extension of the fold line of Graham Land has foundered beneath the sea, leaving the coast of Ant-

arctica along the South Pacific of the secondary Pacific type.

The scientific problems raised in the second volume are of wide interest; though only preliminary statements are given, they show the wide range and high quality of the work. The accounts are most definite in regard to geology and biology, and they include appendices on the meteorology, magnetic observations, aurora australis, and on tides and currents. The expedition was fortunate in having such an expert geological staff as Prof. David, of Sydney, Mr. Priestley, of Bristol, and Mr. Mawson, of Adelaide, of whom the last acted also as the physicist to the expedition. The biologist, Mr. James Murray, is a well-known specialist on the smaller animals most likely to live on an Antarctic land. Among the most remarkable of the geological results was Sir E. Shackleton's discovery of several seams of coal and coaly material, and of a band of limestone in the southern continuation

FIG. 1.—The Gregarious Rotifer, which forms blood-red patches in the lakes at Cape Royds. From "The Heart of the Antarctic."

of the Beacon Sandstones. He was fortunate in collecting the only recognisable fossil (other than radiolaria) hitherto found in this quadrant of Antarctica; it has been determined by Mr. E. J. Goddard, of Sydney, as a piece of coniferous wood of Upper Devonian or Carboniferous age; it furnishes the only direct evidence of the age of the sandstones that are so important in the geology of South Victoria Land.

Mr. Priestley's excursion to the mainland opposite the winter quarters also yielded interesting results, which greatly reduce the thickness previously assigned to the Beacon Sandstone, and throw doubt on its invasion by a younger granite. Prof. David determined the geological history of Mount Erebus, as well as obtained most valuable results as to the structure of South Victoria Land.

One of the most instructive of the geological results is Prof. David's description of the Norden-skjöld and Drygalski Glaciers, which continue out to sea as great ice capes for sixteen and thirty miles from the coast. These projections appear to be certainly

floating, and, though fully exposed to the gales of this stormy sea, they have not been broken up into icebergs; moreover, solution by sea water appears to be very slow, as Prof. David describes the floating end of the Nordenskjöld Glacier as dwindling away from the failure of fresh supplies of ice from the snow-fields by

p. 305) between the Barrier ice and the glacier ice, which in places is thrust into it from the land.

It would be difficult to explain the striking uniformity in level of the Barrier if it were land ice flowing northward, the conclusion adopted by the staff of the *Discovery* expedition. This view was rejected in

NATURE in the reviews, both of Captain Scott's narrative and of the volume on the geological results of the *Discovery* expedition, in favour of the origin of the ice "by the accumulation of layers of snow upon the surface more quickly than the ice was dissolved by the sea beneath" (NATURE, 1906, vol. lxxiii., p. 300). This explanation was then attended by the difficulty that the snowfall was said to be too low. The evidence, however, of the photographs brought back by the *Discovery* seemed so convincing that the writer concluded that the snowfall would be found much larger than was reported. The new observations show that the snowfall at the winter quarters was equivalent to a rainfall of $9\frac{1}{2}$ inches a year, and that on the Barrier the average for the past four years has been $7\frac{1}{2}$ inches. This amount of snow seems adequate for the formation of the Barrier ice from snowfall, and this explanation of its origin is now fully confirmed by Prof. David.

The meteorological results are still indefinite, but further light on the hypothetical South Polar anticyclone may be expected from the full records. The narra-

FIG. 2. —One thousand feet below the active cone of Erebus. From "The Heart of the Antarctic."

which it was formerly fed. The Great Ice Barrier appears to be of quite a different origin. Shackleton records in his diary (vol. i., p. 293) that "The Barrier surface is still as level as a billiard table, with no sign of any undulation or rise." And with his keen geographical insight Shackleton discriminated (e.g.

NO. 2097, VOL. 82] tive shows that there was a less constant blizzard from the south in the southernmost district than was inferred from the cable report. There was a north wind, for example, behind the party during its ascent of the Beardmore Glacier. Nevertheless, the direction of the ice ridges on the polar plateau shows that its pre-

valent wind is from the south. The evidence available suggests that, if the South Polar anticyclone exist, it is either less extensive than was thought, or its centre is in the area between the South Pole and the southern Atlantic.

The appendix on the zoological results gives many interesting particulars as to the habits of the penguins and seals. Mr. Murray is an expert on the rotifers and tardigrades, of which he found a rich fauna in lakelets near the winter quarters. They are only thawed occasionally in the summer, and live in ice through most of the year. They were subjected to various experiments to test their resistance to low temperatures and ultra-saline waters, and they triumphantly survived. Mr. Murray discusses the geographical relations of this fauna, and concludes from the poverty in species, and their wide distribution, that it is due to modern immigration. Mr. Murray collected many marine animals from what he describes as the living carpet covering the sea-floor in McMurdo Sound.

The lakes also contain a rich growth of fungus, which Prof. David describes as giving rise to beds of peat. It is therefore possible that coaly material may be formed in the Antarctic area even under existing conditions. The fossil conifer found by Shackleton shows that Antarctica once had a milder climate than at present, a fact already established by the work of Swedish expeditions, and only natural as a correlative of the warmer conditions that once prevailed in Greenland and Spitsbergen.

J. W. GREGORY.

GAME PRESERVES IN BRITISH EAST AFRICA.¹

COLONEL PATTERSON is already well known to the British reading public by his remarkably interesting book on his destruction of the man-eating lions which infested the eastern section of the Uganda Railway during its construction and first years of activity. He returned to East Africa in 1907, but whether as a Government servant or as a private traveller is not clearly stated in the book under review (which it may at once be said is exceedingly interesting to a wide circle of readers—those who love thrilling adventures, those whose chief interest is in sport, and to students of the East African mammalia). Whether he was all the time or not on Government business, he had not been long back in East Africa before he was requested to undertake an important mission to the little-known north of the Protectorate across the Guaso Nyiro, there to report on the most suitable frontier to be fixed as the eastern limit of the great Northern Game Reserve.

Seeing the risky and important nature of this journey, the need to avoid any unnecessary responsibility and cause for anxiety, and, if need be, to travel light and with swiftness, it was (as the author half admits) unwise to have allowed two friends (an English sportsman and his wife) to accompany him into such a remote and possibly dangerous part. However, they went; the friend was killed by a revolver accident, and the author of the book was faced with the dilemma as to whether he should immediately escort the widow back to civilisation, some three hundred miles away, or complete his survey

(another fifty miles) and then return. He very sensibly adopted the last course. It should be mentioned that the lady with whom circumstances obliged him to travel showed herself a brave woman and an excellent rifle shot. She faced elephants, lions, rhinoceroses and buffalo, sickness of herself and others, mutinous followers, with equal courage and coolness. But it is, of course, a commonplace by now to point out that in the hardships of exploration and the dangers of big-game shooting, British women, some Americans, and a few French and German women, are quite on a par with the men of their race.

One can admire their pluck, but at the same time regret that it should be thrown away on often unnecessary dangers in attacking wild animals far too interesting to be killed. But apparently the men and women of the Caucasian subspecies will not rest content until every big beast and every bird of remarkable plumage is exterminated.

Colonel Patterson does not tell us (so far as we can gather) what recommendation he made as to the definition of the eastern boundaries of this Northern Game Reserve; he hints, however, in one place, that

FIG. 1.—Camels crossing the Kaisoot Desert. From "In the Grip of the Nyika."

its area is unwieldy (which is quite true), and that as it stands it is far too large to be properly supervised. The whole question, it is to be feared, is purely academic in the British Empire. Large or small as the game reserve may be, the native peasant or the nomad hunter *takes* leave, the Royal or distinguished visitor is *granted* leave, and somehow the shooting goes on. Abyssinians, Somalis, Arabs, and even Goanese traders, adventurers, or bandits, enter this Northern Game Reserve and defy the law to stop them or punish them, and it is said the Boer settlers of the western part of the Protectorate are doing the same.

The history of the East Africa Protectorate will, no doubt, be very like the history of Cape Colony and the Orange State: the big game will be nearly all killed out, not within the next ten, but certainly within the next fifty years. For it occupies land which in many parts is really well adapted for human occupation (with all the appliances we now possess for turning the tropics to account). The only way to preserve the game to a reasonable degree in selected parts of Africa will be to convince ourselves that these "useless" beasts are worth preserving for their

¹ "In the Grip of the Nyika: Further Adventures in British East Africa." By Lieut.-Col. J. H. Patterson, D.S.O. Pp. xv+389. (London: Macmillan and Co., Ltd., 1909.) Price 7s. 6d. net.