# THE MEDICAL ASPECT OF THE *DISCOVERY'S* VOYAGE TO THE ANTARCTIC.*

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IT is natural that in an expedition in which the general health of all concerned was on the whole so perfectly maintained as it was on board the *Discovery*, there should be but little of interest to say in this connexion; nevertheless, it may be worth while to give a short account of the conditions of life, of work and play, of summer and winter, of light and darkness, of food and lack of food, of warmth, ventilation, clothing, and exposure to excessive cold, all the hundred and one important and so-called unimportant items, the neglect of which so readily produce disease, and the careful consideration of which, with a certain amount of good luck, can make a ship's crew healthy, and keep it healthy, through three Antarctic summers and two dark winters.

## DIET.

I will begin, therefore, by giving an idea of our method in food and drink on the ship and on sledge journeys.

### *Tinned Foods and Scurvy.*

Our equipment in these respects was almost as good as one could wish. It is true that here and there were exceptions, but, on the whole, our food supply was probably better in many ways than that of any previous expedition to the North or South. It was, therefore, an unwelcome surprise to us, at the end of a year on tinned foods, albeit with a certain constant admixture of fresh salt meat, to find that when we began to exert ourselves in the early spring sledge journeys at the end of the first winter, signs of scurvy appeared in more than one or two. Now this scurvy declared itself notwithstanding every possible precaution in the serving out of the tinned foods. Not a tin of suspicious food was ever passed, and each day not only was every tin of meat examined by sight and smell, but also every tin of milk the moment it was opened. Fresh seal meat was on the table three days a week, as well as frozen mutton on Sundays. We had, moreover, beer and cider, and bottled fruits, with jam and marmalade in abundance, and an unlimited supply of porridge and fresh bread.

On the first of every month there was a general examination of all hands on board, of officers as well as men, stripped naked. Weights and various measurements were taken regularly, and compared with those of the previous month, so that we knew exactly who, if any, were losing weight; who were out of sorts; or who had any spots, swellings, or oedema. At the close of the first year, when all were keenly preparing for the spring sledging, we knew that but one man in the ship had shown at any time the slighest suspicious signs of scurvy in the shape of some unaccountable oedema of the legs, with nothing amiss apparently either in heart or kidneys, and no suggestion of scurvy about the gums.

Then came the spring sledge journeys, the most trying of all, as they are undertaken in September when the days for travelling are still very short, the nights distressingly long, and the temperature persistently somewhere about 30° or 40° below zero F., occasionally running down to −60°. The lowest temperature experienced at all was −68°, and this was under canvas, when three separate expeditions were out for journeys which varied from ten days to a fortnight each. It was in an expedition which had been out three weeks from the ship, under such conditions as these, that scurvy first declared itself.

### *Seals and Gulls.*

No sooner did we realize that our free use of tinned foods was having this result than we knocked them off entirely, and at once set to work to procure a supply of seals, so that none but fresh meat should be eaten.

There was at this time of the year a scarcity of seals about the ship. We killed all that were seen—a very simple business—for they have no fear of man, and are at once stunned by a blow on the nose, when they can be freely bled from the heart.

But we had need for more than could be collected round the ship, as we now began to eat seal in one form or another for breakfast, as well as dinner, six days in every week. On Sundays we had seal's liver for breakfast, the most favourite dish of all, and frozen mutton for dinner. On Thursdays throughout our second winter the seal diet was varied by skua gulls.

We thus discarded all tinned meats, and every symptom of scurvy rapidly disappeared. We at no time enforced lime juice, increasing instead the ration of jams and bottled fruits; but lime juice was freely taken by many of the men who liked it. In some cases, however, it appeared to disagree, and in my own case marked scurvy symptoms were dismissed and the disease completely cured without recourse to lime juice. The main thing undoubtedly was, that fresh meat alone was eaten.

Throughout the winter we had found that two solid meals in the day sufficed. We had a good sound breakfast with an abundance of porridge at 8 a.m., and at 7 p.m. a dinner of three courses. Between these hours—at 2 p.m.—we had tea with bread and jam and butter, and this throughout the winter was the most popular meal of the day. The result of this lighter meal at midday in lieu of a heavier lunch, was that one rarely saw any one of the ward room mess asleep except at night, and insomnia was hardly known.

The meat of the seal is coarse-fibred, dark, and somewhat tasteless, but by no means rank or fishy. The blubber alone is repulsive, and uneatable at table, though even this on an extended sledge journey has been welcomed by a ravenous appetite. The seal's liver especially is excellent, but the heart and kidneys, though considered better than the body flesh, must be cooked with care to be eatable. The skua gulls and the penguins were excellent food, the latter making a good "jugged hare." On our return to the Auckland Islands, where we entertained the officers of the relief ship *Morning* on some of the highly-esteemed New Zealand grey duck which we shot there, the insufficiency of the latter was made up by skua gulls, and so excellent was the gull that the fraud was not detected by our visitors.

### *Beverages.*

I have mentioned that on Sundays we had beer and cider, and a certain amount of claret. There was a large supply of whisky, port, and madeira, and although these were always on the table, very little was used; the taste for alcoholic drinks dropped suddenly on our entry into the ice some months before the winter set in, and this disinclination increased as time went on.

No alcohol was taken on sledge journeys, except a small can of brandy for emergency; tea and cocoa were our regular drinks. For the first month of camp life tea was invariably preferred to cocoa, but after this, as the appetite became more and more difficult to appease, cocoa was welcomed in its place. Every one smoked, except three or four, and I consider that on extended sledge journeys tobacco is invaluable as a sedative to a chronic and unsatisfiable hunger. One pipe a day is sufficient even for a heavy smoker, and this small amount makes all the difference on a prolonged journey when the appetite gets far ahead of the small allowance of food.

## SLEDGE JOURNEYS.

In the journey to the south, in which we were absent three months from the ship, our food allowance was for some six weeks a bare pound and a half per man daily. On this allowance hunger never left us, and sleep was much disturbed by disappointing food dreams—sirloins of beef and steaming cauldrons of cabbage and potato; ball-suppers—stuffed turkeys and splendid hams, and waiters flying around with plates full for everybody else; but shout as one might one could not get attended to, and then one awoke and remained awake in one's sleeping-bag for hours from sheer hunger and healthy appetite to wait for a breakfast of boiled ra and the crumbs of one and a half biscuits fried in the fat of a thin slice of bacon. Then four hours' hauling on the sledges and a cold lunch of dried chips of seal meat, eight lumps of sugar, and a biscuit. Then three more hours of hauling on the sledges or, worse still, of driving on the dogs, and a final camp for the night on a pannikin of soup made of pemmican and pea-meal, with plenty of boiled tea water and a fraction of a piece of chocolate.

As for sleep in the lower temperatures of the spring sledge journeys, it is hardly worth the name. The seamen used to wake in the morning and swear they had been awake all night; but my own experience is the same as that of others, and it is this: one gets into the reindeer-skin sleeping bag with no joy at all, for after a few days' sledging the accumulation of moisture from the condensation of one's breath and from the snowdrift, and from perspiration in one's clothing, has filled the reindeer hair with frost and rime, and

* Read at a meeting of the Gloucestershire Branch of the British Medical Association.

made the leather hard and full of frozen wetness. One crawls into this after freezing one's fingers over changing socks and boots of reindeer skin—an absolute necessity to prevent the freezing of one's feet. Having drawn the flap over one's head and buttoned all the toggles, so that as little air as possible can get in or out, one begins to shiver oneself warm, a business which occupies from an hour to an hour and a half or two hours; sometimes it seems to occupy the whole night. During the process the bag begins to thaw, as well as one's various garments. It must be remembered that in sledging at these low temperatures one's very flannel shirt, with nothing but a vest between it and the skin, is full of hoar frost, the result of frozen perspiration, and all one's clothes outside it are the same. Buttons must never be done up, for if they are it will be quite impossible to undo them in a hurry; yet there is no inconvenience in leaving them undone, as the pilot cloth of which our clothes are made is stiff as millboard. All this accumulated wetness then begins to thaw wherever one's body comes in contact with the sleeping bag interior, but there is no general thaw inside. A frozen sock or boot cannot be thawed except by lying on it. To take it carelessly into the bag does nothing, for the air in the bag remains below freezing point all night, except within one's clothes, which get thawed right through and feel saturated with wet. After this thaw has set in properly one begins to dream, and but for dreams, the most absurd under the sun, one would not believe that one had slept at all. Every hour or so one wakes to shiver, and then again the dreams begin, and this goes on until at last there is light enough in the tent to cook by, and one knows that purgatory is over.

There is never any hesitation in turning out in cold weather sleighing. The sleeping bag is too utterly unattractive. The moment we leave the tent our clothes become converted to a coat of mail. There is a hard and noisy crackling at every movement, for the headgear, which is immovably frozen to the shape of one's head, keeps its place from start to finish. This may be for a fortnight or three weeks; one can never take it off.

Now, having "slept," the first duty is to cook the breakfast, a duty which falls to the lot of each in turn. This means an abundance of frozen finger-tips. So frequently do the finger-tips succumb from touching metal lamps, oil cans, pannikins—even cheese, sugar, and canvas and linen bags—that eventually not a man returns without thick-skinned blisters on the end of each thumb and finger. There is no avoiding this, but there is no excuse for anything more serious, even at the lowest temperatures. We had one or two more serious frost-bites, but they were the result of accident. On one occasion a whole party of men was lost on a hillside in a blizzard, about a mile from the ship, returning from a sledge journey. One of this party (a thin youth of 21) got separated from the rest, and after wandering some hours, fell asleep in the snow from sheer exhaustion, and was partly buried. For forty-four hours he slept there on the hillside, while three search parties were hunting him in vain. Eventually he awoke when the blizzard stopped, and, recognizing his landmarks, walked in to the ship, without even a toe or finger-tip frostbitten; neither was he the least bit the worse in any way for his exposure. The remaining eight of this party kept together for a time, but accidentally, in the blinding snowstorm, got on to a steep ice slope and were separated, and one of them, Vince, who was wearing fur boots, slipped, and was lost over an ice cliff in the sea. One lot of four found their way along the cliff and eventually reached the ship and gave word that Vince was lost and that the others were adrift. A search party was at once organized with lanterns, whistles, ropes and crampons, and the ship's siren was sounded every minute or two. After about two hours' wandering in the blizzard on the hills, these three were found completely dazed and unable to answer questions, the cold in all had begun to produce a torpor, and yet they continued to wander, not knowing where they were going. It was one of these who had the worst frostbitten hands that any of us experienced. In sliding down the ice slope he had lost both his felt and fur gloves, and had been barehanded for many hours, using his sheath knife to cut steps up the ice slope. On the next day, every finger and each hand was as though it had been very badly scalded, enormous blebs formed, full of blood-stained fluid, and the ends of the fingers were like so many large purple grapes. We thought for a week or two that there was small chance of saving them, and yet, although they took many months to recover, nothing but the nails and more superficial tissues were actually lost. The nails dropped off one by one, and the ulcerations gradually healed up. But for the following year and a half this officer had constant trouble from recurring frostbite at the slightest exposure, and though the nails appeared again, the skin remained so sensitive that he was never happy with his hands till we finally left the ice.

The first frostbite I saw affected both the ears of one of my best friends, Lieut. Shackleton. Having heard from my youth up that a frostbite should be rubbed with snow I did so, with the result that the skin immediately came off, not from too vigorous a rubbing but from the fact that at temperatures below zero the snow is as hard as sand.

From that time on I never rubbed a frostbite, finding that it was far better to bring back the circulation by merely applying the bare hand or by gentle massage, or by making the frozen individual swing his arms.

*Clothing.*

One can do nothing in Polar climates without some form of wind-proof clothing, for though the lowest temperatures can be borne if there is no wind, a very moderate temperature becomes unbearable when a slight breeze springs up. The wind-proof clothing supplied by Burberry, with which our expedition was equipped, was of a very light and closely-woven gaberdine; with a helmet, a blouse, trousers and gaiters of this material the whole person is protected from head to foot, and is safe in the worst blizzard of wind and snow.

In these one starts on a sledge journey, and in them one returns; one eats in them, sleeps in them, walks and works in them sometimes for months together.

I have, as yet, said nothing about the warmer clothing that was needful. On the ship we wore rather thicker garments than one wears in winter in England—thick vests and pants of Jaeger's make, woollen shirts and pilot-cloth trousers, a Jaeger collar and tie or a woollen muffler, and a thick woven-wool cardigan. Everything of wool; and it is a golden rule in low temperatures to avoid everything but wool as far as possible. All furs are far too impervious, and, instead of allowing the free evaporation of moisture from the body, collect and absorb it all, and become heavy and wet and stiff when frozen. The only furs really needed are for sleeping bags on sledge journeys, and the only other material besides wool are the close-woven wind-proof coverings which I have already mentioned, and these are quite essential. When there is no wind, no matter how low the temperature may be, there is no need of extra clothing, except for the head and hands; these must be covered up by a woollen helmet and by woollen or felt gloves. Wolf skin mits are admissible, and reindeer hair Lapp boots are essential in low temperatures, but apart from these there is no need of furs nor for more than a jacket over-all in leaving the wardroom for a walk. But if there is any movement of the air, even the slightest breeze, the wind clothes must at once be donned, or serious results may follow on the thighs and legs.

When on a sledge journey, leather boots are never safe if the temperatures are so low as 10 or 20 degrees below zero. The leather absorbs the wet from the skin and freezes as hard as iron, making it impossible to get the boots off or on again in the morning if they have frozen out of shape. They soon stiffen and stop the free movement of the foot in walking, and this, if the temperature is low, is sure to end in frostbite. The reinskin boots being made of soft and rough-tanned skin with the hair outside, can be quickly thawed into comfortable shape by the warmth of the hand and foot; and, moreover, on taking them off at night, before entering the sleeping-bag, it requires but a few minutes' attention to see that the mouth of the soft boot freezes open for the morning; being soft they yield to every movement of the foot and toes in walking, and so encourage the circulation to keep going. They are filled with a particular kind of absorbent hay from Norway, and into this the foot is thrust with two or three pairs of sock. The socks and the grass get wet through by the day's march, and while the former are stuffed inside one's shirt for the night to ensure that they may be pliable enough to put on in the morning, the latter must be teased out to freeze, so that on the morrow the wet can be shaken out of it as hoar frost. The sum total of the effect of these nightly arrangements in a three-man sleeping bag, into which three men crawl with all their clothes on, clothes in which they have been sweating freely every day for weeks, can be more easily imagined than described. On the ship we wore long

Russian felt boots up to the knee, very large and very clumsy, but always warm and comfortable. In the summer months ski-boots were the most useful foot gear, as one almost always went out on ski, the Norwegian snowshoes; but in working about the ship ordinary sea boots could be worn. For the whole two years we saw no rain, so our oilskins were stowed away.

*The Hygiene of the Ship.*

It will be well now to say a word or two about the difficulties of keeping a ship in a wholesome state when frozen into ice for a long period. In the *Discovery* we were fast in ice in one spot for two years and a month, and yet I think there was nothing really unwholesome about any of the living spaces, at any period either during the winter or the summer. The ship was, of course, specially constructed for warmth as well as strength. She had a double skin, with an air space between, which was a great protection from the entry of cold, or rather from loss of heat. The living spaces for men and officers were heated by coal fires with talc fronts, comfortable and cheerful to look at, and convenient for making toast, which was eaten by every one at breakfast and at the midday tea throughout the winter. The winter lasted practically for six full months, but not all this was darkness. We lost the sun on April 23rd, and again saw it appear on August 22nd. For about 120 days the sun was not seen at all, but neither was all this darkness. For a month or more on each side of the midwinter month of almost total darkness we had several hours of twilight, as the sun was somewhere near the horizon either in approaching spring or in departing summer. During the months of March and April we had sufficient daylight to indulge in hockey and football on the icefloe every day at noon. When light failed for this each man took air and exercise daily, either walking over the hills or snowshoeing over the sea ice. Most of the men took kindly to the routine because they found that it enabled them to eat more heartily and to sleep; and indeed the air and exercise were the secret of both.

The upper deck was buried in snow hammered hard to a depth of several feet which formed a substantial roof to the living space below. The actual deck, moreover, was of wood in two layers with a lining of asbestos wool. Then over all we had a winter awning, which to some extent protected the doors and deck houses in the blizzards from getting obstructed by too much snow.

In building the ship there were a few small errors made, which had uncomfortable consequences. The skylights, which in summer admitted the only light we had in our cabins, were in metal frames which connected the cold outside with the warm, moist air inside, and this produced sometimes a drip, but generally the formation of frost rime and icicles, which eventually thawed and dripped as one worked at the tables underneath. Also there were some metal bolts which did the same thing along the bunks, producing disagreeable bosses of ice close to one's face as one lay there, which from time to time thawed and made the mattress and bedclothes wet along the ship's side. This wet ran down behind the bunks and made the clothes in our drawers below as wet as possible, or else, if the temperature was particularly low, bound one's clothes together in a solid mass of ice.

HEALTH OF THE CREW.

But these difficulties sound far worse than they really were, and the only dangerous objection was the damp in one's bunk, which certainly did lead to a good deal of rheumatism in those who had a tendency that way. There were several cases of lumbago, and once or twice a bad attack of more general muscular rheumatism with some fever and free sweating, but never in any case was the acuter rheumatism situated in the joints, a point that seems to uphold the idea that one may be more the result of climatic conditions combined perhaps with an erratic digestion, and the others —the arthritic form—more purely the result of actual infection.

Without, however, venturing an opinion, it seemed to me interesting to note that the muscular form of rheumatism was the more common in what is considered, and no doubt practically is, a germ-free part of the globe, and that although the acuter forms of arthritic rheumatism were absent, the more chronic form of rheumatoid arthritis appeared in one or two cases, and was certainly associated with exposure to cold and wet, combined with a faulty digestion.

Here it may be of interest also to call attention to the absence of "colds." We were entirely free from this trouble from the time we entered the ice to the time we reached New Zealand two and a half years later, except on two occasions, which were somewhat remarkable. On the occasion of our unpacking a large bale of woollen clothing, long after we had been in the ice, a very virulent form of nasal catarrh ran through the whole ship's company. Undoubtedly, in this case the infection was in the clothing. On the second occasion the catarrh was accounted for by the fact that our wardroom carpet was taken up for beating, and the infection, which had lain dormant for many months, was liberated, and had the usual effect. But though the majority of us were infected, and though the attack on the one occasion was very severe, with a pronounced aching all over the limbs and body and much indisposition, and, I have no doubt, also fever, yet it was soon thrown off.

Unhappily for the cause of investigation it broke out just after we had separated on various sledge journeys, so that I heard of the generality of the attack only some months after its occurrence.

One party of three, however, after a few days' travelling, felt so ill with what they thought was influenza that they turned back to the ship and brought their journey to a close.

To return once more to the ship. We never allowed the excessively warm temperatures in the living spaces that one reads were allowed in some other Arctic and Antarctic vessels. In the *Discovery* each officer took his turn to remain up all night on watch, to keep the fires going, and to visit the meteorological screen, a hundred yards away from the ship, for the temperature and other observations, which were taken every two hours day and night.

Therefore, with a thermometer also in the wardroom and on the mess deck, there was no difficulty in arranging that the temperature should be maintained somewhere between 50° and 60° F. When the officer of the watch for the night turned in, after taking the 6 a.m. observations and after calling the cook, he used as a rule to open the skylights; and the wardroom would then be flooded with very cold air, till the temperature had dropped sometimes to nearly freezing point.

This was found to freshen the whole living space, sleeping cabins and all; and yet by the time breakfast was ready at 8.30 the temperature had invariably risen again to 55° or 60°. Often before the midday meal, or while the dinner table was being laid, the skylights would again be opened, and so the whole place was kept fresh and wholesome. The stoves were excellent, and kept a certain amount of ventilation always going; for when the skylights were closed there was still a downtake in the roof for fresh air.

There is little doubt that by keeping the living spaces at a higher temperature the amount of damp in the cabins could have been reduced, but it would have been at the expense of the general good health.

*Scurvy.*

In the *Discovery* the blood count was regularly carried out by Dr. Koettlitz, and his results, if they show anything fresh as the result of Antarctic wintering, will no doubt be published with the rest of the Expedition's scientific work. He took estimations of the haemoglobin as well as counts of the red and white corpuscles at various stages of the winter, and so far from any anaemia as the result of prolonged darkness there was in a good many an increase both in the haemoglobin and in the number of red corpuscles. This may have been due to a general improvement in health from the fresh meat diet, or from the restful life following on a summer of very heavy work.

I think to every one the winter months came as a most welcome time of rest and recruiting after the summer's sledging, which is, under the best conditions, very trying work indeed. To those who went on the longer journeys, and returned with fairly well-marked scurvy, it was the greatest possible boon to feel that rest was possible; for with swollen spongy gums and knees which would not bend and oedema in both legs to the hips; with brain and nervous tissues, I suppose, in much the same dilapidated state, there was nothing, except fresh meat, that one so desired as the feeling that one could sit still for a month and do nothing.

Lieutenant Shackleton, whose throat and breathing passages were affected, was, much against his will, sent home in the relief ship *Morning*, his attacks of dyspnoea, cough, and blood spitting were regularly induced by the approach of a southerly blizzard and it was deemed inadvisable for him to risk a second winter. His superabundant energy and untiring zeal for work were to some extent answerable for his rapid breakdown when attacked by scurvy. He never, unless actually ordered to do so, would consent to save himself, and

this, however admirable in itself, is a bad trait in a scurvy patient.

To be thus cut short in the continuance of this work was the most bitterly disappointing thing that could have happened to him, nor was the loss of his cheery face and constant sense of humour any less of a disappointment to his messmates.

In the cases of scurvy which came under my own notice from the first, the gums were the earliest part affected, becoming swollen and dark purple; and this swelling was to be felt by the tongue at the back of the incisors for several days before there was any visible sign of swelling from the front. Little purpuric spots—chiefly on the legs, and thighs, and arms—were noticeable next, increasing to very considerable numbers; then the nails of the hands and feet should be examined, for in one case there were symmetrical haemorrhages under each big toe nail, and in two other cases there were little longitudinal streaks of dark blood under all the finger nails; then, following the slightest strain, which is a frequent occurrence when travelling amongst and over rough hummocks of ice and snow, a gradually-spreading brawniness appears in the popliteal space or about the ankles, and this increases till the knee cannot be bent at all; the swelling, meanwhile, takes on a bruised and haemorrhagic appearance, and pits very markedly to pressure.

All these signs, perhaps, are too well known to need mention, and the pity is that one was not working under conditions where minute examinations of the blood and urine could be made. As things were, however, it was impossible; and, apart from our being able to give positive evidence that fresh meat will rapidly cure scurvy without either lime-juice or fresh vegetables, I am afraid that our observations will not be of much value. To ourselves the whole point seemed to be fresh meat, no matter what the animal it came from. After cutting off tinned meats, it was only on the longest journeys, when fresh meat could not be taken in sufficient quantity and no living animal or bird was ever seen, that scurvy appeared, and the moment rest and fresh-meat diet was procurable the symptoms began to disappear.

*Snow-blindness.*

There is one more discomfort which I must mention, though it is not peculiar to the Polar regions—I mean "snow-blindness," or "snow-glare," which attacks the eyes on the great ice-barrier plain in a most painful manner, often necessitating that one shall travel for days on end blindfold, and even necessitating sometimes that a party shall camp and wait till the violence of the attack is over before proceeding. There were times when two out of the three on the southern sledge journey were unable to use their eyes at all. We used zinc sulphate and cocaine for all minor attacks, but found that sleep was the best and quickest cure of all, even if an injection of morphine had to be given to produce it.

*A Septic Wound.*

We had one case of septic poisoning on the ship which resulted in such a lengthy business for the man concerned that a word or two about it may be of interest. It was in March, 1903, that one of the seamen was told off to act as butcher for the week, a work which several of the men and officers undertook from time to time. It consisted of the killing and cutting up of seals for butcher's meat. During this occupation he cut himself on the hand and did not mention the fact till he had pain in the glands of the axilla. These were treated at once as well as the wound, and were kept under without ever quite disappearing, for something like four months, at times almost becoming normal and then for no apparent reason becoming hard and painful again, though the arm was strapped in to ensure its rest. About July of the same year the glands suppurated; a superficial abscess was opened, and about a tablespoonful of greenish-yellow pus let out. From that day onward the wound refused to heal, although on our return to New Zealand the remaining glands were twice scraped out and the axilla freely opened. Up to our return to England in September, 1904, there seemed to be a greater tendency for the wound to break down at the edges than to heal, and the patient was then admitted to the Naval Hospital at Chatham, where, as I have been kindly informed by the surgeon in charge of the case, he is still under treatment, and shows signs of very slow improvement.

In this connexion I may say a word about the diseases of the seals in the southern ice. One would expect them to be exceptionally healthy, but they seem to be a prey to the attacks of more than one form of disease. They have frequently a mass of suppurating sores all over them, the result of the fights indulged in by the bulls in the breeding season. In a very large proportion of bulls the skin around the genital orifice is in a ragged and suppurating condition, owing to the fact that this is the part attacked in all their fighting. There are other and larger wounds, which are nearly always in a very unhealthy state, and these are made by the teeth of the killer whale or grampus, which is apparently as common in the South, and as vicious, as it is said to be in the North. In the North the stomach of a single grampus has been found when opened to contain the remains of fourteen porpoises and several small seals. Unhappily, the combined whaling talent of the *Discovery* and both relief ships was unable to kill a grampus, or we might have beaten even that record, but their voracity is evident from the marks they leave on the seals they have failed to catch. Then again we used to find in preparing the seals for food, that now and again in the heart the coronary arteries were hard and atheromatous, or in the kidney there were concretions branching into every tube. And again, at the time when the young were being born, we noticed a good many which were apparently blind, with their eyes streaming with yellow pus.

Cultures were taken from these cases of ophthalmia as well as from the various sores, and cultures were made from the contents of the intestines of both seals and penguins and skua gulls. All the bacteriological work, however, was done by Dr. Koettlitz, and his results will no doubt appear in due course.

We had one fracture during our stay in the ice, and this, which was a comminuted fracture of the lower third of the tibia, recovered well in the usual time.

I think that I have now mentioned most of the ailments that befell us; though one or two were troublesome and gave considerable anxiety at the time under such conditions, they were not, as a rule, of a very serious nature. An exploring ship is no place for surgery, and the sick bay at our disposal, placed close by the galley for the sake of the galley's warmth, was for that very reason the wettest place in the whole ship, because the steam from all the cooking condensed in it. We were exceedingly lucky in keeping so free from illness.

I have taken considerable liberties in diverging from my text, but I hope I have given an idea of the ways and means by which one can promote and ensure health under conditions which are more or less generally considered to be trying and unhealthy. I have spoken of our food on the ship and on sledge journeys, of our methods of keeping the ship warm and comfortable, and at the same time airy and wholesome—a thing which some Arctic expeditions have found most difficult, and I have spoken of the difficulties that beset one in sledge journeying at various temperatures. It would be possible to speak for many hours on the pleasures of life in the Antarctic, but in saying so much on matters which have so slender a connexion with medical science, I must close with the hope that these details may have some interest, in the absence of more important medical information.

# THE PLAGUE.

## PREVALENCE OF THE DISEASE.

### INDIA.

DURING the weeks ending June 3rd and 10th the deaths from plague in India numbered 15,317 and 7,486 respectively. The principal figures during the two weeks were: Bombay City, 346 and 251; Bombay Districts, 707 and 572; Calcutta, 84 and 80; Bengal Districts, 661 and 351; North-West Provinces and Oudh, 1,785 and 956; Punjab, 9,460 and 5,086; Rajputana, 475 and 349; Central Provinces, 6 and 4; Hyderabad State, 34 and 11; Mysore, 19 and 28; Madras Districts, 14 and 14; Burma, 85 and 60. At Bhurtpur, during the six weeks ending June 3rd, 1,974 deaths from plague were reported for the whole period, independently of the numbers reported from Rajputana, with which they are usually included.

### SOUTH AFRICA.

One case of plague was discovered in East London during the week ending June 3rd. One case of plague previously recorded at Queenstown died during the week ending June 3rd. From no other town or district are any fresh cases of plague reported in South Africa during the week ending June 3rd. Rats and mice infected with plague continue to be found at Port Elizabeth, East London, and King Williamstown.

### AUSTRALIA.

*Queensland.*—At Ipswich, near Brisbane, during the weeks ending May 13th and 20th, the fresh cases of plague numbered 7 and 0; the deaths from the disease, 1 and 0. During the weeks ending May 13th and 20th the fresh cases of plague at Brisbane numbered 0 and 2, and the deaths from the disease 0 and 2. At Childers a town 40 miles north-west from Maryborough a fatal case of plague occurred on May 16th. Between April 1st and May 6th no case of plague occurred anywhere in Queensland. Plague-infected rats have been found in all the three towns from which plague is reported.