

Appendix to NANKYOKUKI, the Report of the Japanese Antarctic Expedition, 1910-12

CHAPTER III STUDY ON ROCK PIECES FOUND IN THE STOMACH OF PENGUIN

Among the specimens collected by the Japanese Antarctic Expedition, most interesting are the numerous pieces of rocks found in the stomach of the Emperor Penguin. According to the knowledge of the present author, although grain-eating birds usually take a few pieces of stones or rocks to facilitate digestion, the flesh-eating birds do not have such a habit. The penguins, living on fishes, would not, seemingly, the need for taking pieces of stones to facilitate digestion. As the rock particles were found in the stomach of the penguins together with numerous eyeballs of fishes, it would seem proper to infer that the rocks had been in the stomachs of the fishes eaten by the penguins. In any case, these 140 odd pieces of rocks found in the stomach of the penguin captured at 76°58'S, 154°50'W should be regarded as the most excellent source of information on submarine and land geology of Edward VII Land.

These rock fragments, whether swallowed by the penguin itself directly or whether indirectly through the stomach of the fishes eaten by the penguin, must have initially been taken quite accidentally at various places. Therefore, in spite of their relative smallness in size, these rock pieces should be regarded as a representative collection of rock-samples of the region where the penguin dwelt, that is of Edward VII Land in this case. Following are descriptions of some of them.

1) SCHISTOSE ROCK This rock, being a

kind of metamorphic rock with schistosity of the Archaeozoic age, has a schistosity which are somewhat green in colour.

2) TUFF This is the solidified ashes from the volcanoes of various ages. Specimens collected this time are slightly light-green in colour and are comparatively light and soft. Among the collections, are some pieces of schalstein with a dark greenish-violet colour. They are comparatively hard and heavy.

3) QUARTZITE This is a type of sedimentary rock and was formed in the Palaeozoic age. Specimens collected this time are white coloured and are so hard that they spark when struck by a steel-hammer.

4) SANDSTONE This rock was formed from the sand and gravel deposited on the sea or river bottom. It is, in other words, a sedimentary rock. Specimens collected this time are yellow in colour and look like pressed millet seeds.

5) GREYWACKE SANDSTONE This is also a kind of sedimentary rock. The present specimen is of a dark-grey colour and is exceedingly hard.

6) CLAY SLATE A kind of Palaeozoic sediment. The present specimen looks like a well-packed, fine black soil.

7) GNEISS A kind of the metamorphic rock of the Archaeozoic age. Colour of the present specimen is similar to that of granite.

8) VOLCANIC ROCK A kind of volcanic rock of the post-Tertiary age. All the samples in the present collection are black coloured

and contain a large amount of magnetite or ilmenite. The pieces of the present collection are attracted by the hand magnet. Many of them do not fall even when the hand magnet is moved with violence. They are just what are called natural magnets. These rocks could well be used as iron-ore when their iron content is high.

On the basis of the specimens described above, the following may be said about the rock fragments found in the stomach of the penguin.

The geological structure of the regions

around Edward VII Land may be supposed to consist of clayslates and greywackes of the pre-Tertiary age and of the younger and older tuffs of volcanic origin. It may be noted that volcanic eruptions did, in fact, take place in the regions around Edward VII Land. Mineralogically speaking, the fact is that out of some 140 specimens only 30 of them, were found to contain magnetite or ilmenite, but from the standpoint of geology, the pieces of rock from the stomach of the penguin seem to yield a fair amount of information.

CHAPTER IV STUDY ON THE PROVISIONS FOR EXPEDITION

The food for the expedition was prepared to last the 27 members of the party for two years and was comprised of the following. (A good deal was replenished for the second expedition, mostly of the same kind.)

Polished rice, unpolished rice, glutinous rice, barley, soybeans, red beans, flour, sugar, rice-cake, biscuits, hard tack, cakes and candies, salted salmon.

Canned foods: Corned beef, beef, chicken, salmon, bonito, tuna, whale, sardine, powdered bonito, powdered sea-bream, top-shell, clam, scallop, ear-shell, crab, sea-eel, lobster, bambooshoots, carrots, burdock, coltsfoot, lotus root, mushroom, gellatin, *Fukujinzuke*, peach, cumquat, almond, pineapple, peach, pear, seasoned rice.

Dried food: *Kampyo* (dried gourd-skin), bean-curd frozen and dried, potato, tangle, light cake made of wheat-gluten, flowering fern, trepang, seaweeds, white bait, dried cuttle fish, lobster, grape, starch, candy of wheat, vermicelli and dried noodle.

Casked food: Pickled radish, ginger, pickled cucumber, dried plum, bean paste, soy, radish, vegetables pickled in bean paste, cheese, lard, sauce, butter, ham, jam, powdered mustard, salt, limejuice, lemon oil, acetic acid, onion,

potato, white and red wine, brandy, sake and whisky.

Other Japanese fishes, seasonings, and staples were also included.

All of these provisions were kept in the main hatch on the middle deck of the "*Kainan-maru*". But, there were, of course, no ventilation facilities and since the hatch was next to the engine-room, many of these provisions got stale or went bad when the ship passed through the tropical zone.

The hulled rice together with the herrings for the dogs and pickles, after being left in the hatch where the temperature sometimes exceeded 100 degrees, not only got stale but also began to smell to somewhat like the Chinese rice. Although we, being short of provisions, ate this rice during the expedition, we could not eat it any more after we returned and tasted the regular rice.

As for unhulled rice, there was no serious change in its quality. In the case of glutinous rice, it became a little stale, and the rice cakes made from it tasted just like the rice cakes made from ordinary rice. The barley did not suffer serious damage, but very serious damage occurred in the case of flour on the voyage home it became somewhat red and

we noticed what appeared to be insects' nests. Seven or eight bags became inedible and had to be thrown out.

Most of the hard tack, given by the Army for experimental use, was intact, though some of it tasted a little bitter. This was considered to be one of the most suitable foods, both on land and sea. As to the biscuits, packed in 50 *kin* cans, there were a number of brands. Among these, only one proved acceptable and the others became too bitter to be edible. There also were better quality biscuits of other brands. These biscuits were well flavoured and were found to be more suitable as deserts rather than as staples.

They cost, however, about five times more than the ordinary biscuits. The vermicelli and dried noodles were quite good, but as they consumed much water in cooking, they are utterly unsuitable both for the inland expedition and for the voyage. Seasoned rice (canned) given by the Kure Company was not well boiled and proved unsatisfactory. As for the beef, there were two kinds, corned beef and roast beef. The former was seasoned and the latter was boiled and salted. The canned beef given by the Kure-Futakawa Packing Company did not get stale, while the beef purchased from other canneries went completely bad and became inedible.

With respect to the canned fishes and canned shellfishes, powdered sea-bream, powdered bonito, sea-eel, lobster, crab, top-shell, and fresh water trout, they went a little stale but were edible. All the other, however, got stale and rotten. *Fukujinzuke* (a kind of pickled vegetables), fried burdock and seasoned butterbur were good, and boiled carrot, boiled bamboo shoot, boiled butterbur, boiled lotus rhizome, and boiled mushroom were tolerable, but of them, the carrot, burdock and bamboo shoot were mostly half rotten. Ham was very good, butter did not go stale and the condensed milk of the Taka-brand was fairly good.

Cheese got completely stale and we threw it out into the sea. We took with us the soy sauces of a number of brands, all of which were of the best quality and suffered no change both in the tropical and the Antarctic regions. The *miso*, or bean paste, was both canned and casked. Four tenths of the former became rotten because the cans were damaged partly by the rolling of the ship and partly by the swelling of the *miso* while passing through the tropics. But the casked *miso* remained intact. For the inland expedition, canned *Taimiso* was found to be better than the *Sendaimiso*. On the sea, soybeans, red beans and peas were good, whereas the candy of wheat was not.

As the casked vinegar inevitably gets stale, it is necessary to bring acetic acid when one sails through the tropical zone. It would be best to bring as much lime juice as possible, because it is useful as a preventive against scurvy when there is a shortage of fresh vegetables. When one wants to drink water, it is wise to boil water and cool it and mix some lime juice and sugar. It is much more refreshing and is also good for health. As for candies, the canned ones were the best. Most of the liquors did not go stale. Some of the dried goods got worm-eaten and mouldy, but we could eat them when properly cooked.

Now, we have summarized about the food. Although there are many reasons why the canned foods became stale and rotten, one reason certainly was that the method of packing was unsatisfactory. In fact, none of the canned boiled-lobsters became rotten and stale, because of the perfect packing. It is, moreover, desirable that the cans be painted, since the cans not painted are apt to rust and to cause internal rotting. In the Antarctic region, the unpainted surface of the cans sometimes gets vapoured, causing the skin to stick to it as in the case of lacquer thus damaging it. When the cans are painted this danger is also eliminated.

CHAPTER V STUDY ON THE PROVISIONS AGAINST COLD WEATHER FOR THE EXPEDITION

In the Antarctic region it is, naturally, extremely cold. But since the Japanese Expedition Party went there during the summer season, special winter clothes were not needed.

As a rule, three cotton shirts and two wool jackets were quite sufficient for the members of the expedition. Working hard in these clothes, we used to sweat heavily. On windy cold days, however, we put on, besides those mentioned above, a long fur vest and a coat with a fur neckband, presented by the Army for experimental use. We also occasionally used these fur winter clothes as bedding.

The fur of Saghalien dogs was used for the winter clothes mentioned above, both on the outside as well as for lining. Though in these clothes one looks like a man like animal, the manner of tailoring was the same as in the common western clothes: the coat, however, was cut like the sailor's coat as a pullover for the convenience in putting on and off. The trousers were to be suspended on the shoulders by a hemp rope to prevent slipping. The same hemp rope was also used for the band around the waist. A sock-shaped hood was fastened to the coat by string. The mittens were to be hung around the neck by a cord. The total weight of the complete outfit was over 11.25 kg. These winter clothes are of course indispensable in the Antarctic winter.

On the second Expedition, we also tried specially designed winter clothes, which were called Japanese-Chinese-Western style winter clothes. The outside was made of cloth and the inside was of flannel. Raw silk was used for padding between the inner and outer material. The tailoring was in the Chinese style. But, they proved to be of little use. The chill of the Antarctic can not be staved

by material such as raw silk.

As for the sleeping bags, they were also made of dog skin as the winter cloth. The outside was covered by a dark-brown cloth lined with fur. The bag was seven feet long and four feet wide and tapered slightly toward the end. When carrying, it was tied into a roll. This was very convenient for inland expeditions. At campsites we used to spread it out directly upon the ice and lay in it. It was fairly warm and comfortable to sleep in. It is certainly indispensable to carry such a sleeping bag for travelling in uninhabited snow-covered country.

Having landed on the white ice-field, we were, at first, exposed to the danger of snow-blindness from the strong reflection from the snow. We had taken with us two kinds of snow-glasses to protect our eyes, but both were not very effective. To our regret, several members had been affected with snow-blindness when we landed on Bay of Whales.

In one of the snow-glasses, the black lenses were sewed to a round leather form in the same manner as in diving-glasses. When working hard however they got steamed. This frosted soon in the cold weather making the glasses unusable. They were thus not good for use for any length of time.

The other pair was made of a piece of black silk gauze instead of glass. This had two good points, firstly they were easy to put on, and secondly there was no possibility of frosting. But, during severe snow-storms, the snow passed through the silk. As a result of these experiences, we finally invented what seemed to be ideal ones. They were made of leather, 1.5 inches wide, and were long enough to cover both eyes. The leather was cut away at two points in front of the eyes.

These holes were cut, so that glasses of desired colour could be changed readily with this pair of glasses, we did not suffer from frosted lenses and we could change the glasses of different colour quite easily.

Since it was found to be very tiring to use glasses of the same colour all the time, it was necessary to change them at least once in every two or three days.

As for shoes we took with us woolen shoes, given us by the Army for experimental use. But, as these were originally designed as riding-shoes, they were found to be inconvenient for walking on ice, although they kept our feet quite warm.

At Bay of Whales, we at first used these wool-shoes to which the steel snow-shoes were tied. But after a while, we found them so heavy that all of us took them off and put on the straw-shoes. With three pairs of cotton

and woolen socks under the straw-shoes, we felt very comfortable, and, as we worked hard, we felt no cold even when the inside of the shoes got wet.

These straw-shoes had one more good point; without wearing any special snow-shoes, we did not slip at all when we carried heavy baggage on the ice-banks or went up steep snow-hills. However, as they were made of straw, which is very feeble, they did not last long. In fact, it was troublesome to change two or three pairs a day.

The seal-shoes of the Ainus shared the advantages of the straw-shoes and supplemented their weak points. These were the boots from the hide of seal, which is moisture proof, prevents slipping on ice, and is very light. All of the Inland Expedition Party used them and found them highly useful.

CHAPTER VI STUDY ON SAGHALIEN DOGS AND SLEDGE

When the Expedition Party started on the first project, they carried thirty Saghalien dogs on the "*Kainan-maru*." On that ship, which was only 204 tons, we did not have room for a kennel. We made a box, only six feet in width, five feet in height, and four feet in length, for the dogs: the box was separated into upper and lower parts and each part was subdivided into four parts. These eight compartments were obviously too small for the Saghalien dogs which were larger than the ordinary Japanese dogs. Besides, the dogs were only allowed to get out of their kennels only for their meals three times a day. It, therefore, gave us much pain to think how those poor dogs felt in their holes.

On passing across the equator, the intense heat seemed to affect the dogs severely, as they had long been accustomed to cold climates. Moreover, as they did not have outdoor exercise on the deck, they gradually

enough became very depressed.

Getting into the southern hemisphere, the dogs began to die one after another, and when we arrived at Ross Sea, all but one were dead. The progress of their sickness was as follows; at first they lost appetite, and the legs suffered from what appeared to be rheumatism or beriberi; before long, they were unable to walk and frothed at the mouth, distorting themselves in their pain. Within one hour after the beginning of frothing, they died, in spite of our desperate nursing and medical care. Sometimes, we even buried three or four dogs in one day.

Since all of the dogs for the sledge had died, we decided to obtain thirty more Saghalien dogs on the second project.

The dogs sailed for Sydney on the "*Kumano-maru*" with an Ainu named Yahachi HASHIMURA and with supplementary supplies. They were transferred to the "*Kainan-maru*"

at Sydney and started for the polar region with the Party. All of them landed safe and sound Antarctica and proved themselves to be very helpful.

On the first expedition, almost all of the thirty dogs died during the voyage, while, the second time, most of the dogs were safe. This result was chiefly caused by the following reason: considering the tragic failure of the first expedition, the Supporter's Association took the dogs to a veterinary surgeon for medical examinations as soon as the dogs had arrived at Yokohama, and sent the excrements of the dogs to the Agricultural College for examination through which some tapeworms were discovered. Considering that the failure of the first expedition was probably caused by tapeworms, tapeworm drugs were administered to the dogs. The members of the Party were careful enough to supply the drugs to the dogs during the subsequent voyage, too. This appears to have been the main factor that kept the dogs from dying during the second expedition.

Generally speaking, Saghalien dogs are the strongest among the many kinds of dogs for sledge and are very gentle in nature. They were highly helpful to us. To make the dogs tug the sledge, they were placed one by one on either side of a very strong seal skin loop tied to the head of the sledge: the head dog was placed at the top of the loop, while the others were placed in the order of strength. The proper choice of the head dog was of top-most importance, because the behaviour of the head dog may at times jeopardize the safety of the whole party. The head dog must be wise, gentle, diligent and of good nature, because all the other dogs follow after him. The sledge was started as follows: the coachman, putting on board-snow-shoes, rides astride over the top of the sledge and cries "toh toh" (tug-tug), then the head dog jumps up to tug the sledge, and the other

dogs dash forward following after the head dog. To go right or left was ordered by the coachman.

To illustrate the capacity of transportation by sledge, let us list the things carried by the sledge in the following, giving their weights.

The loads of the sledge:

Clothing:

winter clothes (inside and outside made of dog fur, with hood and gloves)

5 units, 62.5 kg

winter over-coats (made of brown wool, with hood and gloves) 5 units, 12 kg

sleeping bags (both sides made of dog's fur) 3 units, 23.7 kg

winter clothes (made of raw silk, with hood and gloves) 1 unit, 3.28 kg

undershirts (spare) 20 units, 16.5 kg

gloves (spare, brown wool, knitted) 15 units, 1.02 kg

ear caps (made of rat's fur)

5 units, 0.056 kg

black snow-glasses (spare) 3 units

socks (brown, knitted) 25 units, 2.81 kg

steel snow shoes 10 units, 2.26 kg

woolen shoes 8 units, 10.3 kg

blankets 1 unit, 1.31 kg

tent (for 3 persons) 1 unit, 12.6 kg

canvas (1.8×3.6 m) 1 unit, 7.0 kg

,, (1.8×1.8 m) 1 unit

dog shoes 100 units, 2.26 kg

Foods:

hard tack 150 units

biscuits (Mizuho-brand) 2.97 kg

,, (Homare-brand) 1.48 kg

Foods, subsidiary:

boiled beef in Japanese style 200 cans

chicken 5 cans (1 lb. each)

fish-cracker 5 lb.

wreath shells 5 cans (1 lb. each)

smull (sweet fishes) 5 cans (,,)

ear-shells 10 cans (,,)

bean-paste with sea-bream	10 cans (1 lb. each)
lobsters	3 cans (, ,)
smashed sea-bream	3 cans ($\frac{1}{2}$ lb. each)
ham	2 rolls
cheese	3 lb.
dried laver	1 lb.
mushroom	12 lb.
<i>tororo</i> -tangle (tangle cut fine)	0.375 kg
milk	20 lb.
<i>otafuku</i> -beans (large beans)	5 cans (1 lb. each)
confetti	1.87 kg
sugar (cube)	1.87 kg
baked salt	2 lb.
pepper (red)	0.150 kg
pineapple	10 cans
kumquat	3 cans
tea	75 g
<i>aji-no-moto</i> powder	1 bottle
Japanese soy	1 lb.
Herrings for dogs	4 straw bags (150 kg)
Oil range	1 unit, 0.77 kg
Pan	1 unit, 0.45 kg
Matches	20 boxes
Sanitary goods	3 units, 1.35 kg
Cameras and photographic materials	6.8 kg
Bamboo-poles	10 poles, 4.1 kg
Metal signal flags	10 sheets, 3.0 kg
Fuels (oil)	1 can, 15 kg
Mr. Yasunosuke YAMABE, director of dogs (with clothes)	77 kg
Mr. Shinkichi HANAMORI, director of dogs (with clothes)	72 kg
Scientific instruments	15 kg
 TOTAL WEIGHT OF CLOTHES :	 158 kg
TOTAL WEIGHT OF FOODS :	100 kg
TOTAL WEIGHT OF SUBSIDIARY FOODS:	142 kg
TOTAL WEIGHT OF SCIENTIFIC INSTRU- MENTS AND MISCELLANEOUS ITEMS :	346 kg
<i>Total :</i>	750 kg
Load for one dog :	26.7 kg

As the above table shows, the total weight was 750 kg, and as the actual number of dogs was twenty-eight, the weight of load per dog was 26.7 kg. The main party had two sledges and each sledge was tugged by fourteen dogs. The fourteen dogs of the first sledge, loaded as mentioned above, could start, but the fourteen of the second sledge could not do it. The second sledge, moreover, was upset quite often.

So, we unloaded some of the subsidiary foods weighing 21 kg, and some of the dogs' food, weighing 82 kg, from the second sledge, so that it could advance. Therefore, each dog of the second sledge could tug a weight of 23.7 kg, while each dog of the first sledge managed 26.7 kg. However, since the dogs seemed to have been weakened by the long voyage, they became exhausted soon.

We barely marched 13.5 km and 14 km on the first and the second days, respectively. In these circumstances, we decided to cut down the load another 204 kg in addition to the previous cut. Now, the weight of the loads of the sledges was 490 kg, the load that a dog was to carry became 17.4 kg. Cutting the load down in this manner, it was possible to allow Captain SHIRASE, Mr. TAKEDA and Mr. MIISHO to ride on the sledge sometimes. Weights of these persons were :

the leader, SHIRASE (with clothes)	79 kg
the chief of scientific research division, Mr. TAKEDA (with clothes)	75 kg
the chief of sanitary division, Mr. MIISHO (with clothes)	67.5 kg
<i>Total</i>	221 kg.

Adding this total weight to the total weight of the load after the retrenching, the final total weight was 709 kg : the final load that a dog was to carry was 25.4 kg. Afterwards, the dogs' tractive force increased considerably. As a result, we could journey as far as, for instance, 24.9 km, 34.4 km, 36.4 km or 47 km on each day. In the best condition, we could

journey as far as 89 km. On the average, the daily advance was 46 km.

During the journey, the dogs were fed with dried herrings and dried trouts, and on the ship, they were given three or four cups of water with each meal. On ice-land, they ate snow and ice to appease their thirst. The dogs, unlike man and horse, never suffer snow-blindness. When the dogs crouched to sleep, the snow was melted by their body heat to make a hole in the shape of the body. The dog, then, dug the hole further with its mouth and made a comfortable hollow to sleep in. They were pretty strong against cold weather.

The Party used two types of sledge: the dog-sledge and the hand-sledge. The latter, to be pulled by man, was naturally more handy. This sledge, made in Echigo (Niigata Prefecture, Japan), was four inches high, one foot three inches wide, and four feet long with a shaft five inches long.

This was very useful to carry baggages a short distance. Its only weak point was that it was not sufficiently high. On soft snow, the sledge used to sink deep so that the load was touching the snow. Before using, we had thought that it would carry a load of about 160 kg, but in fact we could only carry 80 kg. If we make a sledge six inches high and lessen the weight of the material it may be easy to carry a load of 120 kg.

The dog-sledge, made in Saghalien, was eleven feet long and one foot high (the hand-

sledge was only four inches high) and only one foot two inches wide. Its capacity was, therefore, very small: when the load was piled as high as two feet, it upset immediately. The Inland Expedition suffered from this weak point considerably. As a result of these experiences, we can say that a sledge which is eleven feet long, six or seven inches high and one foot and eight or nine inches wide will be the best design. The sliding boards of the sledges, made in Japan, are generally too narrow, especially those of the dog-sledge we used were only about 1.7 inches wide. As a result, the sledge sank in the snow, increasing the resistance a great deal. They must be widened to three or four inches and, on their sledging surface, a slight ditch must be lined. The slight ditch is to prevent slipping. To prevent slipping, all of the Japanese sledges were backed with iron plate, four inches wide and 0.1 inch thick, by nails. But, in the extremely cold climate, iron does not slide well. As the iron increases the weight of the sledge, too, we consider that the ditch will be better in many respects.

Some of the foreign explorers prepared a sailing sledge in addition to the dog-sledge. The Norwegian AMUNDSEN Party brought skis for every member. By marching on them, they were said to have derived great advantage. Future explorers on snow-covered land, therefore, must study and practice skiing.

CHAPTER VII MEDICAL REPORT OF THE EXPEDITION PARTY

Now, we are going to outline the sanitary conditions of the Expedition Party. The ship encountered a storm soon after it had set sail from Tateyama, and half of the crew and all of the on-land party suffered from heavy sea-sickness.

This was caused not only by the rolling of

the ship, but also by the trimethylamin and other gases which were produced in the cabin. The engineer TAKATORI, in particular, having a weak heart to begin with, was so sick at his work in the engine room, that he recovered only after prolonged treatments. The stench, which was coming from the

timber in the hatches, permeated with blood and fat of salmons, trouts, cods and other fishes, could never be removed. Although we could tolerate it with difficulty in the beginning, it gave great torment to us when we got into the tropical zone.

The permeated timbers began to ferment and to generate trimethylamin and other poisonous gases very actively. Those who had been gassed used to suffer from severe headaches and feel dizzy and quite sick. If one smelt the gases all day long, he could not work the following day. So it became practically impossible to keep living in the cabins. We were forced to live in temporary cabins made of sail on the deck or under the life-boats placed upside down. In spite of the inconvenience, we were thus forced out of our cabins.

From Tateyama to Wellington, New Zealand, it took us seventy-three days: it was just beyond description how much we suffered from this long voyage. The intense heat of tropical seas that exceeded 100°F was one of the most notable causes of our sufferings: some of our food went completely bad, while much of the rest, even if it did not go bad, got stale, and drinking water became very scarce.

Afterwards, when we were caught in a storm at about 36°48'S, the first-class mate, Mr. TANNO was wounded on the forehead and left hand by an accident, and when we were caught by huge swells at the entrance of Wellington Harbour, Commander SHIRASE staggered and crashed against the top of a life-boat on deck and fainted. These two, however, recovered within a few days.

During the onward voyage, one is generally full of morale and careful to keep himself out of illness, but once he arrives at the destination and sets on voyage home, he is apt to loose morale or to get ill carelessly.

Telling this to the members, we constantly

requested to be careful enough about themselves during the voyage home, especially in the First Expedition because the return voyage without succeeding in landing was quite demoralizing.

Actually, we had many patients in that voyage. The kind of disease were congestion of the brain, melancholy, dyspepsia, beriberi, etc. Mr. YOSHINO, in particular, suffered from stomach catarrh complicated by the jaundice, but after the ship entered Sydney Harbour he recovered after treatments on land.

At Sydney, the members, who had been tormented by the tediousness of life on the ship and had become melancholic, got tired and a little weakend because they began to work hard there. The cook, Mr. MIURA, was attacked by congestion of the brain and became unconscious on a day after some hard work: he got well within a little over a week by first-aid treatment.

All of the members, except Commander SHIRASE and few others, suffered from the tooth trouble, which was, we thought, mainly caused by the unaccustomed climate and diet. The cook, Mr. MIURA, after the congestion of the brain, could not fully recover and suffered also from frequent toothache. Therefore, we, in the consideration that he could not stand the strains of the work in the Antarctic, made him return from Sydney. At Sydney, the stocker, Mr. TAKATORI was attacked with beriberi and with nervous heart palpitation; the helmsman, Mr. SATO with hernia; and the mate, Mr. TANNO with haemorrhoid. Considering them to be unsuitable for the work on the expedition, we also let them go home.

The barrack where we lived at Sydney was a one-storied wooden prefabricated house, which originally was intended to be built in the Antarctic. It was built on a hill south of Parcel Bay, left of Jackson Bay; behind it

there was a small hill and on both sides of it there were also small hills. Therefore, we could say that the barrack was set at the bottom of a valley: the place was not quite sanitary. In general, it was damp at Sydney. In the rainy season the torrential rain-water fell on the backside of the barrack from the hills. Fortunately, as the ground was sandy, our drainage work of four ditches forming a rhomb around the barrack was successful.

The climate there was like the spring or autumn in Japan throughout the year. In the coldest season, the frost falls a few times, while in the summer season one scarcely sweats in the day time. Plants are always green and the crimson flowers bloom one after another all the time. This beautiful nature and the mild climate were very effective in releasing the members from the pain that they suffered from for the flat and insipid half-year spent in narrow cabins. We exhorted them to do some physical exercise every day: manely, fencing (*Kendo*), wrestling (*Jūdo*), and so on. These exercises raised their morale and were of an immediate effect on their health.

On the second voyage from Sydney to the Antarctic, the weather was very unstable and we were constantly exposed to rain, snow, and storms. To our good fortune, however, the physical condition of our members was very good.

On March 17, we arrived at Bay of Whales. On the next day, when we transported our baggages to the base in a fierce snow-storm, many suffered from snow-blindness. This was caused by both the intense reflection of light from the snow and by the minute snow-crystals piercing the eyes during a snow-storm or dense fog. This disease causes congestion and tormented us, causing daze and tears. The pain grows more and more intense, and in the end one begins to lose sight. By eye-washing and other treatments, we got

well within five to ten days, in general. To prevent this disease we used deep-blue-coloured glasses, but the moisture from the skin was frozen on the surfaces of the glasses to make them frosted: thus, the glasses were inconvenient during work. We put them off quite often because of the inconvenience, and accordingly, we were affected with snow-blindness.

As for frost-bite, which we had been most afraid of when we entered the Antarctic region, it might be said that we, in actuality, scarcely suffered from it: because we, from the beginning, took sufficient care against it by rubbing the hands with camphor ointment as a preventive before putting on the gloves, and by never putting on wet clothing against the skin. Only in one case, chief of the research division, TAKEDA, was slightly frost-bitten, when he carelessly touched a metal instrument with his bare hand to repair a broken magnetic compass. He recovered completely in a few days.

The patients of toothache during the second voyage were as many as during the first voyage. This was caused chiefly, we thought, by unaccustomed climate and diet as mentioned already. But in all cases, the pain was not serious, and the patients got well by three or four fillings and by gargle treatments for five or six days.

Although we were quite aware that to eat snow and ice is not recommended for the health of the teeth, it was inevitable that we did. For this, chief of the research division, TAKEDA developed a toothache in the front tooth, and it took him more than a month to get well. We realised that those who have golden inlays must be very careful in the polar region, even when they merely open their mouths. When I tentatively exposed my artificial front tooth of gold to the air for several seconds, it caused a severe pain, and the inlay got so chilled that my

lips stuck to it.

During the Expedition, we sometimes drank wine but not too much. Other alcoholic liquors were absolutely abstained.

At Wellington on the homeward voyage, the carpenter YASUDA was attacked with beri-beri. We made him go home from there by a steamer.

We set sail from Wellington on April 2, 1912, and arrived at Shibaura-Beach on June 20. On this voyage we had no patient and all were exceedingly fine.

Such were the medical conditions of our Expedition. Our Expedition Party, of course, consisted of men of excellent physical strength, but, as the voyage was very long during which we scarcely ate fresh food and suffered severe changes of climate, the hardships we experienced were not moderate. As chief of the medical division, I (Mr. MIISHO) am quite satisfied that nobody died of sickness, that nobody suffered from serious sickness, and that all of us could return home in safety.

(To be continued)
