

the man who showed us the way along the coast of Asia. It is difficult to distinguish mainland from island in passing along the coast, the map of which has been considerably altered by the observations on our voyage. The coast of the whole of the Chelyuskin peninsula northwards is very low, but inland we observed mountain ridges partly covered with snow, and probably some small glaciers. Without doubt the most important geographical discovery of the expedition was that concerning the polar basin itself. Formerly it had been supposed to be a comparatively shallow sea, a view in which I had concurred. We found that the sea in 79° N., north of the new Siberian Islands, suddenly became deeper than 100 fathoms, sank to depths of 1800 to 2000 fathoms, and such great depths were found continuously by the *Fram* during her entire drift north-west and west as far as the north of Spitzbergen. The polar basin thus appears to be a deep sea, forming a continuation northwards and eastwards of the depression in the North Atlantic Ocean. This deep sea probably extends further east than the New Siberian Islands, as the *Jeannette* found the depth increasing every time the drift carried her to the northward.

I think we can safely say that little or no land can lie on the Asiatic side of the pole, as in the sledge-journey north of the *Fram's* route we found the ice drifting with greater freedom than further south, which would not likely be the case if there was much land to restrict the movement. There is, on the other hand, a probability of the existence of land to a considerable extent on the American side of the pole, where islands, and islands of some importance, may be expected to be found north of the boundary known at present. A closer examination of these parts we must hope will be undertaken in the not too distant future.

The drift of the *Fram* showed that a deep sea lay along the north of Franz Josef Land, proving that that land has not the great extension northward which it was hoped to have. This discovery confirms Sir Clements Markham's prediction that "Franz Josef Land seems to be part of the Spitzbergen group, rising out of the same shallow sea, with deeper water to the north." The geological evidence confirms this view, and in those parts which Johansen and I would have visited had we not fallen in with Jackson; the Jackson-Harmsworth expedition will no doubt have many interesting discoveries to make. From the disagreement of our discoveries with Payer's map, we were at first led to believe that our watches must be altogether wrong, and that we had come to a land further west; it was only after comparing our watches with Jackson's, that I came to the conclusion that Payer's map was wrong. Dr. Copeland is now engaged in re-calculating Payer's positions, and finds his work particularly good; the error most probably arose through his mistaking banks of mist on which the sun was shining for a great glacier-covered land. Such a mistake is very difficult to avoid in certain atmospheric conditions.

In the course of the voyage along the coast of Siberia abundant evidence of the former existence of a great ice-sheet was forthcoming, and the appearances could not be explained by reference to local glaciers. For instance, the land on the east side of the Chelyuskin peninsula, where I went reindeer-shooting one day, was a very undulating clay plain, over which was strewn a multitude of big boulders of various rocks, which could with difficulty be explained otherwise than as being material brought by an extensive ice-sheet. The fact that I found an indication of stratification in several places can hardly be regarded as an argument against its moraine-like character, as there are incontestable moraines in the south of Norway which show distinct stratification. The exemption from an ice-sheet, so long claimed for Siberia, can no longer be maintained.

The microscopic examination of the numerous specimens of sea-bottoms obtained by our soundings, proved that they differ essentially from the samples taken from the North Atlantic Ocean, as they are wanting in the characteristic organisms. The arctic deep-sea mud was found to be particularly deficient in carbonates, and appears to consist chiefly of mineral components; but so far only very imperfect examinations of these deposits have been made.

During our journey we had abundant evidence of the reality of the ice-drift across the polar area, on the faith in which the expedition had been planned. Earthy matter was found on the ice as far north as 86° , and driftwood also. I remember one day far north, during Johansen's and my journey over the ice, our astonishment at seeing a large piece of timber projecting from the ice; it hailed, perhaps, from the interior of Siberia, and was on its way to the Eskimo of Greenland. The only

thing we could do was to cut our initials on it, with the date and latitude. The cause of the drift is, first of all, the wind, the prevailing direction of which is from the Siberian Sea towards the North Atlantic Ocean. As the wind varies, the drift varies also; but it was always strongest when towards the north and west, and feeblest when it turned towards south and east. Most progress was made in the winter, least in summer, when northerly winds were relatively common. I believe that when the records are worked up it will be possible to demonstrate that there was a slight current in the water under the ice, setting in the prevailing direction, or perhaps a little to the northward of the prevailing wind. The massive ice-cap, which many polar explorers have believed to cover the polar area, has been shattered; instead of it we have the ever-wandering ice fields, like a link in the eternal round of nature.

The ice does not grow to any great thickness by direct freezing; something under four metres was the greatest seen; but, of course, it becomes very much thicker by the piling up of broken ice-sheets driven together and mounting one above another. The pressure of the ice was found to be largely dependent on the tidal current, especially on the margin of the polar ice-fields. There the periods of great pressure occurred regularly about new moon and full moon, the former being the greater. The worst ice-pressures encountered by the *Fram* were when the wind suddenly changed after having been long steady, when smaller masses of ice would be driven by the wind against the greater masses moving on by their own momentum.

The temperature of the water at various depths beneath the ice was of special interest. Even as far east as the sea north of the New Siberian Islands I found undoubted traces of a warm current. The surface water of the entire polar basin is doubtless very cold, between -1.5° and -1.6° C., the freezing point of sea-water. Beneath this cold layer at depths of 200 metres, I suddenly found warm water, the temperature rising to $+0.5^{\circ}$, or even $+0.8^{\circ}$ C. At a greater depth the temperature varied somewhat, but remained nearly constant to 400 or 500 metres, after which it slowly sank until the bottom was reached, without, however, becoming so cold as at the surface. The air temperatures were, as was anticipated, not so low as in Siberia, doubtless owing to the influence of the deep underlying sea. The minimum we found (-53° C.) is not immoderately low, recollecting that at Verkhoyansk -68° has been recorded. The winds in the far north were not very strong, seldom amounting to a gale; but this climate entirely changed on the southward journey, and in the winter quarters on Franz Josef Land a succession of furious gales howled around us continually.

There were exceptional opportunities of observing the aurora, and amongst other curious phenomena the heavens were often shrouded with a light luminous veil, through which it was difficult to see the Milky Way. The aurora was found to be much more common in very high latitudes than it was formerly supposed to be.

Animal life was abundantly observed both in the form of small marine organisms, especially crustacea, and larger creatures. Narwhal were seen in shoals up to nearly 85° N., and seals were also frequently seen in summer. Bears were shot north of 84° , and fox tracks seen in 85° N. Near Hvittenland east of Franz Josef Land, the probable nesting-place of the rosy gull was found. The fresh-water pools on the ice in summer swarmed with diatoms and other algae.

The expedition found much of value in considering future travel. The type of vessel embodied in the *Fram* was found perfect, resisting all ice pressures, and the ship was as sound at the end as at the beginning. Another drifting expedition should enter the ice much further east, entering by Bering Strait, and the ship should be equipped with greater laboratory accommodation. Nothing remains to be done for preserving health; the company on the *Fram* were never seriously ill, and even on the march over the ice I personally increased 22 lbs. in weight. There was never the faintest indication of scurvy.

THE LEGENDARY HISTORY OF FUNAFUTI, ELLICE GROUP.¹

THE first king of Funafuti was Terematua (? Tilimatua), but who he was or where he came from is not known; it is certain, however, he was here before the arrival of the Kauga, people who swam to this island from Samoa, which means, I

¹ This is the story of Funafuti, so far as I could learn it from the King Erivara and our interpreter, the white trader O'Brian.

take it, Samoans who were wrecked from a canoe and afterwards swam ashore. The Kauga were much respected. Toa, a piece of land in Funafuti, is named after one of them, and the southernmost island, Taueriki, after another: after death they were worshipped as spirits.

The only son of Tcrematua was Kitosuga, and he had one son Tilou, who likewise had an only son Tilotu. In the time of Tilotu a subordinate king or chief was appointed, by name Paolau. What relationship by blood, or whether any existed, between Tilotu and Paolau the king could not tell me; a very old woman, as he said over 100 years old, who had instructed him in the history of his predecessors, had not informed him on this point.

Paolau became king after Tilotu's death, and Tilotu's children became sub-kings or chiefs.

Paolau was killed by his younger brother Nigi, who aspired to the throne. When Nigi drew near to Paolau the latter said, "Are you going to kill me?" Nigi pointed to the rising moon and said, "My head is there," and then to the place where it would set, adding "your head is there!" and killed him.

Nigi then became king; after his death he was succeeded by Tukalamiti, whose parentage is not known; he was probably a son of either Paolau or Nigi—possibly of Paolau's, for there were two branches of the royal family, and when one king died his successor was generally chosen from the other branch.

It is not known whether this was a friendly arrangement or not. Then another Paolau became head king, and Masaleika, his brother, sub-king; the latter never attained the chief dignity, as he was killed by Tauvasa. Paolau fell sick on the southernmost island, and Tauvasa sent people in canoes to kill him.

Paolau and his people went to see what the canoes had come for, and invited the crews to stay the night with them. This they did, and during the night Paolau's daughter discovered their purpose and warned her father.

The leader of the expedition, Salaiki, a brother of Paolau's, was then set upon and killed. Paolau retained his kingship, and Tauvasi remained chief till the illness of the former proved fatal, as it did soon after the attempt upon his life. Tauvasi then became king. He seems to have been a good ruler, and signalled his reign by dividing the land, which had hitherto been held in common, and fairly apportioning it amongst the people. The history of the kings now becomes mixed up with that of the priesthood. In early times the people worshipped thunder and lightning and the powers of nature, as well as birds and fishes. This was followed by the worship of spirits, one of whom was named Tufakala after a particular kind of seagull. There then arose priests or spirit-masters (vakatua).

One of the earliest, if not the first, was Erivara, evidently a very masterful person. He abolished the ancient worship, taking the dead Firapu, or his spirit, the father of Tauvasi, for his first god. Firapu was a hero whose death is shrouded in mystery—he and his daughter Mumu had left Funafuti in their canoe on a voyage to the Gilbert Islands, and had never returned. As time went on descendants of Firapu after death were added to the list of spirits, and worshipped as subordinate deities.

Besides this worship of spirits there was also a kind of fetish worship, also introduced by Erivara. Erivara in his sleep visited the other world, and made the acquaintance of seven spirits, who showed him a wonderful object and directed him on returning to earth to make a copy after its fashion, giving him full instructions how to proceed. On his return to earth, more prosaically when he awoke, he sent one of the people to dive outside the reef for a red stone. This was procured and brought to him. He wound round it a dress of pandanus leaves—red, white and black, some fathoms long, and placed it inside a cage shaped like a hen-coop. This was called the Teo.

If a parishioner was sick, Erivara took the stone from its wrappings, talked to it, charmed it with rhymes, and applied it to the sick man. Another fetish was a hat, the size and shape of a hogshead cask, made up of red, white and black fandango (Pandanus) leaves, and adorned with white shells. This was called the Puluo, and was said to be the hat of Firapu. I think this was kept in the spirits-house, but the Teo was kept in a separate hut—the charm-house.

When the people wanted to catch fish, the Puluo was brought out of the spirits-house by the king's orders, and the whole community walked three times round the house, bearing the Puluo in front. The women followed, stark naked, and the men, who belaboured one another with sticks; the children completed the procession.

The charm-house was set round with a great number of sharp-pointed stakes, and when a catch of fish was made the people were required to take it to the spirit-master and lay it down in front of the charm-house, not the king's. The charmer then picked out the finest fish, impaling each, as he selected it, on one of the stakes and dedicating it in a loud chant to the particular spirit—Faiologata, Tamaiki, Fijiroa, Tongatumatua, Firapu, Sasaka, or some other to which the post was sacred. When the dedication was complete, the people shared the remainder between them. The sacrifice was divided between the priest and his relations.

This was a pretty fair source of income; but the charmer could not live on fish alone, and so he had other methods by which coconuts, taro, and the rest were added to them.

The spirits would come to him and give him warning that some one was going to be sick; the spirit-master would then send for this person, and take him to the charm-house to be charmed. This house was a square hut with a fire burning in the centre, and on the entrance of the threatened man this was made to smoke so that the spirit should not be able to see him. The spirit-master was provided with two young coconuts and young white leaves of the coco palm. He rubbed oil on one of the nuts, rubbed his nose against one eye, whispered to it, and then turned it away from him. Crossing his hands he gave it a good spin, and watched how it came to rest; if when it stopped it pointed sideways or away from him, the spirit was very angry and the man would be very ill; if, on the contrary, it pointed to him, the spirit was not vexed.

Of course these performances meant taro and coconuts.

In case the man was to be taxed pretty severely the spirit would of course be angry, and there would be other charms required to mollify him, and these had to be paid for. If a man were really ill the spirit-master would come and wave a staff, with a bunch of coloured pandanus leaves at the end, over him, or he would thrust this staff like a spear through a coconut, or he would try the smoking and the Teo treatment.

In any case the medical attendance was very expensive, and the patient's friends and relatives had to gather together a good deal of food to keep the spirit-master and his friends while the case was in progress.

Erivara, the first devil-master, was so fertile in inventions of this kind, that I could not believe he had owed them all to his own unaided powers, and I inquired therefore if he was accustomed to travel much, and was told he had visited at various times Nukulailai, Vaitapu and Nukufetua, neighbouring islands of the group, as well as the Gilberts. This in itself, however, is no proof that he was a plagiarist.

Erivara was, notwithstanding, a great benefactor to the island; the coconut palms were few, and food was scarce, so he organised expeditions to the Gilbert Islands, and brought back in canoes a great quantity of nuts; the people extracted the cotyledon from these for food, which shows they were very hard-up, and then planted them. The whole of the islets of Funafuti were planted in this way under his direction—a great achievement.

On the other hand, Erivara broke up the ancient laws of the kings, and upset the distribution of the land, dividing it afresh between the king (erikitutu) and thirty or more sub-kings of his own creation (erikitabua). Hence arose disputes as to the ownership of the land, which persist even to the present day. There is this excuse to be made for Erivara, that by reason of his planting the land acquired the chief value that it possesses. Still he might have shown a little more consideration for those families which had no man at the head, only old women; he was oppressive towards the weak.

During the time of Erivara Tauvasi died, and his son Sirimiau became king, after him his son Dili succeeded, and after Dili Sukumuni, after Sukumuni Tarafa, belonging to another branch of the Tauvasi family, succeeded to the headship; he was followed by Taturi, his son, and Taturi by his brother Teriki. Teriki was followed by Matavai, who was deposed by reason of the ulcers with which he was afflicted, the evil smell of which made it impossible for people to sit in the house with him. Jacopa, his eldest son, replaced him; then Manu, his second son; and finally Erivara, the reigning monarch, the youngest of Matavai's three sons. Erivara is a very intelligent and dignified old man, say fifty years of age, every inch a king, though shorn of all power. Our High Commissioner is the chief governor, and makes laws for the island; but the true master here is the native missionary Simona, who is a Christian spirit-master of a very friendly disposition. The ancient religion

received its death-blow about thirty years ago, not from a missionary, but from a white trader, O'Brian, now living on the island, who accomplished its overthrow, not from any religious motive, but because the ancient religion took up much of the time which he thought, rightly or wrongly, should be given to collecting copra for him. He told the natives that the captain of the vessel trading with him threatened on his return to shoot every man, woman and child if they did not destroy the spirit and fetish houses. "And do you think he will do it?" they asked. "Undoubtedly," was the reply. So they were terribly frightened, and some wished to destroy the houses, and others, under the leadership of the priest, were opposed. Three men-friends of O'Brian's were in favour, and they went into the charm-house, took down the Teo, polluted it and put it back. There was a great noise when the deed was discovered, and suspicion fell on these three men and O'Brian. The three men left the island and went to Nukulailai, and of course were thus self-condemned. The spirit-master accordingly performed his charms, and told the people that these three men were now dead. One of the three men, Leveri, had a twin brother who remained in Funafuti after the flight of Leveri, and he was terribly grieved over his brother's death; the other men also were much regretted, and the whole population went into mourning—cutting off their hair, they made necklaces of it to wear round their necks, abstained from eating taro, and in other ways showed their grief.

One day, however, Leveri returned in a ship; the people could not credit it, and said it must be his spirit. Leveri, however, cried out to them in his own proper voice, and they had then no doubt that he was alive; they asked him about the other two men, and learnt that they also were alive and well, and meant soon to return. Then there was great uproar, and the people cried, "Burn the devil's house." O'Brian did not wait for further orders, but went off with a half-caste and set both the devil's and the charm house on fire. The spirit-master, or devil-master, seized the Teo and escaped with it in his canoe to the lagoon. But O'Brian took his double-barrelled gun and went after him, and threatened to shoot him if he did not bring it back: knowing well that if this devil-master escaped with the Teo, the people would begin to worship it again on the first opportunity. The devil-master came back, and O'Brian took the Teo, unwound the stone from its wrappings—it was a red stone from six to eight inches long—and dashed it in pieces on the ground. Then he fired his gun through the roof of the burning house and exclaimed, "There goes your devil up in the air! See him!" And all the people said "Tschah!" an expression of great surprise.

The devil-master threatened proceedings from the next world. "Now," said he and his friends, "never more any turtles, no bonitos, no fish in lagoon."

There was a devil's house on the northern island, and O'Brian and Matika went in their canoe to burn that down too; on the way they got hundreds of black fish, and brought them back to the islanders. The people said, "God was sorry for the devil, and gave these fish to atone." So they gave them away (to the devil-master?).

The turtle is taboo to all but the king. When one is caught it is brought to the king, who recites the following formula over it before cutting it up:—

Te ailu o te fonu
The body of the turtle
Te ika mua e soa
The fore paddles are fellows (a pair)
Te ika muti e soa
The hind paddles are a pair
Te vaesiosio e soa
The lungs are a pair
Te alaga mua e soa
The arms are a pair
Te alaga muti e soa
The legs are a pair
Te matua tinae e soa
The breast is a pair
Te puloa e soa
The belly is a pair
Te laukape e soa
The back is a pair
Te matua lua e soa
The small guts are a pair
Te lakau e soa
The great intestine is a pair

Te fatumava e soa
The liver is a pair
Te ate e soa
The fat under the armpits is a pair
Te mama e kiuku te fua

He then divides it among himself and his relatives.

I have attempted, with the help of the natives, to translate all the lines except the last, which O'Brian told me meant "the eggs are thousands and thousands." The formula as I give it is copied from the writing of a native scribe, who took it down in our presence as the king recited it.

July 19, 1896.

W. J. SOLIAS.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The following have been elected to the University Mathematical Scholarships and Exhibition for 1897:—To the Senior Mathematical Scholarship: E. E. Roberts (Corpus Christi College). *Proxime accessit*: E. Lawton (Corpus Christi College), to whom the Examiners have awarded Lady Herschel's Book for Astronomy. To the Junior Mathematical Scholarship: W. M. Roberts (scholar of Corpus Christi College). *Proxime accessit*: R. F. McNeile (scholar of Balliol College).

Mr. C. L. Shadwell, Fellow of Oriel College, has been appointed a Curator of the Botanic Garden, in place of Mr. F. T. Richards.

The General Medical Council has decided not to register as medical students those who have only passed Responsions. They will henceforth require a knowledge of Algebra up to simple equations, and of Euclid, Books I.-III., with easy deductions, in addition to the ordinary subjects of the examination. Steps are being taken to meet these requirements.

The Junior Scientific Club met on February 3, Mr. A. W. Brown (Christ Church), President, in the chair. Mr. Percy Elford exhibited a series of specimens illustrating the evolution of the match. Mr. A. E. Boycott (Oriel) read a valuable and interesting paper on shell colouration in British extra-marine mollusca; and Mr. B. H. Rolfe (Merton) discussed the effect of climate on building-stone. The President announced that the first volume of "Robert Boyle Lectures" would shortly be published.

The Professorship of Geology is still vacant. At present arrangements are being made for the instruction of those who wish to study geology at the Museum. The new Professor will in all probability be appointed in the course of the present term.

Mr. F. F. Fison has been elected to a Casberd Scholarship in Mathematics at St. John's College.

CAMBRIDGE.—The degree of Master of Arts, *honoris causa*, is to be conferred on Dr. A. A. Kanthack, Deputy-Professor of Pathology. The Senate has assigned a stipend of £250 to Dr. Joseph Griffiths while he is discharging the duties of the Professor of Surgery during the vacancy of the chair. The Senate has also made a grant of £50 to the University Lecturer in Geography (Mr. Yule-Oldham) for additional maps and apparatus.

Dr. D. H. Scott, F.R.S., has been appointed an Elector to the chair of Botany; Mr. J. J. H. Teall, F.R.S., an Elector to the chair of Geology; Sir W. H. Flower, F.R.S., an Elector to the chair of Zoology; Dr. A. S. Lea, F.R.S., an Elector to the chair of Physiology; and Dr. J. Sully, an Elector to the chair of Mental Philosophy.

LORD HERSCHELL recently opened new technical schools at Swindon. They are built upon a site generously presented by Major Rolleston, at a cost of £12,000, towards which the New Swindon District Council contribute £7500, the Wilts County Council £3500, and the Science and Art Department £1000.

THE National Association of Manual Training Teachers has issued a circular letter asking teachers of manual training, "Whether the making of apparatus and instruments for physics (as suggested in the Physics' Syllabus, Form 74, of the Science and Art Department) interferes educationally with manual training?"

THE Cornwall Sea Fisheries Committee have resolved to apply to the County Council to sanction a salary of £250 a year, with an additional £100 for travelling expenses, in con-