Letter from Wilfrid T. Grenfell, Esq., M.R.C.S.,

Superintendent of the Mission to Deep Sea Fishermen.

At the request of the Secretary I venture to send you a brief account of the voyage we made last year in the smack "Albert" 97 tons register, belonging to the Council of the Mission to Deep Sea Fishermen.

We sailed from Yarmouth on June 15th and returned on December 1st, having sailed to St. John's in Newfoundland, along the coast to Labrador and as far north as Hopedale, thence south again and up the Straits of Belle Isle, visiting almost all the fishing stations, and returning by St. John's direct to Yarmouth. The return journey from St. John's to the Start Lighthouse was accomplished in only twelve days.

Your Society, through the Director of the Plymouth Laboratory, furnished me with three deep-sea reversing thermometers, and one instrument for bringing up specimens of bottom water. We used the thermometers on wire with Basnett's patent deep-sea sounder, but this was only gauged up to 100 fathoms, and, not having any line suitable for the thermometers on board, I was unable to take any very deep soundings. Moreover, the work was new to me, and until I was joined by Mr. Adolph Nielsen, the Superintendent of Fisheries for Newfoundland, I had, I am sorry to confess, not realised the value which soundings might have. In the Report of the Fishery Commission of the colony the scientific work carried out is fully detailed, and for those who have not access to that little book it may be worth while my summarising the general conclusions arrived at, especially as to the results to be anticipated from a more extended series of observations, and as to the lines on which these should be made.

We added to that work surface temperatures across the Atlantic both ways, and on our return journey were only prevented by extremely boisterous weather from recording deep-sea soundings also. The observations I have forwarded to the Plymouth Laboratory. Captain Sir Baldwin Walker, R.N., has since shown me some interesting records he made during four years on the Newfoundland coast in H.M.S. "Emerald," but he regrets greatly that the Naval

officers along these shores have no reversing thermometers for deep-sea work. Without any doubt repeated observations made all round the coast would become of the highest value.

The very life of the colony is at times imperilled by the critical condition of the fisheries,—lobsters failing, seals not being found, herring not reaching the coast, and cod vacating their normal haunts. Poverty, misery, and want, with great loss to merchants as well as fisher-folk, result, a great deal of which might apparently be avoided if more were known about the movements of the fish, of the bait, and of the Arctic and Gulf currents, which seem constantly to be varying, and may account often for most unexpected failures.

The resident English fisher-folk along the coast number some 5000, while every summer about 25,000 to 30,000 men, women, and children flock from Newfoundland to catch cod on the Labrador coast. They remain from three to four months, returning only when compelled by the sea freezing over.

I must be categorical in my description of these people in order to convey succinctly an idea of this peculiar fishery.

The coast is rugged and broken, the country barren and inhospitable. Eight months in the year both sea and land are completely ice-bound. No domestic animals but dogs exist, and no vegetables can be grown, except a chance potato or cabbage in the very extreme south.

The people have *no legal representative whatever*, though a Custom-house official visits the coast in the summer in a small schooner, and is also empowered to act as a magistrate. If a criminal wishes to be tried he could with some difficulty manage it.

The schooners which bring the people form a very assorted fleet, and carry a mixed crew of men and women, besides more or fewer passengers who have no boats of their own to come in. These latter huddle into the main hold on the top of the salt, fishing gear, and stores. These boats are not surveyed before starting, and do not all clear from any custom house. More surveyors and better arrangements are urgently necessary.

Once on the coast, mud huts and small stages are erected, the merchants' agent or a large fish planter generally having a larger stage, and a store of goods near the people he has "supplied."

A universal truck system exists, and at the end of the summer the dry fish are "weighed in" in quintals (hundredweights), and go to pay off the outfit advanced in spring. The fish are caught on "jiggers," two hooks back-to-back, or in cod traps, which are simply submerged rooms of nets; but squid, caplin, or launce are used for bait when obtainable.

The cod is successively "throated," "headed," "split," "salted,"

and dried in the sun, and then sent to Mediterranean, English, or Brazilian markets.

The people are a fine, tall, well-built race, brave to fool-hardiness, and generous and hospitable to a fault. Accidents and sickness are by no means uncommon; I have always found the people dividing up orphaned children among themselves, and even Esquimaux rearing the orphans of English settlers.

They experienced this year epidemics of diphtheria and influenza, the people dying in many parts without any possibility of getting medical assistance. No doctor resides anywhere on the coast.

Their hospitality to one another in the winter, when all the country is cut off from the civilised world, brings them occasionally to the verge of starvation.

The causes leading to the summer migration are :—(1) The decline of the Bank Fishery and the French and Canadian bounties; (2) the depletion of the inshore cod and lobster fisheries; (3) the monopoly of the winter seal fishery by the large steamers of the merchants' firms; (4) the crippling of any development of agriculture or mining by the French treaty rights on the shore. It is interesting to note that not more than 500 Frenchmen find it worth their while to fish in summer on the Newfoundland coast, and yet to preserve that exclusive right the only possible resource, in the case of the failure of the fisheries, is entirely destroyed in this, our oldest British colony.

The following is a summary from Mr. Nielsen's report. First of all, he shows from his Norwegian experiences that codfish do seek waters of a certain temperature; (2) that these temperatures can be ascertained; (3) that by the use of deep-sea thermometers more successful fishing can be ensured than by haphazard work; (4) that the fishermen in the Lofoden Islands have used these instruments with great success; (5) that codfish in different countries learn to endure different temperatures within certain limits; (6) that cod thrive between 34° and 52° F., that outside these limits they get drowsy and stop feeding, but do not necessarily lose in condition or flesh; (7) that cod quickly perish from cold when the temperature sinks below 31° F. Moreover fishermen on the coast said that they could have filled their nets and vessels with codfish in this stunned condition at some places off the Labrador coast if they had had a cod seine, and at the same time they lost their summer's "fare" of fish, because the cod would not feed. At times in the stomach of these fish lumps of ice are found, probably frozen after death. Mr. Nielsen sums up as follows :—"The meteorological condition of the waters has a most effective influence upon the habits and movements of the fish and bait, and is a very

important factor to take into consideration in the prosecution of the fisheries on the coast of Labrador. I feel certain, therefore, that the use of deep-sea thermometers in the Labrador fisheries would be of the greatest advantage to all interested in this industry in finding and locating the fish after the fishermen once learned how and where to use them, and by experience had obtained the required judgment and knowledge of the habits and movements of the cod in waters of various temperatures in the different localities on the coast."

Indeed Mr. Nielsen eventually proved most successful as a piscatorial prophet, and could tell the fishermen who took us around on the banks where to fish with most success. He based his prophecies on the fact that uneven bottoms with lively vegetation and a rotatory current, where the temperature ranged between 36° and 39° F., and the specific gravity between 1·026 and 1·027, were the best.

The water off the coast never exceeds 46½° F., even on the hottest summer day, and in some places we found layers of hot in cold water, varying at different depths, or again at short distances apart.

Thus in one place at the bottom (110 fathoms) the temperature was 31·7°, at 100 fathoms 36°, at 80 fathoms 31°, till at 15 fathoms it again became warmer. Thus the fish would be stunned from 15 fathoms, and would feed and live at 100 fathoms down.

What is the source of the hot water? Is it from (1) hot springs, from (2) uncharted branches of the Gulf stream, from (3) unknown far-north warm sources, or from (4) land-water as rivers? Whatever is the source the great rush of thousands of fisherfolk to be first in following up the retreating ice of winter is sufficient to prove that cod are found far north, where we are apt to think no fish could exist, and that as they get further north the fishermen have of late years found the cod more abundant. It is thought on the coast that not only the cod but also the herring, which have been disappearing from southern Labrador of late years, are working further and further into Arctic regions. There seems little reason to doubt at any rate that the movements of the herring and caplin, which are the food of the cod, are largely influenced by meteorological conditions, as well as the other food on which in turn these fishes feed. It was remarkable that at Okak this year the vessels fishing were almost "clean," getting no fish at all, while both north and south of that station good catches were made. Perhaps had they had thermometers they could have foretold this result and saved their voyage. Possibly a temporary inset of some cold current from a change in the formation of the bottom would account for this.

In the Arctic current we found numbers of specimens of animal life, and under stones and in small pools on the shore there were

abundant evidences of organic life. Our preparation, however, both for collecting and storing had been very insufficient, and not much was done in collecting with surface nets or dredges. We sail again about May the 30th from the west coast of England, but we shall again be greatly hampered on so broken and so badly charted a coast, as the necessary funds have not come to hand to allow of the purchase of a small steam launch to tend the vessel.

W. T. GRENFELL.

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NOTE.—Mr. Grenfell, who made surface collections for the Association some time since (Journ. Mar. Biol. Ass., Vol. I, p. 376), and was supplied by us with deep-sea thermometers for his last voyage, left England again in May for Newfoundland and Labrador, taking with him apparatus for a more elaborate scheme of work; it is hoped that his observations will throw further light on the movements and habits of the cod as affected by their food, &c. For such observations no better locality could be selected than the Newfoundland banks.—G. H. F.