

Antarctic Sea-Ice.<sup>1</sup>

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THE study of the Antarctic ice-pack may be approached from two distinct points of view. In the first place, we may consider its movements on a large scale, its distribution and direction of drift, its formation and its ultimate disappearance, and the geographical bearing of these matters. For it is the presence of the ice-pack which has limited the exploration of Antarctica, and no future attempts to reach the still unknown coasts are likely to succeed unless the known facts concerning the distribution of ice are taken into account.

In the second place, we may consider the physical aspects of the pack-ice, its growth, the changes of structure it undergoes after its formation, and the causes producing the breaking and motion of the ice fields. The two lines of inquiry, although broadly distinct, of course overlap considerably.

One important point which has been learned from the drifts of ships such as the *Belgica*, the *Gauss*, the *Endurance*, and the *Aurora*, which have been beset and carried with the ice, is that there is a considerable westerly component in its motion. The chief motive power of the drift is undoubtedly the wind flowing down from the continental ice-sheet, which is generally south-easterly in direction, and so accounts for some of the westerly component. In addition there is a well-marked tendency for the ice to move to the left of the wind direction, owing to the rotation of the earth. The actual direction of the ice-drift at any place is to a large extent governed by local circumstances, such as the presence of promontories or ice-tongues. But for the navigator it is very important to keep in mind the

<sup>1</sup> Substance of a paper, "Some Problems relating to Antarctic Sea-Ice," read before the Manchester Literary and Philosophical Society on March 18.

general westerly tendency. For example, attempts to get south in the Weddell Sea are much more likely to succeed along the east coast than along the west.

In considering the structure of the pack, it should be remembered that the growth of the winter's ice usually starts in a sea already covered with loosely-packed fragments of old ice which the new ice cements together. The large winter floes are heterogeneous in character and are liable to break up owing to a variety of causes. The ice sheet grows by breaking, opening, and thus forming pools, over which a new ice surface soon forms. The new ice may, however, be crumpled up again to form a pressure-ridge. Some very interesting physical problems are associated with the cracking and relative movements of large ice floes and the subsequent formation of pressure ridges. Another little understood point is the mechanism whereby, after exposure to summer temperatures, the hummocked ice loses its salt completely, while even ice *in situ* loses it to some extent. The salt is imprisoned between the flakes of ice during freezing, and newly frozen ice has a platy structure, giving a section of it a fibrous appearance, while ice which has lost its salt has an entirely different structure, and appears granular and bubbly. Undoubtedly high temperatures are necessary for loss of salt to take place, but it cannot be a mere draining out of a saline solution under gravity, since the ice is not porous and an ice sheet in place is subjected to a hydrostatic pressure which should tend to force salt water into it. It is probable that an alternate freezing and thawing of the saline inclusions in the ice will cause them to pass slowly downwards through it.

## The Nature of the Wool Fibre.

MR. H. J. W. BLISS, director of the Woollen and Worsted Research Association, in a lecture delivered at the Technical College, Bradford, on March 13, made a contribution to our knowledge of the wool fibre, which, while not entirely new, is certainly suggestive from a commercial point of view. That wool is specially elastic and extensible when wet has been common knowledge for the past decade, but the idea of taking a comparatively thick wool thread and stretching it out to a comparatively thin wool thread, to the best of our knowledge has not previously been suggested nor attempted. That this is possible at least in the case of the majority of wool yarns, Mr. Bliss has fully demonstrated: the effects of such stretching upon the yarns and on the cloths (woven or knitted) made from the yarns is yet an open question.

If "quality" be defined in terms of fibre diameter, the quality of yarns treated as suggested is certainly higher, but one question at once whether something, which perhaps may be termed the "nature" of the wool and of the yarns into which it is spun, is not at the same time sacrificed. It is quite conceivable, however, that for some purposes the stretched yarn may be better than the normal yarn: this the industry itself should decide, and we sincerely hope that it will seriously put the idea to the test by means of large-scale experiments. Note is made of the lack of twist following the extension of the thread to a greater length and of the tendency to "draw out" in the case of a "twitty" yarn. But these difficulties would be overcome by putting twist into the yarn in

accordance with the ultimate fineness to which the yarn is drawn out rather than in accordance with the temporary thickness to which the yarn is first spun. This same method was employed during the War for cotton yarns for balloon fabrics which were singed down at least ten counts: twist was inserted on the singed yarn basis.

As to whether the stretched yarn will make a good handling piece which will take a satisfactory "finish," and finally result in a good wearing cloth fulfilling all normal requirements, can only be decided in the light of the large-scale experiments already referred to. If it should prove that, by this method, light weight tropical fabrics may be made from comparatively thick yarns, Mr. Bliss, through the Research Association, will have conferred a lasting benefit upon the industry. But should this prove to be the case, the question will then arise as to whether the same end may not be achieved by dealing with heavily conditioned wool and effecting the desirable fibre extension gradually throughout the worsted spinning processes. This would probably be quite possible during combing and in the "English" drawing processes, but not in the "French" drawing processes, the twist control exercised in the former giving just that control required for the extension of the fibres. On the other hand, the stretching of an ordinary cloth 20 per cent. in length and width, while not unthinkable, introduces difficulties and problems which, for the time being, possibly rule out this method from the field of practical attainment. A. F. B.