

THE SHACKLETON ANTARCTIC
EXPEDITION.

THE news that arrived at the end of last week from the Shackleton Antarctic Expedition was of an unexpected nature. The *Aurora*, during a severe gale, broke loose from her moorings early in May, 1915, and drifted in the pack ice, suffering severe damage, until March 14, 1916, when she got free in $64^{\circ} 30' S. 161^{\circ} E.$, and is now on her way to New Zealand. When the *Aurora* broke adrift, a number of officers and men were ashore, including Captain Macintosh, and were unable to rejoin the ship. The wireless telegrams received seem to indicate that ten men are thus left stranded at the Ross Sea base near Cape Evans. They were probably engaged in depôt-laying over the barrier in preparation for the arrival of Sir Ernest Shackleton and his party in their trans-continental march.

News received during the winter from South Georgia had already warned us that Sir Ernest Shackleton had been unlucky in meeting with an unfavourable season, and the weather in Australia suggests that the exceptionally severe conditions extend to the area of Antarctica south of Australasia. The ice in the Weddell Sea is known to be exceptionally variable in extent; and success in the exploration of that region will probably always be largely determined by the good or ill fortune of the explorers in regard to the ice conditions. An expedition which found the Weddell Sea as Weddell found it could do more in one season than in ten years under average conditions.

The continued absence of news from the *Endurance*—the ship which took the trans-continental party to the Weddell Sea—is disappointing, as it is thus still doubtful whether Sir Ernest Shackleton has begun his daring trans-Antarctic sledge journey, and whether a favourable base was established on the shore of the Weddell Sea. But the *Endurance* may well have delayed her voyage back as late as possible on the chance of Shackleton's return to the western base, and to allow the Weddell Sea parties to have a full season's work. No anxiety regarding the *Endurance* need be felt for another fortnight, and news of her safe arrival at the Falkland Islands may be received any day.

The news from the Ross Sea demands more immediate preparation; for though the latest dispatch from the *Aurora* shows that she is seaworthy, she is admittedly so badly strained that it is possible that she may be too injured to be trusted with the relief of the party left at Macmurdo Sound. The explorers left there should be quite safe. They have two huts, both of which appear to be sound. Half the heating arrangements of the *Discovery* hut were left behind in New Zealand, and it was not lined with the insulating material taken out to render it heat-proof. But either hut would furnish safe shelter, and the stores left at this base must be ample for the men left ashore, and for Sir Ernest Shackleton and his party. Moreover, plenty of penguins and seals can be found. It is, however, clear that unless the *Aurora* can be repaired in Australasia, another

ship must be sent out; for a relief expedition must go to the Ross Sea next season.

The absence of news from the *Endurance* is embarrassing, as it may be that another or even two other relief expeditions may be required. If the *Endurance* does not return within a fortnight, arrangements will have to be made for the dispatch of a relief ship to the Weddell Sea. Probably one of the South Georgia whalers might be sent on this mission; but as the South Atlantic is so much nearer than the Ross Sea there would be ample time to send out a suitable ship from this country. It must also be remembered that if Sir Ernest Shackleton started on his daring journey and has not reached either Macmurdo Sound or returned to his Weddell Sea base, it will be necessary to search for him; for he may have reached some place on the coast, where he could live through the winter on seal and penguin. No final decision can be made until time has been allowed for the return of the *Endurance*, but a full scheme of operations should be ready for definite action shortly after the arrival of the *Aurora* and the last day upon which we may reasonably expect this season the return of the *Endurance*.

RICHARD DEDEKIND.

THE death of Dedekind deserves more than a passing notice because he belonged to that small class of profound and original mathematicians typified by such men as Hermite, Kronecker, and H. J. S. Smith. In at least four great branches of pure mathematics he made contributions of the highest importance, and, as a tribute to his memory, a brief account of them will be given here.

It is now becoming a matter of common knowledge that the very foundations of all mathematics have been reconstructed in such a way as to make the science like symbolical logic, and, in theory, independent of all intuition whatever. The beginning of this revolution was the acquirement of a precise conception of irrational numbers, and of the nature of the arithmetical continuum. Dedekind shares with Heine, Kronecker, and Cantor the glory of making this theory complete. His own exposition is contained in the two tracts, "Was sind u. was sollen die Zahlen?" and "Ueber Stetigkeit u. irrationale Zahlen," and in some ways is the simplest and most philosophical of all that have been devised. It may be remarked also that he did this novel work without inventing more than one new symbol. He also shares with Cantor the credit of pointing out that, if we are to assume that the uniform motion of a point along a segment AB is an exact image of a real numerical variable increasing from a to b , we must introduce an axiom of some sort. This axiom, known as the Cantor-Dedekind axiom, may be put into various equivalent forms; one of them is that any definite segment of a straight line must be terminated by two definite points.