practically the only measurement effected in the Southern Hemisphere, was long a subject of perplexity in all theoretical investigations of the figure of the earth, since the result indicated that the earth's surface was less curved in the Southern than in the Northern Hemisphere; but though the verification of the arc was an urgent necessity, it was not till 1840 that Sir Thomas Maclear commenced the work that solved the difficulty. The apparently anomalous result offers a good instance of the effect of local attraction in disturbing astronomical latitudes. The astronomical amplitude of Lacaille's arc (1° 12′) was proved to be very nearly correct, but a large local disturbance of the direction of gravity at the northern end caused a zenithal error of some 8″. Maclear enlarged the arc to nearly 5°, and here geodetic operations practically ceased, till the present astronomer, Sir David Gill, developed a scheme which dwarfs into insignificance all previous measures, and which, if it can be carried out, will prove of the utmost scientific value. He regards all that has been accomplished in South Africa as the first step in a chain of triangulation which, approximately traversing the 30th meridian of east longitude, shall extend continuously through Africa to the mouth of the Nile. He would make his chain follow, or rather precede, the line of that taken by Mr. Rhodes's transcontinental telegraph, proceeding northwards along Lake Tanganyika, through the region of the Lakes Albert and Victoria Nyanza, and along the Nile Valley. The definite survey of Egypt has not yet been undertaken, but commercial and political motives will doubtless soon bring this within the domain of practical science, and assist the onward progress of the scheme. Sir David Gill does not stop at the shores of the Mediterranean. Onwards, by an additional chain of triangles from Egypt along the coast of the Levant and through the isles of Greece, he would connect the African arc with the existing European systems, till it reached an amplitude of 105°. Sir David Gill puts before us a number of considerations by which such a scheme might be carried to a successful issue, without by any means minimising the difficulties which his experience teaches him stand in the way. It is not necessary to dwell on these obstacles, some of which are sufficiently obvious. It should, however, be remembered that no other meridian offers greater, if equal, facilities, or furnishes a better prospect for the realisation of this magnificent scheme. Sir David Gill has not confined his attention merely to the elaboration of schemes; he has accomplished much good work himself, often with straitened means, and by his personal influence and indefatigable energy aided and encouraged others. Under his auspices a chain of triangles has been carried eastward from Cape Town to Port Elizabeth, whence two branches have been carried to the north, one ending at Kimberley, while the other, crossing Natal, stops for the present at Newcastle in the extreme north of the colony. Much exploring work, hardly inferior in point of accuracy, has been carried through Bechuanaland and northwards along the 20th meridian, marking the boundary between German and British South Africa. His latest report tells us that on the eastern side of the continent stations were occupied from Bongwe (Lat. 19° 51′ S., Long. 30° 19′ E.) to a point in 16° 30′ S., and within sixty miles of the Zambesi. There the smoke from extensive grass fires compelled stoppage of field-work for the season, and his party retired to the observatory to occupy themselves in the work of reduction. The outbreak of the war and interruption by the Boers of telegraphic communication with Cape Town have for the moment delayed the determination of longitude of distant stations, but we may be sure that once the country has settled down to normal conditions, Sir David Gill will be ready to prosecute his scheme with the ardour that has ever characterised his undertakings.

RECENT ANTARCTIC BOOKS.[1]

THE long-continued neglect of Antarctic exploration has given place to a period of great activity. Several expeditions have, during the last five years, been hovering on the margin of the unknown, and penetrating within it a few steps farther than their predecessors. Great preparations are being made for what ought to prove the most determined effort to explore and study those regions by means of simultaneous national expeditions from this country and from Germany, and the public will soon begin to ask where the Antarctic regions may be and why people wish to go there.

The forerunners of the inquiring public have hitherto been obliged to cull such information as may be obtainable by the tedious process of consulting the records of original voyages which have been "out of print" for a generation at least; but in 1898 Dr. Karl Fricker came to their aid by producing his admirable compilation, "Antarktis," the introductory volume of Kirchhoff and Fitzner's "Bibliothek der Länderkunde." Of this book it is impossible to speak too highly, and we must congratulate the editors and publishers of the series on their choice of a beginning. We must congratulate the English publishers also on having the courage to show the British public how much better the results of British pluck and enterprise are appreciated in Germany than at home. We know nothing less pleasant to contemplate with regard to the long Antarctic record than the apathy of the British public and publishers alike to the pioneer work of Cook, the public-spirited enterprise of the Enderbys, and the great achievements of Ross. The fact that the account of Ross's Antarctic voyage has never appeared in a popular edition is a mystery in the face of the frequent inquiries for that delightful book.

Dr. Fricker passes lightly over the early history of the Antarctic regions, not mentioning, we may note, Rainaud's excellent historical summary, "Le Continent Austral," in which the myth of the Great South Land is traced to its source. He takes up the work of Cook in the eighteenth century, of the Russian expedition under Bellingshausen, of Weddell, Biscoe, Balleny and the other sealers sent out by Messrs. Enderby Brothers, and deals in a thoroughly satisfactory manner with the simultaneous expeditions at the dawn of the Victorian era, when the French under Dumont d'Urville, the Americans under Wilkes and the British under Ross competed in the investigation of the south polar seas. Probably it was wise to pass lightly over the acrid controversy between Ross and Wilkes, although the English reader might have liked to see how such Homeric heroes assailed each other in the pages of the *Athenaeum* half a century ago.

The history of recent voyages stops with the trip of the *Antarctic* to Victoria Land in 1895. This was inevitable in the case of Dr. Fricker's German edition; but the translator might have endeavoured to convey, in a supplementary chapter, some idea of the great results which have been achieved since the first publication. It would only have been fair to the author to have given him the opportunity of revising his section on Bouvet Island, with which the detailed description of the various known lands of the Antarctic regions commences. The translator might at least have added a note to let the reader know that this interesting group, which was sought in vain by Cook and by Ross, was re-discovered by the *Valdivia* on November 25, 1898, during the first scientific voyage conducted by Germans to the edge of the Antarctic (see NATURE, vol. lx. p. 114).

[1] "The Antarctic Regions," by Dr. Karl Fricker. Pp. xii + 292. Maps and Plates. (London: Swan Sonnenschein and Co., Ltd., 1900.)
"Through the First Antarctic Night, 1898-99. A Narrative of the Voyage of the *Belgica* among newly-discovered lands and over an unknown sea about the South Pole." By Frederick A. Cook, M.D., Surgeon and Anthropologist of the Belgian Antarctic Expedition. Illustrated. Pp. xxiv + 478. (London: William Heinemann, 1900.)

The description of the various portions of land seen by Antarctic explorers is well done, and the critical remarks of the author appear to be judicious and likely to be of service to subsequent expeditions. Then follow accounts of the ice-conditions, on which Dr. Fricker has made himself an authority, climate and life. The book ends with a chapter on the future of Antarctic exploration, excellent when it was written, but now happily out of date.

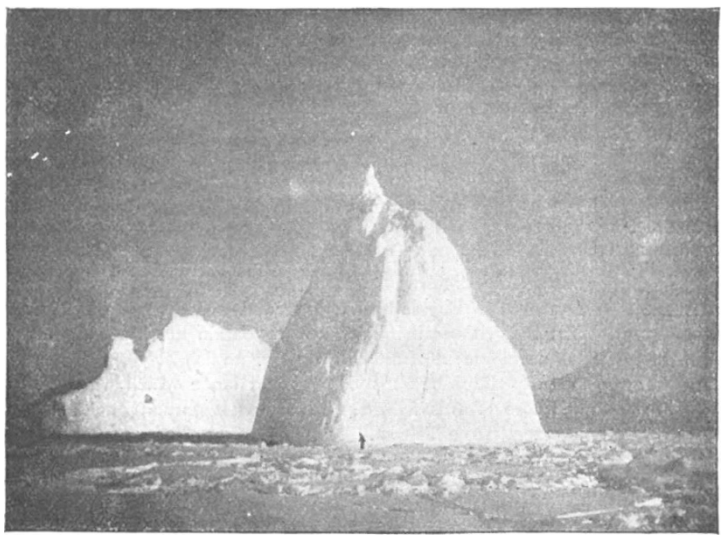

FIG. 1.—Curious weather-worn iceberg (300 feet high). (From Dr. Cook's "First Antarctic Night.")

Mr. A. Sonnenschein has translated the book very well indeed from the literary point of view. We could scarcely have believed it possible that a translation could be made so literal, and yet so free from constraint, as this one is. Still a scientific man cannot help noticing some slips in the rendering of technical expressions, and it may prove useful to the general reader to correct some of these. On p. 104, line 32, the translator interpolates "Mount" before "Erebus," not noticing that the author refers to the temporary position of the ship which was the mountain's godmother; similarly, on p. 117, the objectionable word "insects" is introduced after "coral" without Dr. Fricker's authority. On p. 120 "the lower parallel" scarcely conveys the idea "a great-circle course" which the author expressed. In several places the geological *dip* of rocks is rendered by *slope*, a totally different thing. On p. 175 "layers of secondary formation" suggests Mesozoic rocks, but drift, without regard to the geological character of the stones, is the true meaning. On p. 176 "precipitate rock" should be "sedimentary rock." In several places the word *schären* is translated "dunes," but it really refers to skerries or rocky islets like those of the Skärgård of Sweden. The phrase "relative moisture" is used throughout instead of the familiar "relative humidity." On p. 248 the translator suggests the use of the German word *firn* in English; but it seems to us that the French equivalent *névé* has received too general currency to be displaced from English writings. On p. 261 the word "Translator" has been inadvertently added to one of the author's footnotes.

The editorial note prefixed to the English edition is not very satisfactory. It is gratifying news, which we have not seen before, that Belgium is actively fitting out an expedition for Antarctic exploration; but the statement that a Belgian expedition was sent out in 1897 should have been supplemented by the fact that it returned in 1899 with rich results. The *Valdivia* expedition is not noticed, although Mr. Borchgrevink's return properly finds a place. It would have been useful if the numerous recent papers on Antarctic exploration in English had been added to the bibliography, and if the efforts of Sir Clements Markham and the councils of the Royal Society and the Royal Geographical Society in promoting the British Antarctic Expedition had been specifically referred to.

Dr. Cook is the first of the staff of the *Belgica* to place his experiences on record in book form, and his description is intended for the general rather than the scientific reader. Its great value lies in the frankness with which the subjective side of exploration in the polar regions is dealt with, and in the professional observations on the health of the explorers. It will be remembered that the *Belgica*, after surveying part of the coasts of the channel which continues Bransfield Strait to the south between 64° and 65° S, sailed west and south, and wintered in the Antarctic pack, where for thirteen months the ship was fast in the ice. The claims as to geographical discovery, and the results of the scientific observations, may be left for discussion when the official report of the expedition is published. Dr. Cook says very little about the leader, M. de Gerlache, whose resolution to push as far as possible to the south does not seem to have met with the approval of his subordinates, and it is notice-

FIG. 2.—Making soundings. (From Dr. Cook's "First Antarctic Night.")

able that de Gerlache's portrait is not given in the admirable series showing the officers and scientific staff before and after their experiences.

The preliminaries of the expedition when one might almost think time was wasted in Tierra del Fuego, are described in considerable detail; but the interest of the reader will be mainly attracted by the description of the first winter night (a night of seventy days) ever lived through by human beings in the Antarctic regions. It is described with a restrained realism that suggests many thoughts. We do not admire the author's style in such a passage as—"Even the sailors cannot resist the temptation to stand still and drink, with awe-inspiring amazement, the strange wine of action which hangs over the mysterious whiteness of the new world of ice"; but when he comes to deal with the details of every-day monotony in the narrow limits of the lonely ship, the narrative acquires an intensity of interest which the simplest and most correct expression could hardly increase. The efforts of the scientific staff to carry on observations in most unfavourable conditions deserve the greatest praise.

Dr. Cook attributes the terrible depression of spirits and the circulatory troubles which affected every one on board the *Belgica* to the absence of sunlight and the monotony of the food. He never mentions scurvy; but the symptoms described read not unlike the incipient stages of that disease. With regard to food, he raises a strong protest against essences and "artificial" foods of every kind. However nourishing these may be, their softness and want of flavour excite repulsion. Something with a taste, and tough enough for the teeth to have some work, was what the officers of the *Belgica* sighed for. Of all the foods on board, the Norwegian *Fiskeballar*, or "Fiskabolla," as it is written, were the objects of the heartiest detestation. Either the supply must have been of inferior quality or the abundance produced disgust, for only a few weeks ago we heard a person of intelligence declare spontaneously, on first tasting this delicacy, that with a supply of fiskeballar he could face a polar winter with equanimity. Sugar and milk ran short, and their loss was very severely felt. The experience of the *Belgica* should be very carefully considered by those responsible for victualling the new Antarctic expeditions, and compared with that of the *Fram*. Dr. Cook, by the way, throws doubt on the perfect health and general serenity of Dr. Nansen's expedition; but it appears possible that with a small company of one nationality, personally selected by the leader, and living together, the chance of harmony is greater than with a larger number divided into cabin and forecastle, composed of five nationalities, and speaking as many languages.

Both the books which we have brought together in this review are good, splendidly illustrated, and full of interest; but each would have been better of careful revision. Dr. Cook is unhappy with his proper names; we note *Grand* (for Gand), *Recluse* (for Reclus), Bismark, Monacho, Bellany (for Balleny), Jessup (for Jesup), and there is also carbon diolide, all of which are wrong. In both works the comparison of temperatures on the centigrade and Fahrenheit scales is sometimes at fault, and in one between the hours of 4 a.m. on Sunday and 8 a.m. on Monday several gentlemen succeeded in obtaining thirty-six hours of continuous sleep. HUGH ROBERT MILL.

NOTES.

LORD KELVIN proposes to give a valedictory address to the London Mathematical Society on November 8. The subject will be "The Transmission of Force through a Solid."

THINGS scientific are beginning to move in Egypt a little. A notice has been published in the official journal that on and after September 1 universal time will be adopted in Egypt, and the noonday signal given at mean noon of the 30th Meridian East of Greenwich, *i.e.* East European time. The Ports and Lights Administration have also notified that the time balls at Alexandria and Port Said will on and after October 1 be dropped according to the same time, and not local time as heretofore. At present these time balls are dropped by local arrangements, but before the end of the year the midday signal ball at each place will be dropped automatically by electric signal from Abbassia Observatory. Regarding meteorology, there are now eight stations between Alexandria and Khartum forwarding daily telegraphic weather reports, and these will be increased shortly. Abbassia has now a complete self-registering equipment, and hourly observations for 1900 will be published.

MR. J. S. BUDGETT, of Trinity College, Cambridge, who, it will be remembered, accompanied Mr. Graham Kerr on his journey in search of *Lepidosiren*, and who last year spent several months investigating the zoology of the Gambia region, has just returned to England from a second expedition to that river. Mr. Budgett's main object was to obtain material for studying the development of the Crossopterygian fish *Polypterus*. In his first expedition he obtained eggs and larvæ which were said to be those of this fish, but which, as it turned out, belonged apparently to a Teleost. Mr. Budgett has in his recent expedition failed to obtain the Polypterus material, but he is to a certain extent compensated for this by having obtained a mass of other embryological material which appears to be of great interest. Amongst this is a practically complete series of eggs and larvæ of the Dipnoan *Protopterus* whose developmental history had hitherto remained quite unknown. It is an interesting fact that the developmental stages of all three surviving members of the important group Dipnoi—*Ceratodus*, *Lepidosiren* and *Protopterus*, belonging to Queensland, South America and Africa respectively—owe their discovery and first observation to workers of the Cambridge school of Zoology.

AT the meeting of the Röntgen Society on November 1, Dr. J. B. Macintyre will deliver his presidential address.

LIEUT. C. LECOINTE, who was second in command of the Belgian Antarctic Expedition, has been appointed director of the astronomical work at Brussels Observatory, in succession to M. Lagrange, retired.

A REUTER correspondent at Friedrichshafen describes another ascent made with Count Zeppelin's air-ship on October 17. The balloon remained for three-quarters of an hour at an elevation of 600 metres, and, after carrying out a number of successful steering manœuvres, alighted safely on the lake shortly before 6 o'clock, half a mile from Manzell. Herr Eugen Wolf, who took part in the ascent, has given the following account of his experience:—"The trial lasted an hour and twenty minutes. The start upwards was first-rate. The air-ship moved at an almost unvaried height of 300 metres and went against the wind. All the steering tests proved the efficacy of the new gear, and the air-ship satisfactorily answered the movements of the steering apparatus. The horizontal stability of the vessel was wonderful. Any list was easily counteracted by shifting the sliding weight. The speed of the air-ship was such that, when going against the wind, it outstripped the motor boats on the lake. In still air its own speed was at least eight metres per second. We descended at full speed in the direction of the air-ship's shed rather faster than we expected, owing to an as yet unexplained escape of the whole of the gas in one of the balloons in the forward part of the ship. No damage of any importance was sustained in the descent. The King and Queen of Württemberg and Princess Maria Theresa of Bavaria watched the trial on private steamers."