It is to Germany, however, that the most credit belongs for the development and the work in this field. The number of very excellent texts and treatises in the history of science in Germany is far beyond the production in any other country. German scholarship is here again manifested in both quantity and quality, and Der Deutschen Gesellschaft für Geschichte der Medizin und Naturwissenschaften, organized in 1902, Leipzig, is probably the only organization devoted to the study and fostering of the history of science. The *Mitteilungen* contain a most complete and valuable bibliographical record of articles, memoirs and books in print, also containing originals and translations of historical treatises in science.

Two other publications worthy of notice at this time are the *Archiv für die Geschichte der Naturwissenschaften und der Technic,* Leipzig; and *Isis, Revue Consacrée à l'Histoire de la Science,* published in Belgium (or was published).

In closing, it would seem that in order to lend encouragement and force to aid this new field of investigation great good ought to come from an organization of a section in the American Association for the Advancement of Science, known as the History of Science section.

Frederick E. Brasch
Stanford University,
January 16, 1915

SCIENTIFIC BOOKS

The Home of the Blizzard, being the Story of the Australian Antarctic Expedition, 1911–1914. Sir Douglas Mawson, D.Sc., B.E. J. B. Lippincott Co. Illustrated, also with maps. $9.00 net.

It was thought by many that the acme of antarctic interest had culminated in the record-breaking sled journeys of Shackleton, the attainment of the Pole by Amundsen, and especially in the pathetic tragedy of Scott's latest expedition. It is encouraging to find in the records of Mawson's non-pole hunting explorations novel lines of human endurance, of tragic disaster, and of historical reversion, combined with scientific researches of value to the world. These physical and moral results exacted from the explorers not only the fullest effort of body and mind, but they also obliged the chief, returning as by miracle from death, to face a deficit of nearly $40,000 to pay for his privilege of polar service.

Mawson's expedition, which had the financial support of the Australasian governments, looked to the exploration of antarctic lands in the Australian quadrant—from 90° E. to 180° E.—and their occupancy for scientific observation and research. An intermediate station, wireless equipped and weather observing, was established on Macquarie Island, 850 miles south-southeast of Hobart. Circumstances restricted the parties for the continent of Antarctica to two—the main base at Commonwealth Bay, 67° S., 143° E. occupied by Mawson and 17 men, and the west base on the Shackleton Oceanic Icecap, 66.7° S., 97° E., established by Dr. Frank Wild and 7 men, in January, 1912.

Scientific work was carried out along the principal lines of geographic exploration, geology, biology, meteorology, glaciology, oceanography and magnetism.

Geographic Exploration.—From Mawson's base journeys aggregating 2,400 miles were made, in which King George V. Land was discovered and explored between 138° and 152° E., and from 67° to 70° 30′ S. In one journey a nevé bridge broke and Lt. Ninnis with team and sledge were fatally precipitated into a crevasse hundreds of feet deep, where they disappeared from sight. Mawson and Dr. Mertz were thus stranded over 300 miles from the station, with 6 wretched dogs and food for a week. Manfully accepting the situation, they struggled amid blizzards over frightfully rough ice, killing and eating their dogs as they failed to work. Mertz died of exhaustion 100 miles from home, towards which Mawson struggled in the last stages of bodily weakness, escaping as by miracle through an indomitable will, physical endurance and the finding of a chance cache set up by a search party. From the western base Wild's party discovered and explored Queen

Mary Land, between 101° 30′ E., and Gaussberg, Kaiser Wilhelm II. Land, in 88° 45′ E. By ship and sledge the coast was traced through fifty-five degrees of longitude, and with previous discoveries it is now certain that the continent of Antarctica extends continuously from 86° E. eastward to 158° W. longitude.

At sea Captain Davis discovered Mill Rise, a submarine ridge in about 47° S., south of Tasmania, and Jeffrey Deep, varying from 2,500 to 3,100 fathoms, approximately between 36° to 46° S., and from 110° to 125° E. He also located the continental slope of Antarctica through 55° of longitude.

Magnetism.—Besides regular work at the base stations, field observations were made by each sledge party. The strenuous effort to reach the South Magnetic Pole barely failed by a scant margin of about fifty miles. The party turned back from 70° 36.5′ S., 148° 10′ E., where the dip was recorded at 89° 43.5′, the Magnetic Pole being yet to the southeast.

The standardization of instruments by the Carnegie Magnetic Foundation, and the reduction and treatment of the observations by Dr. Bauer ensure more accurate and definite results than have been before attained. When such discussion appears it is certain that the present conflicting theories regarding the south magnetic pole will be satisfactorily harmonized.

Geology.—Although Antarctica is so covered by ice-caps as to confine geological researches to rare inland nunataks and infrequent stretches of ice-free coast cliffs, yet the general features of both King George and Queen Mary Lands were determined. Abundant red sandstones suggest that the Beacon sandstone formation, with dolorites, associated carbonaceous shales and coaly strata, extend from Adelie Land eastward to Ross sea region. On King George Land, Aurora nunatak, 1,100 feet high, disclosed "highly quartzose gneiss with black bands of schist." Horn Cliff, over 100 feet high had basaltic columns of dolorite 180 feet high.

> The beacons were found to be part of a horizontal, stratified series of sandstones underlying the igneous rock. Bands of coarse gravel . . . were interspersed with seams of carbonaceous shale and poor coal. . . . Several pieces of sandstone were marked by black, fossilized plant remains.

Near Penguin Point, 300 feet high, "the rock was coarse-grained granite, presenting great vertical faces."

In Queen Mary Land, Madigan nunatak, "the rock was of garnet gneiss, traversed by black dykes of pyroxene granulite;" Avalanche Rocks, 600 feet high, "rock mainly composed of mica schists and some granite;" Ross nunatak, "The rock was gneiss, rich in mica, feldspar and garnets;" Bar Smith nunatak rocks "were granites, gneiss and schists." Off the coast in dredging

> Fragments of coal were once more found: an indication that coaly strata must be widely distributed in the Antarctic.

A meteorite was found on the main ice-cap.

Meteorology.—The dominant characteristic of the climate of Adelie Land were the blizzards, which give the title to Mawson's volumes. He says:

> Such wind velocities as prevail at sea-level in Adelie Land are known in other parts of the world only at great elevations. The average wind velocities for our first year proved to be approximately fifty miles per hour.

Hourly records of one hundred miles were not very unusual, and gusts approximating 150 miles per hour were experienced. On May 15, 1912, the average velocity for the 24 hours was ninety miles. Later the reviewer hopes to comment on these remarkable meteorological conditions.

Biology.—Flora is practically non-existent in Antarctica, the brief list being mosses, lichens and algæ. A growth of lichens on red sandstone is reproduced in color as "an example of the most conspicuous vegetation of Adelie Land." As might be expected, the most luxuriant growths were in penguin rookeries. On Gaussberg were "large quantities of moss." Most interesting were the tiny, eye-visible insects found, especially on Horn Bluff, where among the many patches of moss they were caught in myriads. Fresh-water lakes produced low forms of life, mainly microscopic.

Among these were diatoms, algæ, protozoa, rotifera and bacteria.

Bird life was the striking feature of living nature; penguins, petrels, skuas and a new species of prion. Most interesting are the accounts of incubation, nesting, fishing, etc., of the various species. Eggs of practically every variety were obtained, including those of the silver-gray and antarctic petrels, previously unknown. The emperor penguin is the sovereign bird of Antarctica, and both eggs and rookeries are almost unknown. On Haswell Island, off Queen Mary Land, was found a large rookery of the emperors.

> The Emperor penguins had their rookery on the floe, about a mile from the island. The birds covered four to five acres. . . . We estimated the numbers to be 7,500, the great majority being young birds.

Near by was found a large rookery, about 300 birds, of antarctic petrels nesting in gullies and clefts, laying their eggs on the shallow dirt, each having one egg. This island appeared to be a bird's paradise, as there were also large numbers of Cape pigeons, Southern Fulmars, Wilson petrels and snow petrels, while skuas also were present. Of 26 species of birds obtained 6 were penguins, 3 albatross and 7 petrels.

Seal life was abundant during the summer season, consisting of the seal elephant, sea-leopard, Weddell seal, crab-eater seal and the rare Ross seal, of which 6 specimens were obtained. The blue and killer whales were the only varieties observed. Space fails in which to dwell on interesting observations made of bird and of seal life, as well as to the rich and varied marine life procured both by shore-dredging and by deep-sea dredging at 11 stations in depths reaching 1,800 fathoms, and of tow-nettings down to 200 fathoms. The rich fauna and interesting flora of Macquarie Island will prove interesting to scientists. Among these the most important are the rookeries, the sea-elephants having some 500 cows in the largest, the king penguins about 6,000, and the royal penguins covering 26 acres of ground, approximately nearly half a million, as 150,000 birds are killed annually.

Glaciology.—The lands of Adelie, King George and Queen Mary are buried under thick glacial ice, through which protrude rare and small nunataks (ice-free peaks). Not only is the land thus covered, but the continental ice-caps project seaward along the entire coast-line to a greater or less extent. These projections, named by Ross *barriers,* and styled *shelfs* by Mawson, are actually *oceanic* ice-caps. In King George Land Mertz and Ninnis glaciers push seaward indefinite distances, demarcation between land and ocean being undetermined, but each covers more than a thousand square miles of the Antarctic ocean. More remarkable is the Shackleton oceanic ice-cap which covers some 36,000 square miles of the ocean, its dimensions being 180 miles north and south by 200 miles east and west. Its surface extent is approximately equal to the combined areas of the states of New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New Jersey. Rising about 100 feet above the sea, its average thickness can not be less than 600 feet. Special interest attaches to the so-called ice-falls, where glaciers of very steep pitch impinge on the oceanic ice-caps, the Denman glacier being an example. Of this Dr. Wild says:

> Denman glacier moving much more rapidly than the Shackleton Shelf, tore through the latter and shattered both its own sides and also a considerable area of the larger ice-sheet. At the actual point of contact was an enormous chasm over 1,000 feet wide, and from 300 to 400 feet deep, in the bottom of which crevasses appeared to go down forever. The sides were splintered and crumpled, towering above were titanic blocks of carven ice. The whole was the wildest, maddest, grandest thing imaginable. . . . Rending the Shackleton Shelf from top to bottom, it presses onward. Thus chaos, earthquake and ruin.

Other polar publications in recent years have been as sumptuously illustrated as are these beautiful volumes, but here is to be noticed a welcome restriction of personal photographic exploitation. The varied experiences of Mawson and of his subordinates, the wealth of sea-life and of bird-fauna, the immensity and peculiarity of glacial forms, have been wisely

utilized for several hundred illustrations which generally are of both popular and scientific interest. Of the 70 views of birds, seals and sea-elephants scarcely one could be spared. The bird-lover finds penguins and petrels of all ages and conditions; the sea-rover will delight in the scenes of seal and sea-elephant life; the meteorologist notes graphic records of winds and blizzards; the biologist sees prophetic shadows of the riches of later scientific publications; and the geologist finds pictured nunataks, columns of dolorite and cliffs of granite. The volumes will be welcome additions to scientific as to other libraries. The index is neither good nor full. Unfortunate was Sir Douglas in the "literary style" due to his associate, as shown in the foreword and by interjected poetry, which mar the dignity of the story of a great and historic expedition.

It is pleasing to find Sir Douglas Mawson in that restricted class that has a due sense of obligation to predecessors. After praising the skill and daring of Wilkes in the hazardous voyage of his squadron for 42 days along the borders of the antarctic circle, he adds:

> It is wonderful how much was achieved. We may amply testify that Wilkes did more than open the field for future expeditions.

Americans thus owe a debt to Mawson, whose faith, courage and ability have given definite form to the 1,500 miles of the continent of Antarctica, which was reported by Wilkes only to be contemned and suppressed in narratives and on charts, and to be absolutely neglected by explorers for seventy years.

A. W. GREELY

The Lower Amazon. By ALGOT LANGE. New York, G. P. Putnam's Sons, 1914. 8°, ill., 460 pages.

Mr. Lange's new book shows a great advance over his earlier work entitled "In the Amazon Jungle" published in 1912. He has evidently learned the Portuguese language, a thing so many other travelers seem to regard as quite unnecessary, and he has apparently reached the wise conclusion that one does not need to go deep into the forests of the upper Amazon in order to see and to learn interesting things. The experiences described by the author were confined mostly to a trip up the Tocantins, but without reaching the region of falls, another up the Mojú a short distance above the lower falls, and another to the Ilha do Pacoval in Lake Arary—all of them near Pará.

Personal experiences are related and illustrated by good photographs taken by the author, while the maps add greatly to the interest of the book. The author has a facile and attractive style, and no one has ever described more truly or more pathetically the poverty, sickness and despair that hang over the villages and rubber camps of the Amazon region.

In spite of the fact that he does not take kindly to the food of the country, the author is no longer a tenderfoot.

From a scientific point of view there is nothing new in the book. The ancient pottery from Marajó, on which he justly lays stress, has been known to the scientific world since 1870, when it was visited by Dr. Barnard, of Cornell University, and a paper on it was published by Hartt in the *American Naturalist* for July, 1871, while a much fuller account of it is given in the *Archivos do Museu Nacional* of Rio de Janeiro, Vol. VI., Rio, 1885.

Those who want to know how the conditions of life and of business in the Amazon Valley appear to one who is personally and freshly familiar with them will find much of interest in the final chapters regarding the conditions, prospects, food, health, and what the government is doing for the people. Those who believe in the boundless agricultural possibilities of the lowlands of the Amazon should read what is said at pages 27 and 387–8 of the great, enormously expensive, and tragic experiment of a North American firm on the Mojú, and the footnote about its final abandonment.

It is a relief to find a book necessarily containing many Portuguese words with so few typographic errors. On the other hand, it is not clear why the author always uses the Spanish word "machete" for forest-knife, or why he speaks of his men as "bucks." The long accent so often used by him on Portuguese words is not Portuguese at all: in the