the German Geographentag on April 17. After a long discussion, it was decided that the use of different atlases in one class was detrimental to the success of the teaching of geography, it preventing a thorough explanation of the meaning of the map, the material contained in the maps being too different in different atlases.

THE REPORTS OF THE SONORA earthquake are still very incomplete. As far as can be seen from the meagre notes published in the daily papers, the Sierra Madre, which forms the boundary between the states of Sonora and Chihuahua, was the centre of activity. The towns and villages on the Rio de Batepito on its western side, and those on the Rio Corralitos on its eastern side, suffered most severely. In the former valley, reports of loss of property and life come from Oposura (Moctozuma) on the Rio de Soyopa and Babiose. There are, however, two places of that name, — one on the Rio de Batepito, one in the Sierra Madre. On the east side Corralitos and Cases Grandes suffered severely. As the district lies midway between the Sonora and Mexican railways, news travels slowly, and the reports are much retarded. The first shock occurred on May 3, and was followed by other violent tremors, the latest reported being on May 8. The accounts of volcanic eruptions are very doubtful, as it seems that the steam from hot-springs and the smoke of forest-fires have been mistaken for eruptions. There are three lines of volcanoes in this district, — the New Mexican line of extinct volcanoes; the line of California, which meets the former at the head of the Gulf of California; and the Mexican line, which runs from Orizaba to the Revilla Gigedo Islands. It contains several active volcanoes. There are no signs of disturbances of any of these volcanoes during the earthquake, while one report refers to an eruption near the boundary of Guatemala. The shocks were felt in southern Arizona, New Mexico, and Texas, but not so strongly as in Sonora.

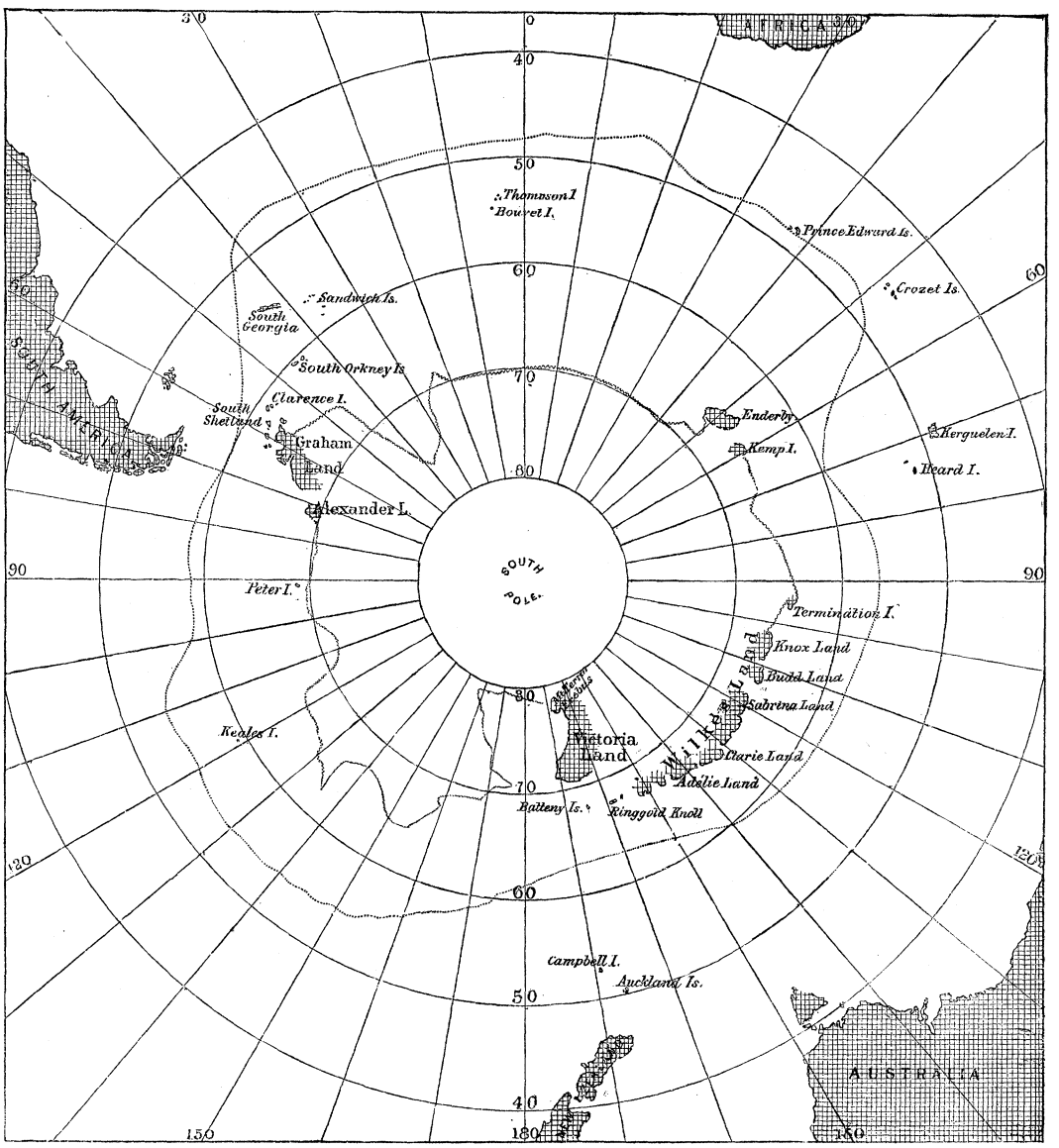
THE EXPLORATION OF THE ANTARCTIC REGIONS.

DURING a period when explorations were most vigorously carried on in all other parts of the world, the antarctic region remained as unknown as it had been for a long time. Since Cook, by his voyages, had proved the non-existence of an extensive Terra Australis, which former geographers supposed to occupy a great part of the southern hemisphere, nothing worth mentioning was done until the beginning of the present century. After peace had returned to Europe, which had been shaken by revolutions and wars, polar explorations were resumed: Parry, Ross, Lyon, Scoresby, and Franklin enlarged our knowledge of the arctic regions; while Bellingshausen, Biscoe, Balleny, Wilkes, Dumont D'Urville, and James Ross explored the antarctic seas. But this period of lively activity in the southern hemisphere did not extend over more than twenty-five years, from 1819 to 1843. After that time the enthusiasm for arctic travel reached its highest pitch in the numerous attempts to rescue Franklin or to ascertain the fate of his unfortunate expedition; but the antarctic seas have never been visited again, and our knowledge has not been increased since the period mentioned.

It was not until quite recently that new efforts were made to revive the interest in antarctic exploration. Maury tried to organize an expedition, but it was in vain: he was unable to find any support, either in England or in America. The revival of interest is chiefly due to the efforts of G. Neumayer of Hamburg, whose frequent and energetic appeals had the effect of arousing many societies from their inactivity, and of awakening a new interest in the problems of antarctic geography. It was in 1861, when Neumayer was director of the observatory of Melbourne, that he tried to work for renewed explorations in those regions. Since that time he has continued to do so with unabating perseverance, and his frequent addresses and writings on the subject have principally created the present interest in antarctic exploration. In 1885 the German Geographentag discussed the subject very fully, and expressed itself in favor of renewed explorations in the antarctic regions. In the same year Admiral E. Ommanney brought the matter before the geographical section of the British association, and a committee was appointed, which reported favorably on the matter. This example was followed by the Scottish geographical society and the Royal society of Edinburgh. Later on, the Royal society of Victoria discussed the subject, and issued a report, in which they express the willingness of the Australasian colonies to render assistance to an imperial expedition if decided on, and the intention of the committee, meantime, to arrange for the despatch to the antarctic regions of a steam-whaler, with a small staff of observers, for the purpose of discovering some safe winter harbor for the projected expedition. The latest news is that Nordenskjöld proposes an expedition which is to last eighteen months.

At this moment, when we may hope that the

exploration of the antarctic regions will be resumed, it will be of interest to review the history of former expeditions. Cook had expressed the opinion that it was impossible to approach the land which he supposed to exist around the pole, sent out Captain Bellingshausen, who discovered Alexander Island and the isolated Peter Island. The results of his explorations, which were published at St. Petersburg in 1831, did not become known until some years later, as frequently is the



MAP OF ANTARCTIC REGIONS SHOWING THE LIMITS OF OUR KNOWLEDGE.

on account of the heavy masses of ice met with. It was his opinion that these could originate only on an extensive land. Almost half a century had passed, and no new attempt had been made to continue his explorations, when Nicolaus I. of Russia case with books written in Russian. He was followed by Weddell in 1822, who, on a sealing voyage south-east of South Shetland Islands, reached latitude 74° 15′ south, where he found the sea free from ice, navigable, and abounding with whales

and birds. For ten years we do not hear of any further attempts. Then one Mr. Enderby of London fitted out several vessels, and sent them to the Antarctic Ocean for sealing and exploring purposes. The first expedition, in 1830, was under command of Captain Biscoe, who discovered the coast of Graham Land and Enderby Island. He was followed by Kemp in 1834, who discovered Kemp Island. The problem of the south pole then suddenly attracted the attention of all nations. Balleny, who commanded another of Enderby's expeditions, discovered in 1839 the volcanoes of Balleny Island and Clarie and Sabrina Land, — two points of the extensive Wilkes Land, the existence of which was later on so much contested.

In the following year, Dumont d'Urville came in sight of Adélie Land, which is situated between the eastern and western discoveries of Balleny. He estimated the height of the land to be about 3,500 feet. It is covered with ice, and no bare patches were seen. On effecting a landing, however, he found some rocks, which proved it to be land, and not drifting ice. Later on, he sighted Clarie Land, which he describes as an ice wall four hundred feet in height. In 1838, d'Urville had visited Graham Land, without making noteworthy discoveries. In the same year, when d'Urville made his discoveries south of Australia, Wilkes visited that region, and sailed all along the coast of the land which bears his name to-day. As he did not approach it very closely, some of his land may have been drifting ice. Ross, on his expedition of 1840–45, sailed over the place east of Balleny Islands, where Wilkes had put land on his map. In 1842 Ross reached latitude 78° 10′ south, the farthest point ever reached. He discovered the highlands of Victoria Land, with volcanoes 12,000 feet in height, and sailed along the formidable ice wall which he found attached to the eastern side of this land. His voyage is by far the most prominent among the antarctic expeditions, on account of the experience of the commander in ice navigation, his perseverance and boldness, and the valuable observations on the physical geography and topography of the antarctic regions.

On the accompanying map the most southern points reached by these explorers are connected by a broken line which includes the unknown area around the south pole.

Except the short journeys of Moore in 1845, and Nares in 1874, no further attempts to penetrate into the Antarctic Ocean have been made. It seems that the singularity of phenomena presented in the antarctic regions did not excite as much interest as did those of regions the borders of which were known. Here the fragmentary state of our knowledge was brought to mind whenever vague news of the unknown parts reached us, while no reports from the icy south pole kept up the faint interest it may have attracted at one time.

The geographical problems of this part of the world, nevertheless, are of the greatest importance. It is well known that the polar regions, particularly the south polar region, regulates the circulation of the oceans, and that its currents must be studied before it will be possible to understand thoroughly the currents of the southern hemisphere. The distribution of land and water, the depth of the ocean, the amount of ice, its thickness and distribution, must be studied for this purpose. Besides this, the meteorological phenomena of the southern hemisphere depend on those of the antarctic region, and our knowledge of the meteorology of the earth will be incomplete until such phenomena of the south polar region are thoroughly studied. The southern hemisphere is to a great extent covered by the ocean, and the land consists of narrow strips which have no great effect on the physical phenomena of the atmosphere: therefore they are not so complicated as those of the northern hemisphere, and their study will further the theory of meteorology. It is hardly necessary to mention the importance of researches on terrestrial magnetism in the antarctic regions. The important bearing of these problems on practical questions cannot be overrated. The seaman cannot dispense with the knowledge of the currents, winds, and magnetic elements, and there is hardly a class of people who will not be benefited by the progress of meteorology.

But, besides this, the scientific problems of the antarctic regions are of great importance. It is possible that in former times the arctic zone was a centre from which the organisms of the present period spread over the northern hemisphere. It will be important to know whether the south polar zone played a similar part in the southern hemisphere. The formation of the antarctic ice is probably very different from that of the arctic ice, because the summer temperature seldom rises to the freezing-point. The glaciation of this region is extremely extensive, and its influence on the formation of the surface of the land can best be studied there. Our knowledge of the geography of the earth will remain a fragment so long as an area of this extent remains unknown, particularly as the physical geography of the southern hemisphere depends to a great extent on that of this region. From this stand-point, the resumption of antarctic explorations is even more important than the continuation of arctic expeditions. Fortunately the chances of success are very good, as the Antarctic Ocean seems to be far more navigable than the arctic seas. The ice

is not obstructed by land, and therefore spreads more readily, leaving open water for the ships to pass through. Whalers and sealers are carrying on a successful hunt in the Antarctic Ocean, and undoubtedly an expedition would open new grounds to them. It is to be hoped that the interest in antarctic exploration which manifests itself in all parts of the world will lead to a new period of discoveries in the ice-bound seas of the south pole.

HEALTH MATTERS.

Distillery milk.

THE raid made by the officers of the New York board of health, on the cow-owners who bring milk to the city from animals fed on distillery swill, has awakened a new interest in this subject, which *Science* has discussed for the past two weeks.

For the benefit of those who are not informed, it may be well to explain what distillery swill is, and why it is regarded as objectionable food for milch-cows. In the manufacture of whiskey from rye, wheat, or Indian-corn, the ground grain, together with malt, is placed in a tub with hot water. The diastase present in the malt, acting as a ferment on the starch of the grain, changes it into glucose. After cooling, yeast is added, and fermentation takes place, resulting in the conversion of the glucose into alcohol and carbonic acid. The contents of the tub are then placed in a still and the alcohol is distilled off. The refuse is distillery waste or swill. In the above process, most of the starch has been changed into glucose. The swill contains a small amount of starch, together with cellulose, gluten, and some dextrine. The quantity of water in swill is very large, varying from seventy-five to ninety-five per cent.

It will be seen from the above statement, that, in order to get a sufficient amount of nutriment, a cow feeding on distillery swill must take into the stomach a very large amount of this waste, so large a proportion being water, and that in so doing the amount of carbohydrates taken is entirely inadequate to the demands of the system; and this want must, of necessity, result in a deterioration of the animal's health, and indirectly of the milk which it produces. It is an unnatural food for cows, as is shown by their dislike of it when first it is given them. In fact, in order to make them eat it, they must first be starved. Hassal quotes Harley as saying that "brewers' and distillers' grains and distillers' waste make the cattle 'grain-sick,' as it is termed, and prove injurious to the stomach of an animal. It has been ascertained, that, if cows are fed upon these grains, etc., their constitutions become quickly destroyed."

The effect of taking so large a quantity of fluid by the animal is to increase the quantity of the milk-secretion and at the same time to cause diarrhoea. We have stated that the quality of the milk produced from cows fed on distillery swill is very inferior. In support of this statement, we quote some analyses made by Dr. E. H. Bartley, chief chemist of the Brooklyn board of health. In a report made by him he says, "The effect upon the composition of the milk, of feeding cows on distillery or vinegar swill, is shown by the following analysis of three samples of swill-milk recently made by me, as compared with normal milk of cows fed on ordinary food: —

	First.	Second.	Third.	Average of 300 analyses of normal milk.
Specific gravity	1,036.50	1,030.10	1,031.60	1,031.00
Water	89.46	88.68	87.56	87.41
Solids	10.54	11.32	12.34	12.59
Fat	2.03	3.02	2.55	3.66
Sugar	2.83	2.74	4.11	4.82
Caseine and ash	5.78	5.66	5.68	4.46

It will be seen from these analyses that the fat and sugar are both deficient in the milk of the cow fed on distillery swill, while the caseine is increased. This is just what would be expected from the character of the food. When it is remembered that human milk contains more sugar and fat than normal cow's-milk and much less caseine, we can readily understand what the effect of such milk must be upon small children fed upon it. The amount of caseine being great, the curd of the milk is increased and the digestion made more difficult. When such milk is rendered slightly acid, or is allowed to coagulate spontaneously, a marked difference is noticed in the character of the curd formed, from that produced in normal milk. In the former the curd is tough and hard, and shakes to pieces with greater difficulty; so much so, that I have been able in a few cases to identify swill-milk by this property of the curd. In order to make such a milk agree in composition, even roughly, with human milk, one and one-half quarts of water must be added to one quart of milk, and then cream and sugar added to supply these ingredients; for, after the water has been added to dilute the caseine, the mixture would contain about one-fifth the necessary quantity of sugar, and about one-fourth the