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OBITUARY FOR

Professor Dr. Leonid Breitfuss

The dean of German polar research, Professor Dr. Leonid Breitfuss, died at Bad Pyrmont on 20 July 1950. His had been a long and successful life and yet he left us too soon.

In Dr. Breitfuss the Archives for Polar Research are losing one of their oldest and most valuable collaborators. During the organization of the Archives he was given direction of the Berlin section. In the course of his activity there he was able to enlarge the specialized library of the Archives considerably and was able to continue Chavanne's bibliography, which includes polar literature up to 1875. The card index compiled by him in this work has been the basis for all bibliographic publications till the end of his life. The board of directors of the Archives for Polar Research made him an honorary member in recognition of these labors.

German polar research has suffered an irreplaceable loss by his decease. May German youth take his untiring diligence and his beneficial work as a model and strive on in his spirit.

Grotewahl

Footnote: Polar Research 1949 Number 1/2 Page 293 - - To Professor Dr. L. Breitfuss on the occasion of his 50th anniversary in polar research and his 85th birthday, 1949, 37 pages. Published by Archives for Polar Research, Kiel, Wilhelminenstrasse 28. Price 2.00 D.M.

THE SEISMICITY OF THE ARCTIC

Professor Dr. E. Tams,

Hamburg

In view of the fact that since the beginning of this century instrumental earthquake research has become increasingly significant thanks to the perfecting of seismographs, our knowledge of the seismic behavior of areas such as the polar regions has grown considerably even though these regions are insufficiently accessible to direct observations. Thus it was soon discovered, as the author was the first to demonstrate, that, for example, the bottom of the European Northern Ocean or the Skandik [Norwegian Sea] between Scandinavia and Greenland from Iceland to Spitsbergen reveals a lively seismic activity in its central region that may be traced into the very arctic itself, and that even the region of the Nordenskiöld Sea [Laptev Sea] between the Taimyr Peninsula and the New Siberian Islands has noteworthy earthquakes.

The most recent comprehensive representation of the seismicity of the earth by B. Gutenberg and C. F. Richter (1949) further completes the picture, so that these two authors now refer to a continuous arctic earthquake belt in the light of recent literature and observations, and that this belt extends as a continuation of the seismic zone in the Northern Atlantic from Iceland across the European part of the Arctic Ocean, the Greenland Sea and Spitsbergen northward past Fridtjof-Nansen Land all the way to the region of the Lena Delta and the New Siberian Islands.

In the instrumental registration of the quakes of this region the earthquake observatories along its edge such as Reykjavik in Iceland, Scoresby Sound and Ivigtut on the east and southwest coast of Greenland respectively, Upsala in Sweden and Eskdalemuir in Scotland have been especially useful, apart from more remote stations in the case of intense quakes. We must mention in passing that a German station was active temporarily (1911-12) at Advent Bay on Spitsbergen, and results from this station published by C. Mainka once served the author as a basis for his own investigation. In a more detailed explanation of Spitsbergen's earthquakes and tectonic phenomena A. Sieberg compares its seismic character to that of the South German block system. In addition to the above an earthquake observatory was attached to the Danish biological station on Disko Island on the west coast of Greenland, and E. G. Harboe reported on its observations made, with extensive interruptions, in the period from October 1907 to May 1912. [See Gerland's Beiträge zur Geophysik (Contributions to Geophysics), Volume XI (1912), Volume XIII (1914) and Volume XIV (1915-18)].

The rim of the Arctic is very little or not at all seismically disturbed in North America and Greenland or in Northeastern Siberia, as far as we can tell from the limited obeervational facilities. On the Canadian rim tremors have been known to occur at the mouth of the Mackenzie and in the Beaufort Sea as well as in the region of the Davis Strait and Baffin Bay. Areas of weak tremors on the neighboring coast of Greenland correspond to the latter regions. There are occasional reports of weak shocks on Greenland's east coast in the same latitude as that of Iceland which lies just across Denmark Strait and is often badly shaken up in its own Southwest and northeast corners.

As can be gathered from the treatise by Gutenberg and Richter, there is an important center in the Siberian-Alaskan transitional region between Asia and North America, apart from a few other quake centers.

This center is located outside the Aleutian and Alaskan zone belonging to the earthquake belt ringing the Pacific at approximately 67 degrees north, 172 west of Greenwich, not far from the Bering Strait. Here the observations of the station at College near Fairbanks in Alaska which has been in operation since 1935 will be especially useful in clarifying the situation.

Considerable progress in the evaluation of the seismic activity of a region was made when Gutenberg and Richter succeeded (1935 and later) in adopting a definite unit of measurement for the "Magnitude" ("Magnitude", M) of a quake as whole, which at the same time permits an estimate of the energy released by it. This obviously goes far beyond the customary intensity-estimates using an empirical magnitude scale based on directly visible effects.

According to the classification adopted by the above named authors and their determinations all over the region under discussion we are dealing exclusively with earthquakes having their centers near the surface (depth of centers no greater than 60 kilometers). There were no indications of genuine deep quakes with centers at depths beyond 300 kilometers (down to approximately 700 kilometers) or of quakes with an intermediate depth of center of 70 to 300 kilometers. The determination of the "magnitude" of an

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earthquake and the amount of energy related to it depends in any comprehensive application upon complex theoretical considerations of the radiation of the elastic earth-waves as well as upon empirical determinations and derivations based on the seismometric registrations of individual quakes. These, as we know, permit reliable conclusions about the wave groups according to type, amplitude and period. Thus it has been found that on the scale which has been so well determined in this manner the most important earthquakes examined for intensity must be assigned a magnitude of approximately $8\frac{1}{2}$M. It was further found that all quakes of a magnitude class equal to or greater than 7.0 are seismically perceptible everywhere on earth, while quakes which do not register at distances greater than 1000 kilometers have a magnitude smaller than 5.3. The great Lisbon quake of 1755 may perhaps be given a magnitude M of $8\frac{1}{2}$ to 9. The amount of energy involved then results from an easily manageable relationship between energy E (in ergs) and magnitude M which for the time being is theoretically and empirically valid: $\log E = 12 + 1.8\ M$. This relationship, however, furnished the value of log E at best to an accuracy of one unit. Since log E involves logarithms to the base 10 the value of E itself, as found in this manner, is therefore at best determined to powers of ten.

In applying this to the earthquakes of the Arctic the following facts further characterizing its seismicity should be given in conclusion. They are based on the very complete foundations of the above-cited work by Gutenberg and Richter. Of the 29 stronger quakes of magnitude classes greater than or equal to 6.0 observed in the years from 1908 to 1945 north of 65 degrees north latitude and which in general still yielded good registrations at distances of 10,000 kilometers from the epicenter, approximately two-thirds belonged to the above-mentioned arctic earthquake belt. One of the three most significant quakes (21 February 1928; M = 6.9) originated in the marginal zone of the Chukotski Peninsula on Bering Strait (67 degrees north, 172 degrees west), another (20 November 1933, M=7.3) in Baffin Bay (73 degrees north, 70 3/4 degrees west). In the case of the third quake (22 January 1910, M = 7.1) we deal with an epicenter approximately 200 kilometers north of Iceland. The author computed its geographic coordinates at the time to be 68 degrees north and 17 degrees west, in round figures. (*Beiträge zur Geophysik*, Vol X, 1910, "Kl. Mitteilg" (Short Notices) p. 250 ff.). While the originating area of this quake and its immediate surroundings again and again radiates more or less important shocks, thus incorporating the region into the main seismic zone of the Arctic, the region of Baffin Bay in the above-indicated area turned out to be seismically very disturbed after the major quake of 1933, certainly up to 1945. And the important quake in Bering Strait of 21 February 1928 initiated a period of more lively seismic activity in confirmation of old experience. At any rate, the same month there followed two more quakes of magnitude M = 6 to 6½ having the same or nearby epicenters, and by the first of May of that year another quake had taken place. So far fifteen quakes have been found with some certainty to have had epicenters equal to or less than 10 degrees from the pole; five of these (M = 5.3 to 5.9) showed areas of origin as close as 5 to 3 degrees to the pole.

The energy quantities of the above-cited three most important quakes should have the following values, based on the given relationship between the energy E and magnitude M: earthquake of 21 February 1928 (Bering Strait, M = 6.9) 6 x 10^{24} ergs; earthquake of 22 January 1910 (north of Iceland, M = 7.1) 6 x 10^{24} ergs and the earthquake of 20 November 1933 (Baffin Bay, m = 7.3) 13 x 10^{24} ergs. For comparison let us take the heavy quake of 28 December 1908 to which Messina and Regio di Calabria fell victim; it, too, originated at a small depth. With a magnitude M = 7.5 it may have developed an energy of about 32 x 10^{24} ergs, in terms of size easily five times that of the quake of January 1910 north of Iceland. In using the above relation between "energy" and "magnitude" we must certainly not forget that it involves a considerable factor of uncertainty. The energy of an atom bomb is assumed to be of the order of 10^{21} ergs.

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(Earthquakes in the Region of the Nordenskiöld Sea), Gerland's Beiträge zur Geophysik, Volume XVII, p 325 ff., 1927.

POSTSCRIPT

In a treatise by Th. Stock on "The Depth Relationships of the European Northern Sea" in Deutsche Hydrographische Zeitschrift (German Hydrographic Journal) Volume III, p 93 ff, 1950, which appeared after the completion of this survey the seismic conditions have been revealed in an especially interesting light. A digest of extensive new sounding material shows that the bottom of this part of the sea has a much more complex relief than has hitherto been shown on maps. Especially the region of Iceland in the direction of Jan Mayen and beyond this island shows marked undulating formations which may be connected, even if not without exception, with a large part of the quake centers. There is another very wavy relief in a region of the sea off the west coast of Spitzbergen which is dotted with many epicenters. The seismic calm or at least dearth of earthquakes of the southeastern part of the European Northern Sea (the Norwegian Basin) which the author of these lines has called attention to before this, harmonizes completely with the newly observed and much more uniform submarine bottom formation which agrees with the probably greater geological age. In a paper on "Topography and Sediments of the Arctic Basin" (The Journal of Geology, Chicago, Vol 57, 1949, p 512 ff.) K. O. Emery conversely derives, with a fair degree of certainty, an irregular submarine topography for the relatively unknown Arctic basin from the course of the above-described seismic zone in the region crossed by it.

EXPERIENCES WITH EQUIPMENT ON AN EXPEDITION TO GREENLAND

Dr. Gottfried Weiss,
Hehlen/Weser

During the war there was an infinite amount of planning and thinking about the most suitable equipment for the arctic weather service expeditions that were then being sent out. It was, after all, completely new territory for us Germans. A great deal of practical experience was gathered from the expeditions of the war years. In order that all this should not fall into oblivion we will here make an attempt to set down a few details about the equipment and the wintering technique of the Northeast Greenland Expedition of 1942/43. This material refers to a winter spent at a fixed location, not traveling. I will simply describe how we established ourselves, not that the arrangements were ideal in every case. Other expeditions may have had entirely different experiences. Precisely for that reason it would be a good thing if the wintering methods of the remaining arctic undertakings of the war years were to be described, above all those of the Air Force. We were fortunate in that the leader of the expedition, Hermann Ritter, was well acquainted with the way of life of the Norwegian trappers on Spitsbergen.

Finished and collapsible huts were originally to be taken along as shelters. This turned out to be impossible in 1942 and we therefore took along tongue-and-groove light boards, finished windows and also beams and posts and built our quarters out there ourselves. They had double walls and had slightly inclined roofs covered with tarred cardboard and strewn with gravel. The sail-cloth covering that we applied on the outside may have been a luxury. The Norwegians obtained absolute protection from the wind by nailing roofing paper on the outside of the walls and cardboard on the inside. In addition to a chimney we installed ventilation shafts on the roofs that could be closed by flaps. Adequate ventilation is the alpha and omega of a tiny, overheated arctic hut. Each of our shelters had but one room for living and sleeping. It was heated by a stove standing in the middle. For good heating it was advisable to run the stovepipe through the room for the greatest possible distance. In order to be warm the living quarters had to be smal. One had a base of 4 x 5 meters, the other of about 7 x 2 meters. Above all they had to have a low ceiling -- as high as a man standing and no more! In my book, Das arktische Jahr (The Arctic Year), Westermann, Brauschweig, 1949, I have described the really practical inside arrangement of one hut and of the wintering space on the ship of the expedition, with plans included. A constant, heavy precipitation collected on the outside walls of our quarters on board ship and on land. This was especially disagreeable because our cots stood against the outside walls. The only really dry items were the shelves and boards located in the middle of the room without direct contact with the outside wall. It goes without saying that the humidity was increased by cooking, by melting ice, and by our washing ourselves and our clothes.

Each hut had a vestibule as a cold lock; it also served as storage space for provisions, coal, tools, skis, sleds, etc. We soon found out that a vestibule couldn't be big enough! During the coldest part of the winter the huts never really got warm, at night they cooled off to such an extent that we had to use fur-lined sleeping bags. At all other times of the year the heat of the stove was sufficient and we slept under sheets and woolen blankets. From spring onward the huts even became insufferably hot because it was difficult to ventilate them adequately. For almost half a year the double windows were covered with ice inside and outside, as well as between the panes, so that no light came into the hut. A curtain hung on the inside of the door between the vestibule and the living quarters. In spite of this frost was deposited at the entrance and so much air escaped into the vestibule while opening the door that frost deposits formed on the supplies stored there. The outside walls were protected by stacking provision boxes all around them. When the "föhns" (chinooks) of spring suddenly melted the snow we found it very necessary to provide some means of allowing the melted water to run off so that the supplies should not spoil or the water penetrate the hut. Brightly burning kerosene lamps gave us light and also furnished considerable heat.

The small traveling huts of the Danish and Norwegian trappers had simple tongue-and-groove board-walls and were covered with roofing paper. None of these huts lacked a vestibule; the sleeping quarters which were heated by a tiny little stove had a base of 2 x 2 meters. The so-called trappers' stations were somewhat larger and very often were scenically placed in very attractive locations, -- a very important psychological consideration that makes life in the arctic more tolerable. For similar reasons some stations had a large window to admit both light and a good view. Such a window, just as the door of the hut, must naturally face south so that you can enjoy the suh as soon as the ice melts off the panes. If you then step out into the darkness of the polar night you at least see the comforting midday light of the sun. [sic]

The Danish government station at Ella-ö made an especially lasting impression on us. It consisted of a large house with a strong framework of beams and walls of fiberboard sheets. The outside walls did not themselves stand in the snow, but were protected by narrow and low coal sheds that surrounded the house on three sides and had hinged roofs. The cross-section of these bunkers may have amounted to a square 1 to 1.5 meters on a side. In the interior the large communal room was surrounded on three sides by the kitchen, radio room, workshop and the narrow sleeping cabins where each man passing the winter had his own little realm. The fourth side of the communal room was taken up by a huge double window with a magnificent view. In front of the door of the house there was a windbreak with doors to the right and to the left. Thus there was always an exit that would not blow shut, no matter what the direction of the wind might be, and a very important problem was solved in a practical manner. There were supplies stored in the attic under the mighty gabled roof. Toilet facilities were laking in Ella-ö just as with out huts. A pit in the snow or a h ole in the ice-cover may have served as a substitute. Perhaps the omnivorous sled dogs and polar foxes were the sanitary police just as the famous street dogs of Constantinople in the old days.

On smaller stations it was a tried and true custom to surround the living room with store rooms and vestibule on three sides whenever possible. That way you obtain dry walls in the living quarters, without the well-known smeary precipitation and in this way you can have a clean and European arrangement. The warmest hut that i came to know was the old Norwegian station Krognes at Cape Stosch on the Gulf of Godthaab. It has walls made of sod with planking on the inside and straw bunks. Benches made of sod were also very popular for covering the walls of the hut at its base.

Our provisions were so packed that a complete monthly ration for the entire expedition could be taken from a group of boxes. This made housekeeping easier. We had an even more practical arrangement on our second trip in that two or three boxes contained the entire food supply for one man for 30 days (or for 10 men for three days). This arithmetic made it easy to keep house regardless of the number of men in the main camp or the side camps. Everything was canned and certain meat products were covered with wax. Such supply boxes can be stored in the open without worry, but this is a luxury that the average Norwegian winter occupant cannot afford. He puts paper bags in his closet like any European housewife, uses tin cans and burlap sacks and keeps flour in barrels. Our diet contained much meat and fat and did not otherwise differ from an ample European diet. Instead of potatoes we had dried potatoe sticks which in use were allowed to swell up in water and tasted delicious. Canned goods had been replaced by dried vegetables whenever possible, in order to save weight as with the potatoes.

The cans contained chiefly meat and sausages, fruit and fruit juices. The latter were extremely popular. For trips there was a small quantity of pemmican and dried onions to make the flat pemmican more tasteful. Also dehydrated bread that can freeze all it wants since it contains no water. Otherwise we baked bread almost daily, which was a great convenience. Very little alcohol was taken along, but a great deal of tobacco, just as the old arctic recipe prescribes. Our meat supplies were supplemented by fresh or preserved frozen meat of musk ox, polar bear, seal, snow hare and snow hen. We avoided the liver of the polar bear. Its harmfulness has recently been ascribed to an excessive vitamin A content. Because of the danger of trichinosis polar bear meat especially was eaten only after thorough cooking or roasting. (On another German wartime expedition a general trichinosis epidemic, caused by the eating of raw polar bear meat, almost resulted in a catastrophe. For polar animals carrying trichinosis see The Polar Record, Volume 1950 V, p 474.

In the provisions of trappers we repeatedly noticed a lot of dried vegetables and dried fruits, a lot of coffee, spices, mustard powder and sharp sauces for making game palatable. We learned quite a few tricks from the trappers on obtaining fresh food and vitamins. These include sauerkraut and home-brewed beer, herring, cod-liver oil, eggs that have been frozen and are dropped into a pan while hard as glass, onions that are also frozen, lemons, paprika-paste, onion flakes, garlic as well as dried parsley and leek that are allowed to soak up water. ~~Your should of course also take along winter apples to soak up water~~. You should of course also take along winter apples and carrots, but this kind of fresh foodstuff cannot stand being frozen. Mulberries and cranberries play an important part with the Norwegians. On my last expedition in 1944 I took along deep-frozen fruits and vegetables. Since the expedition failed nothing can be said of this attempt. It might, nevertheless, have been possible to store the packages that were wrapped in aluminum foil between chunks of ice on August and September days, at temperatures of 0 degrees Centigrade, and thus keep them frozen. At some stations we found small hotbeds. There they had tried to raise some vegetables. The trappers by no means rejected vitamin preparations, especially when they did not have any fresh meat. We, too, took vitamin pills.

Our equipment was most incomplete with regard to clothing and shoes. Polar clothing may consist of furs and sealskin or of cotton-padded clothes and felt boots on the Russian pattern. Unfortunately no experiments were made with the latter in our case. We found out that if you are not taking any trips during the winter heavy European woolen clothes with windproof outer garments are sufficient. We soon learned that it is best not to take off the windproof outer pants at all. It is important to have them close tightly at the ankles so that no snow can get into the foot-gear. This is best done by having an elastic on the trouser-leg which is pulled over close-fitting ski-leggings. Anoraks have to be loose-fitting so that you can move easily, have enough air and don't perspire. They must be long enough to protect the abdomen. The sleeves should extend some distance into the gloves. This is never the case with an anorak bought in a sporting goods store. Sheep-lined leather caps as used by pilots or motorcyclists were found to be excellent protection for the head. In Greenland we also learned how pleasant it is for the skin of your face if you sew a strip of fur on the inside of the rim of the anorak hood, preferably of dog fur. The hair of this fur has almost the same effect as a well-fitting face protector which should be knit (stretchable) and must have holes for eyes and mouth. The German military face protector that no one knew how to wear was absolute nonsense. In the fall and in the spring we wore light woolen caps. For gloves we used light woolen mittens and over them waterproof ski gloves with leather insets on the palms. Gloves with separate index fingers would have been nice for shooting and working, if the mittens had had an index finger! But even next to the skin regular gloves with separate fingers are too cold. Fur-lined gloves bought in a sporting goods store are almost always to skimpy, especially over the thumb, which makes it only too easy to get beautiful cases of frostbite. The gloves naturally always got wet whenever the temperature was not too low, and we became used to having an extra pair of dry mittens with us for changing. The most waterproof outer gloves are naturally of sealskin type worn by the trappers.

We learned, moreover, that it was very important to keep clothing dry if it was to keep us warm. Snow-covered outer garments are best left in the cold vestibule and shaken out right there so that they can't begin to thaw. The same goes for sleeping bags that have been penetrated by snow. Unless a sleeping bag is made of coarse sailcloth it simply must have a cover so that it stays dry. As for fur-lined clothing we had pilot's suits exclusively --

sheep-lined jackets and pants; naturally, things made of pure wool were very scarce during the war.

One must not have an exaggerated idea of the cold to be found in the Arctic, especially outside its continental parts. With us the temperature never went below - 40 degrees Centigrade. It wasn't even as cold as in some parts of Russia. It is much more important to protect yourself against the wind than against the cold. The cold only becomes dangerous when it is connected with wind or with wetness or when you don't keep moving.

Our footgear was completely inadequate. We had only leather boots which became hard at temperatures below-20 degrees Centigrade and chafed. The so-called African laced boots may have been made of sailcloth but also had thin leather soles. Not until Greenland did we see traveling boots made of sailcloth and crepe soles and came to know the American arctics with rubber soles and sheep lining. Other German expeditionary parties made their own shoes from much-quilted sailcloth or sheepskin which naturally wore through very quickly. In the "kamiks" you had the feeling of going barefoot, because of the thin soles; you felt the slightest unevenness of the ground and the soft stocking gave the arch of the foot no support. Thus "kamiks" are only for people whose feet do not suffer from the usual ailments of civilization! We also learned that socks and mittens should preferably be made of raw wool (still containing natural oils) or at least of dry wool, so that they will be water-repellent.

Our sleeping bags were heafy but waterproof and warm. They had an outside cover of sailcloth, were sheep-lined on the inside and had a close-fitting head end. Knapsacks and pack boards are indispensable even in the Arctic. Ice axes are only needed for climbing around on a glacier. We could use skis only in fall and in the spring. As early as late fall the surface of the snow became hard as brick and so irregular because of the "sastrugi" that skis were out of the question. Bindings having a steel spiral at the heel should be the most pracical. For climbing the slopes that were covered with hard and smooth snow in the wintertime ice cleats (light two-toothed glacier irons) were indispensable. I shall here forego the inexhaustible subject of tents, tenting equipment, snow goggles, sleds and dogs, especially since I have discussed these items in my book. But I would like to mention that you simply cannot have enough tools for jobs using iron and wood, especially if technical installations are involved. But even sailing gloves and sail needles were in constant use with us.

We stored our supplies in such a fashion that we would not lose all our vital goods if a hut caught fire. We therefore set up depots all over the area. When our situtation became risky we also placed some sleeping bags in the open, which turned out to be a wise move upon the loss of our hut. Gasoline and kerosene barrels were always stored in the neighborhood of the beach. This was done not merely for precautionary reasons, but because they were the heaviest items of our entire equipment. On other trips we took along only liquid fuels in small canisters so that they could be transported with ease across country. But the more canisters there were, the more seals there were that could leak, the more gas formation and danger of fire, especially in the hold on board ship. You must figure on using 2½ tons of coal per fire per winter. As long as there is enough room in the hold it is best to take it along all packed in coconut-fibre bags.

Our most important conclusion was that after all it is possible to get along with few, but useful supplies. On our second trip we took along much less equipment than on the first. The first time you hear about primitive Norwegian wintering methods you can't quite understand how human beings can exist in the arctic in a tiny hut made of boards and roofing paper, and dressed in wool socks whose soles have been cut from old automobile tires. When we got back from Greenland we could understand it, for we, too, had learned with how little you can get along.

RADIO PROPAGATION AS AN AID IN POLAR WEATHER EXPLORATION

Karl Schenk,
Oberkochen/Württg.

If we look at the equipment and resources of present day antarctic and arctic expeditions we will note considerable differences in comparison to former years. The scientific expeditions themselves furnished the impetus to further development of apparatus along a multitude of scientific and technical lines. On the other hand such undertakings took along equipment and instruments to make performance tests under unfavorable conditions. Even observational methods and theories, for example, astrophysical and geophysical problems, had to have their correctness subjected to proof in the polar regions.

My present article will deal with a problem that is still in its initial stages and that many have already tackled in vain. A positive result cannot be expected until science occupies itself seriously with it and carries out long and thorough observational series on a broad, international scale. Polar exploration will here be of the utmost importance, since precisely in the polar regions the extreme conditions and disturbances of the upper atmosphere and the ionosphere allow us to expect manifold and informative discoveries.

Even in the early days of radio the establishment of a relationship between reception and weather conditions was attempted. No successful investigation could be based on the ideas then in vogue about the processes involved in the propagation of the electromagnetic waves used in radio. Even our knowledge of the course of the weather was restricted to the lowest layers of the atmosphere and here, too, the necessary basic principles for a common viewpoint and a connection of radio propagation and weather were lacking. The last 15 years have brought especially great progress in this field. To the exploration of shortwaves was added the discovery and further development of ultrashort and centimeter waves. In meteorology weather processes were explored and regularly observed right up into the stratosphere by means of regular balloon and airplane ascents. I have based my observations and conclusions on the present status of this and other related specialized fields. The observations of radio propagation are limited, for very special reasons, to the medium wave range of the usual broadcasting band.

Even in this range disturbances in propagation are quite noticeable. If specific broadcasting stations are observed at identical times on several successive days perceptible differences in the strength and quality of reception are obtained. In addition to slow variations in volume or fading, short-period fluctuations are also observed. In high-quality radio sets these disturbances are to some extent eliminated by automatic volume control. If, however, the amplitude of the variations in field strength exceeds a certain figure (as happens almost continuously in short wave reception), then the automatic volume control fails and the transmitter becomes weaker or completely inaudible. If we observe the quality of reception of certain transmitters for a longer period of time and relate these audibility curves with weather conditions we can determine rough functional relationships which, however, are by no means final and can exhibit considerable local anomalies. I have, for example, been able to ascertain in the observation of the Südwestfunk (Radio Southwest, of Baden-Baden, Freiburg and Koblenz) that volume increased considerably with the approach of a cold front from the west. On the other hand, exactly the opposite happened in the receiption of Berlin and Leipzig (before the change in wavelengths). A good reception of these transmitters meant the building up and continued presence of high pressure for us, while deterioration of reception heralded the approach of a low by as many as four days in advance. On the strength of these radio observations I was able to amplify considerably the announcements of the daily weather service and correct and prove a great deal ahead of time.

All disturbances in radio propagation can be attributed primarily to ionospheric phenomena. By ionosphere we mean today the layer of the upper atmosphere that extend from 40 to 400 kilometers in altitude and are characterized by various ionization maxima. Going upwards these ionosphere layers are designated as the D, E, F_1, and F_2 layers. All layers owe their existence mainly to radiation in various short, ultraviolet wavelength ranges as well as a corpuscular radiation. Both types radiate from the sun, and both show easily separable effects in the terrestrial ionosphere. While the ultraviolet radiation shows its maximum intensity at such points in the atmosphere where it impinges as vertically as possible, the corpuscular radiation is diverted at great altitudes towards the two poles by the magnetic field of the earth and displays its greatest effectiveness there. This is clearly exhibited in the phenomenon of polar auroras. This fact, which is so important for polar research, makes it extremely difficult to apply knowledge acquired in low and middle latitudes to the polar regions.

Let us look at the influence which the ionospheric layers haveon electromagnetic waves in the range from long waves to ultrashort waves. In radio propagation we must first of all distinguish between the ground and sky wave. The ground waves, for all practical purposes, spread out along the ground. The maximum range is therefore, limited by absorption in the atmospheric layers close to the ground and by surface conditions and depends on the wave length used. The sky waves leave the earth's surface at a multitude of angles and because of this are influenced by individual or several ionospheric layers to a greater or lesser extent. Here, too, the wave length used is of crucial importance. The shorter the wave length, the less will the sky wave be influenced by ionized atmospheric layers, until below a certain critical wave length the ionosphere becomes practically ineffective and the radiation can penetrate into space practically unimpeded. Naturally this critical wave length changes with the ionization concentration of the layers involved, and this, in turn, depends on solar radiation, or on sunspot activity. In general the critical wave length is around 20 centimeters. A beautiful example that demonstrated the penetrability of the ionosphere for very short waves (the ultrashort waves below 10 meters) was furnished by an American army radar station. In January 1946 this station pointed its dipole antenna at the moon and was able to receive its echo a little more than two seconds later, after it had been reflected by the moon.

In this way, using the most modern basis, the distance from the earth to the moon's surface was measured.

The D-layer the lowest known with certainty up to the present time, is located 40 to 80 kilometers altitude. It exists in a perceptible concentration only during the dayti e and reflects primarily long waves while it strongly attenuates medium and short waves. When, following sunset, the ionization-process of the D-layer stops and the layer itself disappears almost completely, the medium and short waves are no l onger attenuated and can penetrate to the E resp. F-layer and be reflected back to earth from there. This explains without difficulty the good long-distance reception of medium wave transmitters in the evening and at night. The propagation of radio transmissions in the medium wave range thus takes place by means of the ground wave during the daytime and by the ground wave and the sky wave superimposed on one another, at night.

The F-layers above the E-layer are then the only ones of importance in the propagation of short waves.

From the above we can see that a clear-cut interrelation can exist only between the ground wave and weather conditions in the vicinity of the ground. This is demonstrable by the fact that the range of the ground wave becomes appreciably greater within moist air masses. This phenomenon can, however, not be used for weather prognosis, since for technical reasons a simple separation of ground and sky radiation can be carried out only conditionally. In any case such a prognosis would be of o nly secondary importance because of a small headway in time. Electro-magnetic echo sounding opens up much greater possibilities for a timely recognition of changes in over-all weather conditions originating in the stratosphere before such a recognition becomes possible on the strength of air pressure changes near the ground or at greater altitudes.

Let us take a closer look at the sky waves of a certain transmitter that is sending out medium waves. We will here ignore daytime propagation. If this transmitter is monitored daily at a certain hour of the evening and if reception quality remains constant for a period of several days, we may, with some certainty, assume the same to be true of the reflecting ionospheric layer, in this case the E-layer. If, however, reception quality has become better or worse compared to preceding days, then some change must have taken place along the path travelled by the radio waves. In this the lower layers up to about 50 kilometers can be ignored since their ionization is not strong enough to affect these waves noticeably. We must therefore, look for the causes for changes in radio propagation in those ionospheric layers where local and large-scale changes in ion concentration or an altitude shift of the layers could have produced these propagation disturbances. We are now faced with the difficulty of establishing a correlation with the weather.

Meteorology has undergone profound changes in the last two decades, as is especially obvious in the realm of high-frequency techniques.

Out of weather observations confined to small spaces grew weather research on a large scale, observing the course of the weather over a period of days over a large geographical area such as Europe. This was only possible through a comprehensive arrangement of the aerological network and through daily and regular ascents right up into the stratosphere. It must be noted that in large-scale meteorology the hitherto used concepts of warm and cold fronts, precipitation and fog areas, as well as low and high-pressure areas confined to the ground have receded into the background and new expressions have been coined. If we attempt a correlation between changes in the ionosphere and weather conditions we shall have to free ourselves from these concepts identified with small spaces.

The cyclones and anticyclones that extend right into the stratosphere and which, depending on their effect, are known as guiding or action centers, change their position very slowly and are dominant over a certain region for several days or even weeks. The changes in the weather near the ground are guided by them, and this can be clearly seen even on charts of the mean altitude of the 500 or 225 millibar surface. Should we not assume that even the action centers that change slowly are guided by centers lying at yet greater altitudes? The ascents made to date are insufficient in answering this question. Here, however, ionosphere research comes to our rescue. In electromagnetic echo-sounding operating on wave lengths between 10 and 100 meters it furnishes us a means not only of determining the state of ionization of all layers at all times

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but also of indicating the height of the individual layers above the point of observation.

The weather services thus find it possible, by means of proper evaluation of ionospheric measurements, to carry out a continuation of their altitude weather charts up to about 400 kilometers.

To be sure, the small number of operating stations does not yet permit the drawing of ionosphere charts for these purposes. There are only about 80 ionosphere stations, five of them European, in operation on the entire earth. The so-called radio weather charts which are published for short wave and amateur communication over large distances must not be confused with the above, as they are based on methods of evaluation differing from those needed for our purposes.

If we wish to attempt a correlation of the weather with the ionosphere we must not lose ourselves in processes confined to small spaces, but must concentrate on changes in the large-scale weather situation and the course ofpressure at high altitudes.

My remarks up to this point couldonly be based on observations and experiences obtained at low and middle latitudes. If these findings are to be utilized specifically in polar research then the totally different conditions prevailing in the polar regions must be taken into account. Here we have, first of all, the phenomenon of the solar corpuscular radiation which, radiating from the poles, influences the entire magnetic field of the earth

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and at the same time all ionospheric layers. Since at this writing there is still no polar ionospheric station in existence we can only give tentative indications on the structure of the ionosphere, its daily and yearly pattern, its height and ion concentration. These indications are extrapolations from other latitudes. Thoroughgoing investigations, especially those made at the auroral observatory of Tromsö, show a remarkably high interdependence of ionospheric structure and its changes and auroral activity. It was possible to trace disturbances in the ionosphere layers caused by auroral phenomena that were not observable in our latitudes. It is possible to establish an especially close relationship of the corpuscular current and, therefore, also of the northern lights, to terrestrial magnetism. For this reason it is possible in high latitudes to observe the ionosphere indirectly through measurements of terrestrial magnetism as well as through conditions of radio propagation. These data naturally have only a conditional value, and the construction of echo sounding stations should follow here as soon as possible. The modern radio industry is unquestionably in a position to reduce the space taken up by such stations to an absolute minimum and to manufacture correspondingly weatherproof equipment. It is necessary for these problems to be tackled by polar research as soon as possible. For the above reasons very little can be said about problems of radio propagation. Everything will depend on results produced by observations from a well-designed station network in the polar regions.

In summary it be stated that a direct correlation of radio propagation, ionosphere and weather can not yet be established unambiguously. I have shown here that we must no longer seek a correlation on the basis of weather confined to small spaces and close to the ground, but that our perspective must be based on large-scale weather as well as stratospheric potential surfaces. It will further be necessary to build a broader, international foundation for the exploration and continuous observation of the ionosphere which is now being carried out only by sampling. Above all, the observational network must be tremendously enlarged. Even today our weather services would not be in position to draw daily charts of the altitude of the 500 millibar potential surface over the northern hemisphere if only isolated ascents were available! Polar research here has an even more comprehensive research task in meteorology, geophysics, astrophysics as well as high frequency techniques which can only be mastered by long years of the most difficult work. It is not merely a matter of wiping out the headstart in our knowledge of the more densely populated parts of the earth, but at long last to close the gaps that are felt everywhere andthat stand in the way of our progress and knowledge in these fields.

THE CATASTROPHE OF THE "COBURG" IN THE ICE OFF SHANNON [GREENLAND] ON 18 - 19 NOVEMBER 1943

Professor Dr. Heinrich Schatz,
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I shall report on the crushing by the ice during the night of the 18th and 19th of November 1943, using my diary and notes made immediately afterwards.

The barometer had dropped sharply and for two days a north-northwest storm with heavy snowfall had been raging. The snow-drifts on the starboard side of our ship had grown to a height of several meters. In spite of the deck-sail powdered snow blew across the deck and collected in deep drifts so that the super-structure of the ship was barely recognizable. In order to cross the deck we had to dress as for a polar trip. Since yesterday we have been unable to reach the weather shack which stood on the ice about 100 paces away, off the side of the ship. When I attempted to reach it in the evening the storm tore me along for some distance across an ice-sheet and only after a difficult detour did I regain the ship. Since then we have been making weather observations from the navigation deck.

In our warm and cozy room we felt safe and did our daily work. To be sure, on the morning of the 18th we heard the well-known scraping and groaning of ice pressing against the sides, but it soon let up and we worried no more, especially since the ice had frequently been in motion in the last few days and had always

That evening we were sitting in our weather service room in the bow. Our companions were just taking a shorthand lesson and I was writing in my work-corner. Then a man came from astern and called to us that the ice was opening up behind the ship and that the stern was being badly squeezed. At the same time we noticed the trembling of the engines as they were being started up. We quickly put on our furs and climbed to the navigation deck. The storm almost threw us off the ladder and the snow topside was meters deep. Our searchlight shone backwards through the pitch-black night. Behind us the ice had broken up and as far as the light reached we saw black water with high waves. The waves overran our ice-sheet by degrees, tore off pieces and drove them off. In spite of the howling gale that had already exceeded Force 10 we were able to hear the roaring of the surf, and our ship bucked and trembled. When we clambered down from the bridge the ice-floe with our pack-boards and sleds had already floated away and the open water reached to the igloo that we had built of snow-blocks for filling our balloons. Many of our boxes containing irreplaceable materials were stored there, too. The ice near the ship was moving violently and had almost crushed the gangplank. Nevertheless two of the company ran out and salvaged the skis from the endangered igloo. They had difficulty getting back to the ship through the towering ice blocks. Now things began to crack inside the ship. The ice pushed up along the sides; on the starboard side the entire ice field moved against the ship, piled up against the sides and reached the railing in its precipitous rush. Now our situation on board became precarious. We brought our emergency baggage, the sea bags, sleeping bags, lamps and fuel cans that we had readied earlier, from our room out on deck and piled it next to the boat. Then the pressure let up and we gathered in our room. Without excitement the men sat down to eat and played the phonograph. But soon the racket started up again. The sides were groaning and we hurried on deck. There we beheld a sinister sight. The ship was pushing itself right across the ice towards our igloo, the igloo collapsed and disappeared under the ice with everything that was inside it and next to it. A mate came from the engine room and announced that the pressure of the ice had pushed in several meters of the ship's side. He said the ice had come in through the hole like toothpaste out of a tube. A sailor then cut the guy ropes of the decksail, we jumped onto the ice from the port side and the others threw the emergency baggage and a hundred boxes of provisions overboard. We took the cargo and stacked it in a large pile where the ice was calm. The storm raged without let-up, it was cold (around -25 degrees) and we soon had a thick crust of ice on our faces. In spite of the cold we perspired from the heavy work. In the meantime the piled-up ice had calmed down again and we were able to warm ourselves a little in the ship. Soon it started all over again; only more violently than before. We had to go on deck again. There we noticed to our terror that our boat was already near the pile of boxes and the ice was bending under its weight. We had already been pushed close to the little hut that we had erected earlier near a small iceberg. It seemed to be safer there in the protection of the iceberg. So we threw most of the things into the hut. Some of them had already sunk, others we pulled with considerable difficulty of the ever more violently moving floes. Tired and frozen through we returned to the ship during a lull. A renewed squeeze then began. The rivets flew out of the plates with a big noise, the ship's sides bent inward under the pressure and there was a hellish racket. Suddenly the ship slid across the ice field towards our hut and pushed a wall of ice in front of itself. It rammed against the weak wooden wall, the structure collapsed and we hurried out to save a pouch containing important notes. Then the bottom gave way and between ice blocks rearing up the water gurgled through. While some of our mates on the side of the ship succeeded in getting back into it I climbed the iceberg with a companion. We just managed to get to the top; behind us the boxes floated in the water. Then the berg broke apart in the middle and we stumbled across the floating debris. As if by a miracle we got back to the ship over a detour. Again there was a short lull. But soon afterward the most intense squeeze up to that point set in. More and more ice walls piled up on the starboard side. Several large pieces had already been pushed onto the decksail that was sagging on that side. Suddenly the ship began to rear up and tilt. The cargo on deck started to slide, the barrels and boxes rolled to port and we sought to cover from the rolling cargo behind the masts. The ship was sharply tilted to one side, the bow reared up and we climbed to the superstructure on the bow where most of our people were staying. The commander issued orders very calmly but they couldn't be understood everywhere because of the noise. We clambered back to the railing with him. He shouted to us to get out on the ice and to assemble where it was calmer. Somebody threw a tin kettle to me while we were jumping off; later we found out that it contained eating utensils. In the meantime our searchlight went out and we were in the dark. With flashlights we stumbled over the wildly moving floes and frequently we had to pull our feet from between blocks about to crush them. We reached a calmer footing, the storm almost threw us down and with our flashlights we gradually located eight of our companions. We found some protection behind a snow-drift; our wet clothes froze into an armor of ice and we dug a small hole into the wall of snow with the tin kettle and a knife. There we could warm ourselves a little one after the other. The storm didn't let up until morning. Around five o'clock the moon penetrated the fog and soon we saw the searchlight once more, after it had been put back into commission. We made our way back to the ship which presented a ghost-like picture. The bow stood straight up in the air, the deck was leaning to one side by over 30 degrees and the bridge seemed to be lying on the ice. Our companions had spent the night on the forecastle. Since we didn't dare close the heavy iron doors it was ice-cold inside the ship. Our clothes and bunks steamed with moisture. On the floor was the content of our lockers in a pile of broken dishes and lamps. But we were all accounted for and nobody was injured.

The catastrophe made it necessary to prepare immediately for the transfer to the shore that was planned for spring, and now there began for us a difficult time of transportation in the winter night. In spite of all the trouble this had the advantage that the strenuous work helped us get over the spiritual load of the long night. We were even able to continue successfully our weather observations in spite of the critical losses in materials.

Later we found out that the pressure had been so intense over only a small area. The rigid ship may have been partly responsible for the effect's being especially strong in its vicinity.

THE STEREOSCOPIC PICTURE IN POLAR RESEARCH

Hans Richter,

Photogrammeter, Berlin

Collecting picture material in polar regions has for many years been just as much a habit as the institution of geographical picture archives itself and it would be superfluous to say any more about it if the possibility did not exist to increase the scientific value of these collections almost without additional expense by making every effort to bring these pictures into the archives as stereoscopic pictures. It is remarkable to note the surprises that the study or projection of stereoscopic pictures produces again and again because they give a much better insight into the details of an object than a two-dimensional picture and it is a pleasure to note the graphic recording of conditions. The stereoscopic picture has already proved its worth in many instances in the photography of relatively inaccessible regions (for example, polar regions) and of moving objects (for example, glaciers and other ice masses). If the circle of makers and users of stereoscopic picture is not yet taken as a matter of fact, the blam must not be placed on the processes or instruments; neither the use nor the taking is more complicated than with a single picture. Even production costs are equal for all practical purposes , so that no increased expenditures are necessary either for equipment or costs. On the other hand, the stereoscopic picture has marked advantages over the flat pictures, especiall for the geographer, in this case particularly for the polar explorer. This is true above all because of the exact measurability in all dimensions. Even with simple instruments and tools the original photos can be measured spatially. As is well known, photogrammetry always uses stereoscopic pictures and it is a foregone conclusion that for every photogrammetric photograph stereoscopic pictures are taken, regardless of purpose. For this reason stereoscopic pictures were made in all photogrammetric operations carried out up to this point in the polar regions as, for example, in Northeast Greenland, Spitsbergen, the regions of the polar trip of the dirigible "Graf Zepplin" and the antarctic. In the transfer of the photographs into the picture archives this advantage has unfortunately not always been fully utilized. Insofar as the original material (negatives) is at the disposal of the archives the prints in the collection need not be stereoscopic, but unfortunately many negatives have been lost and will even in the case of future new photographs rarely be at the disposal of the archives. In spite of the loss of the original photographs from many regions it may still be possible to assemble many stereoscopic pictures, and it is recommended to check presently available picture material for this and to supplement it with material still obtainable at this time. In the case of future photographs or in the exchange with institutions in other countries every effort should be made to see that the new photographs are stereoscopic whenever possible. On new trips to the polar regions the taking of stereoscopic pictures should always be provided for. Since photographic equipment is a foregone conclusion on exploration trips and since stereo-cameras and since stereoscopic pictures of objects at rest can be made with an ordinary camera, there exists no technical reason for any difficulties in carrying out this suggestion in practice. This applies not merely to the occasional pictures of the traveler but for all photographs, such as those taken from the air, for panoramic and detail pictures from fixed locations on the earth's surface, for close-ups for geological, biological, botanical and other purposes, and for microphotography of ice, soil, microscopic life, etc.

The various types of twin and stereo-cameras available today permit the taking of stereoscopic pictures without any difficulty; however, it is possible to make stereo pictures with an ordinary single camera, whether of miniature or other size, either by photographs spaced in time or by the addition of a stereo attachment. If, however, moving objects are to be photographed a stereo camera or a single-lens camera with a stereo attachment on the lens is necessary for the simultaneous taking of the two individual pictures. Even the taking of stereoscopic microphotographs right on the spot is possible with a special camera. The necessary equipment is easy to handle, takes up very little space in the baggage and special tripods permit photography in any arbitrary position of the camera. To summarize, I should like to repeat that it is possible to take all future pictures in stereoscopic form, to supplement parts of the available picture material to make it stereoscopic and thus to create, without noteworthy additional expenses, archives for stereoscopic pictures.

In discussions about these questions the opponents of stereoscopy always pointed to the technical difficulties and the allegedly larger expenses involved in the taking of stereo pictures. But all these claims are either not borne out by the facts or else science has in the meantime overcome the difficulties. Today it is possible to make stereoscopic pictures instead of the customary single pictures without additional trouble or increased weight. Naturally a little more skill is necessary than is demanded by ordinary amateur photography, but the explorer of today who uses photographic equipment is almost always more than an ordinary amateur photographer. He will have no difficulty in acquiring the necessary tricks for the taking of stereoscopic pictures.

Taking stereoscopic pictures is after all nothing but a photographic imitation of natural binocular vision. As with our eyes two photographic exposures from different viewpoints are required. The distance between these viewpoints -- in the case of physiological vision the separation of the eyes -- forms the base. With the eyes it amounts on an average to 60 to 65 millimeters. It makes possible three-dimensional vision, i. e., the perception of differences in depth. Naturally this small base of our eyes limits perception of depth. In making stereoscopic pictures the two necessary exposures (partial pictures) can be taken at the

the same distance from one another. For this purpose a series of stereo cameras have been built on which the distance between the objectives is approximately 65 millimeters and which take the two individual pictures simultaneously. Such cameras are used primarily for closeups up to a few tens of meters because of the limitation of three-dimensional vision (up to about 40 meters). If, however, a greater depth is to be recognizable, the base must be made larger. The question of whether the prospective photographs are to be simply pictorial views or to be measured must be kept in mind. Since it is advisable to take the photographs so that they will always be precisely measurable, the base must be adequate. Long practice has furnished a rule of thumb according to which the base should have a length of about 1/10 of the depth. In this you must remember that especially on exploration trips the aim is always to record as much as possible on few exposures. As applied to stereoscopic pictures this has its limits, for it is impossible to unite distant shots and close-ups, i. e., to have close and distant objects not only visible on one pair of pictures, but also exactly measurable. Best results are obtained by infra-red pictures which, depending on the altitude of the point of observation, frequently show the terrain 100 kilometers and even farther away. Naturally it is not always possible with distant views to choose the base according to the rule of thumb. You must then be satisfied with the normal stereo effect in the case of terrestrial photographs. The plastic effect of a stereoscopic picture will nevertheless be obtained with a smaller ratio of the base to the depth. Here, too, there is a rule of thumb which will help you determine to what depth the stereo effect reaches for a certain base.

In the use of normal cameras the stereo effect reaches to a distance corresponding to 700 times the base. Even beyond that distance a three-dimensional effect is perceptible, but no longer reliable. In order to record foreground and distance quite clearly you place one or possibly two additional exposures having the same direction of exposure between the two original exposure points (series exposures). The same method is practical in taking coastal photographs and pictures from airplanes. In this case series exposures (having individual bases set for the foreground) are taken without regard to distance (foreground and distance). In the viewing, respectively measuring, those two exposures out of a series are always combined into a stereopair whose base corresponds to the distance of the object. With this method infra-red stereoscopic pictures having a spatial depth up to about 250 kilometers have already been taken from an airplane in the polar regions and in northern Scandinavia (oblique exposures). Normal oblique exposures for measuring purposes taken in Greenland, the antarctic, etc. permit three-dimensional measurements of distances up to about 100 kilometers.

A few data are necessary for the measurement of the stereoscopic pictures. They can be taken down without difficulty for every exposure. They are:

1. Length of the base. As long as the base amounts to only a few meters its measurement will cause no difficulties. If, however, the base of a long-distance shot involves some obstacles between the exposure points, its length may be determined by optical means or, if these are not available, by an auxiliary base and a

third exposure. This exposure has the same direction of shooting as the main exposure and its position is on the main base. The length of the auxiliary base must be measured and should amount to at least one tenth of the main base.

2. Data on the direction of the exposure axes (parallel to one another, if possible).

3. Record of the focal length of the camera and of a possible distance setting.

4. With close-ups (distance from the objective of only a few meters) a record of the distance is essential.

5. If stereo-microphotographs are made a notation on the objective used is sufficient.

On the basis of these data it is possible to evaluate the stereo-exposures at any time. Not only terrain mapping but future comparative measurements for ice observations can be undertaken by means of these. This has been discussed in earlier treatises. Today it ~~was~~ is merely a question of recommending the taking of stereoscopic pictures instead of the flat pictures in vogue up to the present time, so that an archive of stereoscopic pictures of the polar regions may come into being.

THE PROBLEM OF BIPOLAR LICHENS

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We define as bipolar plants (or animals) those which occur only in the two polar regions, but are competely missing in between, or are found in a few widely separated localities. Many species (or genera) have a single area of occurrence, with others this area is split up into two or more regions. A few general, preliminary remarks for an understanding of this phenomenon are in order. The present distribution of plants over the surface of the earth is the product of the plant migrations that have taken place in the history of earth and, in conjunction with these migrations, of the origin of the species as such. It is further the product of the rock and soil composition of the locality, but above all of the climatic conditions of the region in question. Along the equator there is a belt of perennially green rain-forests produced by the uniformly moist and hot climate. In the dry and hot zones to the north and south there are belts of scrub forests, savannahs and deserts which can show great variety in the range of types within the individual landmasses, due to separation by the oceans. However, north and south of the equator these regions have much in common since the separating rain-forest belt represents no absolute barrier but is broken up by islands of drier climate or by mountain ranges. By means of the wind or birds, seeds and spores can travel from the zones of one hemisphere to the corresponding ones of the other, with the help of these way stations. There follow the temperate zones with evergreen forests turning into deciduous and coniferous forests farther towards the pole. These are naturally poorly developed in the southern hemisphere with its scarcity of land. Even these zones still show common species even if in greatly reduced numbers because of the separation. One might designate these species as temperate-bizonal. The most extreme ring is formed by the sub-arctic zones with tundras, swamps and cold steppes and a further reduction in the number of subarctic-bizonal species. Finally we reach the polar caps themselves whose common species are similarly designated as bipolar species.

The number of higher plants known in the Arctic amounts to almost 900; we only know of two in Antarctica. For this reason the groups of lower plants acquire special significance in the study of bipolar species, especially the lichens which play the dominant role in polar flora and vegetation. In the Arctic they are represented by over 2,000 species; in the Antarctic which, with its average elevation of 2,300 meters, its extremely unfavorable climate and its almost complete ice cover, hardly furnishes the conditions for the development of a flora, we nevertheless know of about 300 species of lichen. About a tenth of these are common to both polar regions.

How are we to explain the occurrence of these species in both polar regions? The explanation which still seems acceptable for the bizonal-xerotropic species, namely, that their seeds or spores can be carried in steps across the moist equatorial zone by

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wind or birds, hardly seems probable for the bipolar species. The distances are much too great. Peterson (Helsingfors) has established that in the case of mosses dissemination of spores by the wind is possible over a distance of 2,000 kilometers in an east-west direction. But this explanation fails in the bridging of the 15,000 kilometers between the northern and southern polar regions, especially since the belts of the prevailing westerlies would have to be crossed at right angles.

We must keep in mind that the most widely distributed arctic varieties of lichens are macrolichens (large lichens, i.e., foliose and fructicose lichens) which almost exclusively reproduce vegetatively by means of soredia (fungal hyphae + algae) or by fragments which are much heavier and larger than spores and therefore cannot be transported as far as the latter. The microlichens (crustose), on the other hand, are grown fast to the substratum with their entire body; fragments are hard to detach and dissemination by spores is the only way. In view of the complicated nature of the lichens which represent a symbiotic association of a fungus and an alga this reproduction by spores produced exclusively by the lichen fungus is of doubtful success, for after the germination of the spores the necessary and appropriate algae must be present so that a new lichen plant can be combined. For this reason the species of crustose lichens in the Arctic have a much smaller area of distribution than the macrolichens, in spite of the greater mobility of their spores. So it is doubly interesting to find that of 33 bipolar lichens 24 belong to the crustose lichens. In the light of all these obstacles the migrations of the bipolar lichens must have taken place in smallsteps extending over l ong periods of time.

To assume that in the course of the evolutionary history of the flora a plant species could have developed simultaneously at two separate points of the surface of the earth is completely improbable, and completely impossible for the large number of 30 bipolar lichens. On the other hand, we do know that all species of plants having separated areas of distribution had a connected single habitat in former times which only later was split by environmental factors.

In the course of the last 12 years the reseaches of Du Rietz (Uppsala), Lynge (Oslo) and Lamb (Ottawa) have demonstrated that the above line of reasoning also applies to our bipolar lichens. These scientists were able to show that present day conditions are indadequate in explaining bipolarity, but that plant migrations from the northern to the southern polar regions or vice versa were possible in earlier times. It was found that some of the bipolar species are not confined to the polar caps of the earth, but have several intermediate stations, especially in the high mountainous regions of the lower latitudes. In this way the former paths of the migrations are indicated. Research became especially fruitful when the field of species to be examined was extended to subarctic-bizonal and temperate-bizonal lichens.

Du Rietz was able to establish a whole series of various types: species which are found in the north but could also be found in the extreme tip of South America at a few places; species

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of equal distribution which also occur in New Zealand; species which can be found in the North, in Central America and in the Andes; species which also occur in New Zealand and Australia; finally those whose discovery in the Antarctic is tied in with occurence in South America and New Zealand.

The problem can be somewhat extended by going beyond the species having simultaneous northern and southern areas of distribution, to genera in which one or several species have a northern area and other closely related ones a southern area. Here, too, cases of relating discoveries can be observed, for example, genera which extend from the North to South Africa or to South America or both at the same time, or finally those which extend from the northe either across the mountains of south-east Asia to Java, Australia and New Zealand, or across the Andes to the Antarctic. These discoveries of bipolar species linking the northern and southern areas, which occur exclusively at altitudes in tropical and subtropical mountains where the cold local climate allows these polar lichens to thrive, are nevertheless too widely spearated to be explained by present-day distribution facilities. But they can be interpreted as final traces of the paths of migration of these plants in former geological eras. We are tempted to think of the glacial periods of the diluvial ate when the advancing ice pushed the polar flora before it far towards the equator and when the mountain ranges crossing the equator had much more extensive cool summit regions reaching down to much lower altitudes. This assumption of an ice-age migration certainly applies to some bipolar plants. For others it is improbable, especially for species which obviously have penetrated to New Zealand-Australia via the Antarctic. These must have begun their migration before the Antarctic became impossible as a land bridge with the complete closing in of the ice. For example, we know of subarctic species which occur at widely-dispersed points in Tierra del Fuego, the Kerguelen Islands, southernmost New Zealand or the adjacent southern islands. The regions are each separated from the other by a third of the circumference of the earth but they indicate a common center of radiation in Antarctica that is extinct today. From petrifications in Graham Land we know even in the late Tertiary the climate there was still so favorable that deciduous forests could flourish. At that time there also still existed the possibility of migration for our bipolar plants via the Cordilleras and the Antarctic to New Zealand -Australia. Instances of a differently directed migration via southern Asia -- East Indies -- Australia -- Antarctica, to South America are not known for lichens.

In looking for the dissemination of the bipolar lichens we cannot go further back in time, for according to the investigations of Steffen the arctic flora did not develop until the late Tertiary. During the earlier epochs of geologic history the climate all over the earth was so uniform that the floras of individual regions hardly differed one from the other, were characteristically tropical-subtropical and also temperate from the upper Cretaceous onward. Not until the great mountain ranges were formed in the Tertiary did the climate become sharply differentiated, possibly also because of the newly-oriented wind and ocean currents. The formation of land-locked ice began in the polar regions and the flora developed the types we now designated as arctic plants. The lichens which both in terms of number of species and of quantity are today far more noticeable in high mountain regions and in cool-temperate and subarctic zones than in the tropics and subtropics probably had their heyday of species development and dissemination migrations in the late Tertiary up to the ice-age. The heat-loving and probably older species retired to the tropics, and the newly developing species, adapted to a cooler climate, escaped to the north and south or to the summits of the mountains. Many species survived the advances of the ice in regions overwhelmed by the inland ice-sheet on the snow-free slopes of mountain peaks sticking up through the ice.

Since the end of the ice-age only minor migrations have taken place -- the lichens spread much too slowly. Many arctic species have hardly enlarged their area in spite of an improvement in conditions. The fact that the greater part of the lichen flora of Antarctica consists of endemic species, i. e., types occuring there exclusively, indicates the great age of that flora and the improbability of immigrations subsequent to the ice-age. The case is similar for the subarctic region of the Kerguelen Islands which because of its remoteness from land shows a high percentage of endemic species and genera. Undoubtedly the number of bipolar lichens in Antarctica was greater before the onset of the ice-age than it is today; only those which accidentally found a favorable hide-out escaped destruction and saved themselves for the present day.

In general we may assume that the time of migration is less remote for species having bipolar distribution than for bipolar genera which over a longer period of time succeeded in the formation of differing but still closely-related species in the north and south. In many cases such types were thought of belonging to the same species, until recent and more precise investigations uncovered small but significant differences that forced a separation into several species. These are known as substitutive or vicarious species since they substitute for one another in regions of equal soil and climatic conditions. As a general rule the number of plant species (including the lichens) formerly considered cosmopolitan has been continually reduced in recent times. It has been shown more and more that there just are no plants able to cope simultaneously with a tropical, a temperate and a cold climate and at the same time grow on all sorts of substrata. Let it be emphasized that the maps showing the distribution of some species of lichen all over the earth that are being attempted today, are by no means in position to show an accurate picture of the actual distribution. Our knowledge of the composition of the lichen-flora in individual countries is much too spotty for this, and we usually know least about regions that interest us most and would be able to furnish most for scientific analysis.

The above statements are not to be interpreted as saying that the bipolar plants always migrated from the northern to the southern hemisphere. We may assume this for species having their chief distribution in the north, with only few locations in the south, or for general which are represented by many species in the

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north and only sent one or a few to the south. But we do know species and genera which have their main area in the south and sent only a few branches northward. But it is also conceivable, and actually has happened, that a genus originated on one hemisphere, migrated to the other and there developed more extensively than in its original habitat, so that today we have the impression that it migrated in a direction opposite from the actual one. Finally, a genus may have originated in the equatorial regions, have expanded to north and south, adapted itself to a cooler climate and then have died out in its area of origin.

In order to explain these plant migrations various geographic theories have been drawn upon, especially Wegener's hypothesis on the original cohesion and later separation of the continents. It is especially tempting in furnishing an explanation for the migrations via South America, Antarctica to New Zealand, since it assumes cohesion of these regions right up into the Tertiary, when the African-Asiatic landmasses had already separated. -- A variant of the Wegener point of view is the hypothesis by Hilgenberg which tries to explain the same continental shifts by an expansion of the earth. In this expansion the sial continental masses expanded less than their sima bases. Here, too, the original cohesion of the above regions is emphasized. -- Other scientists reject the Wegener conception, especially because of the plant-geographical relation unquestionably existing between southeast Asia Malesia-Australia-New Zealand. -- Du Rietz, in agreement with Skottsberg, even insists on a former landbridge from South America via the Juan Fernandez, Marquesas, Hawaiian and Bonin Islands to East Asia. According to the latest researches by Stille, however, the Pacific is an original ocean which hasn't changed its American rim, in particular, since the Cambrian era.

We can see, therefore, that the problem of the bipolar lichens is by no means solved. Many details have been cleared up, others still await clarification. Further research of the lichen flora and vegetation of the Antarctic and of the higher tropical mountain regions will furnish the most important basis. As yet we know next to nothing about the lichens of the high American mountain ranges, of the Himalayas, of the African and Australian peaks; what surprises might await a lichen expert among the mighty mountain giants of New Guinea! -- American, English and Australian expeditions have recently brought much valuable material from the Antarctic which has been evaluated by Dodge (St. Louis) and Lamb (Ottawa). A request should be made asking all future Antarctic expeditions to place maximum emphasis on the collecting of the lichens inhabiting the snow-free rock surfaces of mountains right to the South Pole, together with data on the locations of their occurrence. This was done in model fashion by the second Byrd expedition in 1934/35.

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THE MOUNTAIN REGION OF PETSAMO

A MORPHOLOGICAL SKETCH

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The mountain region of Petsamo -- Russian Pechenga -- covering 10,470 square kilometers, until 1947 belonged to the northeasternmost part of Finnish Lappland. The mountain region rises east of the Inare, extends northward to the shores of the Arctic Ocean and eastward to the former Finnish-Russian boundary.

Within the framework of northern Europe it belongs to Fennoscandia, whose western part is the Caledonian chain raised in the Middle and Upper Silurian. Eastern Fennoscandia, which includes Finland, Kola, and a part of Sweden, represents a rock slab of low formative force, as seen from an over-all point of view. It is made up of the Baltic shield, crystalline and metamorphic rocks such as granite, quartz, gneiss, crystalline slate and conglomerates. The building up of volcanic masses was characteristic for the pre-Cambrian history of this shield. At that time the granites were mixed with other rocks, lost their characteristic appearance and formed mixed rocks, so-called migmatites. All pre-Cambrian depositions are strongly folded; only the youngest layers, the Jotnian sandstones, lie horizontally. After their formation a strong denudation began which until the beginning of the next era ["earth's antiquity" = Palaeozoic?] deposited a quasi-plain across Finland. Remaining rigidly quiet, it was never again folded. Not until the Miocene period were there any tectonic upheavals. Upward bulges lifted the Norwegian-Swedish highlands, the Finnish lake plateau and northern Finland together with Kola. The mountain region of Petsamo was thus formed over incredibly long periods of time. The age of surface features is not yet clear. A tie-up of the present surface with the sub-Cambrian has not yet been successful. The structural variety of the substrata in no way influences the world of morphological forms. The latter crosses the former in a perfectly uniform manner.

Beyond the Maan and Saariselkä -- the watershed separating the Arctic Ocean and Gulf of Bothnia -- there is a flat area filled with ground moraines, swamps and moors which surrounds the island-studded Lake Inare and which has an average elevation of 130 meters. The mean relief-energy amounts to less ghan 10 meters. It is crossed by long trough-like lakes. This depression may be thought of as a continuation of the great syncline filled by the Gulf of Bothnia. They are separated by the transverse arch of the Saariselkä.

On this lowland step leading to the mountain region of Petsamo, which shows great physiogeographic variety, we find only occasional weak, gently-formed, moraine-covered granite hillocks which in no way destroy the impression of a flat country. In the north and south of these level places there rise occasional steeper walls. The flat horizontal line dominating the countryside is framed by the dark silhouette of hills which tops the flatland by 15 to 20 meters.

In the east and northeast these hillocks rise at an angle towards the lowland level -- the hill country of Petsamo -- which is also situated in unarticulated gneiss and granite. The heights, which have an altitude of 150 meters in the west, rise eastward in the Shuort to an altitude of 490 meters. The mean elevation is 300 meters. The island mountains rise singly and have round, oval and extended shapes that are grouped around their vertex, the Shuort.

From here the hilly country gently descends towards the east and north to the wide, swamp-filled valleys of the Petsamo and the Tshuonjoki.

On the other side of the latter there are, first of all, steeper, stretched-out and flat mounds and small dome-shaped hills that increase in elevation and pass over into the upland level of this mountainous country. Diabases and tuff-covers predominate, but sandstones, peridotites and gabbro are also represented. Empty, little articulated Fjelds (300 - 400 meters) are topped by four mighty domes, whose highest is the Kuorpukas having an elevation of 632 meters. The mountain massif extends west-east for 30 kilometers and is shaped by the intense erosive activity of the rivers flowing around it like a ring. In a clay slate layer of the diabase there are nickel ores worth exploiting. The quantity is estimated to be four million tons. Near Kolosjoki the ores have been worked since 1920. -- The Petsamo river interrupts the massif, but it continues on the other side with the Maattert having an elevation of 528 meters. This mountain descends sharply towards the east by some 300 meters to a lake-filled lowland along the former Finnish-Russian border. The mountain country also forms a roof towards the north to a depression running from southeast to northwards which is used by the road to the Arctic Ocean.

From here a last rise leads to the violently indented and torn-up coastal mountain country of Petsamo. Here we find a complicated alternation of rocks. Next to dark garnet-gneiss and gray gneiss-granite, which predominate, we find veins of amphibolitic slate, quarzite and diabase containing galena and zinc blende. The position of the latter is easily recognizable because of their limited ability to resist. Ravine-like depressions which take their place are a source of danger from falling in for the Lapps and their reindeers. With a maximum relief energy of 450 meters dome-topped Fjelds alternate with water-filled exaration basins, fjords and trough-like lakes, without any transitional forms. Suddenly and steeply this bare coast strewn with ice-scarred boulders drops down to the Arctic Ocean. This coastline which represents a direct continuation of the coast of Varanger is a fault edge which continues to the Murman coast. The first establishment of the fjords can be correlated with these fault movements that took place in the Tertiary. While the Varanger Fjord lies along the chief fault line, all the other fjords are oriented approximately at right angles to it. One group -- the Petsamo Fjord and the adjacent Petsamo Valley the valley of the Norwegian Sandelv, as well as the Neidenfjord -- is directed towards the southwest, while another group -- the Peuravuoni (Falkefjord) and the Jar Fjord -- points to southeast. Not only the fjords and some river valleys are identified by such fault lines, however. It appears that the majority of the lakes follow fault lines, with the exception of a few exaration basins (such as Lake Trifona).

It remained for the glaciers advancing from the ice-sheet situated in the southwest to re-shape the land, to soften, on the one hand, the surface contours by mighty ground moraine deposits and, on the other hand, to deepen as well as heighten them by scooping out the preformed troughs, by forming glacier mills and by depositing eskers. Such a one occurs north of the Fjeldmassif between Kolosjoki and the Petsamo River. The extremely rocky character of the loose masses is typical of this most northern part of Europe. This may be attributed to the nature of a moraine as well as to the intense frost erosion. In addition to this solifluction produced talus drops and accumulations. In the parts of the mountain region close to the coast the sea smoothed over the presently bare rock masses before the post-diluvial rise. In other portions of the landscape the finer components of the ground moraine were worn away by flowing water and by the wind, so that only erratic blocks remained behind. The more sandy components were blown together into flying sand fields near Ivalo south of the Inare and in the Petsamo Valley near Yläluostari.

The coastline is accompanied by a broad beach slab which appears at low tide. On it there arise, 15 kilometers from the shore, the Heu Islands (Heinäsaaret), almost constantly washed by the foam of the breakers. The Petsamo point is connected with the Fischer Peninsula by a narrow neck called the Maattkimuotka. The peninsula is a dreary, flat tableland with elevations up to 250 meters, which is built up of horizontally placed layers of sandstone. A few domes top it.

ON THE FÖHN WIND IN SPITSBERGEN AND GREENLAND

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My theory of the Föhn current close to the slope on the leeward side of sufficiently high mountains pictures and explains the föhn as a free stream whose propulsion lies in the föhn cloud cover, called föhn wall, which falls across to the leeward side (1). In this the energy of motion is thermodynamically taken from the moisture ~~liability~~ instability of a downward directed flow of increasing acceleration as long as liquid particles are available, whether in the visible form of obscuring cloud droplets or whether as invisible dropping streaks of further subdivided precipitation particles. Since more or less coarse precipitation particles are more loosely distributed than is the case with cloud elements and are not at all or hardly visible, the moisture-~~labile~~ unstable effectiveness of a föhn cloud cover occasionally reaches much farther down than is indicated by the underside of the clouds. The flow can furthermore be accelerated downward, even when all liquid water has been used up by evaporation, as long as the stratification conditions work towards a dry-~~labile~~ unstable process. This is effected primarily by the temperature conditions of the slope, which in exchange help to determine the temperature of the air masses close to the slope through their heat exchange in re-radiation and irradiation. These relations are much less clear in an individual case [sic:] and much more difficult to determine, since the available radiation on slopes depends first of all on the exposure of the slope, secondly, on the clearness of the sky, i.e. cloudiness and haze development, and thirdly, since with the alternation of day and night and the constantly changing solar altitude and declination it is subject to the greatest daily and yearly variation of all meteorological quantities.

Nevertheless we have two zones on earth where the above-mentioned complication of the problem is limited by the fact that the day and night arcs of the sun show a certain constancy. These are the tropics, where both remain approximately equal, day in, day out. In addition there are the polar regions, where at the times of the solar solstices the night arc is missing in the case of the summer solstice, while conversely in the case of the winter solstice the day arc is missing. On the whole conditions are much simpler for the polar regions than for the tropics, since the second condition, the clearness of the sky, is relatively simple and lucid in view of the low water-vapor content. This corresponds, during the colder half year, to the heat and humidity conditions of the Ci-layer of the other latitudes. The first condition, the exposure of the slope, is a morphological geographical element which is equally variegated everywhere on earth. Complete simple relationships are encountered only within minute spaces in all mountainous regions, since in addition to the compass direction which the slope faces, its inclination along its entire course, its length and the physical condition of its surface are included in this concept.

It is a good thing that Spitsbergen and Greenland are in the same latitude, are close to each other and yet have a very different mountainous character, and that, in addition, in these two areas the föhn has been best observed and investigated.

The föhn of Spitsbergen in its summer condition was discovered by H. Hergesell who investigated it aerologically from shipboard by kite and pilot-balloon ascents in the years, 1906, 1907 and 1910 (2). To be sure, he still doesn't designate these winds as föhn, but speaks of "local winds". But even Hergestell found out that these air currents are confined to a few hundred meters above the ground and that the kites would only rise to their upper boundary. He further noted that these winds blow with great regularity in Kings Bay, Cross Bay, Danes' Inlet (Dänengat), South Inlet (Südgat), Smeerenburg Bay and above all Wijde Bay. It was also found that the temperature decrease in the wind layer is rapid and approximately adiabatic, while the humidity occassionally increases to 100 percent. These local land winds appear most noticeably when there is fair weather at sea; however, they may cease completely on foggy days. In the long and wide fjord running north and south, the Wijde Bay, this wind blows without regard to the time of day as a south wind of maxiumum intensity which reaches 7, even 10 meters per second (28 July 1906) and increases from the mouth of the fjord towards the interior.

Even at night these local winds always blow from the land. Hergesell very astutely attributes them to temperature differences between land and sea in which the sea is always warmer than the land. This conclusion must naturally be drawn more concisely in order to arrive at a valid theory of these winds, as follows: Up to altitudes of 600 and 800 meters the atmosphere above the sea throughout has higher temperatures than prevail at the same altitude on the slopes of the mountain ranges framing the fjords. The additional circumstance of these winds appearing only in fjords that are open more or less towards the north and therefore slope downwards in northerly directions indicates that we are dealing with gravitational winds which originate in the continuously operative [emissive] radiation and the heat exchange with the substratum that is partially covered with snow and glacier ice. We must further conclude: Around the summer solstice, possibly as long as the midnight sun is shining, there is a time in Spitsbergen when the mountain and valley winds are not upset by the alternation of maximum and minimum solar altitude. Moreover, in the fjords whose slopes point to the north and which therefore receive only very weak radiation for a few hours, there is always a mountain or land wind. The reverse is to be expected in the case of valleys and fjords whose slopes point to the south and where insolation strongly predominates. Here there will be found a prevalent, though not so marked, valley or sea wind, as long as no glacial or permanent snow cover inhibits the conversion of the predominant insolation into higher temperatures. A careful check of this hypothesis would greatly advance our knowledge of local winds with relatively simple limiting conditions.

A first test of these ideas is possible with the aid of the wind observations made by the Swedish station at Cape Thordsen during the international polar year 1882/83 (3). To be sure, the station was not on the open sea, but across from Advent Bay on the north shore of the broad ice-fjord, 90 meters above the surface of the fjord, on a peninsula extending towards the south and having moderately inclined slopes with southern exposure. Cape Thordsen is 60 kilometers from the west coast of Spitsbergen and since it is hard to estimate to what extent the water of the Gulf Stream is noticeable in the interior of the fjord it might be possible to obtain better data. Nevertheless the wind-frequencies for the northern sector (combined NNW, N and NNE) and the southern sector (figures for SSE, S, SSW) clearly represent the effect as a ya yearly function:

1882

	Sept.	Oct.	Nov.	Dec.
NNW NNE	64	37	38	66
SSE SSW	6	2	4	4

1883

	Jan	Feb	Mar	Apr.	May	June	July	Aug.
NNW NNE	41	15	40	29	20	6	6	2
SSE SSW	3	0	3	6	0	20	43	12

The midnight sun is visible from the middle of April until the middle of August. Because of the ice and snow cover in these latitudes its effectiveness is shifted even further towards later in the year than the effect of the highest solar altitude in our latitudes. Even for the development of plant life the three summer months do winds from northerly directions become less important than others, and at this time the predominance of southern winds becomes equally marked, compared to the other months. This is with-

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out doubt conclusive evidence that in clear summer weather valley or sea winds on the slopes with southern exposure correspond to the local mountain or land winds of the fjords that point northward. The former will, however, hardly be so well-defined and strong since any nozzle or jet effect is lacking and since occassional interruptions must decrease their force and steadiness.

The "local winds" noted by Hergesell were recognized as being föhn-type winds by G. Rempp and A. Wagner in the year 1911/12 in Advent Bay (4). They established this by pointing out a series of phenomena connected with these winds that are also associated with the Alpine föhn. One gap still remained; that is the question of just how they originate. This gap I should like to close by means of my föhn theory and in conjunction with the comprehensive points of view which A. Schmausa developed for the origin of föhn-like currents on the occasion of the festival colloquium at the celebration of the 50th anniversary of the Zugspitze Observatory of 30 September 1950 at Garmisch. In this connection I should like to show, using the entirely different Greenland föhn, what this approach can do with proper application.

I daresay that in the rarest of cases is the föhn-like wind of the fjords of Spitsbergen produced by currents descending in a humid-unstable manner in the upper and uppermost strata [sic]. With almost all of the currents given by Hergesell, G. Rempp and A. Wagner a dry-unstable descent on the gently falling slopes is sufficient. It originates in that that constant outward radiation from the more or less snow and ice-covered slopes is in a state of heat exchange with the adjacent atmospheric layer, whose temperature then sinks noticeably below that of the air further from the slope and thus creates dry-unstable conditions in the direction of the slope or along the flow line. The predominantly clear weather which is windless on the open sea also speaks for this. In line with this reasoning these winds should be designated as uninterrupted mountain winds blowing without diurnal upset, but not as föhn winds. The considerations presented above were to show that there can and must exist such winds in a mountainous region at such high latitudes, at the time of the midnight sun.

Mountain wind and a genuine valley föhn can be clearly distinguished as fair-weather and foul-weather wind even physically and gentically. The former moves downward at moderate velocities along with dry-unstable phenomena produced in heat-exchange with the radiating slope, and a small inclination and great length of the slope not favorably. The latter attains high downward velocities with large acceleration, predominantly through a humid-unstable downflow of air filled with cloud and precipitation particles. In this case, conversely, a large inclination of the slope, i.e. the shortest possible slope length for an equal difference in elevation, is a favorable condition.

In line with this differentiation all cases having come to my attention from the data of Greenland expeditions are to be thought of an explained as genuine valley föhns.

The first comprehensive material came from H. Stade (6) and was collected by the Greenland expedition of the Gesellschaft für Erdkunde (Geographic Society) of Berlin, under the direction of Erich von Drygalski, between 1 August 1892 and 28 July 1893 at the Karajak station (70°27' N + 50°10' W). This was situated on

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the innermost cove of the Umanak Fjord on the Karajak Fjord, on a rock terrace 28 meters above mean sea level in the immediate vicinity of the large Karajak Ice Stream [not glacier] and at the foot of an abruptly rising cliff 340 meters high, to the east.

Stade furnishes a very graphic and detailed description of a föhn invasion on 5 March 1893, at 8 o'clock, for the identification of all genuine instances of föhn. From noon of the previous day the pressure dropped steadily at a considerable rate, the temperature was - 20 degrees, the relative humidity was high. "On the path to the thermometer hut which was about 120 meters away the author suddenly noticed the rushing of a strong gust of wind that made the snow swirl up and drive forward on the height of the nunatak; it was still quiet down below, but closer and closer came the gust, it could be heard rushing down the slopes of the valley, and suddently it broke loose over the station, where it produced a sensible, certainly not negligible rise in the temperature; the aspiration-psychrometer showed - 12 degrees. For a few moments all was quiet again, then a new gust came down the mountain, this time of such a strength that it was hardly possible to stand upright. Before the eyes of the author the mercury zoomed from -12 degrees to the freezing point within a few seconds, while the relative humidity simultaneously dropped from 70 to 50 percent. There followed gusts of sometimes greater, sometimes smaller intensity, always of short duration, sometimes lasting for but a few seconds... At first the air temperature oscillated a few degrees about the freezing point, but around noon it held fairly steadily at + 1 degree, while the relative humidity even sank somewhat below 50 percent. The weather was decidedly murky, So-clouds from the SSW

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almost covered the sky completely, on the highest peaks St-clouds were occassionally visible, there was no precipitation. The character of the weather was similar with all appearances of the föhn at Karajak; however, a few times rain drops were observed."

The dynamics of the process can be unambiguously seen in this description if my föhn theory is used. As the strongly falling pressure and the SSW wind on the heights shows, a cyclone approaches the west coast of Greenland from the west from the direction of Baffin Bay. Along with the increasingly steep pressure gradient the wind becomes much stronger on the inland ice which in turn tremendously increases the driving of the loose snow which is already considerable in the gravitational wind directed towards the coast. Large-loose-snow masses are blown out beyond the steep edge of the glacier ends and the precipices of the nunataks onto the inner portions of the fjords, at first at great altitudes. In dropping down this snow drags the air along with it and while the snow finally melts and evaporates the air heats up, first slowly, according to the wet-adiabatic curve for snow (melting + evaporation heat = 680 calories). In general this will take place more slowly than with the air already there, so that the descent takes place in a humid-unstable manner until the snow particles are essentially evaporated. Then the air flows farther down due to inertia, but heats up dry-adiabatically by 1 degree per 100 meters of loss of altitude. Occasionally single ice particles changed into raindrops get through to the bottom and evidence for this found by Helge Petersen, (7) page 292, was doubted by him unjustifiably. Petersen's work also contains three charts of pressure and wind distribution which better support our theory than that proposed by him: Figure 1, ENE föhn at Upernivik and SE föhn at Jakobshavn on 17 February 1895 with a cyclone of less than 735 millimeters pressure at the center above the west coast of southern Greenland and extending from Holsteinborg to Cape Farvel; Figure 2, NW föhn at Angmagssalik on 2 February 1901 with a low of less than 760 millimeters over Denmark Strait; and Figure 3, E to SE föhn at Jakobshavn on 27 June 1912 with a low of less than 745 millimeters at the center, between Greenland and Labrador.

Petersen endeavors to explain these incidences of föhn showing large temperature increase and large decrease in humidity in the manner of Alpine föhns, namely, by air currents that have crossed the entire inland ice-cap. Indeed, Petersen does not consider that such a crossing of the inland ice by the current cannot contribute to the heating up of föhn on the leeward side, no matter how much precipitation has separated out on the windward side. For in flowing down on the leeward side this current carries along much drift-snow, and only the quantity, density and horizontal velocity of this drift-snow above the fjords determines the extent and intensity, lastly also the duration, of the föhn produced by it. The peculiarity of the föhn in the coastal regions of Greenland that are close to slopes consist precisely of the fact that for its appearance no condensation above or no precipitation formation need to have preceded. -- In nature these conditions may also be fulfilled. All that is necessary and sufficient is that there exist large loose-snow masses in the fringe areas of the inland ice-cap and that they are violently and massively set in motion by winds of storm intensity blowing away from the land.

From this viewpoint it follows that the föhn in Greenland must become ever weaker in its manifestations in the outer parts of the fjords, as long as they are not partially rimmed by glaciers or projections of the inland ice. There can be nothing here to correspond to the "Dimmerföhns" of the Alps. In this connection H. Stade, (6) page 531, writes: "It is possible to observe a marked rise in air temperature repeatedly at Karajak, while there is hardly an indication of it at Ikerasak which is situated 30 kilometers closer to the sea." "There the föhn appears almost always later and, as a rule, with smaller intensity than at Karajak" (page 523). Finally it should be mentioned that in temperature measurements in the mountains and on the inland ice above the station Stade noted predominantly adiabatic, often even superadiabatic temperature gradients, in the case of föhn as well as other land winds. There is no notation to what extent his measurements satisfied the requirement of strict simultaneity, which must absolutely be observed because of the lively temperature instability prevailing with föhn.

Excellent föhn observations were also furnished by the Danmark Expedition 1906/08 at the Pustervig station on the southern slope of Danmarks-Monument, between Hellefjord and Mörkefjord in northeast Greenland (10). Peter Freuchen and Alfred Wegener here made observations at the bottom of the valley from 1 November 1907 to 31 May 1908, and as often as possible (77 times) on the slope of the Monument up to an elevation of 400 meters.

The following general remarks appear on page 551, "The temperature conditions associated with föhn deserve a few remarks. As in the case of kite ascents at the main station, so at Pustervig there also appeared a marked increase in the temperature gradient -- or weakening of the inversion. During the most characteristic föhn phenomena it was unfortunately impossible to make any observations on the slope, because the intense, driving snow made climbing the mountain slope impossible, especially in the dark months. However, we did succeed in obtaining a few observations in November and May at times of typical föhn conditions. At Pustervig the föhn was noticeable well in advance of the rise in temperature by a loud rushing noise on the ridges of the mountains. Simultaneously with the rise in temperature came the wind, which was whirling in nature in the valley lying at right angles to the direction of the wind. In the tapering-off things first calmed down below while the temperature was generally maintained unchanged for several hours, until a sudden sharp drop occurred."

Here are a few of the numerous individual observations that speak for my conception: "27 November 1907. On the occasion of a walk across the fjord at midday between 11 and 12 o'clock the observer is suddenly hit by an extremely strong gust of wind that throws him to the ground and so stirs up the snow that it is impossible to see as far as 1 dm [probably decameter]... At noon the temperature recorder shows a sudden rise of about 12 degrees; at Danmarks-Havn the corresponding rise in temperature (amounting to about 8 degrees) did not occur until some 6 hours later."

An instance involving moisture instability down to the floor of the narrow, supposedly "wind-protected" valley: 14 January 1908. In the morning, fine snowfall, no wind. The observer attempts an observation on the mountain but is forced to return by violent gusts of wind that throw him over. Soon there develops a strong storm with dense snowfall and with gusts of wind coming from all sides. The snow is driving down the mountains from all sides (N and S, too) with such force that it is hard to catch your breath; the readings at the English shack become difficult since the wind several times drags you off the boxes serving as steps and blows them away. Relative humidity is 78 percent at 0800, 65 percent at 1400, 78 percent at 2100.

Similarly on 28 January 1908. With low humidities of 65, 68 and 60 percent there is again continuous, strong driving snow with a slightly cloudy sky. "At the time of the 8 o'clock reading it is absolutely impossible to stand up. The wind direction changes continuously and runs through all the points of the compass... From time to time it is completely quiet down below; then there is a mighty rumbling in the mountains and the gusts of wind often begin with the wind rushing down the gorges and carrying along sand and snow so that it is impossible to open your eyes out in the open. -- The noise of wind on the mountains sounds like roars and howls."

Finally it should be pointed out that valuable and instructive material consisting of simultaneous registrations of temperature and relative humidity is available from the German Greenland Expedition of Alfred Wegener of 1930/31 -- (11). These were gathered at the West Station (winterhouse) on the edge of the inland ice at an altitude of 950 meters, at Kamarujuk at the innermost and narrowest part of the fjord at sealevel but a few kilometers from the winterhouse and at Umanak, a small island in the outer fjord, 55 kilometers SSW of Kamarujuk. Six remarkable instances of fohn are recorded in the curves. Unfortunately recordings of wind velocity are missing and there are no other wind data given. In almost all cases the föhn effect at Kamarujak is very large, but it is almost completely absent at Umanak or at most negligible. A more precise evaluation by one of the expedition's participants according to the principles outlined above might be valuable.

I shall close with a very graphic description by J. Georgi which resembles that of H. Stade (see above) but contains much more (12). "

"The inland ice is usually separated from the sea by a rocky coastal strip where the air temperature in the summer can exceed 15 degrees centigrade, a few kilometers from the ice and without the slightest trace of a wind from the inland ice. But in the evening it is possible to notice wisps of fog at the edges of the cliffs high above, and an hour later the föhn, invading the valley with mighty, cawcade-like gusts, threatens to break up the wisps. But what looked like fog was really driving snow brought by the inland-ice wind out over the coastal mountains..."

The time interval set by Georgi at about one hour approximately equals that found from a calculation according to my theory (1), if full allowance is made for the initial phase and the time required for the flow to become reasonably stationary.

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MEASURING INSTRUMENT FOR DIRECT SOLAR RADIATION FOR USE BY EXPEDITIONS.

Dr. John Georgi, Hamburg

I.

At the meeting of the Geophysical and Meteorological Societies at Hamburg of 21 to 29 October 1950 the author was able to demonstrate a new type of pyrheliometer. In general phrheliometers are complicated laboratory instruments involving thermostats and the extensive use of electrical measuring instruments. For this reason they are generally restricted to especially equipped radiation observatories. In their case the radiation to be measured enters a jar-like calorimeter vessel in order to prevent reflection losses, and at the bottom of this vessel the radiation is converted into heat by means of a black absorption layer. Nowadays the principle first introduced by Knut Angström in 1899 of compensating and measuring the heat of radiation by an equivalent amount of electrical heat, is generally accepted. But even the oldest and at the same time simplest instrument of this type still in use today requires an ammeter for measuring the compensating thermo-electric current, in addition to the radiation measuring device, as well as a highly sensitive mirror galvanometer to determine the temperature equality of the two lamina heated by radiation and by current. Lastly, a battery is needed. If in the course of an exploration trip just one of these items should be damaged, all further measurements are either impossible or afflicted with a creeping error that cannot be determined. Actinometers in current use are simpler in construction and application, to be sure, but are just as sensitive to transportation. Nevertheless, while the calibration of an Angström pyrheliometer could be checked on the assumption of undamaged galvanometers, the calibration of an actinometer is possible only before departure and after return from a trip. This means that while wintering you never know whether the instrument did not suffer a jolt even while being unloaded etc, which would somewhat change the calibration. Thus it was possible for all measurements obtained under great difficulties to be rendered completely useless subsequently, after the change in calibration value between departure and return was discovered, simply from ignorance of when such a change occurred.

As participant in several expeditions the author has suffered a great deal from this situation whic is naturally not so strongly felt at home. This was the more regrettable since on the occasion of the two Northwest Iceland expeditions of Professor F. Dannmeyer in 1926 and 1927 the total solar radiation and partial regions selected by means of normalized filters were to be compared, by the use of a cadmium cell referred to Davos [dell probably standardized at Davos, Switzerland --], with numerous observations in the near ultra-violet. Nevertheless, the first measurements in this region were interesting and could be compared with other climates in spite of the difference in calibration value and the uncertainty arising during the trip. But the intended evaluation of the meteorologically and biologically hopefully anticipated fine differences between the two radiation regions had to remain fragmentary.

On the first meteorological exploration trip of the German Naval Observatory in 1928 on the "Meteor", covering the waters around Iceland and Greenland, a new instrument was tried following this mishap. This was the newly developed "solarimeter" of Moll-Gorozynski made at the famous instrument shop of Kipp and Zonen at Delft. The radiation instrument proved to be stable beyond all expectations and has in the meantime gained complete acceptance especially for the registration of solar and sky radiation incident upon the horizontal surface of the earth; it also worked well at all times in 1929 and 1930/31 in Greenland. Far more disagreeable were the tricks played by the indispensable sensitive pointer-galvanometer. perhaps the sensitive point suspension suffered from a holt or humity got inside or electrical charges on the hard-rubber front plate either made the pointer stick or execute oscillations of its own. After these obstacles had been overcome with great anguish it was found, upon return from the midst of the ice, that in the inhospitable climate of a cave in the glacier snow-field a soldering joint inside the galvanometer had oxidized and may have changed the calibration at an unknown time in an unknown amount. Since all these possibilities are well known they must have a paralyzing effect on the expedition member charged with these measurements. If future expeditions were to as for a radiation meter assuring certain results, the answer would have to be: There is no such thing, unless a large apparatus such as a compensator with a standard element for checking galvanometers is taken along, and this would be impossible for reasons of weight and expense.

II.

A portion of the efforts directed towards a second International Polar Year 1932/33 and the completion of A. Wegener's program on the inland ice -- unfortunately not realized -- was to be devoted to the improvement of the instruments which at that time were not yet well-adapted to the conditions of an expedition. Here the shelters and supplies of the West and Ice Center Station were to be used as a valuable base of operations. It has since been possible to develop a hydrogen-generator with an automatic filling valve for pilot and radiosonde balloons that has already proven itself in the polar regions, a pressure theodolite for optically following the balloons and an appropriate instrument for the evaluation of wind displacement. Other instruments primarily designed for future expeditions but also useful in general weather service are a converter for obtaining the true wind from that felt on board, a small mechanical wind-recorder for hourly means and eight wind directions, a force-looking meteorological standard clock making the supplying of an expedition simpler [this could be a synchronizing chronometer interconnecting several instruments], a thermohygrograph to be used without shelter and having a time scale of 1 hour = 2 millimeters, thus giving greater resolution with a normal length of writing tape, a collapsible weather shelter with streamlined shutters for better ventilation of the interior and a reduction of the deposition of drift-snow. A thermometer and psychrometer sling without the cold-sensitive "Assmann" clockwork makes possible accurate measurements of the air temperature and humidity even under conditions of the most intense solar and reflection radiation; a "conical rain and snow gauge" that can be raised on the anemometer mast above the zone of driving snow permits distinguishing between snowfall and drifting snow, something we had not succeeded in doing with the Wegener Expedition. Finally we should mention a rather simple arrangement by means of which the entire sky all around the horizon can be photographed on miniature film, using the Leica, for example. At times of interesting weather changes a view of the sky may be very cheaply obtained every ten minutes or every minute, as required, in order to capture all the changing cloud formations. It was hoped to be especially useful for the photography of the aurora borealis streamers often appearing simultaneously all over the sky. This instrument was to have been taken along by the Wegener Expedition, but was not completed in time. Finally the most difficult problem of the radiometer was tackled and, as is to be hoped, solved "to the first approximation".

III.

The new instrument which was tested during the summer of 1950 by more than 500 radiation measurements contains a "measuring body" of copper protected against external influences by an ordinary one-half liter Thermos bottle and blackened by a special reproducible process on the irradiated facing side. It is carefully insulated, so that its half-value time amounts to $4\frac{1}{2}$ minutes. Into a fine drill-hole there is inserted a thermo-element whose second soldering joint is embedded in a large copper block whose temperature can be measured thermoelectrically or by an ordinary, calibrated thermometer. The heating of the measuring body by the incident radiation is measured by a sufficiently sensitive galvanometer. By means of two or even only one calibrated thermometer the deflection of the galvanometer per degree centigrade can be checked or redetermined after repairs at any time, whether in a tent on the inland ice, or in the desert or on high mountains. Further details, especially the determination of the heat loss of the measuring body during radiation measurements which can also be carried out in the field, are to be found in a more detailed publication soon to appear. An essential characteristic of the new instrument is that a complete temperature equalization takes place between the measuring body and its metallic environment within the Thermos bottle, formed in part by the above-mentioned copper block. Furthermore, accidental effects from the outside and marked temperature changes of the outer parts of the instrument exposed to solar radiation, wind etc, are kept away. Thus every individual measurement takes place under exactly equal, rigorously defined initial conditions. The time required by the galvanometer indicator to climb from zero to a fixed scale division representing possibly a heating of 0.8 degree centigrade is measured by a stopwatch or an ordinary clock.

A question which is important for a smaller expedition is the cost. The specimen used with great success this summer and representing the second and final version was assembled almost single-handed by the author; even if made in a shop it can't be too expensive. The most expensive part is the galvanometer, and especially to be recommended is the loop galvanometer made by Carl Zeiss, Jena, which has small sensitivity to shock in spite of its high measuring sensitivity. But then this galvanometer will be used simultaneously for all sorts of thermoelectric measurements during the course of an expedition, for example, for the temperature at various heights above and below the soil or on the ground or the surface of the snow, for pyranometer [pyrometer] measurements with the "solarimeter", for physiological measurements such as skin temperature, and other things besides, so that expenses should not all be charged to the radiometer.

Editorial Comment

We believe that this new radiometer, which aroused great interest with radiation experts (who even sacrificed a noon recess for a detailed discussion) at the geophysicists' and meteorologists' meeting, can be very valuable to future expeditions because of its clearcut and rugged construction and the ease of checking its calibration solely from instrumental constants and using an ordinary thermometer. The same is true of the other incidentally mentioned new constructions or improvements of meteorological expedition equipment. With all the confidence in the internally determined calibration of this new radiometer there naturally arises the desire to make it possible for the author, with the help of meteorological organizations or others interested in the Arctic, to make comparative measurements where the standard purheliometers accepted today are in operation, in order to determine the magnitude of possible deviations.

NORTHERN CANADA -- SOURCE OF LIFE OF TOMORROW

Professor Dr. F. E. W. Altmann, Munich

Canada will enter a new period of her economic and historic development during the coming weeks of bitter cold, ice and snow when the last sections of a railroad line from Seven Islands, a small settlement and fur-collecting station on the St. Lawrence, to the center of a new, huge mining region in Labrador and Northern Quebec, 500 miles to the north, will be completed. This will make the transportation of iron ores produced there easier and cheaper. During the first half of the twentieth century Canada succeeded in rising from an agrarian country having one-sided monopoly cultivation to an industrial nation and the rank of the third-largest commercial nation in the world. The second half of our century will probably be characterized for the Dominion by the planned extension of its economy to the hitherto unopened North.

Seven million square kilometers, i.e. 70 percent of the area under Canadian sovereignty, are still almost without human beings and covered with ice and snow for most of the year. Only one million square kilometers or 10 percent of the surface are being exploited, and in the last ten years scientists, engineers and government officials have been extremely active in discovering high-yield deposits of gold, silver, uranium, copper, zinc, iron, coal, tellurium, cadmium, selenium and petroleum in the northern regions of the Canadian Provinces as well as in the Yukon and the Northwest Territories. Only a few high-grade ores were mined in limited quantities and flown south for processing. Up to now the unfavorable transportation situation and the climate have prevented

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a more intensive integration of the North into Canadian economic life.

In the light of present structural changes in the world economy Canada must adjust herself to the fact that in a few years she will no longer be able to exist on the export of her agricultural and industrial products. She will have to use the export profits of the next few years to perfect her own economic structure. In this special attention will have to be paid to the opening up of the northern regions so rich in mineral resources for the creation of a highly skilled heavy industry and as a basis for a highly diversified finished-products industry. The aim is to make Canada largely independent of imports from Great Britain and US in order to reduce the number of starting points for possible economic crises as much as possible. The only serious obstacles in this path have really only been a lack of interest until now as well as a shortage in means of transportation and labor supply.

Interest is increasing to the same extent that the relatively above-normal share in exports of this country numbering 14 million inhabitants is on the wane. The shortage in labor forces is no longer a serious problem since Canada has had favorable results with the 800,000 Dp's taken in since the end of the war and since an unpredictable number of Britons, Frenchmen and other Europeans are waiting to find a new home in Canada. The solution of the transportation problem is more difficult, however. The construction of roads and railroad lines which are absolutely necessary for the real opening-up of an area demands financial means which show no returns until much later. Nevertheless a more intensive integration of the North into Canadian economic life.

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The huge water reservoir of the northern regions favors the construction of power plants for supplying current to the means of transportation, the metallurgical plants as well as the settlements. In the uranium mines near Eldorado, the mining settlements of Mayo and Dawson in the Yukon, on Great Bear Lake and in Yellowknife in the Northwest Territories they have been responsible for making life bearable for human beings. Warmth, light, heat [sic] and power for machines is furnished by electricity. The coal deposits discovered up to now in the southern of the Provinces of New Brunswick, Alberta and British Columbia have only local importance. The Canadian Dominion Government is therefore vitally interested in obtaining "white" coal and in the exploitation of the rich oil wells in Alberta and the Yukon.

As soon as the necessary power plants are completed the metallurgical processing of the ores of the North can be done right on location and their further processing into finished products can take place in the provincial cities, on the large lakes or at any other location favorably placed for transportation. An estimate of the wealth of the Canadian North has not even approximately been made by the geologists charged with this task. An organic development of the Canadian economy in harmony with its permanent requirements must take account of the value of the northern regions. There is no doubt whatever that mining in the undeveloped North of Canada will soon be the third-strongest pillar of her existence and there is a good possibility that within a decade mining will be the most vital source of life for the country and form an important basis for the manufacturing industry of Canada and the US.

To be sure, today airplanes are the only means of communication of most mining settlements of the North, both with each other and with the outside. They bring food, newspapers, medicine, clothes and mail. But in Labrador a beginning has been made to open up the North of Canada to human use systematically, from the point of view of transportation as well. Thus we will soon no longer speak of economic cases in these regions, but of the very cornerstones of Canadian economic life. Technology will conquer climate, loneliness and wilderness, at first to the extent made possible by the six billion dollars made available by industry, foreign countries and the government.

THE "PAYER-WEYPRECHT EXHIBITION"
IN VIENNA 1949-1950

Dr. Oskar Regele, Vienna

The "Payer-Weyprecht Exhibition" which opened in Vienna on 17 December 1949 and which enjoyed the special support of Federal President Dr. Renner and Federal Minister for Education Dr. Hurdes, was not merely to commemorate the discovery of Franz-Joseph Land and the return of the Austro-Hungarian North Pole Expedition of 75 years ago, but also served to portray the total accomplishment of Austria in the field of arctic exploration. This exploration began as early as 1869/70 with the participation of Payer in Koldeweys's Greenland Expedition; it includes the two preliminary expeditions of 1871 and 1872 using the ship "Isbjörn" and the main expedition of 1872 to 1874, participation in the two international polar years 1882/83 and 1932/33, and finally the Spitsbergen expeditions of 1891 and 1892. The greatest accomplishment, however, remains the discovery of Franz-Joseph Land, not simply as a success in itself, but because on the occasion of this undertaking "scientific research instead of records and adventure" assumed its rightful place -- as Knud Rasmussen put it.

The incentive for this exhibition came from the Vienna War Archives since they are custodians of Weyprecht's complete scientific legacy, of important contributions to Payer's biography and of the records of 1882/83. The Museum of Ethnology furnished the exhibition rooms, added numerous momentos of the expedition and the Museum of Natural History rounded out the show by the first exhibit ever shown of polar fauna, flora and rocks of the arctic regions where Austrians did research. A noteworthy feature of this section is a new geological map of the Arctic. The effort toward the greatest possible completeness was aided by the cooperativeness of the remaining 43 exhibitors, to whose number were added some from Belgium, Germany, England and Hungary. Over 350 exhibition objects were assembled, complemented by some 300 exhibits in natural history.

The Second World War resulted in lamentable gaps in all governmental and private collections; the Payer-Weyprecht Exhibition had to suffer especially from this cause. The mementos of the 1872/74 expedition are not too numerous to begin with, since the expedition vessel, the "Admiral Tegetthoff", had to be left behind in the eternal ice.

The exhibition begins with contributions to "The Life of Julius von Payer". Here one sees his report cards from the military academy, with the best mark in geography, his patent of nobility, which gave him the extraordinary privilege of including the national flag in his coat of arms, the grant of a general's pension following his retirement from active service, and a whole showcase filled with Payer's work as alpine cartographer. Payer carried out first-ascents in the South Tyrol Alps and was the first to make maps at altitudes above 3000 meters. These maps, publicized in <u>Petermanns Geographische Mitteilungen</u> (Petermann's Geographical Bulletins), smoothed the road into the great, wide world for the enterprising young officer. He received Koldeway's invitation and was henceforth aided in his scientific efforts by the War Minister, Kuhn. The compass on exhibition which Payer used on his sledge-trips on Franz-Joseph Land demonstrates the primitigeness of the instruments then in use, as does Weyprecht's telescope. The reproductions of the Franklin Series (the originals are in Belgium) show Payer as a magnificant painter of the polar world; numerous pencil drawings give eloquent testimony to the artistic talent which in those years replaced the photography which was not yet in general usage.

The Greenland Expedition 1869-70 and Isbjörn furnish reference points for Payer's activity as topographer of the Koldeway Expedition; a glance at the illustration of the "Isbjörn" calls forth a comparison of the small sailboats of those days with the icebreakers of present-day polar undertakings.

A small room is devoted to the expedition vessel "Admiral Tegetthoff", to the expedition's equipment and to paintings by Payer. Two sleds from Greenland and from Franz-Joseph Land have been preserved. Payer's models of lifeboats and sleds show how thoroughly the explorers went to work. After leaving the ship the expedition covered 450 kilometers from Franz-Joseph Land to Novaya Zemlya, partly in the small boats with emergency sails, partly by sleds on which the small boats were pulled. This doubtlessly most heroic part of the Austrian North Polar trip the visitor sees immortalized in Payer's giant painting entitled "No turning back!" Then there are the ship's chronometer, the hunting rifles with bronze barrels, the clothing of the polar travelers modeled after the fashion of North American eskimos, and a series of portraits of the persons who applied their efforts in the interest of the expedition: Count Hans Wilczek, the well-known patron and benefactor, Rokitansky, president of the Academy of Sciences, to whom we owe the publication of the expedition reports, the above-mentioned Minister of War, Kuhn, the Minister of Trade, Admiral Wullerstorf, famous in his own right for his circumnavigation on the "Novara" and the introduction of the postcard, and Admiral Sterneck who always encouraged the use of warships for scientific purposes.

A group of showcases is also devoted to the life of Karl Weyprecht. Just as Payer distinguished himself at Custozza, so Weyprecht fought bravely in the naval battle at Lissa. As a naval officer he saw a good part of the world. A picture shows him observing a solar eclipse in Tunisia. A remarkable scientific hand characterizes the scientific documents which were soldered into tin cans and brought from Franz-Joseph Land to Pola and then to the Vienna Archives, a distance of 5000 kilometers. Several publications by Weyprecht give an insight into his contribution of having put the exploration trips on a strictly scientific basis. Pictures of all 24 expedition participants are shown, in addition to many diaries and other small momentos. Among these the most conspicuous is the passport for the polar regions issued by the Austrian government and valid for three years. In a letter of invitation to the hunter of the expedition, Johann Haller, Payer wrote in February 1872, "we shall make discoveries and see unknown lands ..." Weyprecht's exhibited correspondence with Hochstetter, Middendorf, Nordenskjöld, Oppolzer, Petermann, Scherzer, Sibiriakoff and others proves that the entire scientific world of those days was in close contact with Weyprecht's activities. Even the arts were represented, as shown by the "Weyprecht-Payer March" composed by Eduard Strauss.

Among the remaining contemporaneous documents the following should be pointed out: the ukase of 1872 by Czar Alexander II, requesting all Russians to aid the Austrian expedition if it should experience trouble while on Russian territory (the expedition was picked up in 1874 by a Russian schooner), the journey and drift map drawn by Weyprecht himself, other shipboard journals and the ship's log with the entry of 31 August 1873 showing the discovery of Franz-Joseph Land, Weyprecht's diary covering the return trip, his telegram to the War Ministry in Vienna which on 4 September 1874 brought the first news from the expedition which had been assumed lost for over two years. In the central area of the exhibition a geographic-cartographic panorama is grouped around the "No turning back!" painting and the returned ship's flag. This shows the state of exploration in the Arctic in 1872 and from 1872 till the conquest of the North Pole. Payer's sledge journeys in Greenland and Franz-Joseph Land, the two international polar years and the honor lists of the ship's company and the 9 trips to the Arctic carried out by Austria.

The final section takes us into the period of the first international polar year, when Austria was assigned a station on the Norwegian Island of Jan Mayen. Since Weyprecht had died in 1881 Captain von Wohlgemut led the expedition which reached its goal only with the greatest difficulties, on board the naval steamer "Pola". Wohlgemut's activities were so successful that according to a document the International Polar Commission in Petersburg noted on November 1883 that the Austrian station was in every respect the best of all participating nations. For this reason the

Fourth International Polar Conference of 1884 was held in Vienna in honor of Austria. Since Weyprecht had been instigator and arranger of the international polar year, Austria was given an honorary invitation to participate in the second international polar year.

The section on natural history introduces the visitor to the arctic environment with an excellent exhibit, so that it is easy to form an exact picture of this world.

The exhibition visitor carries away the lasting conviction that the success of the expedition of 1872-74 must be attributed exclusively to the thorough preparation and the personal attitudes of the two expedition leaders. So many expeditions have failed miserably, but here all participants and scientific results were saved. A single member of the expedition only did not return: the ship's machinist Krisch who died in the eternal ice and found his last rest there.

The exhibition has great significance for science, for we now know accurately what is available in research sources and mementos, and where they are to be found. Permanent, too, is the place of honor which the explorers of those days resolutely fought for at a time when there were only human beings, dogs and sleds and neither steel-plated ships, airplanes, motor sleds, radio nor other technical accomplishments were available. These are taken for granted in our day and have changed a polar expedition into a tourise undertaking.

TO JAMES CLARK ROSS ON THE OCCASION OF HIS 150TH BIRTHDAY ON 15 APRIL 1950

Martin Müller
Zwickau-Planitz

One of the most heroic figures of polar exploration was James Clark Ross, whose name is associated with successes which were especially esteemed in the scientific opening up of the Arctic and Antarctic and in the investigation of terrestrial magnetism: the discovery of the northern tip of the American continent, of the magnetic North Pole and of the Antarctic continent. For this reason the great successor to James Cook and ancestor of the well-known travelogue writer Colin Ross who died in 1945, deserves to have his work and its importance in the continued exploration of the polar regions and of terrestrial magnetism saved from oblivion, especially since within the last fifty years no extensive biographical article has appeared about him in Germany.

James Clark Ross was born on 15 April 1800 as the third son of the London merchant George Ross. At the early age of twelve he joined the navy, where he acquired an excellent scientific education in various institutions. Up to 1818 he served under his uncle, Captain Sir John Ross, who had made a name for himself in polar exploration. In 1919 there began for J. C. Ross an important apprenticeship for his later, epoch-making discovery trips. Until 1827 he stayed under the command of the famous North Polar explorer Sir Edward Parry, whom he accompanied as midshipman, botanist and zoologist on several exploration trips which were mainly devoted to the solution of the problem of the Northwest Passage. J. C. Ross, who had in the meantime been promoted to lieutenant, scored his most brilliant accomplishment in 1827, when together with Parry he advanced from Spitsbergen on 17 July to the northern latitude of 82 degrees 45 minutes never previously reached. This was the first attempt to readh the North Pole by sled. On the strength of this he was promoted to commander.

From 1829 to 1833 he accompanied his uncle John Ross on the expedition financed by Felix Booth for the accomplishment of the Northwest Passage and shared with him the command of the "Victory" which was the first polar ship to have a steam engine. As a matter of fact the expedition did not reach its set goal, but did bring home a wealth of scientific results. In 1829 it did discover the Boothia Felix Peninsula projecting far to the north and the Gulf of Boothia, south of North Somerset Island. During the winter of 1829 to 1830 the two Rosses came to know the North American eskimos for the first time, and with them the younger Ross explored the coastline of Boothia Felix and discovered King William Island. At that time he discovered that Boothia Felix is connected to the American continent by means of the Boothia Isthmus and forms its northernmost tip. In addition to these discoveries he made another, much more important one, which was fundamental from the point of view of geophysics. In the course of a sled trip he was the first, after months of measurements of terrestrial magnetism, to locate on 1 June 1831 what was then the northern center of terrestrial magnetism. This was on Cape Adelaide on the west coast of Boothia Felix,in north latitude 70 degrees 5 minutes 17 seconds, west longitude 96 degrees 46 minutes 45 seconds. This feat brought him promotion to captain and the peerage.

After J. C. Ross had made a survey of terrestrial magnetism in Great Britain in 1838 under the auspices of the British Admiralty. A. V. Humboldt felt it necessary to have investigations of terrestrial magnetism initiated on the Southern Hemisphere as well. Through his efforts interest was stimulated in England, France and America in the exploration of the Antarctic whose polar circle had up to that time been crossed only by James Cook, Bellingshausen, Weddell and Biscoe. In 1838-43 these countries undertook the exploration of the south polar regions with one expedition each.

The most important of these three expeditions was the English one under J. C. Ross, whose goal was the exploration of the Antarctic and the determination of the magnetic South Pole. On board the sailing vellels "Erebus" and "Terror" commanded by himself and F. R. M. Crozier he made three voyages to the Antarctic between 1840 and 1843.

Since d'Urville and Wilkes had already made discoveries in the regions Ross had set out to explore, he made the extremely fortunate decision while in Tasmania of sailing south on 170 degrees east longitude in order to reach the magnetic South Pole which according to Gauss' calculations was to be found at 73 degrees south latitude, 150 degrees east longitude. The main results of this first south polar voyage by Ross were the first crossing of the pack ice by a sailing vessel, the discovery of the open Ross Sea, of the South Victoria Land, of the active volcano Erebus and the Ross Ice Barrier. The discovery of the mysterious south polar continent on 10 January 1841, which James Cook believed existed but assumed could never be found, was the greatest accomplishment of Ross' career as an explorer. To be sure, Biscoe in January 1832 had first seen the land of the south polar continent proper, had discovered Graham Land in February 1832, and in January 1838 d'Urville had sighted Adelie land. But since neither could establish their discoveries as part of a continent J. C. Ross must be designated as the true discoverer of Antarctica. Not until 1939, for example, did B. Rymell find out that Graham Land is a peninsula of the continent since the "Stefansson Strait" turned out to be only a deep fjord. Ross approached the magnetic South Pole to within 260 kilometers. By many careful measurements he was able to determine its position in 76 degrees south latitude, 145 degrees 20 minutes east longitude with such accuracy as if he had been there. Not until January 1908 was the magnetic South Pole discovered by a contingent of Sheckleton's expedition. Douglas Mawson found it at 72 degrees 25 minutes south latitude and 155 degrees 16 minutes east longitude. The Pole had thus migrated some 150 kilometers towards NNE in the period from 1841 to 1908.

On his second south polar voyage in 1841/42 Ross reached what until then was the highest southern latitude, 78 degrees 9 minutes 30 seconds, in 161 degrees 27 minutes west longitude, in front of the Ice Barrier. The results of this trip were scantier than those of the first. He had gone only 11 kilometers further south. He followed the sheet ice for ten longitude degrees towards the west, measured its height at from 24 to 70 meters and behind it may already have sighted the King Edward VII Land discovered by Robert Scott in 1902. In the ice wall he found an indentation which was later to play a vital part in the discovery history of the South Pole. From here Borchgrevink first jumped onto the Ross Shelf Ice on 17 February 1900. From this "Borchgrevink Bay" which by a crumbling away of the ice wall had become enlarged into the "Bay of Whales" Amundsen undertook his successful push to the South Pole in 1911. Behind it Byrd erected his "Little America", from where he executed his extensive continental flights between 1928 and 1947. In addition, Ross had travelled a huge, unknown sea lane and crossed a pack-ice belt 1800 kilometers wide with two sailing vessels.

He began his last and third southern voyage in the Falkland Islands in December 1842 with the intention of reaching a high southern latitude in 55 degrees west longitude and to meet a continuation of Louis-Philippe Land. The main results of this voyage which was completed in Capetown in 1943 were the unveiling of the islands east of Joinville Island and Louis-Philippe Land, the discovery of this land is a peninsula stretching northward, the discovery of Mt. Haddington on James Ross Island (so named by Otto Nordenskjöld in 1902/03 and the attainment of the southern latitude of 74 degrees 30 minutes in 14 degrees 51 minutes in the Weddell Sea. Here Ross came close to Coats Land discovered by W. Bruce in 1904 and to Crown Princess Martha Land found by R. Larsen in 1930, without, however, having seen these coastlines. Of the additional rich scientific results of his entire south polar expedition we need only mention the zoological, botanical, geological, oceanoographical, terrestrial-magnetic and meteorological observations covering a period of almost four and a half years. Ross was the first to discover that air pressure rises again beyond the subantarctic pressure trough.

After his return Ross was promoted to rear admiral, received an honorary doctorate from Oxford University and was awarded gold medals by the Geographic Societies of London and Paris. In 1843 he married Anne, daughter of Thomas Coulman from Whitgift Hall, Yorkshire, who bore him three sons and one daughter. She died after only fourteen years of marriage. As can be seen in Volume 49 of the Dictionary of National Biography (1897) an agreement was made with his wife's family on the occasion of his marriage which prevented him from assuming command of the Franklin Expedition.

Once again J. C. Ross went into the polar regions. John Franklin had sailed in his vessels "Erebus" and "Terror" in 1845 in order to force the Northwest Passage and the British Admiralty had no news whatever by 1848 of the 136-man company which in the meantime had already starved and frozen to death. Ross, with his companions Bird, McClure and McClintock on board the vessels "Investigator" and "Enterprise", in 1848/49 carried through the first of the approximately 40 rescue expeditions which were sent out up to 1889 to determine the fate of Franklin and his companions. Due to unfavorable ice conditions in Lancaster Sound and in Barrow Strait Ross was denied success.

Right up to his death he continued to be the first authority on all matters dealing with arctic and antarctic exploration. On 3 April 1862 Ross died at Aylesbury at the age of not quite 62. His successful discovery voyages have at all times been honored and his names has been immortalized at many points on polar maps.

In conclusion let us briefly mention the works of the great discoverer. He collaborated in the description of the discovery of the magnetic North Pole and the sledge trips of the 1829/33 expedition in the works of his uncle John Ross. The full title is, Narrative of a second voyage in search of a Northwest Passage and ofa residence in the arctic regions during the years 1829-1833. Including the reports of James Clark Ross and the discovery of the northern magnetic pole. (Two Volumes, London 1835). Two German translations appeared in 1835 and 1845, at Leipzig. Ross wrote about his south polar trips in, Voyage of discovery and research in the Southern and Antarctic Seas (Two Volumes, London 1847). The German translation appeared in 1847 in Leipzig in one volume entitled, Entdeckungsreise nach dem Südpolarmeere in den Jahren 1839-1843. The expedition which was to search for Franklin was described by Ross in 1850 in Volume 35 of the Parliament Papers, under the title, Narrative of the Proceedings in Command of Expedition through Lancaster Sound and Barrow Strait. The scientific results of all voyages in the polar regions were published by the British government in special volumes.

Thus the name of James Clark Ross will forever remain associated with research in terrestrial magnetism and the scientific opening-up of the Arctic and Antarctic. Even one of his great deeds in the field of polar exploration would have sufficed to make him immortal.

EXPEDITIONS OF THE NORSK POLARINSTITUTT DURING THE YEAR 1950

Anders K. Orvin, Oslo

During the summer of 1950 the Norsk Polarinstitutt sent out expeditions to Svalbard (Spitsbergen) and Jan Mayen. A total of ten topographic, hydrographic, geological, glaciological and zoological sections were active at different sites.

(a) Jan Mayen

The expedition vessel, the motor cutter Minna from Brandal, was unable to take along all participants of the Svalbard and Jan Mayen expeditions. For this reason the vessel first sailed towards Jan Mayen from Aalesund on 13 June. Three topographic sections with their equipment were on board, furthermore three participants from the J. Warren Wilson Oxford University Expedition to Jan Mayen and two men from Vaervarslinga for Nord-Norge. The ship reached Jan Mayen on 17 June and returned to Aalesund. The following topographers from the Norsk Polarinstitutt were active on Jan Mayen: Wilhelm Solheim, Thor Askheim and Sigurd Helle. Seven assistants were active in the infividual sections. Following the appearance of the map by the Austrian expedition of 1882/83 no precise survey had been undertaken. Since the Austrian map shows no contour lines it should only be regarded as a sketch.

Norsk Polarinstitutt had begun the mapping of Jan Mayen in 1949. That summer astronomical place determinations, base measurements and the triangulation of the central part of the island were carried out. In addition to that the Norsk Polarinstitutt topographer Bernhard Luncke took aerial photographs for cartographic purposes in the course of a non-stop flight from Skattora near Tromso in an Air Force Plane. Last summer the triangulation of the island was completed, and to supplement the aerial photographs terrestrial photograms were also made. Furthermore continuous water-level measurements were carried out for a month at Hvalrossgat.

Norsk Polarinstitutt is now in possession of this material which is sufficient for the drawing of a very detailed map of Jan Mayen. Once this map is available soundings around the island will begin. This work will be especially important for the fishing industry, since large herring schools have been shown to exist close to the coast. The surveying parties and the Oxford expedition were picked up by the motor cutter "Polarbjorn" when this vessel called at Jan Mayen en route from Greenland. The vessel reached Aalesund on 5 September.

(b) Svalbard

The "Minna" was unable to begin her trip to Svalbard until 26 June because of repairs. After the gas bottles for the Svalbard beacon-fires had been loaded at Harstad the ship left on 29 June but had to return to Harstad the following day because of engine trouble. In order not to lose more time then expedition members left on 1 July on board the "Jacob Kjöde". The "Minna" was again repaired by 3 July and left Harstad, arriving at Longyearbyen on 7 July. 23 persons participated in the Svalbard expedition. Laare Lundquist was the leader. The following projects were carried out in the course of the summer by the various teams: Lundquist, on board the "Minna" transported all landing groups to their respective work sites and landed them at other points or picked them up again at the prearranged times. Lundquist also took care of the changing of the gas bottles for the beacon fires [probably flares used for triangulation] and the changing of automatic radio-beacon batteries. In addition he and the ship's company helped with the erection of a twenty-meter aluminum mast for the radar service on Cape Linné. The radar installation was set up by engineer McCausland of the British firm of Kelvin and Hughes. This firm delivered the installation. These various tasks unfortunately left no time for soundings from the vessel. Helge Hornbaek and three assistants carried out soundings by motorboat of Forlandsrevet and a part of the Trygghamna on a scale of 1:50,000. In the last few years he has also sounded the harbor areas of Sveagruva and Ny-Aalesund on a scale of 1:10,000. Harald Major continued his investigations of coal deposits between Sveagruva in Bellsund and Longyeardalen near Adventfjorden. In several places he uncovered the outcroppings of the coal seams which are strongly variable with respect to thickness. Analyses and coking samples will determine the quality of the coal in various regions. The same seam can exhibit great quality differences. Thore Sinsnes and Dr. E. Gasche, the latter from the Basel Museum of Natural History, have drawn a detailed profile of the strata sequence Lower Carboniferous-Permian near Ahlstrandodden, somewhat farther east. A wealth of fossil material was collected which will later be worked on by the various specialists. Prior to this such a large, coherent profile had been drawn only of the palisade-type profile situated on the south side of the outermost part of the Isfjord. Olav Liestöl undertook an exact survey of the Finsterwalder Glacier on the south side of Van Keulen Fjord. The present intention is to measure this glacier every second year in order determine its increase or decrease. Other Spitsbergen glaciers were measured during the summer with this in mind. Similar measurements of glaciers are being made by the Norsk Polarinstitutt in Norway. All above-mentioned persons, with the exception of Dr. Gasche, are employees of the Norsk Polarinstitutt. In addition to these gentlemen the following persons participated in the expedition: Rolf Feyling-Hanssen undertook measurements of marine terraces near the Isfjord and northward toward the Kongsfjord and collected shells from the various levels. The results of his work combined with the investigations by Feyling-Hanssen and Finn Jörstad near the Sassenfjord in 1948 should contribute a great deal to our knowledge of the last land-emergence on Spitsbergen. Dr. Herman Lövenskiold continued his research into bird-life. He worked in the western part of Sörkappland and near Adventfjord and collected a wealth of ornithological material. He was also able to find out that several species of birds nest on Spitsbergen that were formerly not known as nesting birds. The photographer Lief Pedersen took a series of color photographs and among other things also recorded different cloud formations. The "Minna" left Spitsbergen on 1 September. Because of strong headwinds she did not reach Aandalsnes until 11 September.

(c) The Antarctic Expedition to Dronning Maud Land

The Norwegian-British-Swedish expedition to Dronning Maud Land was transported to its goal in the middle of November 1949 on board the motorship "Norsel". In mid-November 1950 the ship once more proceeded southward. Under the direction of Professor H. U. Sverdrup this expedition will bring new equipment to the expedition's winter station at Maudheim. In addition two airplanes were used to photograph the western part of Dronning Maud Land.

(d) Expedition to Northeast Greenland

This expedition, which was carried out under the supervision of Norsk Polarinstitutt by the Arktisk Naeringsdrift A/S, sailed from Aalesund on 27 July on board the new sealer "Polarbjörn". The director was Magister Sören Richter of the Norsk Polarinstitutt. The expedition carried equipment, provisions and personnel to Radio Myggbukta and the hunting stations. Three members of the J. Warren Wilson Oxford University Expedition accompanied the ship to Jan Mayen. "Polarbjörn" reached Jan Mayen on 30 July and Cape Herschel near Claveringfjord as early as 1 August. In the subsequent weeks all stations from the south side of Kong Oscar Fjord to the Hochstetter Forland were visited. Eight young musk oxen were captured; they were released in the Dovre Mountains in Norway. The ship left Greenland 28 August and proceeded to Jan Mayen where the topographical sections of the Norsk Polarinstitutt numbering ten men and the Oxford University Expedition numbering 6 were taken aboard. The ship arrived at Aalesund on 5 September. The zoologist Per Höst took part in the expedition; he took a series of color photographs and a motion picture in color. The yield for Arktisk Naeringsdrift A/S amounted to 750 foxes. Fishing for mountain trout (salmo alpinus) was not as successful as in former years. Ice conditions were favorable this summer, and the "Polarbjörn" was able to travel without difficulty through the Shannon strait to Hochstetter Forland up to about 76 degrees north latitude.

METEOROLOGY IN THE POLAR AREA

Gerhard Schindler,
Bad Homburg V. d. H.

In Vse-soyuznoye geograficheskoye obshchestvo, Izvestiya 78 (1946) 123 ff. D. B. Karelin reports on a flight to the North Pole. This flight was undertaken at the beginning of October 1945 by the Leningrad Arctic Institute for the purpose of making ice observations in the western sector of the Russian Arctic. The route was via Khatanga Bay, Cape Chelyuskin and Cape Molotov to North Land (Severnaya Zemlya). The return flight was via Kotelny Island (New Siberian Group) and Chokurdakh near the mouth of the Indigirka. (From Meteorological Abstracts and Bibliography I (1950) I.)

Weather Polar Flights

Weather 4 (1949) 11 ff. (London) presents an interesting report on a North Polar Flight which began at Fairbanks (Alaska) on 2 August 1948. The lowest temperature at an altitude of better than 6 kilometers was not recorded above the Pole but at 82 degrees on the Alaskan side.

Duration of Frost in British Columbia

The Meteorological Section of the Ministry of Transport discusses (1949) causes of frost, its local distribution and peculiarities in a 20 page pamphlet. In addition changes in frost-duration with increasing or decreasing geographical latitude and altitude above sea-level are cited. For 258 stations listed in a special appendix altitude, yearly results, mean beginning of the first autumnal frost as well as the last frost in spring and the mean duration of the frost-free period are given.

The Climate of the Arctic from the Viewpoint of the Explorer and the Meteorologist

In Science 108 (1948) 193 ff. William Herbert Hobbs discusses in great detail past and present theories on the pressure and wind distribution over the North Polar Basin and Greenland's inland ice. The various expeditions that have dealt with this problem are mentioned, especially those to Greenland. An exhaustive source-list goes as far as 1948. The treatise is climaxed by a defense of the "glacial anticyclone" theory which is contrasted to the picture of low-pressure areas drifting across Greenland's inland ice.

Weather Research in Antarctica

Weather processes in Antarctica are being very well watched by the present intense research activity of the Australian, French and British-Norwegian-Swedish expeditions. Scientists all over the world are awaiting with great interest the new results that will come from all this activity. (Weatherwise, Vol. 3 No 1 February 1950)

Ionosphere Observations in the Polar Regions

Between June 1944 and April 1945 the hourly values of the critical frequency for microwaves which are reflected from the F-layer were determined at Tromsö. Maximum occurred around noon, a second, weaker one, in the early morning. The critical frequency had a lower value on magnetically disturbed days than on quiet days. (O. Burkard in Archiv für Meteorologie, Geophysik und Bioklimatologie [Archives for Meteorology, Geophysica and Bioclimatology] Ser. A, 1948 93 ff. quoted from Meteorological Abstracts and Bibliography I (1950) No 4)

INTERNATIONAL COMMISSION FOR PERIGLACIAL MORPHOLOGY

Professor H. Poser,
Braunschweig

On the occasion of its most recent meeting in Lisbon the International Geographical Union (Union Geographique Internationale) established a Commission for the Study of Periglacial Morphology (Commission pour l'Etude de la Morphologie Periglaciaire). The task of this commission is to promote periglacial morphology all over the world [sic] and to produce material that can be compared, according to a unified plan, before the next meeting (Washington 1952). With this in mind the work of the commission will primarily cover the following points: 1. Mutual adjustment of the multilingual nomenclature and unification of the conventional map signs; 2. Making maps of the distribution of recent and prehistoric periglacial phenomena, (a) as well maps for larger regions, (b) as special maps for smaller areas on a scale of 1:50,000; 3. Production of periglacial-morphological profiles for high mountain ranges with designation of noteworthy altitude limits; 4. Descriptive and morphogenetic explanation of the mapped phenomena; 5. Climatological evaluation of the wealth of periglacial forms. -- The following professors belong to the commission at this time: Dr. Hans W. son Ahlmann, Sweden (President), Dr. A. Cailleux, France (Secretary), Dr. C. E. Edelman, Holland, Dr. R. F. Flint, U. S., Dr. A. Guilcher, France, Dr. Corte, Argentine, Dr. H. Poser, Germany, Dr. R. Tavernier, Belgium, Dr. L. Trevisan, Italy. Each commission member was assigned a special region. Central Europe was assigned to Professor Dr. H. Poser of the Geographical Institute of the Braunschweig Technical College.

REPORT ON THE VII. INTERNATIONAL BOTANISTS' MEETING HELD AT STOCKHOLM IN 1950

Dr. Fritz Mattick,
Berlin-Dahlem Botanical Museum

The VII. International Botanists' Meeting took place at Stockholm from 12 to 20 July 1950, attended by 1500 participants. Within the section for plant geography an entire morning was devoted to the problems of the arctic flora.

N. Polunin of Montreal traced the precise course of the boundary of the arctic region on a map. He places it approximately 80 kilometers north of the limit for coniferous forests. The mean temperature of the warmest month plus one-tenth of the mean temperature of the coldest month lies below 9 degrees centigrade. The interval between spring and autumn frost is less than 50 days. Annual precipitation is less than 500 millimeters. The Arctic is the home of about 850 species of higher plants. In the subarctic zone vegetation frequently still forms a continuous ground cover, in the middle zone it becomes intermittent and poorer in variety of species, in the high arctic small areas of vegetation are limited to favorable locations and the cryptogamia take over, especially the lichens.

T. Böcher of Copenhagen showed that the ice-free rim of western Greenland has a very dry, continental climate in the vicinity of the inland ice; as a consequence various arctic and subarctic steppe plant genera are widely distributed in its vegetation.

A. E. Porsild of Ottawa described the higher flora of the

North American Arctic. He subdivided the region into four flora provinces, including Greenland, of which Alaska is richest in species.

G. Rousseau of Montreal described a "semi-arctic" zone consisting of a 2 to 300 kilometer wide band in northern Quebec where tundra and taiga are so intermingled in view of the changing surface relief that the valley bottom are occupied by forests while the tundra prevails a mere 50 meters higher. -- In the course of a second lecture showed that the botanical evidence for non-glaciation during the Ice Age in the region around the St. Lawrence must be considered far more limited than had previously been assumed.

M. Raymond of Montreal elaborated on the distribution of the sedges (Carex) and the 200 species of this plant with which the Province of Quebec is so richly endowed, out of a total of 2,200 species of higher plants.

In conjunction with the meeting there were botanical trips to almost all parts of Sweden. Those designed to study the primitive forest and high-altitude vegetation in Lappland drew the largest number of participants.

THE COURSE OF EXPLORATION AND THE STATE OF CURRENT KNOWLEDGE ABOUT THE ANTARCTIC

Dr. Hans-Peter Kosack,
Landshut

The great southland, Terra Australis Incognita, played a large part with the cosmographers of the 16th and 17th centuries. This mysterious southland had already been suspected by the geographers of antiquity. Ptolemy connected the southern tip of Africa with India and called this coastline an eastern continuation of Ethiopia. A. Chaldean, Seleukos, had declared in the second century B. C. that the Indian Ocean had no tides and therefore had to be bounded by land on all sides. All successors went on this assumption. This belief in a great southland survived the centuries up to the time of Cook's voyages -- proof of the tenacity of erroneous views and the difficulty of removing them.

The discovery voyages of around 1500 established the fact that Africa can be circumnavigated, and at least at this point the great, unknown southland had to be shifted to the south. The discovery of the Straits of Magellan, the belief in the existence of land in high latitudes received fresh support. The Terra Magellanica had to be a part of this southland and was retained in this form in the atlases of the 16th and 17th centuries. Its main area was now displaced to the Pacific; whereever Spanish sailors discovered new islands the coast of the southland was thought to be. As late as 1680 it was endowed with all the blessings of nature: Elysian fields with flowers and fruits and friendly inhabitants. Even the discovery of Tasmania and Australia did not

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Dr. Hans-Peter Kosack,
Landshut

The great southland, Terra Australis Incognita, played a large part with the cosmographers of the 16th and 17th centuries. This mysterious southland had already been suspected by the geographers of antiquity. Ptolemy connected the southern tip of Africa with India and called this coastline an eastern continuation of Ethiopia. A. Chaldean, Seleukos, had declared in the second century B. C. that the Indian Ocean had no tides and therefore had to be bounded by land on all sides. All successors went on this assumption. This belief in a great southland survived the centuries up to the time of Cook's voyages -- proof of the tenacity of erroneous views and the difficulty of removing them.

The discovery voyages of around 1500 established the fact that Africa can be circumnavigated, and at least at this point the great, unknown southland had to be shifted to the south. The discovery of the Straits of Magellan, the belief in the existence of land in high latitudes received fresh support. The Terra Magellanica had to be a part of this southland and was retained in this form in the atlases of the 16th and 17th centuries. Its main area was now displaced to the Pacific; whereever Spanish sailors discovered new islands the coast of the southland was thought to be. As late as 1680 it was endowed with all the blessings of nature: Elysian fields with flowers and fruits and friendly inhabitants. Even the discovery of Tasmania and Australia did not change this. This continent was recognized as new land, to be sure, but the southern continent was immediately shifted to New Zealand and stretches across the entire southern Pacific. As early as between 1578 and 1616 the Terra Magellanica was recognized as a small archipelago, but once again land was sighted further south, this time by Gerrits, so the coastline needed only to be shifted to this point. Each new island discovery was treated as a tip of the southland: South Georgia in 1675, Easter Island in 1687, Bouvet in 1739 (called Cape Circumcision by its discoverer), even the Crozet and Prince Edward Islands as late as 1772.

At this point political and economic interests entered the picture. If there was a happy southland, then there had to be a great deal to be taken from there as long as you were the first to discover the fairyland. For this reason Cook's second world-circling voyage was undertaken to get to the bottom of the mystery. He succeeded in circumnavigating the entire water area surrounding the southern continent in two small wooden ships, in a continual battle with icebergs, storms and cold. The actual discovery results were skimpy. Only South Georgia and a part of the South Sandwich Islands were sighted, but the negative results of this voyage are all the more important. All around the South Pole up into high latitudes there was an ice-filled sea, but no trace of land, and the capes and coastlines named up to that point shrank into small islands.

The effect of this on the scientific world was tremendous. The old assumption that the equilibrium of the earth would be disturbed if there were no land in the south was mathematically refuted by Schmidt in 1829. Thus the path was cleared for the assumption of a continuous southern polar ocean which might at most contain a few isolated little groups of islands. Even the land-sightings of the first half of the last century didn't change matters; even great geographers such as Petermann and Peschel opposed the view claiming that large land-areas must be present. As late as 1863 and 1867 energetically defended this attitude, when Wilkes and Ross had already proven the existence of large landmasses. The impression given is that of the swing of a pendulum to the other extreme, as now the sea-theory was defended with the same vigor as the continental theory of earlier days.

But the economic benefit derived by the world from Cook's voyage was also great. He had reported great seal herds on South Georgia and soon after his voyages sealers went there to claim the loot. When mass-slaughter reduced the yield they went farther south to find possible new hunting-grounds and thus found the South Shetlands, the South Orkneys and Graham Land. James Waddell, an English sealer, penetrated the sea named after him and attained a high southern latitude. Beginning with 1820 there was a catcher's station on Deception Island, and when Bellinghausen reach Deception on his polar circumnavigation he found no less than eight English and American vessels with a large catch. Some already had cargoes of 60,000 pelts. These sealing expeditions at first had very little value for science. The captains kept their discoveries secret in order to complete the slaughter at the catching sites themselves. Only when there was nothing left were map sketches published. The first cartographer, Bransfield, accompanied a sealer during the southern summer of 1819/20 in order to map the South Shetlands. What the sealers found out seemed to be confirmed by the discoveries of Cook and Bellinghausen. There were only island groups or individual islands, while no one sighted a continuous coast. When the hunting grounds south of Tierra del Guego were exhausted, various companies sent exploratory boats into African and Australian waters. In the course of this Enderby Land and Kemp Land, the Belleny Islands, the Sabrina Coast, Macquarie and the island groups southeast of New Zealand were discovered. Islands such as Royal Company and Emerald were sighted, but these have not been found again since then. An American sealer, Morrell, allegedly sailed westward in an ice-free sea south of Enderby Land which meant that this Land as well as Kemp Land also had to be islands. The fact that this report was falsified was not full revealed until 1930. Since the new discoveries did not contain any seals exploration by these trapping vessels ceased completely.

Scientific exploration began around 1835. Extensive sea voyages demanded accurate magnetic values for navigation. The long-term variations had been known for a long time, but there were no stations that had made long observational series. A. V. Humboldt suggested observations and found the British admiralty receptive of the idea. But France and the United States also put in an appearance. The magnetic North Pole was reached in 1831; in order to locate the South Pole three expeditions were sent out from 1838 to 1843. These did not reach the magnetic pole but made extensive sightings of land in the Australian quadrant which add up to a large land-complex. James Ross was especially favored by luck. He penetrated far south, discovered South Victoria Land with mountains exceeding 4,000 meters in height, an active volcano (Erebus) and the great ice barrier which later took his name and became the starting point for the most successful expeditions.

After these expeditions done in the grand manner exploration rested for almost fifty years. There were occasional advances, most without ship especially adapted to the ice.. During this time there was strong promotional activity on behalf of south polar exploration. Von Neumayer, later director of the German Naval Observatory, also Petermann, Markham and others took up the cause and assembled scientific information without having any practical success. Questions dealing with the North Pole were too prominent. In 1886 Hanns Raiter made the interesting experiment of attempting to prove the existence of an antarctic continent by comparison with South America, on the basis of available data. This proved to be wrong in details but successful in its results, as can be shown in retrospect.

The actual impetus again came from practical, economic quarters. With the decrease in the whale herds in the North Polar Basin the occurrence of whale in the Antarctic Ocean became important and the first reconnaissance voyages went south in 1873. The first expeditions did not have much success but in 1898 the Ross Sea was opened up and it was found that the ice belt at this point is not impenetrable. This furnished the most favorable entrance gate throughout the decades right up to the present time.

Science at first made only modest contributions. In 1882-83

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an International Polar Year was agreed upon in the course of which meteorological and terrestrial magnetism observations were to be carried out from fixed stations according to a fixed plan. From about 1860 on meteorology was sufficiently developed that prognoses were attempted, but without knowledge of arctic conditions these remained unreliable. Here, too, the North Pole at first took precedence and no station was set up in the south polar regions. On South Georgia and on Tierra del Fuego only did German and French scientists make observations, but the results are inadequate for drawing conclusions about the antarctic climate.

One of the new whaling expeditions had the luck to encounter favorable ice conditions and first stepped ashore on the antarctic continent. Immediately the voices demanding a stay through the winter multiplied and as early as 1898 and 1899 two expeditions were under way who accomplished what was thought to be impossible. It was a daring undertaking. Nobody knew what turn temperature and light conditions would take and some wild notions about the psychological effect of the south polar winter made the rounds. One expedition wintered on board, frozen into the pack ice and drifting in the southern Pacific. The other for the first time built a fixed station house and carried out regular sled trips.

With that the curse was lifted and when the second international Polar Year was set for 1901/02 three large expeditions started out which in addition to observations were simultaneously charged with a geographic and oceanographic program. These were the Gauss, the Discovery and the Antarctic Expeditions. They had mutually arranged their scientific program and brought home such a wealth of material that its processing took decades. They also served to test human beings; many notable polar explorers of later times were also members of the earlier expeditions. The main results contributing to progress in south polor exploration was the discovery that the Ross Shelf Ice extends at least to latitude 82 degrees south and constitutes an ideal path to the Pole itself.

The most important issue of the subsequent years was less a scientific one than one of sport. After an International Union for the exploration of the Polar Regions had been founded in 1905 with the chief goal of reaching the earth's poles, several expeditions started out in the years immediately following with the explicit purpose of reaching the South Polefirst E. Shackleton did not succeed, but he did find out that the way lay across a high mountain wall and that the pole would probably be found on an ice plateau some 3,000 meters high. But the second section did succeed in reaching the magnetic pole -- a purely scientific result. The expedition of Roald Amundson and R. Scott were the first to reach the pole itself. On this occasion Scott and five companions so tragically lost their lives on the return march. In addition the Scott Expedition brought home a wealth of scientific results which marks it as one of the most successful expeditions. Amundsen had noticed on his march to the pole that the mountain wall between the polar plateau and the Ross Shelf Ice extended much farther to the east than was previously assumed. Straight across, on the Atlantic side of Antarctica, the Weddell Sea also extends far to the south and here, too, table-like icebergs are common such as can only stem from an ice-sheet. The geographical problem therefore arose of deciding whether Antarctica does not consist of two large parts separated by a sea passage. Polar geographers such as Richthofen and Nordenskiöld, also Markham, president of the London Geographic Society, held to this view. Such an ice-covered ocean bay would be important in the determination of ocean currents and the prediction of ice conditions which in turn is of great value for practical navigation. This problem called forth a whole series of expeditions, with W. Bruce and W. Filchner as well as Shackleton from the Atlantic side, and R. Byrd especially from the Ross Barrier side. Only Filchner succeeded in reaching the southern coast of the Weddell Sea, but a natural catastrophe and a difference of opinion with his captain prevented him from further pursuing his discovery. A large portion of the barrier broke loose and began drifting with the station house on board, and Captain Vahsel demanded an immediate return of the vessel. But the latter froze fast and made a dangerous drifting voyage. This was repeated years later by Shackleton when the vessel "Endurance" was crushed and sank. Not until the Ronne Expedition of 1947/48 was a complete mapping of the southern boundary of the Weddell Sea accomplished, with the exception of a small gap in the east. The problem of the sea arm is not yet completely solved even if the probability of such a strait is very slight. If there were one it would be covered with ice down to the bottom, and a water exchange between the Atlantic and the Pacific certainly doesn't exist there.

In addition to these expeditions a few others were also active which also brought home partly geographical partly geophysical results, such as the expedition by Mawson and Dharcot.

After the World War which temporarily interrupted exploration south polar exploration was resumed with new methods. Again practical economic considerations furnished the impetus when new whaling areas had to be found. Captain Larsen who had been travelling around in south polar waters since 1893 had shown on his first trips that he was also interested in matters economic. He brought home the first plant fossils from the Antarctic; he commanded the ship of the Swedish 1901/03 expedition and was the first to establish a permanent whaling station on South Georgia, Grytviken, which today is the center of south polar settlement. Right after the World War he undertook the penetration of the Ross Sea with a whaling mother-ship and five whale-boats, and once again the Ross Sea became important as an entrance gate.

The whalers operating out of the South Shetland Archipelago furnished a good backbone for exploration trips. A whaling station set up on Deception Island -- the southernmost settlement on earth -- offered an excellent harbor at the same time. Here the first attempts were made to test the new methods.

During the World War the airplane had been technically perfected and soon proved its worth in polar exploration as well. By airplane it is possible to photograph within a few hours areas which would have taken earlier expeditions years to cover. Its use in exploration brought a revolution in expedition techniques which made possible the great advance in our knowledge of the south polar regions.

The first flights as yet did not yield much. Navigational difficulties (magnetic and gyro compasses were useless due to the nearness of the poles), insufficient knowledge of the weather, difficult estimation of illumination, insufficient experience in altitude determination -- all this resulted in the first flights bringing home "rich results" which had to be refuted by later expeditions. Where sea straits were "discovered" there are plateaus 2,000 meters high, where mountains were supposed to be, deep bays were found and positional errors for individual objects of up to 180 kilometersare no rarity! The only reliable objects are those found at the same place on two or more flights and only these should be entered on large-scale maps.

The use of airplanes involves two possibilities. One works with fixed stations, such as Byrd's 4 expeditions which had the task to reveal the region east of the Ross Sea as far as the pole, or the other which operates from shipboard, as was the case with the Norwegian expeditions from 1928 to 1937 and with the Mawson expeditions. Airplanes have also been successfully used for ice and whale observations. It was found possible to map large parts of the coastline of the African quadrant and of Marie Byrd Land by 1931, and the missing coastal stretches with the exception of the west antarctic coastline by 1937. An aerial feat not yet duplicated was accomplished by the Ellsworth expedition of 1935/36 when the entire western Antarctic was crossed from Dundee Island to the Bay of Whales. Due to weather conditions several intermediate landings were necessary during the flight, and these were carried out without accident. After the development of instruments capable of making series aerial photographs there followed the German Antarctic Expedition of 1938/39 whose chief task was the cartographic survey by means of aerial photographs of a large section of Antarctica. They permitted maps on a scale of 1:50,000 and 1:500,000 (Wohltat Massif) while the results of the expedition as a whole have not yet been published.

The second World War to a large extent prevented further exploration. In 1941/41 Byrd was in the south polar regions for the third time, but the reconnaissance flights only yielded results that were superceded in part at a later date. The other geophysical results of the expedition are far more important. During the Second World War new methods were again developed that benefitted scientific research. Radar makes it possible to make continuous soundings of the ground and to draw a profile of the route covered while maintaining constant altitude. Land areas hidden under ice can be recorded continuously by magnetometers, which cannot be done seismically, and their rock composition can be determined. Through the use of duplex instruments [probably walkie-talkies] more exact position bearings may be taken and soundings of the Heaviside-layer make predictions of radio reception possible. New technical photogrammetric methods such as the tri-metrogon system of measurement and the swiveling camera permit photographs having a strip-width of 350 kilometers. These are all advantages which permit the surveying of large areas with limited means.

The postwar expeditions made use of these new methods. The fourth Byrd expedition was specifically an experimental expedition which was to test various materials for their polar usefulness: airplane carriers and submarines in the pack ice, heavy planes and the testing of their landing gear, protective clothing, the usefulness of heavy caterpillar tractors in ice and snow -- all these were the vital considerations. Along with this there were extensive scientific investigations, especially of the tropopause and the ionosphere, attempts at radio communication across the magnetic-pole area and many other things. It is hardly surprising that extensive mapping operations were also carried on, for example in the hinterland of South Victoria Land, on the north-coast of western Antarctica, in Wilkesland and on the coast of the African quadrant. The major geographic event is probably the discovery of high peaks of more than 6,000 meters in the western Antarctic which are 1,500 meters higher than the highest previously known peaks. They can compare favorably with the mountains of other parts of the earth.

The final chapter in present developments was written by the Finn-Ronne expedition which succeeded in determining the west and south coast of the Weddell Sea. What now remains to be done is an unlocking of the eastern Antarctic from the coasts right to the pole which could technically be accomplished by a few cross-country flights. Also needed is a cross-country survey flight from Prince Regent Luitpold Land to the Horlick mountains in order to determine the course of the Quenn Maud Range toward the east and north. A great deal of geophysical research is yet to be done and geological research leaves a great deal to be desired. A survey of the present state of mapping is shown on the attached map. It also shows the reliability of the data of our polar survey maps.

The methods of exploration developed with equal intensity in the course of time. The data of the early days of polar exploration were obtained by means of the distance-meter [log], chronometer and sextant. Since landings were feasible only in exceptional cases these measurements from shipboard are not entirely reliable. Depending on the experience of the captains distance estimates are more or less accurate. Exact route mapping was possible in the polar regions only on cross-country journeys, where position could be determined from camp to camp. Triangulation measurements are available only for the McMurdo Sound area. The ponies used by Scott and Shackleton sank too deeply into the snow and were more susceptible to climate. Tractors were used on the Byrd expeditions, but gave up in territory rich in crevasses. They are also too heavy in new snow, and the expeditions had to depend on cold-proof fuels. On cross-country trips duplex (walkie-talkie) phone instruments and radio direction finding have proven themselves. Even more accurate a series survey photographs, regardless of the method used, as long as they are tied to at least two astronomical control points. As already stated individual observations from airplanes are inaccurate, since in that case positions can only be given approximately.

Antarctica. State of Exploration.

[Photo]

1. Terrestrial triangulation. Very high accuracy

2. Route surveys from sled trips. Frequent astronomical points. Altitude determinations chiefly barometric.

3. Coastal surveys from shipboard. Position of the ships astronomically determined. Coastal mapping by bearings.

Altitudes estimated in many cases.

4. Fairly dense network of individual flights. Position orientation by airplane positions. Series of aerial survey photographs which overlap in many cases. Sterographic altitude measurements or length-of-shadow measurements.

5. Regions with at least two reconnaissance or mapping flights. Availability of aerial photograph survey series either not known or not yet published. Altitudes estimated from altitude of plane.

6. Regions covered by only one flight or sighted by plane. Positional errors of several kilometers, altitude errors of hundreds of meters are possible.

7. Unexplored territory.

PROGRESS OF THE FRENCH ANTARCTIC EXPEDITION UP TO THE PRESENT

Fritz Loewe, Melbourne

As representative of the Australian government I have participated in the antarctic voyage of the "Commandant Charcot" commanded by Captain Max Douguet. The following should be reported about the progress of the trip:

The task of the expedition was to erect a wintering station on the coast of Adélie Land which no one had set foot upon since 1840 and to undertake scientific work in going and returning as well as while staying there. The "Commandant Charcot", a wooden vessel of 1300 BRT without special reinforcement against ice left Hobart on 22 December 1949 carrying the expedition members, the equipment of the wintering party and 30 dogs. The pack ice was reached at latitude 65 degrees south and after almost three weeks' efforts we succeeded on 18 January 1950 in breaking through the second, southern ice belt near the coast and to reach the open coastal waters which are kept free of ice by the descending winds blowing down from the inland ice with great intensity. After reconnaissance on Cap de la Decouverte and Cap de Margerie which are small rocky promontories interrupting the wall where the inland ice breaks off towards the sea, the wintering party was landed on Cap de Margerie (66 degrees 50 minutes south, 141 degrees 20 minutes east). Frequently the landing operations had to be interrupted because of the prevailing stormy SSE winds, although there were occasional windless and sunny half-days. At these times a strong melting of snow and ice could be observed. The landing section consists of ten men, their leader is Andre Liotard. Equipment is exceptionally complete and weighs a total of 300 tons. "Weasel" type caterpillar tractors proved especially valuable in the landing operations. The first year's task of the landing party is to be above all the technical setting-up of the station. But scientific, especially meteorological work is also to be undertaken. The Commandant Charcot also visited Point Geologie where in 1840 Dumont d'Urville's expedition made the only previous landing in the French sector on an islet facing the coast, and Cape Denison where the Mawson expedition's wintering hut (1911-12) was found undamaged. On the return trip to Hobart the ice belt could be crossed after cruising for several days. In ice reconnaissance a "Stinson Voyager" seaplane helped with success. During the trip radiosonde ascents, oceanographic depth measurements and studies of the ionosphere and the origin of air-currents were carried out. Following a brief stay in Hobart the ship is to advance once again to the edge of the ice and to continue to Madagascar via Heard Island and Kerguelen Island, and from Madagascar Adelie Land is to be revisited at the end of 1950 in order to provision the wintering station and to relieve a part of the personnel.

It should be further mentioned that the 2,700 meter high mountain on Heard Island has been recognized unmistakably as an active volcano. The reflection of the lava within the crater could be seen from the sea.

THE "ATLAS OVER DELE AV DET ANTARKTISKE KYSTLAND"

(ATLAS OF PARTS OF THE ANTARCTIC COAST)

Hans-Peter Kosack, Landshut

In 1946 the Atlas of Parts of the Antarctic Coast appeared in Oslo which contains the cartographic results of Lars Christensen's mapping expedition of 1936-37. Editor is Captain H. E. Hansen who is already known by his 1936 atlas of Antarctica and the south polar sea.

The atlas contains eight pages of text with a discussion of the mapping method and the accuracy to be expected. There follow 16 panoramic aerial views, in part with magnificent rendition of landscapes, and 12 maps. Sheets 3 to 12 cover the entire coastal stretch from Enderby Land to the western end of the West Ice (Kaiser Wilhelm II Land) on a scale of 1:250,000. Two sheets lie between Enderby Land and New Swabia, for Lützow-Holm Bay 1:250,000 and Princess Ragnhild Land 1:500,000. The reduction of the aerial photographs (the maps are based on oblique pictures taken by the expedition) was handled in part by the Schweizerische Luftvermessungs A.G. (Swiss Aerial Survey Co.) and in part by B. Luncke of Geografisk Opmaling of Oslo. The maps show contour lines, blue in ice-covered areas and black in ice-free areas. The coastline is indicated by three symbols: blue double line for shelf ice coast, single blue line for ice coast, and black for a rocky coast. Numerous altitude figures give an impressive picture of the relief. Some of the questionable representations have been superseded by more recent research. An example is the rendition of Edward VII Bay whose inner portions were more thoroughly explored by the 1947 Byrd Expedition, another is Stefanson Bay which was accurately surveyed by the William Scoresby expedition. Nevertheless the maps constitute a valuable contribution to our knowledge of the antarctic continent.

This is not the place to discuss individual map sheets in detail. On sheet 11 there is an exact representation of the Vestfold Oasis about which very little was known up to now. The coastal stretch from Sandefjord Bay to Cape Bjerkö with the Amery Barrier (Norwegian: Kvarv Barrira) was more firmly fixed than before, and the cliffs of Enderby Land and McRobertson Land have been mapped accurately for the first time.

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Of special interest is the fact that in the west the Atlas adjoins the German explorations in New Swabia and in the west Kaiser Wilhelm II Land. While there is still a gap of 270 kilometers between Sheet 11 and Kaiser Wilhelm II Land (Cape Penck) that has not been covered by accurage maps, Sheet 1 adjoins directly the map of New Swabia on the scale of 1:1,500,000; for this reason a comparison is very interesting.

While the Wohltat Massif up to the advance post is available on a scale of 1:500,000 on Gruber's map, the Wideroe Massif which adjoins at some distance to the east is entered on Hansen's map.

New Swabia as a complete area is available only on the 1:1,500,000 map which is only a temporary evaluation. Gruber's corrections shifted the advance post towards the west by about 5 degrees. To what extent this shift affects the mountain ranges farther west can be determined only approximately, since a like shift of the frontal mountains (Passat) cannot be harmonized with the position of the coastline. In any case it is noteworthy that the Sör Rondane of the Norwegian map lie at about the same latitude as the Payer Group, only farther east. Here as in New Swabia we are dealing with a plateau drop in front of which there are outlying mountains (there the Wohltat Massif, here the Menipa, the Brattnipane and the Romnaes Fjell).

A special problem is the representation of the coastline. On the German map it runs fairly directly eastward from the big shelf ice tongue for some 15 degrees at 69 degrees 35 minutes south latitude. It is also a shelf ice coast, but is situated decidedly farther south (70 degrees 29 minutes). There is a considerable difference between the two coast entries which the American "Antarctica" map evens out by letting the coast turn towards the south. This representation is in my opinion correct, since the region of the German expedition is indicated only by line-shading. The 1947 Byrd expedition reported a more southerly position of the coast farther to the east, so that the above-mentioned view seems justified.

In any case it has been established that the two regions belong to a large natural unit: shelf ice on the coast whose transition to inland ice is poorly defined. The ice cover slowly rises to 600 to 700 meters and merges into outlying mountains (literally advance mountains) which show local glaciation and are the remains of a great plateau which formerly extended much farther north and was broken up into individual peaks and chains through tectonic processes and ice erosion.

RECESSION OF ICELAND GLACIERS IN THE YEARS 1930-1947

Jon Eythorsson, Reykjavik

[Table in text showing numerical values, units undefined, of recession of variour Iceland glaciers.]

LIST OF STATIONS

[Any disagreement with original is due to illegibility of photostatic copy]

I. DRANGAJÖKULL

1. Kaldalón
2. Leirufjörður
3. Reykjarfjörður
4. þaralátursfjörður

II. SNAEFELLSJÖKULL

1. Hyrningsjökull
2. Jökulháls
3. Norðurkinn
4. Blágilsjökull
5. Hólatindajökull

III. EYJAFJALLAJÖKULL

1. Gigjökull
2. Seljavallajökull

IV. MYRDALSJÖKULL

1. Sólheimajökull W
   --- E
2. Jökulhöfu

V. VATNAJÖKULL

1. Skeiðararjökull W

V. VATNAJÖKULL (CONTINUED)

--- E

2. Morsárjökull
3. Skaftafellsjökull
4. Svinafellsjökull N
   --- S
5. Virkisjökull (Falljökull)
6. Gljúfursárjökull
7. Stigárjökull
8. Hólárjökull
9. Kviárjökull
10. Breiðamerkurjökull
11. Fellsjökull
12. Brokárjökull
13. Birnujökull
14. Eyvindstungnajökull
15. Heinabergsjökull S
    --- N
16. Flaájökull W
    --- E

V. VATNAJOKULL (CONTINUED)

17. Hoffelsjökull W

--- E

18. Hoffelsdalsjökull

VI. HOFSJÖKULL

1. Blágnipujökull

2. Nauthagajökull

3. Múlajökull

VII. LANGJÖKULL

1. Folskvisl

2. Hagafellsjökull W

3. --- E

VIII. HRÚTAFELL

1. Norðurkinn E

--- M

--- W

2. Norðvesturjökull

(NW glacier)

IV. KERLINGARDJÖLL

1. Loðmundarjökull

THE INTEREST OF STAMP COLLECTORS IN THE POLAR REGIONS

Dr. C. Krüger, Beverungen

The philatelic world follows developments in the polar regions of the earth with the greatest interest. The Anglo-Saxon world especially is interested in the mail service operating continuously or intermittently in the north and south polar regions. In 1938 Danish Greenland obtained its own stamps for its mail. Mail delivery to Spitsbergen is in the hands of the Norwegian Postal Service. Nothing is known about mail organization in the artic regions of Russia. In the entire Canadian Arctic there are only six post offices, and those are in the eastern arctic part of Hudson Bay, Hudson Strait and Baffin Island. They are the postal stations Port Chimo, Port Harrison, Dundas Harbour, Lake Harbour, Pangnirtung (Eskimo name) andPond Inlet. The post office in Dundas Harbour was reopened on 15 September 1946 after being closed for several years.

A book entitled Antarctic Mail Delivery by the Englishman Dr. J. H. Pirie, member of the Royal British Philatelic Society of London, appeared in 1948. Dr. Pirie, himself acquainted with the Antarctic, deals especially with the stamps or cancellations occasionally issued by south polar expeditions. As early as 1908 the Englishman Shackleton's south polar expedition used stamps with the overprint "King Edward VII Land" officially issued by New Zealand's Post Office Department (cf. Stanley Gibbons, British Empire Stamps, New Zealand.) Even Scott's famous 1911 expedition used New Zealand stamps with the overprint "Victoria Land". In 1944 the stamps of the British Falkland Island were given, for postal purposes, the overprint Graham Land, South Georgia, South Orkneys and South Shetlands, respectively.

Australian stamps were used for the 1947 Australian expedition. Mail to be sent to Australia from the two headquarters of this expedition (Macquarie Island and Heard Island) was identified by the two-line dated cancellation "AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITION 1947". G. N. Morris, in the January 1948 American Philatelist reports in detail on stamps and cancellations used on South polar expeditions.

Mr. B. S. H. Grant, one of England's leading philatelists, to whom we owe these data, has an excellent collection of Falkland Islands stamps which was recently awarded a prize at the IMABA in Basle. Grant has made valuable contributions to the development of postal history in the south polar regions.

JUST KNUD QUIGSTAD 98 YEARS OLD

Erich Wustmann, Bad Schandau

Rector J. Quigstad's life is dedicated to youth, to the state, to science, and -- to the Lapps. He is one of Norway's most significant men, the oldest Lappologist of the present day.

Quigstad was born on Lyngseid on 4 April 1853, went to Tromsö at the age of ten, attended the higher schools there, became a teacher and stayed in the city to the present day, with short interruptions. Although he was kept busy enough with his activity as a seminary teacher, state counselor and chief in the church and education department he turned to museum work and Lappology at an early stage. He not only mastered the Lapp language, but all its dialects. His first great work as a translator was his treatment of the Bible and the Old and New Testament. From 1881 to 1927 there extends a series of 80 publications (excepting newspaper articles) on Lapp folklore and linguistic research; many other original papers followed. Among his greatest works, which he himself translated into German, must be numbered: Lapp Language Samples, Lapp Superstitions, Lapp Proverbs and Riddles, Lapp Stories from Hatfjelldalen, The Lapp Dialects in Norway, Lapp Texts from Kalfjord and Helgöy, Place names in Spitsbergen and others. His last work which appeared three years ago dealt with the place names of Lappland.

Great honors and nominations to honorary membership of scientific societies in Norway and abroad were given him. Quigstad's name will always be intimately associated with Tromsö and Lappland, whether Finno-Ugric, especially Lapp linguistic science, general Lappology, archeology, ethnography, Nordic zoology and botany or the Tromsö Museum itself are involved. May he long remain the Nestor of Lapp research.!

BRIEF NOTES

NORTH POLAR REGIONS

General Items

The German Hydrographic Institute in Hamburg has received a new survey and exploration ship bearing the name "Causs". The ship was put in service on 6 January 1950 in the presence of the Federal Minister of Transport. It was built in 1944, displaces 769 BRT and is equipped with all the instruments needed in modern exploration and surveying.

In the Kaiser Wilhelm Museum at Krefeld an exhibition on Lappland took place from 23 April to 21 May 1950. Paintings, water colors and drawings by Gustav Hagemann as well as an exhibit entitled The Lapps draw their Life were shown.

The German Fishing Fair was held in Bremerhaven from 20 to 31 May 1950. The Federal Minister of Food, Professor Niklas, expressed the hope that Germany might in the near future be admitted as equal partner in whaling, on the strength of the Petersberg a- greement. 340 firms exhibited their products. In addition to the fishing industry numerous branches of associated industry and of the industry's advertising were represented. A large harpoon gun of the German Whaling Society shows that in this field, too, German industry has kept pace with developments.

Our collaborator Professor Dr. Ferdinand Dannmeyer celebrated his 70th birthday on 26 August 1950. The celebrant is the founder of the Light Research Institute from which many valuable publications on difficult problems in light research, public health and nautical optics have come. The management of the Polar Research Archives expressed their heartiest good anniversary wishes to the celebrant who is a noted expert on Iceland.

On 10 February 1950 the German sealer "Sachsen" (135 BRT) left Hamburg for its first catching trip in the waters around Labrador and Newfoundland. The ship was commanded by Captain Krite. In addi- tion to two steersmen and a crew of ten Dr. Nusser and Mr. Trense participated in the trip as scientists. The valuable pelts of the "bluebacks" and"whitecoats" are primarily to be handled with process- ing immediately after capture. Some 21,000 seal pelts can be stowed in the storeroom. The "Sachsen" is the last of three sealers that worked for the Nordmeer Ship Line and of which two had to be delivered to Norway. The Nordmeer Line which is the only German Line engaged in sealing was founded in 1938 in conjunction with a Leipzig tobacco products syndicate.

N. E. Odell of British Columbia University reports on page 23 of Science News Letter 57, 1950 that on the Seward Icefield (St. Elias Range on the Yukon-Alaska Border) at an altitude of 1,800 meters he actually found ice worms whose existence had hitherto been doubted. They are Enchytrae of the genus Mesenchytrae which belongs among ringed worms with few setae. These black ice worms are about 2 centimeters long. Odell observed these worms in the vicinity of "blood" snow. In all probability they feed on the algae which produce it. Birds of the genus Phalaropos (sandpiper-like water birds) are supposed to eat these worms. If these ice worms are taken from ice or melting snow into a hot place they dry up and die in a short time.

The 61-year old Catholic priest Bernard R. Hubbard, widely known as the "glacier-priest", is considered to be one of the best experts on the Arctic. For a long time he was active as consultant with the 10th Air Rescue Squadron stationed in Alaska and under the command of the well-known polar explorer Bernt Balchen. Father Hubbard has taken a large number of arctic films having great artistic and scientific value and containing a large proportion of marvelous color shots.

Sir Hubert Wilkins, in a lecture in Washington on The Strategic Significance of the Arctic pointed out that in the event of war Americah planes would encounter heavy anti-aircraft defense along the radar-equipped Siberian coast and that the US Navy would have to count on a strong complement of Soviet U-boats. He recommended the use of specially constructed submarines which can advance unmolested under the arctic ice sheet. The ice would have to be cut open by means of electrically heated drills for setting up a base for planes or remote-controlled missilcs.

According to detailed investigations by Swedish Dr. Tryde the members of the Andre expedition (1897) did not die of cold but of the consumption of trichinous polar bear meat. Norwegian investigations have shown that the polar bears of Spitsbergen have a high incidence of trichinosis. Dr. Tryde compared the symptoms of a trichinosis case with Andree's note and found exact agreement. While investigating the camping equipment recovered in 1930 and stored in Gränna near Vättern, Andree's birthplace, Dr. Tryde, among other things, also found 14 small pieces of polar bear meat in which even then 6 trichinae were present. This result apparently clears up completely the death of the three intrepid balloonists. In several symptoms trichinosis is said to resemble scurvy so that wrong diagnoses are easily possible.

In March 1950 Father Primo Girard died at the age of 66 years. He had to take care of the largest parish in the world, 140,000 square kilometers containing only 140 parishioners. Girard, the priest of the North Pole, was active for 30 years among the Eskimos, whose way of life and migrations he shared.

W. M. Antipin reports in Priroda (Nature) Vol 39, No. 9 that a few instances are known where seals have covered large distances on land. Saddle seals are said to have crossed the Kanin Peninsula and walrusses are supposed to have crossed the narrowest part of Kamchatka from Bering Sea to the Sea of Okhotsk. In 1924 a migration of numerous saddle seals was observed on Kolguyev Island from the ice-blocked west coast overland to the east coast. In 1930 a hunter met a saddle seal on Novaya Zemlya 40 kilometers from the sea, while the animal was covering the long distance from the Kara Sea to Barents Sea. Similar instances have been frequently observed on Novaya Zemlya. (Umschau [Review] 50,1950, 16, 513).

In order to determine the number of icebergs all of Baffin Bay was photographed by plane in 1949. 40,232 icebergs were counted. Frequently as many as 700 can be seen from shipboard at Julianehaab. Since most of them get caught in the bays of the North American east coast only 5 percent reach the latitude of Newfoundland. The Ice Patrol observed an average of 431 annually in the years from 1900 to 1947. But the number varies considerably from year to year. The maximum was reached in 1929 with 1,350, on the other hand none at all were sighted in 1940 and 1941. The largest so far encountered was 10 kilometers long and 6 kilometers wide. The iceberg season begins in March, but the reconnaissance flights begin 1 February. When ice conditions have become critical for shipping, reports are sent out by radio twice daily from the Argentia base of the Ice Patrol in Newfoundland. The ice patrol ships then put out to sea in April. Every captain sailing the Atlantic is obligated to aid them in their work. Every 4 hours position, course, speed, air and water temperature must be reported, as well as visibility, condition of the sea and ice seen. On the basis of these reports a water-temperature chart is drawn which permits delimiting areas containing icebergs. April is the peak of the ice season, sometimes even May.

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By June there is a gradual decrease and from July on the danger can be regarded as past. Only in 1939 were there any icebergs as late as August. The velocity of the iceberg usually amounts to up to 1 kilometer per hour. The trip of the bergs from their birthplace to the Newfoundland Banks often takes 2 to 3 years.

Radar techniques greatly benefit all shipping in the ice of northern waters. By means of radar it is possible today to obtain a clear picture of the structural make-up of the ice-fields to be crossed. Tests on a grand scale by the Swedish icebreaker "Ymir" showed that smooth ice-fields do not reflect radar pulses. On the instrument screen they appear as surfaces whose dark color is more intense than that of the open sea, since the latter still shows a few reflections caused by wave motion. But the corners and edges of pack ice furnish almost ideal reflections. Even a moderate and not-too-tightly packed snow cover on top of the ice cannot materially influence the accuracy of the radar reading. The Northeast Passage is even today being systematically watched by radar for ice conditions.

When Russia sold Alaska to the US in 1867, one of the Diomede Islands called Krusenstern was surrendered, but the larger, Ratmanow Island, together with the small cliff island Farway remained with Russia. Ratmanow is the Russian island situated closest to the American continent. Following evacuation of the civilian population it was transformed into a military advance base.

The number of Eskimos living in the Soviet Union is said to have increased steadily in the last 25 years. In addition this race is said to have proven educable and even anxious to learn. Following evacuation of the civilian population it was transformed into a military advance base.

The number of Eskimos living in the Soviet Union is said to have increased steadily in the last 25 years. In addition this race is said to have proven educable and even anxious to learn. Following the compilation of a dictionary and an Eskimo grammar schools were erected where Eskimo children are instructed in all subjects of their mothertongue. In this numerous Eskimos proved to be so intelligent that their further education in specialized fishing, navigation and radio schools was undertaken. Young Eskimos also became students of institutions of higher learning. A few graduated and are today studying at Russian universities.

In the past few years sharks have moved farther in the Atlantic. In September 1950 Norwegian fishermen caught several large sharks in the waters of northern Norway.

During the period from 6 to 8 September 1950 international shortwave traffic was severely disturbed by sunspots. The arctic stations in Greenland and Canada especially could in part not be heard at all.

On 26 October 1950 was the hundredth anniversary of the day when McClure found the Northwest Passage. Let it not be forgotten that the German, Johann August Miertsching from Herrnhut, was active for ten years at a mission station in Labrador and played a decisive part in the solution of this problem which occupied all of mankind for three centuries as hardly another has done.

The chief research of the linguistic section of the Soviet

Academy of Sciences during the last two report years was devoted to the preparation of dictionaries for the linguistic regions of the Asiatic Soviet populations that live beyond the Arctic Circle. The Marx Institute for Linguistics in Leningrad has published a dictionary of the Eskimo language. The material for this work was gathered by scientific expeditions to the Bering Sea coast.

Since the US and the Soviet Union are situated very close to each other at Bering Strait and since this region could be the starting point for important strategic undertakings, the US in Alaska and the Soviet Union in the Chukotski Peninsula are consolidating their positions with all the means of modern war technology. On the Russian side the Politburo in 1948 ordered the Chief of the General Staff, Shtemenko, and Marshals Govorov and Meretskov to make practical preparations for waging war in the Russian Arctic. Three arctic defense districts were created. During the winter of 1948/49 maneuvers were held for the first time in the Russian Artic. The purpose of these maneuvers was to test, under polar conditions, a coldproof gun, special clothing, suitable food and land and air transport facilities. The experiences with men and material were not encouraging. Human failure was too great. The clothing also was not practical enough. The electric heating elements sewed into the uniforms and fed by dry cells did not prove themselves because of too rapid discharge of the cells. On the other hand the combination suits filled with eiderdown lived up to expectations. Supply by land was handled by propeller-driven sleds, but it suffered frequent interruptions due to blizzards and snowdrifts. Supply service by plane was also quite unreliable in the polar night with its fog and storms. During the winterof 1949/50 only a few special units were detailed to obtain additional experience. Here it was again demonstrated that war technology is the all-important factor in the Arctic. The well-trained troop units that are committed must be completely familiar with arctic conditions and have a large proportion of technical personnel. Wherever troops are located in the Arctic air-borne troops must be nearby for quick support. Since 1948 launching sites are being built on the Chukotski Peninsula for radio-controlled rocket missiles of the "V5" and "V6" type which have an effective range of 5,000 kilometers. Submarine support bases for a special arctic type having a large operating range are also available.

Dr. Franz Nusser, Hamburg, was given a teaching position for polar geography at the University of Hamburg.

The Soviet Union issued a new series of airmail stamps which shows an airplane in the polar regions above the three-ruble valuation.

The Lappland-explorer and painter Gustav Hagemann, residing at Watenstedt-Salzgitter, started his 16th trip to Lappland October of 1950. Hagemann intends to produce film and picture documents of Lapp life on this trip.

From 23 to 28 October 1950 there was a meeting in Hamburg of the German Geophysical and Meteorological Society. Dr. Max Grotewohl participated as representative of the Archives for Polar Research.

On the occasion of the 20th anniversary of the death and the 70th birthday of Alfred Wegener an Alfred Wegener Memorial Celebration was held at the University of Hamburg in connection with the meeting of the German Geophysical and Meteorological Society. Frau Else Wegener participated. The opening address was given by Professor Dr. Kuhlbrodt, followed by a lecture by Geheimrat (Privy Counselor) Professor Dr. A. Schmauss on Alfred Wegener's Life and Work as Meteorologist and an additional lecture by professor Dr. H. Cloos on The Dynamic Picture of the Earth.

Professor Dr. Georg Wüst, Director of the Oceanographic Institute of Kiel University, celebrated his 60th birthday on 15 June 1950.

EXPEDITIONS

An expedition from the Arctic Institute of North America has set out to make observations on the warming-up of theArctic in the last few years.

GEOPHYSICAL ITEMS

In the meteor number (sic) of the German Hydrographic Journal, Vol 3, 1950, 1/2, 93-100 Theodor Stocks reports on The Depth Conditions of the European Northern Sea. The numerous soundings of the last few years have made it possible to draw a new depth chart of the named area on which a wealth of new facts on the contours of the sea bottom is to be found. Numerous ridges and swells produce a much more distinct articulation of the northern sea into basins that had been assumed until now. A system of ridges and swells is found especially around Jan Mayen, and this system may be considered to be the roots of the Atlantic Ridge. In addition, what was hitherto the northern hydrographic boundary of the northern sea in the form of the Nansen (Spitsbergen) Swell was confirmed in much more southern latitudes as the Spitsbergen (Nansen) Ridge, while in the hitherto assumed latitude only a discontinuous polar swell can be found.

In the same number (pages 136-143) Joh. Georgi explains his views on the origin of high altitude storms above Denmark Strait. Since 1926 northern high altitude storms at heights of 5 to 15 kilometers and lasting several days have been observed above Iceland, Greenland and the Greenland Sea. It is believed that these greatly accelerated air masses penetrate far south solely by virtue of their mass inertia, without regard to the previously existing air pressure field and that they can exert considerable influence upon the existing pressure field. In the meantime such high altitude storms have also been described above the US as "jetstreams" which here, too, lead to cyclogenesis and probably correspond to our "frontal zones". Georgi emphasizes quite rightly that it is difficult to visualize a self-amplification mechanism at high altitudes. A special characteristic of the high altitude storms which certainly cannot consist of cold polar air for stability reasons is the undifferentiate pressure field in the lowest high-altitude kilometers. From this it must be concluded that neither frontogenetic readiness in the form of the presence of differentiated air masses nor a compensation for any possible cold air at high altitudes was available below.

NORTHERN EUROPE

The director of the tourist organization in Lappland, Markland, reports that new travel destinations are to be made available to the traveler beyond the Arctic Circle. The high points of such a future trip into the land of the midnight sun are to be Spitsbergen and the ice wastes of the polar sea. With the airport of

Lulea in northern Sweden as a starting point such an 11-hour trip by air should cost about 200 dollars, as calculated by the Swedish airline ABA.

In the flora of the Murmansk region more than 300 honey-carriers have been found. Initial experiments with bee swarms transferred to this region are said to have shown excellent results.

In order to increase the eider-duck population of 7 rocky islands on the coast of the Kola Peninsula the duck eggs are collected by Russian ornithologists and hatched in specially constructed breeding stations on the bird mounds. The young eider ducks are put into the bird nests to develop further there. Numerous artificial nests are also constructed on flat rocks and are gladly accepted as a place to breed. After departure of the birds some 20 grams of eiderdown is left in each nest.

30 years ago housing in the settlements on Barents Sea consisted of blockhouses which were constructed of heavy logs sealed with caulking. When in 1929 the first brick building was erected in Murmansk this conversion seemed to be a risky affair. During the period of the first two Five Year Plans Murmansk developed into a polar city with modern houses, wide streets, numerous cultural edifices and facilities for the constantly increasing trade. But in the Second World War Murmansk was largely destroyed. Immediately after the end of the war the reconstruction of the city was begun on the basis of construction experience gathered in arctic regions in the meantime. Today there are residential buildings of 7 and 8 stories on Stalin Street, equipped with all modern conveniences. High buildings are also under construction on Lenin Street. A

square also framed by high buildings is to contain sculptures of the great Russian arctic explorers

ICELAND

The Icelandic postal authorities in 1950 issued an entire set of stamps that picture an eruption of hekla with great optical realism. The designs are by the Icelandic graphic artist Stefan Jonsson.

In September 1950 200 Soviet fishing boats cruised in Icelandic waters where in normal times herring can be found in large quantities during that month. This year they were missing so that Swedish, Danish and Norwegian fishing boats had long before left the above-named waters.

SPITSBERGEN

Between 17 and 21 September 1944 the escort submarine U 507 under Commander Herrle succeeded on a voyage of only 5 days in circumnavigating Spitsbergen's Northeast Land, with Dr. Wilhelm Dege on board. On this trip it was possible to observe the topographical subdivision of this remote island which still presents many problems. Dr. Dege distinguishes the following parts: 1. The fjord and foothill country of the northern coast 2. Prince Oscar Land 3. The flat stony tundras of the Northwest 4. The mound-type hill country south and east of Murchison Fjord 5. The table-land in the southwest with its ice caps 6. The ice-free Rijp Disctict 7. The great upland ice-masses 8. The great ice break-off in the east and south of the island and 9. The glacier calving area of the Eton Depression. (From Meine Umseplung des NO-Landes von Spitsbergen [My Circumnavigation of Spitsbergen's Northeast Land], Mecking Anniversary Publication, Hanover 1949).

On Cape Linné a radar station was erected during the summer of 1950. It is the first in the Arctic and serves especially smaller ships that have a radio station but no radar equipment of their own. This new radar station will make the approach to the coast considerably easier in foul weather.

GREENLAND

Since the fishing industry is becoming ever more active in Greenland waters and since the consumption of oil is therefore constantly rising the large oil companies have decided to erect oil depots in Greenland. An annual consumption of 5,000 tons (probably metric -- translator) of Diesel oil, 6,000 tons heavy fuel oil, 1,200 tons petroleum and 200 tons gasoline.

Greenland is the land without any jail. When a Greenlander commits a crime the maximum punish ment given him is that he is forbidden to enter any store. This moral degradation is felt consciously and painfully.

After an interval of four years the Danish postal authorities have issued new stamps for Greenland, effective 15 August 1950. Among these a bust of Frederic IX is issued in the following denominations: 1 Oere black-green, 5 Oere burgundy-red, 10 Oere green, 15 Oere purple and 25 Oere red. The arctic vessel "Gustav Holm" is shown in front of an iceberg on the following denominations: 50 Oere blue, 1 Crown brown and 2 Crowns red. The portrait stamps vertically arranged, the higher values horizontally. The designs are by Viggo Bang; the engraver is Bent Jacobsen.

NORTHERN ASIA

Of the Soviet rivers flowing into the Arctic Ocean the Ob is to be the first to be so dammed up by a 78 meter high dam that in the future it will flow southward, where there is a scarcity of water and where it is hoped fertile country will be created by proper irrigation and water management. A Siberian Sea having an area of 25,000 square kilometers and a capacity of 4,500 cubic kilometers will be created. From this largest reservoir in the world a path must be cleared for the water to flow into Aral Sea and from there to the Caspian Sea. However, the Turgai Mountains lie in the way, with an average elevation of 26 meters above the level of the future Siberian Sea. A trench is blasted into these mountains, making a cut 22 meters (sic!) deep and 120 kilometers long, with a water depth of 5.5 meters. All in all this supply-canal will be 930 kilometers long and descend south through 22 locks. Numerous dam installations make it possible to obtain hydroelectric power on a tremendous scale. In this way it is hoped to convert an area of the combined size of Germany and France into fertile agricultural land. The construction time for these projects is estimated at 15 to 20 years.

LABRADOR

Huge ore deposits are to be made accessible in Labrador through American-Canadian cooperation. With an investment of 150 to 200 million dollars the largest mining installation of North America is to be set up here. A 360-mile railroad to the St. Lawrence River and a new inland waterway to the metallurgical centers on the Great Lakes are being built to transport the ore.

A huge meteor crater was discovered in Labrador. With a diameter of 5 kilometers the crater is far larger than theSan Diablo Crater in Arizona (Diameter 1.2 kilometers). The rim of the crater rises 200 meters above the icy wastes of the Ungava Steppe. The interior of the crater is filled with an ice-covered lake.

ALASKA

If Alaska is transferred to a map of the United States it can be seen that this territory covers an area one fifth that of the United States and extends from Charleston, South Carolina to Los Angeles, California. The distance from the northern tip of Alaska to the Soviet Union is only 90 kilometers and the distance to the important Russian naval base on Kamchatka is 1,125 kilometers. Ketchikan, Alaska is also several hundred miles nearer to the Panama Canal than Hawaii. Point Barrow is 320 kilometers closer to Berlin than to New York and 800 kilometers closer to Moscow. The shortest routes to the Orient also pass through Alaska which is actually closer to the power centers of the world than the United States proper. Even for the defense of the Panama Canal and the West Coast Alaska is better located from the viewpoint of distance than Hawaii. The capital of Alaska, Juneau, is on the same latitude as Dunbath, Scotland, and Bergen, Norway. Fairbanks corresponds in latitude to Risback, Sweden, and Amatignak to Dunkirk. (Geogr. Rundschau [Geographical Review] 2, 1950, 1, 7-10).

Alaska is the leading salmon fishing country in the world. In about 100 canneries distributed along the Pacific coast some 4 to 5 million cases of canned salmon are packed annually. This means that the Alaska's share in world production is 50 percent, a figure which is supposed to be even higher in some years.

Under the code-name of "Operation Sweetbriar" extensive maneuvers by Canadian and American troops took place in Alaska in January 1950. They were directed by officers with special polar experience. A few ski regiments were transported non-stop by air from Colorado to Alaska over a distance of 4,000 kilometers. These maneuvers showed that military operations in the Arctic can be carried out only by small units which have received special arctic training. At a temperature of minus 40 degrees centigrade arctic war is said to come to a complete standstill. In contrast to these experiences a large number of Russian divisions accustomed to the arctic climate are said to be stationed in eastern Siberia on the same latitude as Alaska's supported by an excellent arctic air force and navy.

There are plans to construct a 2,250 kilometer long railroad to Fairbanks, Alaska, from Prince George, a community of 6,000 inhabitants in the Canadian Province of British Columbia. Costs are placed at 250 million dollars. At Fairbanks this railroad is to connect with the 600 mile long main line of the Alaska Railroad to Anchorage. The reason for this railroad construction is to be seen in the fact that in the event of military operations in the far North neither the Alcan Highway nor an air bridge nor the sea lanes would be able to assure the necessary supplies. After completion of this line supplies could be brought without reloading from American and Canadian armament centers to the depots of the Alaskan army. But apart from the strategic significance of this line there are economic considerations involved whose importance cannot even be estimated today and which are a prerequisite for a really large-scale settlement and the economic development of Alaska

On 4 March 1950 Alaska was admitted into the federation of the United States as the 49th state [sic!].

WHALING AND SEALING IN THE ARCTIC

The expedition to the Barents Sea undertaken by the Small-Whale Fishers' Sales Company of Sunnmöre and Romsdal yielded 675 tons of whale meat which was disposed of on the domestic market. (Fischereiwelt [Fishing World] 1, 1950, 1, 81).

During the seal catching season of 10 June to 27 July 1949 70,891 fur seals were killed. This yield is 749 animals less than in 1948. Since 1910 sealing in the Pribilof Islands has been carried on by the American Government. Through ruthless exploitation the number of seals had been reduced to 132,000 individuals by 1910. Thanks to the protective measures of the US government they again numbered 3,837,000 by 1948. On the basis of the Alaska Fur Seal Law of 1944 the Canadian government receives about 20 percent of the furs obtained each year. It is estimated that 80 percent of all fur seals go to the Pribilofs to have their young. The by-products obtained in sealing amounted to: 62 tons blubber oil, 350 tons seal meat and 26 tons body oil. (Fischereiwelt [Fishing World] 1, 1950, 1, 8).

The whale most frequently caught in the Arctic by the small-whale fishers is the dwarf whale. The area of distribution of this smallest of the grooved whales, attaining a length of 8 to 10 meters, is worldwide. In the summer it is found in northern waters, during the southern summer it can frequently be found in the Antarctic Ocean. Whalers call him "Minke". This designation is supposed to have originated from a German by the name of Meincke who was a whaler near Svend Foyn. The dwarf whale is found singly or in groups of 2 to 3 animals. It may circle drifting ships for hours since it is not at all shy, but quite curious. Not until it has moved in ever narrowing circles and touched the side of the ship with its snout does it move on. It can be easily recognized by the sharply outlined white cross-stripe on its breast fin. The vessels used for catching small whales have an average crew of 4 men. With approximately 300 vessels a total of 1,200 to 1,300 men are involved. Even in a good season the gross profit is said to amount to not more than 4,000 to 5,000 Swedish crowns. (Fishing World, 2, 1950, 8, 125-26).

On 13 August 1950 the motortrawler "Arktis" built for the First German Whaling Company of Hamburg made its shake-down and transfer cruise from the Kiel Howaldt Shipyards to Hamburg. Both from the point of view of construction as well as dimensions the "Arktis" must be considered a special type in our fishing fleet. The dimensions are: length between sounding-leads 38.5 meters, beam 7.9 meters and freeboard 4.0 meters. With a gross tonnage of only 315.4 tons the ship can hold 3,400 baskets of frozen fish. Professional deep-sea fishing circles are especially interested in finding out whether the expected advantages of the all-aluminum fish hold will actually materialize. (Fishing World 2, 1950, 9, 140).

SOUTH POLAR REGIONS

General Items

Commodore B. B. Walford reports that the map made by the

German Antarctic Expedition 1938/39 have proved extraordinarily reliable, so that they permitted rapid orientation in the operational area of the British-Norwegian-Swedish south polar expedition. Walford therefore did not withhold recognition for the accomplishments of the German scientists. The two Auster-type planes that were taken along thus not only easily located a landing-place for the "Norsel", but using the German photographs also made comparison flights which confirmed all data given by the Germans. The two planes were first used with floats, then with skis.

The British expeditionary ship "William Scoresby" and the Danish steamer "Galathea" intend to take a 10 months' trip to the Antarctic Ocean in order to rediscover the "blue fish" (Latimeria). It had been assumed that this fish had died out many million years ago.

In May 1950 the Soviet Union addressed a note to the US, England, Australia, France, New Zealand, Norway, Chile and Argentina, making the demand to be consulted in all future discussions of the Antarctic.

EXPEDITIONS.

The French Antarctic Expedition reached Adélie Land at the beginning of February 1950 and landed all equipment.

Eleven British scientists who were isolated by ice masses on Stonington Island for over 2 years were picked up on 31 January 1950 by the 1,200 BRT rescue vessel "John Biscoe" and by airplane. The members of this expedition reported that the ice-barrier in

King George VI Land is constantly receding. In the course of a 90-day hike they discovered a series of new islands that had emerged from the ice belt.

On 10 February 1950 the expedition vessel "Norsel" announced by radio that a landing place had been found at 71 degrees 6 minutes south latitude and 11 degrees west longitude. The spot is a small bay south of Cape Norvegia on the west coast of Queen Maud Land. The location for the winter quarters was chosen some 4 kilometers from this bay. The "Norsel" began the return voyage on 20 February 1950.

On 17 April 1950 "Discovery II " left England in order to explore the last remaining unknown regions of the Antarctic.

On 15 June 1950 it was reported from Moscow that the Soviet union intends to send out a new exploration and whaling expedition to the Antarctic, and that this expedition is to be under the command of Aleksey Solyanik.

WHALING

During the whaling season of 1949/50 which lasted from 22 December 1949 to 7 April 1950 the shooting of 1250 humpback whales (500 blue whale units) was again permitted. Ever since the season of 1938/39 the humpback whale stock had been protected.

There are plans to build a heliocopter with a harpoon-throwing device, where the harpoon will be thrown at the whale like a bomb.

In July 1950 there was an international whaling conference in Oslo to which 16 countries had each sent three to five delegates. The international conventions on whaling were the subject of discussion. Chairman Birger Bergersen (Norway) emphasized in his opening address that the maximum annual catch quota of 16,000 blue whales in force up to now is too large and absolutely had to be reduced. He claimed that from the biological point of view it should be best to fix a maximum limit internationally for each individual species of whale and not for all species together. Norway proposed to shift the beginning of the whaling season by 14 days from 22 December to 4 January. Article 8 of the Whaling Convention of 1946 would have to be changed accordingly. The US desired protection for the sperm whale and England proposed not to begin the permitted catch of 1,250 humpback whales before 1 February 1951. Additional points of discussion were the regulation of pelagic whaling and the possible admission of several other countries, among them Germany. By resolution of the conference the season is to begin on 2 January in the future instead of 22 December.

After the quota of 16,000 blue whales had been caught the 1949/50 season was declared closed on 15 March 1950, three weeks before the official deadline. 18 "factories" with 214 catchers participated in this season. Compared to 1948/49 the number of catchers increased by only 24. Since the oil yield increases with the advance of the season the fatter whales of the last weeks of the season unfortunately were lost through the early termination of the season. (Fishing World 2, 1950, 4, 56-57).

The first whaler left Hamburg as early as 1644 and as early as 1675 a whaling fleet of 83 ships with a total crew of 4,000 men left Hamburg Harbor. A total of 6,000 Greenland voyages for whales and seal started out from Hamburg. According to Wanda Oesau Germany had three periods of whaling:

First period: German Greenland voyages for whales and seals from 1643 to 1873, with short interruption by war, involving 10,000 trips and 500,000 men.

Second period: German South Sea fishing of the nineteenth century. With 60 voyages from the homeland each voyage was a circumnavigation and lasted 2 to 4 years.

Third period: Recent German whaling (16 voyages) and sealing (3 voyages) 1936-1939 (Fishing World 2, 1950, 5, 76-77)

In 1950 the US again participated in whaling. A representative of the Olympic Whaling Company, Inc. stated that 8.5 million dollars had been made available for 12 ships. Numerous German sailors participated in this voyage. On behalf of the above-named organization the First German Whaling Company of Hamburg had undertaken the outfitting and equipping of this whaling fleet which was built in Kiel and Hamburg shipyards.

Studienrat Kurt Ruthe, Holzminden

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BOOK REVIEWS

G. Fox: Sonne über Labrador. (Sun Over Labrador). Life and deeds of a great man. Publishers: Carl Uberreuter, Vienna, Heidelberg 1949. The book contains the biography of the English physician, Wilfred Grenfell. He is the sun which passes over the ice-capped and gloomy coast of Labrador. With selfless devotion he dedecates his life to those in the most needy circumstances among the stagnating and destitute families of fishermen. The terrible and backward conditions are hard for us to conceive. We are introduced to a personality, well adapted from growing youth to serve his ideal.

M.

Hans Helfritz: Zum weissen Kontinent. Mit Flugzeng, Schiff und Kamera in die Antarktis. (On the White Continent. By Plane, Ship and Camera in the Antarctic.) Editorial "El buen Libro", Buenos Aires 1950. As participant in the Chilean Antarctic Expedition of 1947, the author carries us, in his richly illustrated book, over Tierra del Fuego and the South Shetland Islands towards Graham Land. His simple recital expresses the solemn and melancholy feelings which are so easily induced in days dominated by drenching storms and pursued by dark clouds, but he also speaks of the sublime beauty which the landscape of the Antarctic continent can reveal during its rare sunny days.

M.

R. E. Harrison, Hans W. Weigert and V. Stefansson: New Compass of the World. A Symposium on Political Geography. Publishers: The MacMillan Company, New York 1949. 375 pages. Price:

5.50 dollars. The present work is concerned with an attempt to clarify the contemporary situation of Europe through the national geographical factors. The authors establish with grave concern the fact that the Soviet Union has expanded in all directions, even over the Polar Circle.

Christiani

I. E. Armstrong: Fort St. James Map Area, Cassiar and Coast Districts, British Columbia. Geological Survey of Canada. Memoir Publishers: Edmond Cloutier, Ottawa 1949. 210 pages. Price: 75 cents. The results are announced of several exploratory expeditions through the province of British Columbia and Northwestern Canada, hitherto still little explored. It is indicated that there is small prospect here of conducting exploration expeditions in the outermost forest covered territory of North America. The book gives an excellent survey of the Geological structure of the Rocky Mountains, which continue into the Arctic ridges.

Christiani

V. J. Okulict: Geology of Part of the Selkirk Mountains in the Vicinity of the Main Line of the Canadian Pacific Railway, British Columbia. Publisher: Edmond Cloutier Ottawa 1949. 26 pages. 25 cents. This volume can be of value as a supplement to Fort St. James Map Area by Armstrong. It deals primarily with the geological structure of the stretch between Albert Canyon and Beaver River in northern Canada.

Christiani

A. L. Washburn: Reconnaissance Geology of Portions of Victoria Island and Adjacent Regions in Arctic Canda. Waverly Press, Incorporated, Baltimore, Maryland 1947. 142 pages. This work ties together in excellent fashion all the current information concerning the geography, stratigraphy, rock structure, economic geology, glaciation, level variations, and geomorphology of the above named territory. A voluminous bibliography, as well as 52 illustrations and 3 maps supplement the many valuable details.

Christiani

Karl Saller: Art und Rassendehre des Menschen (Species and Races of Man) Publisher: Curt E. Schwab, Stuttgart 1949, Ces-Collection, Volume 33 DM 4.80. This book is the second of a trilogy on anthropology. We are doubly indebted to the author: (1) in spite or ratherbecause of the attempt to exploit the race-concept, he quite clearly sifts the facts, which beyond all ideological or other valuations, will always retain validity; (2) he gives an excellent survey of the present state of our knowledge of the origin of man and of the division of the races. Among the many virtues which may be counted is that by this means the reader is induced to study the subject further.

Schmelzkopf

Benoit Bronlette: Atlas of Canada Project Preliminary Survey. Publisher: Canadian Social Science Research Council. 1945 77 pages. In this volume the usefulness of issuing this new atlas of Canada is demonstrated. In addition the author tells how he came into possession of the individual map sheets of this very penetrating and exact atlas, whose acquisition can be most heartily recommended to all scholars interested in Canada.

Christiani

Friedrich Gerstacker: In die Sudsee. (To the South Seas) Newly revised and published by Hans Plischke. Droste-Verlag, Publishers, Dusseldorf. About 30 pages of a comprehensive introductory chapter "Whaling in the South Seas and Friedrich Gerstacker", copious illustrations from the period of 100 year ago, and an appendix with scientific explanations from the pen of the famous League of Nations representative at Gottingen University, -- all these make the new edition especially valuable. Old and young follow with pleasure the narrator of many tales of adventure to these expanses of paradise in the Pacific.

M.

Hellmut Berg: Grundfragen der Wetterkunde. (Fundamentals of Meteorology) Publisher: Curt E. Schwab, Stuttgart 1949. Ces-Collection Volume 31, DM 4.80. Out of the multitude of possible problems the author has selected especially those which do justice to the great progress of meteorology before and during World War II and the future tasks arising from it: Structure of the atmospheric clouds and meteorology of precipitation and synopsis. The book is directly useful only to the specialist; the interested layman requires a prior study of an introduction to meteorology.

Schmelzkopf

Hellmut Berg: Einfuhrung in die Physik der festen Erde. (Introduction to the Physics of the Solid Earth) S. Hirzelverlag, Publishers. Stuttgart 1949, 296 pages. 107 illustrations. To all who wish to get a reliable orientation in the physics of the solid earth, this book is heartily recommended for its clear and comprehensive survey. It is provided with copious illustrations and is written in a very fluent and easily understood style. Everyone devoted to geophysics should get this valuable and exceptionally qualified book, offering him great stimulation.

Ruthe

Geographical Institute of the University of Hamburg, in conjunction with the Akademie fur Raumforschung und Landesplanung (Academy for Area Studies and Land Planning): Festschrift zum 70. Geburtstag des ord. Prof. der Geographie Dr. Ludwig Mecking. (Written in Honor of the 70th Birthday of the Professor of Geography, Doctor Ludwig Mecking). Dedicated by friends and students. Walter-Dorn-Verlag (Publisher). Bremen-Horn 1949. The present testimonial work pays tribute to a full life's work and to a profound and mature synthesis of world geography, as it honors a scholar and university professor deserving of the highest recognition, to whom former students and colleagues have presented, as an outward token of personal and scientific solidarity, this outstanding testimonial work, reflecting Mecking's many sided fields of interest. It should be specially mentioned at this point that Professor Mecking has always devoted himself to Polar problems with extreme enthusiasm and expertness of the highest order, as his student Doctor W. Dege of Munster shows in his article "My Circumnavigation of Northeast Land in Spitzbergen"

Ruthe

Leo Wied: Flammende Polarlichter (Flaming Polar Lights) Uoni's adventures in the Polar Sea. Publisher, Carl Uberreuter, Vienna 1950, 197 pages. An excellent juvenile book, which from the very first page is written in a breath-taking and fascinating style and which presents worthy characters as models for youth.

The type and format of the book, which contains 22 drawings do full credit to the publisher.

Ruthe

Pierre Auger: Die kosmischen Strahlen. (The Cosmic Rays) Dalp Collection Volume 3. A Francke AG Publishers, Bern 1946, 144 pages, 12 tables, 5.80 Swiss francs. P. Auger knows how to present all the problems pertaining to cosmic rays in an unusually clear, lucid and distinguished form. It is a real pleasure to read this book, so superior in respect to method that one puts it aside with rich reward.

Ruthe

Haakon Evjenth: Hongkongkulalongkorn Tor's adventure in Lappland. Denerlich Press. Gottingen 1950, 236 pages. The 16 year old Tor Lieng, with his father, made his home for 18 months in a hunter's lod e on the lonely mountains of norther Finnmark (Northern-most county of Norway). The author depicts for us the adventures and experiences of this youth in an excellent manner so that old and young follow him with tense interest.

Petersen

Carl Hanns and Erich Tilgenkamp: Uber Pole, Kontinente und Meere. (Over Poles, Continents and Seas) Publisher, Eberhard Brockhaus. Wiesbaden 1950. 282 pages. The authors chat about the generation of discovery of the aviators. It is an informative, basic and captivating account. It reads like an epic of a bygone day. Good pictures and maps add to a vivid presentation.

Decker

Peter Freuchen: Der Eskimo (The Eskimo) A novel of the Hudson Bay. Safari-Verlag (Publisher) Berlin 1949, 294 pages. In masterly language the author sketches a broad picture of the customs among the Eskimos. It is an eventful account and characters are delineated very well, so that reading this book is a delight.

Spinti

Thor Heyerdahl: "Kon-Tiki" Ullstein-Verlag (Publisher) Vienna 1948. 288 pages. DM 12.50. In a captivating account, spiced with humor, the author depicts the hazardous drifting before the trade winds in the Humboldt Current of his directed raft built on old Peruvian models. One hundred days after the take-off in Callao (Peru) the gallant vessel is stranded with its crew of six men (5 Norwegian and 1 Swedish) on 7 August 1947 on the reef of an atoll of the Tuamotu group of Polynesian Islands. Because of this daring voyage the obscurity has apparently been dissipated concerning the origin of the light-skinned and tall Polynesians.

M.

Kenneth Roberts: "Nordwest-Passage" (Northwest Passage) Publisher: Paul-List-Verlag. Munich, Leipzig, Freiburg, Breisgau. The novel does not deal as might be expected, with Polar region of North America. True the futile advances into the Hudson Bay are mentioned, but only as the occasion for raising the problem of finding, as a substitute for the ice-blocked northern passage, a northwest passage over the Canadian seas and the Mississippi - Missouri River Basin towards the Pacific Coast. The exciting action, constituting a veritable song of glorified comradeship resulting from shared experience of danger, leads in the second half of the 18th century from the New England States into the Wild West and incidentally has a place in the London scene. It conveys with a wealth of concrete images and strong personalities a profound insight into the political and cultural life of the rugged period and transfigures the account into a lasting experience.

M.

Eberhard Walker, Sterne (Stars). People's astronomy annual for 1950. Published by Fr. Haberer-Kalenderwerk (Fr. Haberer's Calendar Publishing House), Schopfheim, Baden. A richly illustrated little book, which will be welcomed eagerly by the reading public.

Ruthe

Fritz Bartz, Alaska. Geographical Handbooks. Published by K. F. Koehler, Stuttgart, 1950, 384 pages, with 24 figures and maps and 47 illustrations. Since the Second World War Alaska, from being an out-of-the-way country, has become a strategically important region which is receiving more and more attention from the Pacific powers. This well-prepared book, containing much of interest including the latest developments, gives the geographer a thorough survey of this previously ignored region. In addition it is an excellent source of information for all who are interested in foreign countries.

H. Jager

F. Machatscheck, Geomorphologie (Geomorphology). Third edition, Leipzig, Teubner, 1949. This new edition, containing 70 illustrations, considers the results of research of the last 14 years. Thus the first (tectonic) section depicts the eustatic rise in the sea level as a result of the melting of the inland ice-cap. Another extended section consists of a description of the morphological effect of exogenous geological forces. The part of the book devoted to topography is divided according to morphologically significant climatic conditions. Among others, there is a section on "glacial forms", which also includes a brief discussion of inland ice. In addition, in one of the last sections coastal forms and islands are dealt with.

W.

E. Hagemann and H. Voigts, Bioklimatischer Atlas fur Schleswig-Holstein (Bioclimatic Atlas of Schleswig-Holstein), Lubec, 1948, published by the Research Institute for Agricultural Planning and Topography. Price DM 100. The atlas includes 60 maps measuring 85 by 60 centimeters. Although it appears to be the intention of both of these authors to limit their work to Schleswig-Holstein, the title seems somewhat too modest considering the content of the book, which far exceeds that area. It should be mentioned that the atlas, in addition to discussing climatic data for all of Central Europe, deals with the neighboring North Sea, including especially the formation of ice, which we find interesting, and which in winter is connected with the formation of ice in the polar regions. The corresponding maps were prepared by Professor Budel. The disposition of ice from January to April appears to be dependent on the severity of the preceding winter. On the other hand the correlation between the amount of ice in this sea and the resulting beginning ov vegetation in Lubeck makes it possible to predict this important season of the year.

Schindler

Carl Kircheiss, Wal hoooo! Weltreisen mit Harpunen, Angelhaken und Netzen (Whale Ho! Traveling about the World with Harpoons, Fishhooks, and Nets), Wilkens Publishing Company, Inc., Rendsburg, 1950, 288 pages, price DM 12. In this book Captain Kircheiss has far surpassed his previous literary accomplishments. This is not only a particularly thrilling tale, but a comprehensive scientific work dealing with the whole field of whaling. Anyone who reads this book will be excellently informed on all phases of old and modern whaling. This excellently prepared and beautifully illustrated book is warmly recommended to all who are interested in seafaring and whaling. In addition Captain Kircheiss in his book shows German youth how through thorough knowledge and ability, as well as courage, eagerness, and energy can attain the high goal which a young German possesses who, with a firm will and a fervent heart, strives forward. In this book Captain Kircheiss has given German youth a true, glowing model to follow and has erected for himself a lasting memorial.

Christiani

Ernst Backsmann, Geologie als Erdgeschichte (Geology, the History of the Earth), published by Curt E. Schwab, Stuttgart, (CES Library) volume 3. This little book is neither an extremely dry textbook, nor a light popularization of a scientific subject. Instead the author takes a middle road. He writes with great versatility, and is very thorough in developing his case. In this way he makes the problems of geology seem real to the reader.

Kraatz

Aksel Strehle and Jorgen Haestrup, Von Gronland bis Svalbard (From Greenland to Spitsbergen). Published by Fremad, Copenhagen, 1947. Price, 2.50 crowns, 48 pages. In this volume the position of Greenland and Spitsbergen are pointed out, together with the great interest that North America shows in Greenland, and that Soviet Russia shows in Spitsbergen. The description of journeys in the arctic waters which surround Greenland is interesting, if brief. This little book is recommended to anyone who wishes a bit of information on the history of Greenland and Spitsbergen.

Christiani

J. Bartels, Geophysik (Geophysics), Heidelberg, Winter, 1944. This volume, one of a collection of textbooks, is devoted to geophysics, and contains 200 pages with 55 illustrations. The organization of the book is apparently based on textbook format, since only in the first half of the book is the field presented systematically, while the second half presents examples from geophysical research, and contains study aids. A detailed bibliography is presented at the end of the work. W.

M. Schwarzbach, Das Klima der Vorzeit (Climate in Prehistoric Times), Stuttgart (Enke), 1950. This excellent presentation of paleoclimatology, on 211 pages with 70 illustrations, fills a serious gap in the literature of the history of the earth, since the last such work appeared twenty years ago. Of the seven sections into which the work is divided, section 3 is the most outstanding, presenting a survey of all possible types of climate. Section 5 contains a history of climatic changes during the history of the earth, and section 6 hypotheses of the causes of climate changes throughout the history of the earth. Efforts to explain the ice ages receive special attention here. The author's effort to achieve a synthesis of all attempts at explanation is noteworthy. According to this the interaction of terrestrial and extraterrestrial causes is probable. The "radiation curve" appears to be unsuitable to explain the repeated Quaternary Ice ages, while primary oscillations in the sun's radiations should be taken into consideration. Wegener's continental shift is rejected. Bibliographic notes and place-name and factual indexes conclude the book. W.

Jean Gabus, Miluka, Der Eskimo (Miluka, the Eskimo). This is a tale from the far North, published by the (Swiss Printing and Publishing House, Zurich, 1949. This book describes the Eskimos' fight for life in the most thrilling manner. Their difficult life and the constant battle with their relentless surroundings calls for our constant admiration. It is a great joy for the reader to be able to share this adventure with such a group of people.

Spinti

H. W. Ahlmann, Glaciological Research on the North Atlantic Coast, Geographic Society Research Service, I, 1948. This book describes glacier research which was undertaken in five regions throughout the North Atlantic. These regions were southern and northern Norway, the Northeast Land of Spitsbergen, Clavering Island of east Greenland, and southeastern Iceland. The work is accompanied by 44 cartographic and diagrammatic illustrations. According to the geographic description of the region being investigated a comparative presentation of the conditions of accumulation was undertaken with stratum profiles from the Isachs Plateau in Spitsbergen and from the Vatnajokull in Iceland. Then the process of melting is contrasted with accumulation. Snow boundaries and glaciation boundaries are then considered in their relation to summer temperature and to amount of precipitation. A table of "glacier calculations" contains all of these observations. Then there follows a survey of the existing types of glaciers according to morphological, dynamic, and geophysical classifications, based on information concerning the observed rates of flow. The author closes with a compilation of data on the retreat of the glaciers in the past decades; he considers the probable cause of this to be the conveyance of heat by means of more intensive south winds through the atmosphere of the North Atlantic.

W.

Hans Stille, Die jungalgonkische Regeneration im Raume Amerikas (The Late Algonkian Regeneration in America), Academy Press, Berlin 1949, 39 pages, 12 illustrations, price 5.25 DM. This work presents the results of geotectonic work dealing with the transition from ancient to more modern geologic times, and thus with the algonkian revolution.

Christiani

Christian Fibe, Langthen og Nordpaa (Langthen and Nordpaa). This book describes the Danish Thule and Ellesmereland expedition of 1939 and 1940. Published by the Gyldendal publishing house in Copenhagen in 1948, it contains 199 pages and costs 18.75 crowns. This excellently illustrated book makes it possible for us to participate in the Danish expedition to Ellesmereland. The expedition had the good fortune to come into contact with Eskimos who had pursued their own way of life without falling victim to foreign cultures. Numerous well-reproduced photographs show us the more interesting types of these Eskimos in their daily life. A German translation of this book would be welcomed.

Christiani

Hans Wehner, Untersuchung mikrobarographischer Wellen auf Jan Mayen (Investigation of Microbarographic Waves on Jan Mayen), Academy Press, Berlin, 1949; 56 pages, price 7.50 DM. In this volume the author demonstrates that the local barometric oscillations observed on Jan Mayen are to be attributed to the lee effect of the Beerenberg on that island, as a result of which certain errors have been included in the weather reports which have been sent from Jan Mayen while the north wind was blowing. These influences come to light in the formation of local high and low pressure areas. This fact is important because it can be observed nowhere else in such a clear-cut form.

Christiani

The Northwest Territories, Administration -- Resources -- Development, issued by the Northwest Territories and Yukon Services, Lands, and Development Services Branch, Department of Mines and

Resources, Ottawa, Canada, 1948, 67 pages. This small volume consists of official reports, giving a very short survey of the Northwest Territories, that region of Canada lying north of the 60th parallel, between the Yukon and Hudson Bay. Everything of importance to topography is in this book, including information on the administration, transportation, economy, mining, population, climate, flora, fauna, geography, and geology of the region, as well as on about 80 important settlements in the area.

Tiedemann

Economic Geography of the USSR, edited by S. S. Balzac, C. F. Vasyntin, and Ya. G. Feigin, American edition edited by Chauncy D. Harris. Published by the Macmillan Company, New York, 1949; 620 pages. This work, by Russian scholars, on the economic strength of the Soviet Union, was commissioned by the American Council of Learned Societies to be translated by American scholars, and, in order that readers without a knowledge of Russian might better understand the subject, it has been supplemented with additional information and notes. The book gives an exhaustive survey of the economic geography of the enormous eastern empire, and much statistical information and a number of maps which serve to illustrate the natural foundation of the productive power of this country. It is an excellent source of information for the scholarly world, and will also be of special value to those who are interested in the future potential of the Artic.

Paul Muller

Martin Gusinde, Urmenschen im Feuerland (Primitive People in Tierra del Fuego). From explorer into native. With 32 illustrations and a survey map. Paul Zsolnay Publishing House, Berlin Wein, Leipzig, 1946; 389 pages, price 10.50 DM. This work from an outstanding

German anthropologist is more than a story of discovery, or of the topography and anthropology of Tierra del Fuego. It is an introduction to the environment and to the material and spiritual culture of primitive people who have survived to our times. This book eliminates a number of errors which have been current among us concerning the hunting and water nomads of Tierra del Fuego. The astonishing conclusions of his research are of a profundity seldom attained, and his expositions are powerful, while the entire work is of the highest anthropological value. At the same time the descriptions are so fascinating that one forgets that he is reading a highly scientific work.

W. Dege

Professor Doctor E. F. W. Altmann, Kanada: Geographie, Geschichte, Wirtschaft (Candaa: Geography, History, and Economy), Academic Publishing House of Foreign Scientists I. Belej, Munchen 17, O. J. (1948), 240 pages. Price, half leather, 8.50 DM. This work appeared as Volume I of the Wirtschafts - und Verkehrsgeographischen Handbucherei (Library of Economic and Communications Geography), published by the central office of the Atlantic Union of Economic Geographers, in Panama. It consists of a succinct, factual survey of Canada. It contains an extensive bibliography and numerous tables. Illustrations, sketches, and an unfortunately poor survey map complete the work. The purpose of the book is to provide some orientation for all who are interested in emigrating to Canada. This is done in an exemplary fashion. The most recent data, which to some extent include the postwar period, will also be of interest to professional geographers and economists.

W. Dege

Gerecke, Fr., Seismische Registrierungen in Jena 1 Januar 1948 bis 31 Dezember 1948 (Seismic Registrations in Jena 1 January 1948 to 31 December 1948.) Akademie Publishers, Berlin, 1949, 55 page, price 10.50 DM. The folder contains a survey of the instruments employed in the stations of the Central Institute and the results of observations during 1948; the origins of individual quakes are reported.

Christiani

Tutein, Peter, Ich lebte unter Eskimos (I lived among the Eskimos), Central German Publishers, Halle O. J. 178 pages, price 6.80 DM. The work "Dramet i Storisen" of the Danish author has now also appeared in German. Friends of a healthy, i.e. well written and objectively founded literature of adventure will welcome this very much. The book describes the drifting of Danish trappers and seamen on the E st Greenland River, debarkation from the ship, rescue and the life among the Eskimos of the Angmagssalik district; it does so with a genuine and graphic objectivity and humanity rare among books on this environment.

W. Dege

Schumann W., Erdmagnetische Anomalien in Europa und ihre Beziehungen zu den geologischen Verhaltnissen (Anomalies of Terrestial Magnetism in Europe and their Relationship to Geological Conditions), Abhandlungen des Geophysikalischen Instituts, Potsdam, No. 14; Akademie Publishers, Berlin 1949. In this work the author makes the very useful attempt to give a unified and summarizing description of the general problems of rock magnetization and of the geological origins of anomalies of terrestial magnetism in Europe.

Part A contains a systematic petrographic classification and description of all magnetically active minerals and rocks. The attempt to base the still puzzling terrestial magnetic secular variations entirely on processes in the earth's crust (temperature variations at greater depths; plutonic-magnetic influences), is not, however, completely satisfactory. According to more recent views, (Elsasser, Vestine, Bullar) the location of the primary terrestial magnetic field and its secular variations, should, in the main, be assumed to be in the very deep interior of the earth. Part B, by applying the rock-magnetic basis, given in part A, deals with the terrestial magnetic anomalies in Europe and their relationship to geological conditions. An extensive bibliography of 221 entries concludes this significant work.

Macht

Publications of the Meteorological Service of the German Democratic Republic, No. 1

Konig W., Verzeichnis der in der Fachliteratur behandelten Wetterereignisse Deutschlands im Zeitraum 1901-1940 (Index of Weather Phenomena in Germany during 1901-1940 Treated in the Specialized Literature of the Field), Akademie Publishers Berlin, 1950, DM 11.-, 80 pages. In the index under review all unusual weather phenomena between 1901 and 1940 mentioned in specialized literature are listed. This makes it possible to locate the literature dealing with any weather phenomenon during the above period.

Christiani

Publications of the Meteorological Service of the German Democratic Republic, No. 2

Konig W., Verzeichnis Zusammenfassender Arbeiten uber Wetter und Witterung in Deutschl nd, 1950. (Index of Monographs about Weather and Weather Conditions in Germany, 1950), Akademie Publ isners, Berlin, DM 6.-, 40 pages. The author has with a great deal of industry gathered the titles of all publications about weather and weather conditions in Germany, so that meteorologists can, with the aid of this index, be completely informed of all the weather phenomena occurring within the territory of Germany.

Christiani

Koch H.G., Meteorolcgische Studien im Mittelmeer (Meteorological Studies in the Mediteranean). (a) Ueber die Aerologie der Etesien des oestlichen Mittelmeers im Sommer 1942, (Concerning the Aerology of the Etesian Winds of the Eastern Mediterranean during the Summer of 1942), (b) Die Winde und Wetterlagen in Suedsardinien (Winds and Weather Conditions in Southern Sardinia), Akademie Publishers Berlin, 1950, DM 20.-, 66 pages. The network of permanent weather stations in the area of the Eastern Mediterranean and in south Sardinia remains very sparse and poorly equipped with modern meteorological apparatus. Because of this it is very valuable for workers in this field that the author decided to collect and publish his extensive material, gathered during the War, on high-altitude ascents, ground wind and barometric observations. It may be assumed that by this series of exact observations valuable deductions concerning the influence of the Mediterranean climate upon our own region may be made.

Christiani

Schmid Karl, Eisgipfel unter Tropensonne. Bergfahrten und Reiseerlebnisse in Peru. (Icy Summits beneath the Tropical Sun. Mountain Expeditions and Travel Experiences in Peru). Alfeld, Alpha

Publishers 1950. 217 pages. 76 illustrations, 3 maps. In a well appointed volume the author gives a very impressive report about the 1939 Andes expedition of the Alpine Association under the leadership of Professor Doctor Kinzl. Aside from the description of the people and countryside of Peru, the very interestingly written book reports on the scientific work of the expedition. The participants, three of whom had fatal accidents at the Tunshu, climbed seven peaks of over 6,000 meters for the first time. Interesting data may be found on expedition techniques and about equipment in icy mountain areas. The book, which is amply supplied with illustrations and is written in an instructive, scientific manner, can be recommended to all types of readers.

Tiedemann

Naturfoschung und Medizin in Deutschland 1939-1946 (Natural Science Research and Medicine in Germany 1939-1946). Wiesbaden: Bookstore of the Dieter Publishing House 1948-1949, Vol. 44-47; Geography Vol. 48; Geology and Palaentology Vol. 49; Meneralogy Vol. 50-51; Petrography; DM 10.- per volume. With this German publication of the FIAT Review of German Science, the book store of the Dieter Publishing House has rendered a service to German scientists that cannot be underestimated. In the most concise form a survey of the work and achievements of German science between 1939 and 1946 is given. The most important specialized scientific literature that appeared during this period is listed and identified according to content. -- In a monograph about cartography and photogrammetry by R. Finsterwald, Volume 44 presents data on the German Antarctic Expedition of 1938/39, in addition to reports on climatology, microclimatology, history of climate and vegetation in the quarterary period, geomorphology and glaciology. In the second part of the geography there is, among other things, an essay about North America and northern Asia and a report about the polar regions by H. Poser, while the following volume contains papers on the subarctic regions of northern Europe and northwestern Russia. The glacial-geological research in Alpine regions dealt with in Volume 47 by F. Machatschek, is of great value for comparative studies in polar research. In the volume on geology and palaentology there is a list of literature on diluvial geology and recent deep sea sediments. In the volume on mineralogy new investigative methods developed in recent years are specifically described as are chrystallographic and geochemical work. Volumes 50-51 contain the most recent results and evaluations of special petrography; the material gathered by Wegmann and Buetler in eastern Greenland is treated in detail. There are also collected reports regarding new testing and working methods and the science of deposits. -- It may be stated by way of summary, that volume 44-51 of the series Natural Science Research and Medicine in Germany 1939-1946 represent an indispensible reference work for polar explorers and for every scientist concerned with geographic and geological problems.

Tiedemann

Kupferschmidt, Franz: Das Weisse Land. Landschaften der Erdpole (The White Country. Landscapes of the Polar Regions). Collection "Volk un Wissen", Series O, Vol. 5. Publishers "Volk und Wissen" Berlin, Leipzig, 1949, 40 pages, DM 0.60. This little volume contains an excellent short introduction to the topography, climatology and ice science of the polar regions. The individual sections are supplemented by descriptions from travel reports of famous polar explorers.

Tiedemann

Seismische Arbeiten 1947/48 (Seismic Papers 1947/48), Akademie Publishers, Berlin 1949 145 pages, price 13.75 DM. Several well-known seismologists have collaborated in this work, among them G. Krumbach, A. Sieberg, W. Sponheuer and R. Barton. In an interesting way, which is not fascinating merely to specialists, a survey is given of all branches of seismology in addition to construction suggestions for buildings located in regions under threat of earthquakes. The account of the destruction of the two Greek cities of Helike and Bura in BC 373 is very interesting and stimulating for archaeologists. This book is warmly recommended to every one interested in seismic measurements and other seismic investigations.

Christiani

Richard B. Sealock and Pauline A. Seely: Bibliography of Place Name Literature United States, Canada, Alaska and Newfoundland. Chicago: American Library Association 1948, 332 pages (linen) 4 dollars and fifty cents. The American Library Association has published a volume, compiled by dilligent work, which contains an inclusive bibliographic enumeration of the literature on the geographical names of the North American continent. In the bibliography, which is carried up to th present, the literature of the last century is also covered. Approximately 2,000 titles of books and articles are arranged according to geographic regions and for the most part, are supplied with a commentary. An author and topical index facilitates use of the work. Materials most valuable for scientific work are collected here making the book a useful reference work.

Tiedemann

Rorig Fritz: Rechtsgeschichte der Territorialgewasser: Reede, Strohm und Kustengewasser 1949 (Legal History of Territorial Waters: Harbor, River and Coastal Waters 1949), Abhandlungen der deutschen Akademie der Wissenschaften zu Berlin, Akademie Publishers Berlin, 1949; DM 2.30, 19 pages. The author repeats his opinion which he presented before the German supreme court in Leipzig during 1925-28 in the course of the legal controversy between the Land Lubeck and the Land Mecklenburg. Essentially, the problem here is that of defining the concept of river (Strom) which in normal usage applies to a larger stream (Fluss). On the basis of the industrious and exact research of the author it could be determined, however, that since the earliest Middle Ages the roads of a harbor town is also designated by the word river (Strom). On the basis of this reasoning the legal controversy was decided in Lubeck's favor, while Mecklenburg was ordered to desist from fishing operations in the region of the Lubeck river (Strom).

Christiani

Ejgil Knuth: Fridtjof Nansen og Knud Rasmussen. Een Slaegstudie (Fridtjof Nansen and Knud Rasmussen, a Family Study), Kopenhagen 1948. In the present work Ejgil Knuth undertakes a detailed investigation of the ancestors of both polar explorers. One learns from the excellent and highly interesting work that both explorers had a joint ancestor. This is Mr. Gert Geelmuyden who lived in Bergen from 1630 to 1701 who undoubtedly was of Netherland extraction. Much German blood is also encountered among the ancestors. It is to be hoped that this richly illustrated, excellent book will be translated into German.

Christiani

Heinrich Spieker: SOS Schneesturm. Eine Jungengeschichte von der Eismeerkuste (SOS -- Blizzard. A Boys' Tale of the Arctic Coast), Bastion Publishers, Duseeldorf 1940, DM 3.80. In fluent, gripping and true-to-life language seafarers and Eskimos are described. The details of folklore in particular make the volume valuable reading for young people. The type and illustrations are practical and tasteful.

Spinti

Jon Svensson: Zwischen Eis und Feuer. Ein Ritt durch Island (Between Ice and Fire. Through Iceland on Horseback), Herder Publishers, Freiburg 1949, DM 6.-. This volume ought to be in every boy's library, and many a teacher will want to read aloud from it in order to enrich and enliven his instruction. This travel report is enlivened by questions and answers, well supplied with black-and-white pictures, and written in most lively fashion. Whether young or old you will always gladly read this book.

Spinti

Jon Svensson: Sonnentage. Nonnis Jugenderlebnisse auf Island (Days of Sun Shine. Nonni's Boyhood Experiences in Iceland.) Herder Publishers, Freiburg 1949. These collected stories are recommended so far as the first part is concerned, since they are well adapted to a child's mentality. But, starting on page 123, the chapters bulge with improbable adventures, provoke a mania to be a super man and demonstrate how children's books should not be written.

Spinti

Frank Hurley: "Shackleton's Argonauts. A Sage of the Antarctic Ice-Pack." Angus and Robertson, Sydney, London 1948, 140 pages.

The present volume contains the unusually excitingly written story of Shackleton's expedition. His great leadership qualities, the unbending courage of all the participants of the expedition and the firm ties of exemplary fellowship overcame the unheard-of dangers of the wild remorseless Antarctic. The author, who took part in the expedition as a photographer, is an excellent observer of nature, man and animals. This is one of the most interesting books on the polar regions that I have read.

Helmut Jahns

Richard E. Byrd: Fliegerstadt am Sudpol. Erlebnisse wahrend meiner 2. Expedition zum sechsten Erdteil. (An Airplane Town on the South Pole. Experiences of my Second Expedition to the Sixth Continent), Eberhard Brockhaus Publishers, Wiesbaden 1948, 192 pages, DM 7.50. Our young people will read the present work with the greatest fascination; it is part of the great travel book "By Airplane Sled and Tractor".

Helmut Jahns

Gudmundsson Kristmann: Helle Nachte (Bright Nights) Novel. R. Piper and Company, Publishers. Munich 1948, 159 pages. The human beings in this plot are children of the countryside in spite of their spiritual quality and are thus subject to the conflict between their acquired mental attitudes towards things and their natural passions. In the hard, magnificent landscape of the country of bright nights they mature into splendid figures such as one would want to identify with these regions.

Helmut Jahns

W. H. Cobb: Wie die Welt entdeckt wurde (How the World was Discovered) Carl Ueberreuter, Publisher, Vienna 1949, 34 pages with 42 colored illustrations and maps. Price 6.70 DM. It is certainly a good idea to give boys from 10 to 13 years a composite view of the great deeds of the discoverers, in order to stimulate their reading of their original reports. The sketches showing the routes of the discovery voyages and the discovered continents are also very good. However, whether the text is sufficiently exciting to arouse a desire to read more is doubtful. German boys will feel the absence of the deeds of our polar explorers quite painfully. In addition the colors used in the pictures seem to be entirely too unreal even for this age group.

Helmut Jahns

Rudolf Jonas: Fahrten in Island (Journeys in Iceland) With contributions by Franz Nusser. Publishers L. W. Seidel and Sohn, Vienna, 1948, 200 pages. Price 12.50 DM. This work by the young Viennese doctor who has thoroughly explored the island so rich in legends furnishes a very vivid picture of the countryside, history and daily life of that distant island. The main part of the book consists of the report of the 1935 Austrian Iceland-Vatnajokull Expedition and is described with wonderful clarity and aliveness. There are 84 illustrations, which suggest in four colors the artistic beauty of Iceland with the green of the mountain meadows, the blue of the lakes, the gray of distant mountains and the white of the glaciers. They leave strong impressions of the wildness of the waterfalls, the frightening crevasse-labyrinth of the Dyngjokull and the springtide (sic.) of the geysers. A description of a plane trip by F. Nusser to the north rim of Vatnajukull forms the conclusion of this charming book on Iceland.

Paul Muller

Publishing House F. T. Rageot: Young People's Books translated from English and Norwegian and published by the publishing house of G. T. Rageot, Paris, in French in the Collection Heures Joyeuses Nature (Pleasant Hours with Nature): Nuvat l'Intrepide (Nuvat the Intrepid) by Radko Doone, Le Roi de l'Arctique (The King of the Arctic) by Harold Mac Cracken, Dans la Toundra (In the Tundra) by Hakon Evjenth, Les Bateiniers du Soleil de Minuit (The ---- of the Midnight Sun) by A. J. Villiers. In addition to gripping adventures involving human beings and animals these books give young people an excellent insight into the hard laws of nature that every living being is subject to in the Arctic. They are to be highly recommended as school reading matter.

Helmut Jahns

Henri Kubnick: Charcot et les Explorations Polaires (Charcot and Polar Exploration) Publishers: Mame, Tours, 1940. This book is a tribute to the accomplishments of the French polar explorer Charcot in arctic and antarctic exploration. In a very sympathetic manner the noble character of this explorer is drawn from his attitude to humans and animals. Not the vanity of a sportsman, but thirst for knowledge and the desire to serve his people was the motive power of his actions. A book to be highly recommended.

Helmut Jahns

Hans Cloos: Gesprach mit der Erde (Conversation with the Earth) Geological world and life journey. Publishers: R. Piper and Co. Munich 1949, 14th to 17th thousand. Price: 18.00 DM. Any one interested not only in geology but in science in general will enthusiastically and excitedly follow the author on his trips across the continents. Whether the volcanic regions of Italy, South Africa or

America are involved, the author knows how to communicate an understanding of the mighty actions of dead matter by his vivid language and his love of natural phenomena. This work culminating 50 years of research will offer a multitude of new facts and problems especially to the geologist. 79 excellent photographs and drawings admirably complement the reading matter.

Petersen

Walter Rentzschler: Aufbau der Materie (The Structure of Matter) Curt E. Schwab, Publisher, Stuttgart 1949. Price 4.80 DM. In a very comprehensible form the author explains the physical forces involved in the formation of chemical combinations and the visualization of the formation of chemical basic materials and combinations. The book will find many friends among educated laymen and on the upper level of our institutions of higher learning thanks to its excellent and clear-cut presentation.

Oswald Bohme

W. Braunbeck: Methoden und Ergebnisse der Atomkernforschung (Methods and Results of Atomic Nuclear Research) "Ces" collection volume. Curt E. Schwab, Publishers, Stuttgart 1949, price 4.80 DM. The author has an excellent gift for introducing those interested in atomic physics to the structure and operation of atomic nuclei without presupposing an extensive knowledge of physic and chemistry. By subdividing the huge material of natural and artificial radioactivity into smaller, easily comprehensible sections he will succeed with this book to acquaint even those who haven't the time to deal exclusively with these problems with these extremely significant facts of our day.

Oswald Bohme

H. W. Tilman: Mount Everest 1938. At the University Press, Cambridge, 1948, 160 pages. The author gives a lucid report of the difficulties and events that the English expedition had to face in its attempt to climb Mount Everest. A large part of the presentation is taken up by a description of the experiences with the manifold items of the equipment and the advice resulting from this experience. Thus the book is above all valuable for projected expeditions that have set the same goal for themselves.

Helmut Jahns

Herbert Rittlinger: Im Meer der Strome und Walder (In the Sea of Streams and Forests) Publishers Eberhard Brockhaus, Wiesbaden 1949, 263 pages. Price 8.50 DM. Friends of the Arctic may welcome a glance at anoth r large exploration area on the equator. In a series of charming sketches Herbert Rittlinger gives us a picture of the immense vastness (sic!) of the Amazon country, its geographic character, the history of its exploration and the adventurous journeys that he made through the forest primeval by foldboat, on rafts and by a river steamer. Life at the borders of civilization and in the great commercial centers of Manaos and Para is described in an impressive manner. The reader gains the conviction from the work as a whole that Amazonia is "one of the most forward-looking settlement and world-trade areas of the world" and "a part of the promise of tomorrow".

Paul Muller

Jean Gabus: Iglous. Vie des Esquimaux-Caribou (Igloos. Life of the Caribou Eskimos) Editions Victor Attinger, Publisher Neuchatel 1947, 264 pages. In the years 1938-39 the author undertook an ethnographic research trip into the region west and northwest of Hudson

Bay. His chief goal was to make recordings of songs of the Padleirmiut and other ethnographic groups and to portry the life of various Eskimo tribes on their migrations, on their hunts and on festive occasions by means of a documentary film. His reports are convincingly true to fact. The reader learns numerous details about the mores and customs of the inland Eskimos, their clothing, their relationship to their dogs, their tools, fetishes and toys. He also obtains a deep insight into the spiritual life of these people fighting so hard for their existence.

Paul Muller

Jose Manuel Moneta: Cuatro Anos en las Orcadas del Sur (Four Years in the South Orkneys) Ediciones Peuser, Publishers, Buenos Aires 1949, 341 pages. The author has participated in several Argentine expeditions to the Antarctic. He places great value in bringing home to the reader the minutiae of life in the dark, cold and stormy loneliness of the Antarctic. He has succeeded extremely well in this easy-flowing and exciting book, so that one is captivated from the first to the last page. The make-up of the book is very good, but the rendition of the photographs is not up to present-day standards.

Christiani

Andre Renaud: Les Glaciers (The Glaciers) Editions du Griffon, Publishers, Neuchatel 1949, 52 pages, 33 illustrations. The magnificent glacier photographs alone give this 52 page booklet an especial value. However, the text dealing with scientific research on the origin, motion and usefulness of glaciers is clearly and comprehensibly written, so that it is a pleasure to follow the trains of thought.

Helmut Jahns

W. J. Rooney: Earth-Current Results at Tucson Magnetic Observatory, 1932-1942.

I. Lange and S. E. Forbush: Cosmic Ray Results from Huancayo Observatory, Peru, June 1938 to Dec. 1946 (Researches of the Department of Terrestrial Magnetism, Vol. IX and Vol. XIV, V and 309 pages, and V and 182 pages. Published in the Publications of the Carnegie Institution of Washington No 175, Washington, D. C. 1949 and 1948) These two publications make available long-period measurement results, in each case extending over an entire sunspot cycle, for two geophysical phenomena for which in general only very short, sporadic observational series are available. The Terrestrial Magnetism Observatory at Tucson, Arizona (US) where the earth-current observations were made is situated at 32 degrees north latitude, 111 degrees west longitude, and 770 meters above sea-level. The Geophysical Observatory of Huancayo is situated in the Peruvian Andes at 12 degrees south latitude, 75 degrees west longitude, and 3,350 meters above sea-level. Each volume contains predominantly a detailed set of tables which give hourly observations, daily and monthly means among other things. The numerous tables form a valuable basic material for appropriate geophysical investigations. A short introductory text with explanatory illustrations precedes all observational material, but a discussion of the results from earth-current measurements is given only in Volume IX. Volume XIV contains the combined values as a supplement -- daily, monthly and yearly means -- of simultaneous measurements of cosmic radiation from October 1938 to December 1946 at the Terrestrial Magnetism Observatory at Godhavn (approximately 69 degrees north, 53.5 degrees west) in Greenland.

Macht

R. Bock, F. Burmeister and F. Errulat: Magnetische Reichsvermeasung 1935.0. Teil I (Tabellen) (Magnetic Survey of the Reich 1935. 0, Part I, Tables) Abhdlgn. Geophysikal, Inst. Potsdam, No 6 (DIN A pamphlet, 53 pages. Price 6.00 DM. Publishers Akademie Verlag, Berlin 1948) The complete results of the terrestrial magnetism survey of the German Reich of the years 1934-35 are presented in a uniform manner, with the help of the German Research Council. The survey is based on extremely carefully made measurements of the declination, horizontal intensity and inclination by the author and H. Reich at 552 stations. Following an introductory text (pages 3-8) the following items are given in five detailed tables: the position of the station, their magnetic elements (including the derived intensity magnitudes X, Y. Z and T), the station values of the normal field 1935.0, the deviations from the normal field (values and vectors of the perturbations) as well as the mean values for 184 groups of 5 stations each. The formulas for the normal field 1935. 0 (series development in terms of geographical latitude and longitude up to and including terms of the second order), separately computed for each element, are given on page 6 of the text. Thanks and recognition must be given the authors, especially Professor R. Bock of the Geophysical Institute of Potsdam, for this publication which was at last produced under the most difficult circumstances. In conclusion it is to be hoped that this available part of the terrestrial magnetism survey of the Reich of 1935. 0 will soon be supplemented by the portion containing the maps.

Macht

Vitalis Pantenburg: Arktis, Erdteil der Zukunft (The Arctic, Continent of the Future) August Bagel, Publisher. Düsseldorf, 352 pages, 64 plates with 77 pictures and one general map. Cloth-bound. Price 14.00 DM. The inhabitants of the temperate zone have always been attracted to the mysterious, fairy-like realm of the eternal ice on the northern hemisphere of the earth, and this region is the scene of much exemplary heroism. In the last two decades, however, the north polar regions have so intensely moved to the center of general interest that an over-all survey of the great future importance of these regions became absolutely necessary. It is therefore cause for rejoicing that Vitalis Pantenburg assumed this thankful task and carried it out in masterly fashion. An excellent, model book about the Arctic was the result which gives outstanding and comprehensive information in a clear-cut and lively presentation of the modern problems of the north polar world [sic]. For the specialist and anyone interested in polar research this book is a treasure-house about all modern polar problems. Special thanks must be given the publishing house of August Bagel, Dusseldorf, has brought out this book at a reasonable price and in an attractive make-up. The photographs are very very impressive and are technically very well reproduced and form a valuable addition to the text. This book is very useful as a reference work, since its appendix contains extensive numerical material on geographical and historical facts, a bibliography and a person and subject-matter index. The reviewer can recommend his informative book most warmly to all interested.

Ruths

Gottfried Weiss: Das arktische Jahr (The Arctic Year); One Winter in Northeast Greenland, Publisher: Georg Westermann, Braunschweig 1949. It is hard to decide who deserves the higher tribute for this excellent book: the author for his impressive presentation of the polar scenery and for the gripping reporting of experiences, or Walter Kubbernuss for the attractive illustrations, or the publisher for the excellent production. Let us thank all of them for this book which successfully tries to bring closer to us one of the harshest landscapes on earth. It is the first complete report on a polar undertaking by the navy weather service during World War II.

Schmelkopf

Werner Schaub: Weltraumflug (Space Flight). Astronomical and Physical Fundamentals (A study in celestial mechanics). Publishers: Ferdinand Duemmler, Bonn 1949, 93 pages. Price 6.35 DM, paper bound. The well known astronomer presents a paper which deals with the conditions on which possible space flight might later be based. Starting with gravity and its conquest he deals with problems such as an artifical moon which have already advanced into the sphere of realization but are very often misrepresented in the press. The importance of the air envelope for life on the earth and a future penetration of outer space also are discussed. At that point astronomical facts come to the foreground, following a desceiption of the rocket and its operation. The text becomes quite dramatic in dealing with the "neutral point" between the earth and the moon or with the sun as controlling body. The discussion remains strictly within scientific limits. For those who enjoy formulae there is a summary in the appendix. The fluent and clear language makes the study of the booklet a pleasure. It was quite essential that a qualified person should write about the material contained in the book.

Schindler

Fritz Hela Groissmayr: Die grosse saekulare Klimawende um 1940 und das Katastrophenjahr 1947 in Zentraleuropa (The Great Secular Climatic Change of around 1940 and the Catastrophic Year 1947 in Central Europe). Reports of the German weather service in the US zone, Vol. 10, Bad Kissingen, 1949, 39 pages. If we mention this monograph here it is because it contains a lot of observations made in the Arctic and the Subarctic. In addition the other facts discussed in the paper and as yet without an adequate physical explanation will be of general interest.

Schindler

Achton Fries: Arktische Jagden Arctic Hunts, Publishers, Stuttgart, 1948. In 1925 the Danish painter and polar explorer

Achton Fries published his diary notes made during the Danmark expedition under Mylius-Erichsen 1906-1908, under the title of "Arktische Jagter". In this book the publishing house of Engelhorn presents an excerpt from his work. We experience here big game hunting for walrusses and bears with all its difficulties, its setbacks and its bitterness dictated by the instinct for self-preservation. But the painter also depicts the color wonders of the Arctic which remain unforgettable if seen once, the tough struggle for existence of plants and small animals who survive the cold and darkness of the polar winter in order to enjoy life in the short arctic summer. The basic tone of the book is set by the heroic poem about a small group of courageous men who in order to serve the science defy the constant threat of death, overcome tremendous hardships and to the end keep faith with one another in unshakable devotion.

Arnold Court: Meteorological Data for Little America III. Monthly Weather Review, Supplement No 48, Washington 1949. A volume of 150 pages presents the detailed meteorological results of the "US Antarctic Expedition 1939-1941" in tables and in graphs. The observations were made at the west base of the expedition at 78 degrees, 30 minutes south latitude, 163 degrees 50 minutes west longitude (east coast of the Ross Sea, just south of the Shelf Ice Barrier), close to the main depot of the two Byrd expeditions of 1928 and 1934 and also to "Framheim". The results obtained in 1939/41 provide interesting comparisons with meteorological conditions during the previous antarctic expeditions. The aerological observations by the US expedition of 1939/41 have a special significance because radiosonde ascents were made for the first time during an antarctic winter (temperature and pressure high-alti-

altitude measurements up into the stratosphere). These produced several new and unexpected results, above all the temporary disappearance of the lower stratosphere boundary (tropopause) during the Southern winter. Above the normally very pronounced ground inversion the temperature increased almost uniformly -- without additional inversion layers -- up to the highest point of ascent (14-16 kilometers). This report represents a valuable contribution to the climatology of the Antarctic, which is still incomplete.

COMMUNICATIONS

The Association for the Advancement of the Archives for Polar Research at Kiel, Wilhelminestrasse 28.

The periodical "Polar Research" is published semiannually. It is the organ of the Association for the Advancement of the Archives for Polar Research. Applications for membership in this advancement association should be addressed to the office at Kiel, Wilhelminestrasse 28. Membership dues are up to the judgment of the individual and are at least 3.00 DM for individuals and 10.00 DM for judical persons semiannually. According to a decision of the Finance Bureau Kiel-North, City District 10, dated 12 April 1949, the association is a public body and tax-exempt, that is, dues and other contributions to the association can be deducted by members and other contributors from their income. As a tax-exemption in special cases exemption from all membership dues may be granted. Members receive the periodical Polar Research free of charge. Postage is also paid. As a member you have additional privileges such as an information service, a large library at

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your disposal, opportunity to work in the archives, etc.

Important Note: Please change the numbers of pages 1-64 of the 1948 volume into numbers 197-260 of the current volume II.