

Greenland is now a major breeding ground for North Atlantic icebergs. Is it on the way to becoming as torrid as South Carolina?



ANDERS SVAHN

Climatologist Hans Ahlmann asserts that the earth is undergoing a change toward greater warmth.

old-fashioned blizzard someday disappear? Here are the startling

But since 1948 there has been a January thaw every year-to the astonishment of Indians and Old Towners alike. In 1949 the ice went out so suddenly three days. Now the state of Maine has decided to build a bridge across the river to the island. "God has really been good to us," says Mrs. Bruce Poolaw, wife of the chief. "If He hadn't changed the weather

reported that they had seen schools of "rare tropical fish" and "tropical flying fish" cavorting off their coasts. There was even considerable conjecture that

That mysterious changes are happening to the world's climate many persons are beginning to suspect, and a few scientists know. Speaking before the Royal Geographical Society, in London on May 3, 1948, Dr. Hans Ahlmann, director of the Swedish Geographical Institute and professor of geography at Stockholm University, declared flatly that "Ordinary people are beginning to realize that something has happened (weatherwise) and is happening which is of great interest to themselves. . . . If older people say that they have lived through many more hard winters in their youth, they are stating a real fact."

Even more recently the prime minister of Denmark announced enthusiastically, "In the last generation, changes that have had a decisive influence on all social life have occurred in Greenland (a Danish possession). A new era has begun. . . . The Greenland climate has changed, and with it Greenland's natural and economic prospects. This fact of climatic change has been observed over all parts of the earth, and is in Greenland made apparent by warmer weather and warmer sea water."

In the United States, long-term climatological records which have been accumulating over many years indicate that the weather is becoming warmer and drier. Baltimoreans and Bostonians know that the trees aren't growing so rapidly any more and can refer you to studies made in their vicinities of the annual-growth rings of trees. In Utah, Great Salt Lake tells its own mute story; it lost nearly half its volume, and the saltiness of the remaining water nearly doubled between 1877 and 1940. Uprooted "Okies" now living in West Coast states recall with bitterness and fury the great dust storms which drove them from their homes a few years ago. The tropical hurricane which roared up through New England in the autumn of 1938 and took hundreds of lives is still remembered as something more than a freak blow; there have been hurricanes in North Atlantic states since. Fresh in the memory of New Yorkers is the winter of 1949-50, when almost no snow fell and there were four days of record-breaking heat.



## Just What's Our Sun Up to Anyway?

**P**EOPLE are asking questions: Is the weather actually changing or are we just experiencing a few freak seasons? Has the Gulf Stream shifted its course? Is the sun throwing out more heat, perhaps getting ready to explode and snuff out all life on earth in a matter of seconds? Is the solar system, in its twelve-mile-a-second spiral through the Milky Way, or Sol's home galaxy, emerging from the last filmy fringes of a cloud of cosmic dust which for centuries has prevented a small but critical portion of our luminary's radiation from reaching the earth? Has atomic experimentation upset delicate thermal balances, perhaps by increasing molecular activity in the atmosphere? Is the warming-up process worldwide or merely regional?

The person best fitted to answer many of these questions is probably Doctor Ahlmann, one of the world's most distinguished glaciologist-climatologists. A tall, lean viking with quizzical blue-gray eyes and frost in his blond hair, Ahlmann has spent years of his adult life on the Greenland icecap and the ice rivers of both Europe and North America. Gradually, with the co-operation of many other glaciologists, meteorologists and oceanographers from all over the globe, Ahlmann has pieced together a mosaic of what is happening to the world's climate. His picture deals with a multitudinous variety of clues: the migration of flora and fauna, the melting of the world's ice, changes in oceanic and atmospheric currents and temperatures, barometric pressures, rainfall and the diminishing salinity of the seas, indicating a higher proportion of fresh water. Doctor Ahlmann asserts flatly that the earth is undergoing a climatic fluctuation tending toward increasing warmth in many areas. He made the extremely significant statement that "this is the first fluctuation in the endless series of past and future climatic variations in the history of the earth which we can measure, investigate and possibly also explain." Doctor Ahlmann rules out all abnormal seasons, whether super hot or cold, moist or dry. Since man began to keep accurate records, many such freak seasons have been noted. One of the earliest examples on record was a seven-foot (Continued on Page 57)

Beating the heat under an open fireplug in Dallas, these Texas kids may think it's hot now, but the chances are very good that they'll grow up to a warmer world than their grandparents ever knew.

The choking dust storms of America's Midwest, the "freak" New England hurricane of 1938, the fact that Utah's Great Salt Lake is rapidly drying up—all these point toward a definite climatic upheaval.



# IS THE WORLD GETTING WARMER?

A CONTRACTOR

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snowfall which blanketed ancient Rome in 399 B.C., accompanied by cold which froze the Tiber River solid and exacted a toll of hundreds of lives among the thinly clad populace. A century and a half later the Roman Forum was shrouded in snow five feet deep, and the weather remained so cold that traces of the blizzard still existed forty days later.

England's Thames River, which almost never freezes, was icebound for seventy-five days in 503 A.D., and again for fourteen weeks in 1063. In the winter of 747-8, Constantinople had 100 days of snow, and in 763-4 both the Dardanelles and the Bosporus froze. Hardy travelers could walk all the way from the Danube to the Euphrates without crossing open water. The Nile froze in 1010. In the terrific winter 1749-50 the Rhine, Po, Thames, Bosporus and Dardanelles all froze. That same winter, ten feet of snow fell in Italy and Spain. Europe had one of its bitterest winters in 1939-40. At that time the German climatologist, Prof. R. Henning, stated that, in his opinion, no future generation would be subjected to such cold. In this country, New York City had its worst blizzard at Christmastime, 1947. It's always easy, as Doctor Ahlmann points out, for a skeptic to cite a recent very cold winter as proof that the climate isn't really moderating. That's why only long-term trends, revealed by years of investigation, have significance. Cumulative studies now indicate that the climate of vast areas is warming rapidly. Economically, the results already noted over a few decades have been enormous. As an example, Ahlmann mentions Greenland. In that vast subcontinent, Eskimos who never sank tooth in a codfish prior to 1900 have suddenly discovered that the cod has become their main item of diet. Along the West Greenland coast, the cod first appeared at Godthaab-latitude sixtyfour degrees north-in 1919. By 1922 they were at Sukkertoppen, in 1927 they reached Holsteinsborg, and by 1948 they had arrived at latitude seventy-three north-a march poleward of nine degrees in twenty-nine years. West Greenland's total cod catch in 1913 amounted to only five tons. Thirty-three years later, in 1946, 13,000 tons of cod were caught in the same waters. In recent years, rifts have begun to appear in the two-mile-deep ice dome that has covered most of the 827,300square-mile surface of the world's largest island for many centuries. In Southwestern Greenland, dwindling ice has exposed the relics of farms, cemeteries and other evidences of Norse settlements which have been buried in ice for 600 years. The human population of Greenland is increasing rapidly. Danes are migrating there by the hundreds, and a thriving fishing industry is growing. We cannot know with certainty, however, that the entire earth is undergoing a similar moderation in climate until incontrovertible evidence has been secured that the 6,000,000-squaremile Antarctic Continent is also emerging from beneath its sheathing of ice. The first international polar expedition in history sailed last October for Queen Maud Land in the Norwegian sector of Antarctica, its sole objective the

securing of proof that the world's biggest icebox is starting to defrost.

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Considerable evidence that Antarctica is thawing out already exists. Not so long ago, the largest iceberg ever reported -150 miles long - was seen drifting hundreds of miles north of the towering ice barrier that surrounds the continent. Over the years, polar expeditions have reported a steady shrinkage of the vast ice pack. From Adélie Land, a frigid gale fifty miles wide blows incessantly at fifty-mile-anhour velocity off the ice dome, driven by an influx of warmer air from more temperate latitudes.

Rear Adm. Richard E. Byrd, returning from his last Antarctic expedition, reported an ice-free region forty miles wide and studded with openwater lakes. In 1947, Lieut. Comdr. C. A. Bunger, of the United States Navy, landed an amphibian plane on an antarctic lake three miles long, in the heart of an enormous oasis perhaps 1000 square miles in extent and literally spangled with green and blue lakes. In recent years, moss and lichens have been found growing on Antarctic rocks, although the fine soil which they invar-



iably produce has not yet appeared. A warm area has been located within 175 miles of the South Pole.

In the past two years a veritable rash of climatological parties has appeared in many frigid areas of the earth. During the summer of 1948 alone, four different expeditions-two Danish, one French and one Englisharrived in Greenland, one of the groups parachuting to the heart of the tremendous interior ice basin, inside the ring of mountains, ranging in height to more than 13,000 feet, that circles the coast. Groups of probers have arrived in Canada, Alaska, Scandinavia and Iceland. Already the discovery of a viking sword, shield handle and ax in the vicinity of Nipigon, in Southern Ontario, has led to the tentative conclusion that the Norsemen were able to negotiate the straits between Greenland and the North American continent 600 years ago, reaching the Hudson Bay region by open sea. At the present time the United States and Canadian governments are collaborating on the establishment of a permanent meteorological outpost deep in the Arctic island archipelago, within 500 miles of the North Pole.

Though these new developments provide evidence of intensified interest in long-term climate trends, and will undoubtedly prove of great value, we already know that the earth is warming, and swiftly. A truck either has them, or it doesn't. Nothing can take the place of sound, strong, *dependable* axles—Timken-Detroit "3 for 1" Axles with Hypoid Gearing. No other axle ever built can match their ability to cut maintenance costs and boost trucking profits. That's because no other axle can even approach the unique combination of advanced engineering developments built into every Timken-Detroit Axle. The best proof of all is the billions of miles of cost-saving service these superior axles have rolled up. Before you buy new trucks, do this—*look under the truck* for Timken-Detroit Axles and Brakes!

Doctor Ahlmann, who incidentally maintains his own staff of observers on the vast Stor Glacier in the Kebnekajse massif in Lapland throughout five months of the year, announces flatly that "all the glaciers examined (by his and other glaciologists) are shrinking. The rate of decline has increased during the last decades....Some small glaciers have already disappeared."

In describing the phenomenon of glacial ablation, or melting, Ahlmann uses the picturesque phrase "negative glacial budgets." He points out that the receding glaciers all have strongly negative budgets, steadily losing more material by ablation in warm weather than they receive through fresh snowfalls in wintertime. Above his own pet Stor Glacier the ice has lost about thirty feet in height since 1902. In Southern Norway, the huge Jostedal Glacier has receded more than 500 feet since 1910. and some of its outlet fingers have vanished entirely. The celebrated Jungfrau dropped about eighteen inches (Continued on Page 60)

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annually between 1926 and 1946, and sagged ten feet in the scorcher of 1946-47.

South of the equator, glaciers are undergoing a parallel shrinkage. The dazzling "snows of Kilimanjaro" made famous by Ernest Hemingway have lessened. So have the icecaps of the two other high East African volcanoes, Mounts Kenya and Ruwenzori. Recent reports submitted to the International Union of Geodetics and Geophysics indicate parallel shrinkages in the Andes Mountains glaciers of Colombia and Peru.

In Iceland, land is emerging that was icebound for 600 years. All these phenomena, however, "seem to be put in the shade by what has taken place in Alaska," Doctor Ahlmann states. There the tremendous Guyot Glacier has lost 1000 feet in thickness in thirty-five years, and Muir Glacier has pulled back its paleolithic horns about eighteen miles over the same span of time.

In the oceans themselves, the pack ice is also melting. Forty years ago Spitsbergen's important coal-shipping port was ice-locked from October through June. Now the port is open to navigation more than 200 days a year, and in 1946 a collier set an all-time record by sailing from Spitsbergen on December sixth. On the opposite side of the Atlantic, a vessel bringing supplies entered the harbor of Upernivik, Greenland - less than eighteen degrees from the North Pole-during Christmas week of 1942. Until a few decades ago, the Arctic Ocean north of Siberia was locked in ice the year round. Now there is an open belt of water between the coast and the southern edge of the ice pack every summer. Over nineteen years, the average area of ice in the Arctic Ocean dwindled by 600,000 square miles, while the thickness of the ice has decreased by one third in less than half a century. If Adm. Robert E. Peary were alive today, he would probably find it impossible to repeat his 1906 feat of sledging hundreds of miles across the ice pack to the North Pole. Slowly but inexorably the water released by the melting glaciers and gigantic ice domes of Greenland and Antarctica is raising the level of the world's oceans. During the past quarter century, the sea level has crept upward more than an inch. The alarming question has been raised: Can all this

freed water cause another deluge, such as the catastrophe recorded in the Bible and in the myths and legends of all human races?

It's impossible to say. Recent coastline surveys off the coasts of New Guinea and South Australia indicate that at the peak of the last great glaciation the ocean surface was 300 feet below its present level. Estimates of the amount of water still immobilized in the frozen, rigid state vary greatly, due to the fact that we know almost nothing of the underlying land contours of both Greenland and Antarctica. In a given spot, the ice may be three miles deep or it may be only a thin sheath atop a mountain peak or plateau. Some scientists calculate that melting of all the planet's ice would raise the oceans no more than ninety feet; others assert the rise would be in the neighborhood of 500 feet. In either event, all present seaports would be seriously affected while the majority would be completely inundated. Millions of square miles of land surface, including most of England, for example, would disappear beneath the waves.

The hydrographer, H. Auchinloss Brown, has evolved a most unpleasant theory which, if correct, might explain the Flood, but holds no comfort at all for mankind. Mr. Brown says that, at roughly 8000-year intervals, accumulating ice at the poles attains sufficient weight to cause the earth first to wobble on its axis and finally overturn, establishing a new axis, new poles and a new equator. The earth is wobbling pretty badly right now, and a new flop-over is imminent, according to Mr. Brown. Fortunately for us, the polar icecaps are now dwindling, instead of increasing. If they haven't overturned the earth already, they're not likely to in the immediate future. The enigma of tremendous cataclysmic floods is still unexplained. So is the great mystery of what caused terrific cold to pour over the once tropically hot North Polar regions with such speed that rhinoceroses and mammoths literally froze to death in midstride. In the Yukon region alone the perfectly preserved carcasses of several rhinoceroses and more than a score of mammoths fresh enough to be eaten by animalshave been dug out of the paleolithic ice, while many such discoveries have been reported from Siberia. Fresh plants and fruits have also been found.

Astronomers point out that a goodsized heavenly body - a massive comet, roaming planetoid or even a dark or illuminated star - might cause a violent shift in the earth's axis if it passed close enough to our planet. There is no conclusive evidence that this has ever occurred, however, and even if it has occurred, it has only been at extremely wide-spaced intervals. Masochists and mongers of doom, however, can revel in the thought that it may happen at any time.

More optimistic persons may comfort themselves with the strong probability that, though the oceans will rise - and perhaps with greatly accelerating speed-that rise will be spread out over decades and perhaps centuries, giving humanity plenty of time to adjust to the changing conditions.

Climatologists estimate that a threedegree rise in the planet's average mean annual temperature would be sufficient to melt all accumulated ice within a relatively short span of years and prevent winter ice that formed thereafter from remaining throughout the summers. Temperature rises in many North Temperate and Arctic regions already approach and in some instances even exceed this critical amount. In Spitsbergen, for example, average February temperature climbed seven degrees in twenty-six years. Greenland has had a succession of increasingly mild winters, including a 1947 scorcher that was ten degrees hotter than the norm. Despite the fact that roughly 18,000 square miles of ice breaks away from Greenland's coast each year, the International Ice Patrol-operated in western North Atlantic waters by the United States Coast Guard in behalf of fourteen participating nations-notes that the number of icebergs invading the Great Circle route between North America and Europe is declining. Warmer water melts more of them before they can reach the lower latitudes. Though Doctor Ahlmann denies that the Gulf Stream has changed its course, he does declare that more warm water is being borne northward by that current, while there is an increase in the volume of cold water being forced out of the polar basin. North-going ocean currents in the North Atlantic are both warmer and saltier, while

southbound currents are fresher and colder, indicating an increased proportion of water derived from melting ice.

Mysterious changes are occurring in the atmosphere too. The velocity and volume of the prevailing southwesterly winds in the Northern Hemisphere have increased, bringing a greater volume of hot humid air poleward and dispersing colder air to the south. In high latitudes, winter atmospheric pressures have decreased, indicating an increased supply of warmer, lighter air. An area of low-pressure air over the North Atlantic has moved "abnormally far to the north, thereby changing the direction of the atmospheric pressure gradient so as to increase the flow of warm air to these Arctic regions." Rainfall is increasing in high latitudes.

These phenomena are so numerous and far-reaching that the climatologist R. Scherhag, after publishing a paper in 1931 on the extraordinary improvement in the climate of Northern Europe, coined the apt phrase: "The warming of the Arctic." While the planet as a whole is warming gradually, and higher latitudes with extreme rapidity, the increased agitation of the atmosphere and oceans has actually caused, in some instances, a slight drop in tropical and subtropical mean annual temperatures and considerable losses of moisture. The vast Sahara Desert is enlarging southward at three quarters of a mile per year. East African lakes are drying up; the level of Lake Victoria has fallen seven feet in ten years, Lake Naivasha has been dwindling rapidly since 1917, Lake Elementerita is now only about two feet deep, and in 1947 Lake Nakuru was only a parched bowl of soda and other saline deposits, with a few brackish pools remaining here and there. As previously mentioned, the climate of the United States is definitely drier. Thus the planetary trend at present is in the direction of greater uniformity of climate, with the Arctic less cold and dry and some of the belly regions of the planet less hot and moist. As the fluctuation continues, vast areas along the equatorial belt may become boiling deserts, totally unfit for human habitation.

A striking example of the extent to which mid-Europe's climate has already come to resemble that of the hotter, drier United States is found in the fact that the thorny, flowering locust tree which was imported from the United States to the warm plains of Southern Russia many years ago, has recently been migrating widely. Following railway lines, this tree jaunted successively to Austria, Germany and France, and only last year established a foothold in the London area of Southern England. In the United States many species of vegetation are migrating northward.

All along the Arctic periphery the line of permanently frozen ground has retreated northward. In Northern Asia, this recession is measured in hundreds of miles. Forests of pine, spruce, birch and willow are advancing into previously treeless areas throughout Northern Scandinavia, Siberia, Canada and Alaska. Beyond the Arctic Circle, the Finns are planting and harvesting crops of rye, barley, oats and potatoes.

In northern regions there are fewer severe winters, and longer, milder summers. Between 1875 and 1915, Finnmark, in the northernmost part of Norway, had only two good seed years, but since 1915 good crops have been obtained "with few interruptions." In the extreme north of Finland, trees at the timber line, "very sensitive to even the smallest variations in climate," are not only maintaining their position but increasing in size and advancing. A recent survey of 900 tree cross sections by the Swedish Institute of Forest Research indicated an increase in the rate of growth "since the turn of the century." In Alaska, according to Dr. Robert F. Griggs, "everything . . . suggested that instead of being held to a stationary line, the forest was advancing." Prof. Jean Michea, French Arctic explorer and ethnologist, finds that the tree line is advancing northward in the Ungava District of Northern Canada, while "skeleton trees" and small bushes are growing larger. All around the roof of the world, Arctic species of birds are retreating and visitors from more temperate climes are arriving in increased numbers and prolonging their annual sojourns. What's happening? May we expect giant sequoias and ginkgo trees to bloom again in the Arctic, as they did 60,000,000 years ago? Within the life spans of persons now living, may we expect fertile farms deep within the Arctic Circle, flourishing cities in Northern Greenland, coal, lead, copper, silver, gold and uranium mines, oil fields and fisheries in Antarctica? Should "Go north, young man," become the motto of many of the world's youth, just as "Go west" was the slogan for thousands of Americans throughout much of the nineteenth century? According to Doctor Ahlmann, the present climatic fluctuation began well over a century ago, continued rather hesitatingly until the turn of the twentieth century, stepped up its pace thereafter, and since around 1920 has been accelerating rapidly. He comments wryly that the climate is now changing so fast that "each new contribution (of fact) to the subject is out of date almost as soon as it is published. Constant revision is therefore necessary." One thing is certain. This is more than a brief, superficial change. It cannot be accounted for by the elevenyear sunspot cycles, or by the longer Brückner cycles, in which the weather is supposed to be cold and wet over

half of a thirty-five-year period, warm and dry over the remaining half. According to Dr. Clarence A. Mills, of the University of Cincinnati's Laboratory for Experimental Medicine, earth temperatures rise regularly about every 2000 years.

The long-term solar cycles still remain mysteries to us. We haven't had time to plot them. But many meteorologists agree that an increase in solar-energy output is responsible for the changing climate. According to Prof. Carl-Gustaf Rossby, Swedish meteorologist, ".... the most plausible cause is some change in the activity of the sun. It may be that more ultraviolet light is being produced. Such an increased production of ultraviolet light might affect the upper atmosphere and so make the climate warmer. Should we succeed in finding the cause, we may well be able to estimate how long the warming process will go on."

We know that our sun is a nervous, or jittery, star. Probably it has been that way ever since the planets were ripped from its bowels by the gravitational pull of another, passing star,

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# CORN GROWING

### **By Herbert Merrill**

When summer banks her fires up To hold the heat until daylight, This valley like a steaming cup Stands simmering throughout the night.

Then is the time for corn to grow And stretch a leafy leg and back, Till up and down the reaching row You hear the bones and tendons crack.

And out of summer's magic dust Rise up the green and jointed bars

Where corn is struggling to thrust A living ladder to the stars.

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some billions of years ago. Undoubtedly solar activity fluctuates in many ways, in various cycles ranging in duration from a few years up to thousands of years. But we do know that, since life began on Earth, the sun has never grown hot enough to extinguish it all. And it seems plausible that if the sun were going to blow up, it would have done so at the time the solar system was born. If the sun does let go in an atomic explosion of complete self-destruction, we shall never know it. We shall not even see the light of the explosion, for in the split second that it reaches us, eight minutes after the event actually occurred, we shall all die. Nor is the earth likely to blow up. Its internal energy is decreasing, not increasing. Had the earth been vulnerable to suicide, the act would have been committed long ago. More, nuclear scientists generally believe that man could not blow up the planet by atomic experimentation, even if he wanted to. The most reasonable conclusion is that the earth is emerging from the last lingering chill of one of a succession of little ice ages that followed the last great ice age some 15,000 years ago.

There are reasons to expect a relatively long period of balmier climate.

The principal one-aside from the probability that the sun has decided to favor us with more heat for a whilemay be found in the fact that climatic trends, once they gain a foothold, tend to build up like money earning interest in the bank. To illustrate by a bad pun, they "snowball." Ice ages grow more frigid, and torrid epochs more tropical. Climate alters in pendulumlike swings, each swing developing sufficient momentum to carry the trend somewhat beyond the variation that might be anticipated through a knowledge of the factors involved.

If there were a very old, very intelligent Martian astronomer who had studied the earth over thousands of years, he would have noticed an extremely interesting climatological phenomenon. At the peak of the last great glaciation, he would have observed that our planet gleamed like a highly polished mirror. Its albedo, or lightreflecting power, was high. But as the ice melted, exposing rock and water, the albedo declined greatly. The earth became a much less brilliant spectacle, with vast areas of gray, blue, black and green replacing much of the dazzling white. Now the planet was absorbing much more heat from the sun than formerly, and the Martian would have rightly suspected that the climate was moderating. We are in the declining-albedo swing of the pendulum now. With each square foot of ice surface lost, the heat-retaining capacity of the planet increases. Warm land-and-water surfaces dissipate more heat through the surrounding air, thawing more ice. This

process is continuous and cumulative.

We have no way of telling how long the era of balmier climate will last. For one thing, we do not know how long the sun will continue to maintain its present slightly stepped-up rate of radiation. It is highly significant that the fluctuation has already lasted more than 100 years and shows every sign of increasing. Doctor Ahlmann stresses this when he says that "as more areas are investigated as a result of the increasing interest in the present climatic fluctuation, the more extensive the phenomenon seems to be."

Ahlmann uses the word "phenomenon." Actually, the current years are crucial ones. Any day now, we may expect a report from the tri-nations expedition in Queen Maud Land, clinching Ahlmann's thesis that the climatological improvement is indeed world-wide. Most climatologists expect just such findings. We may then assume that, if the moderation in world temperature continues for another decade or two, the retreat of the ice will become a rout. And the world will be able to plan with certainty on at least several hundred years-perhaps a millennium or more-of balmier climate. The entire earth may not become tropical, but Baffinland will be as warm as Minnesota, Greenland as warm as the Carolinas, Vladivostok as warm as Calcutta. Deserts will enlarge in Africa and the United States, but vast new food-producing areas will be put under cultivation farther north. From the present temperate and tropical latitudes, millions of people will migrate northward and southward toward the poles.