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HUMAN GEOGRAPHY IN THE AIR AGE

RENNER

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HUMAN GEOGRAPHY IN THE AIR AGE

(A Text for High School Students)

BY

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G. T. RENNER

pre-flight aeronautics. Second, it seeks to provide pertinent aviation materials which may be woven into existing courses in the curricula of the secondary schools and, wherever feasible, of the elementary schools.

To name all the men, women, schools, aviation industries and authorities, publishers, representatives of colleges, universities, school systems, non-profit institutions and agencies of State and Federal Governments who made possible the AIR-AGE EDUCATION SERIES would be a difficult task. In individual books, authors have acknowledged assistance and advice from many sources. Yet the series owes its existence more particularly to a few individuals and organizations.

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The Institute of the Aeronautical Sciences, a non-profit scientific society devoted to the advancement of aeronautics, is glad to sponsor the AIR-AGE EDUCATION SERIES in the belief that it will aid American education to eliminate the hiatus between technical aeronautical advances and popular understanding of aviation as a revolutionary world force today and tomorrow.

BEN D. WOOD
Chairman, Education Committee, The Institute of the Aeronautical Sciences

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ILLUSTRATIONS

FREEDOM

We are not free: doth Freedom, then, consist
In musing with our faces toward the Past?

* * * * * *

Freedom is re-created year by year.

* * * * * *

And, as the finder of some unknown realm,
Mounting a summit whence he thinks to see
On either side of him the imprisoning sea,
Beholds above the clouds that overwhelm,

* * * * * *

A continent to him first oped, — so we
Can from our height of Freedom look along
A boundless future, ours if we be strong;
Or if we shrink, better remount our ships
And, fleeing God's express design, trace back
The hero-freighted Mayflower's prophet track
To Europe entering her blood-red eclipse.

JAMES RUSSELL LOWELL

CHAPTER 1

GEOGRAPHY AND AVIATION EDUCATION

Ideas and airplanes. The airplane has created a new world geography. A well-known news-commentator once remarked, "Put an engine between two wings, and nearly anything can happen." We have done this, and a new geography is one of the things which has happened. It has happened so suddenly that most people do not even know that something new has replaced something old. The world has changed faster than man's ideas have changed. Fortunately, we have schools for the purpose of helping people to obtain new ideas which will fit new conditions in their world.

Ideas have shape and size as well as content. Every idea which a human being has in his head, or can get into his head, is centered about something or other. That is, human ideas have *content.* Every human idea also has a *shape.* That is, it has dimensions just as a room, a ball, a pound of sugar, a nail, or a book does.

How do men's ideas get their content? They get it from observation, from experience, from living. In school, such subjects as literature, economics, sociology, mathematics, help people to get a greater and greater number of ideas, and to make those ideas fuller and richer.

How do men's ideas get their dimensions? The answer to this is a little more difficult. The length of an idea is derived from history. The breadth of an idea is derived from geography. This pair of subjects gives two dimensions to human ideas. For a long time men lived in a two-dimensional world, just like dots on a sheet of paper. Recently, though, aviation has added height or depth — a third dimension. (See Fig. 1.) We now find ourselves living in a three-dimensional world, and it may be a bit painful to readjust our thinking to it. A nation today that cannot think ideas which are historical, geographical, and aeronautical is not only backward, it is dangerously unprotected.

The ideas of uninformed people do not have much shape or dimension. Such folk have little notion of what went on in the world before they were born; that is, they have no historical perspective. They also have little notion of what exists or happens outside their community. To them, the United States is a place, not an area, a realm, an expanse. Europe is only some land somewhere. To them, events are happening *at* Europe, not *in* Europe. Thus, they have little geographical perspective. To such people, also, aviation means only specific objects such as airplanes and airports. They do not see that it means that man has suddenly come to live in a vastly expanded three-dimensional world.

The ideas of educated people are somewhat better than this. In America we have studied a good deal of history. Consequently,

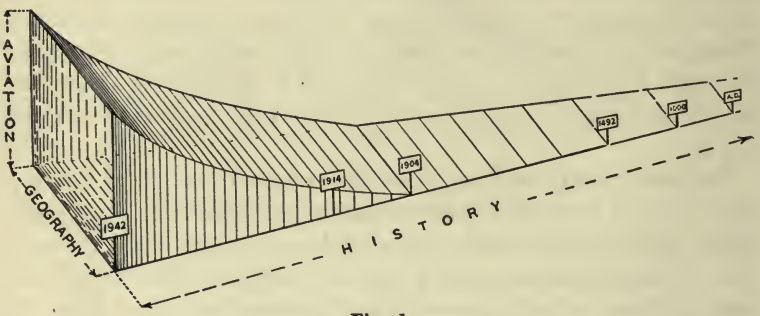

Fig. 1

Diagram showing the dimensions of human ideas. History supplies length, geography width, and aviation a third dimension—depth

educated Americans have a fairly good historical perspective. We have not, however, done so well in teaching or studying geography. We have mistakenly regarded geography as an elementary subject. Most Americans stopped studying it in the seventh or eighth grade. And so, when we attempt to make our nation aviation-minded we find it difficult to do so because the ideas of our people, even of the educated ones, have little or no geography in them. Now, we find that we must spend much time teaching Americans the new geography. The mental jump from a two-dimensional world to the three-dimensional world of aviation is going to be much harder than it would have been had we been accustomed to thinking geographically to even a small degree.

America invented the airplane, she invented the high-compression motor, she invented high-octane aviation fuel, she took the lead in developing commercial aviation, but the great majority of the American people have been far from well-informed about these things. Their ideas have lagged behind. Mentally we have continued to live and think on the ground and on the sea: in automobiles and ships. Other nations took our inventions, improved upon our ideas, organized our discoveries, and so forged ahead of us. The United States, the greatest democracy of the earth, has been assaulted, threatened, and humiliated by a thoroughly modernized horde of new barbarians. It is time that we began to become air-conscious. We must, as quickly as possible, train hundreds of thousands of American airmen for both war and commerce. We must do even more, we must understand and learn to live in an air age.

What task does this throw upon the school? It means that the school must not only provide the *content* to man's ideas, it must begin to see that those ideas have proper *dimensions* also. In achieving this latter, the school must stress history, geography, and aviation. (See Fig. 2.) We are already studying a good deal of history, but what we are studying needs to be reorganized and redirected. We are now making a beginning at aviation education. The school can and must provide background studies, tool studies, and pre-flight training. The governmental and commercial aviation agencies will then give flight training.

We have neglected geography. The most serious part of the task, therefore, lies in our need for geographic education. No other subject is quite so necessary to make us understand the changes which man's new machines have brought about in our world; to make us realize the way in which old distances have been shortened, old barriers broken down, old isolations cancelled out, and new relations imposed. And yet no other great nation has been trying to get along with so little geographical education as has ours.

John W. Studebaker, U. S. Commissioner of Education, sums up this neglect in the following words:

> Now is the time to teach the American people geography. I think . . . we are more illiterate in geography than any other civilized nation.
>
> The reason is that we have never taught geography. Young people

have stopped studying geography beyond the 7th and 8th grades of the schools.

I recommend that in some way throughout the secondary schools and colleges and universities a real effort be made to acquaint American citizens with the realities of the world situation.

Fig. 2

Better late than never

Our misconception of geography. Americans have never been very conscious of other peoples or of the nature of the outside world. Our own territory has been so large for a two-dimension age that we have not sensed our lack of information. We therefore have frequently been unable to develop our foreign relations to our own advantage. The years from 1932 to 1942 were a period of particular difficulty.

One of the reasons, and perhaps the principal reason, was our almost universal belief in a worn-out geography. To most people this may seem a strange statement — even a silly one. Many persons will reply, "Nature made the world's geography. It is permanent and can't change. How, then, can geography become outworn?"

This is the standard belief, but unfortunately it is wrong. Nature did make the world, but not the world's geography. Geology, geometry, and geophysics are nature-made, but geography is man-made stuff like slums, national debts, and styles in women's hats, and it can change just about as quickly and drastically.

Maps are not geography. To this, some will answer, "But look at the map of the world. There is the world's geography, isn't it? A good modern map is accurate, isn't it?" The answer to that is that maps are not geography. A map is only a device for visual education. A map can show some geographical ideas, but can also show historical ideas, or economic ideas, or political ideas, and so forth. Maps are educational instruments of a *general* character. As such they are only pictures of what is in man's head. If whatever is in man's head is wrong, or misleading, or out-of-date, then any map made by him is misleading, no matter how accurate the map be from the mathematical point of view.

No map can show the geography of the world, or of any part of the world. At best it can only show a diagram of a few geographical ideas. It can only show cartographically a small part of what the map-maker *thinks* is the geography of a country or the world. If man changes his ideas, then he has to make a different diagram to serve as a framework on which to hang his ideas.

Man can make new geography. Every time man invents something he helps to create a new geography of his town, his state, his nation, or, for that matter, of the world. The airplane was such an invention. It was one of those things which required that man have new ideas. These new ideas in turn required man to

make a new diagram of his world. Indeed the airplane was one of the most important single inventions ever made in terms of what it did to men's ideas (or at least in terms of what it *should* have done to men's ideas). Actually it created a new geography of the United States, of North America, of the world.

If we learn little or no geography in our schools, or if we learn outworn geography, that is, geography which was good before the airplane but not since, then we Americans are doomed to go on having wrong ideas in our heads no matter how many of us learn to fly. All this is merely to emphasize the point that geography has changed as man's ideas have changed, a point which can be demonstrated with startling clarity if we examine some past geographies of the world.

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CHAPTER 2

GEOGRAPHY IS MAN-MADE

World Geography, 900 B.C.

FROM very early times people have speculated about the size and shape of the earth and the nature of things upon the earth. Out of their speculations have grown definite concepts which we call geography. One of the earliest geographies of which we have any record was that described by the Greek Homer nearly 3000 years ago. Homer is supposed to have been a blind bard. He was a scholar and a thinker, eminent for his day. He was a real teacher of men, as were many of the bards. Singing and reciting poetry was a common method of teaching in those times. Homer sang of a geography of the world about 900 B.C.

Figure 3 shows the world of Homer's day. It included parts of what we now call Europe, parts of what we now know as Asia, and the northern portion of what we now call Africa. It was thought to be flat like a disk, or wafer, or an enormous cookie. The central part was occupied by the Mediterranean and the Black Sea. Greece stood at the exact center of this world. The lands were arranged about the Mediterranean Sea. Around the whole flowed the Ocean River. One could get out of the central Mediterranean area by sailing westward through the Strait of Gibraltar, or by sailing eastward through the Strait of Kerch and the Gulf of Taganrog.

Within this world diagram there existed a civilization as good as ours in some respects. In its mechanical knowledge it was, however, far inferior to our own. All around the edges of the Mediterranean and upon its islands and peninsulas were the settlements of the Greeks, the Phoenicians, and their contemporaries. Wars, trade, and other world affairs happened there. Islands, peninsulas, capes, promontories, river deltas, and fertile strips

of coast were things to be fought over. The Hellespont, Scylla and Charybdis, the Isthmus of Corinth, the island swarms of the Aegean, Mount Olympus, the volcanoes of Italy, and the many templed promontories of the coasts were the features of that world.

Civilizations arose, flourished, and fell. Trade routes were de-

Fig. 3

The world according to Homer—as a flat disk or wafer

veloped. Wars, both naval and military, were carried on for possession of the small strategic spots between Troy and the Pillars of Hercules. This was a flat wafer world. It had an uncrossable river around its outer edge. In the center lay a sea with a rim of land around it.

Many of you will exclaim, "What a perfectly cockeyed geog-

raphy!" Not so, however. It was a perfectly good geography. It was even intellectually valid, because it embodied all of what man knew about the world; it expressed man's concept of his world. When the Admiralty of the Athenian Navy planned its grand strategy against the Persians, they based it upon this map. It worked perfectly well as naval geography, too. When the Ionians planned a trading voyage to Gades or some other distant point, the ship got there and came back with a cargo. Therefore it was also good commercial geography.

A somewhat similar idea of the world existed in Babylonia. Archaeologists have dug up a brick tablet made shortly after the time of Homer which bears a map of the world. Needless to say, it puts Babylon near the center of the world.

Anyone during those times who tried to think of the world in any other terms than these would have been considered queer or foolish — perhaps insane. Human psychology permitted only a flat world, a world shaped like a wafer. Therefore the world was flat and it was wafer-shaped. Such geography was entirely valid and useful for a world of rowboats and small sailing vessels.

Human knowledge gradually increased. Navigation improved a little. Bigger and better boats were built. Caravan trade by land increased — a little. By the time of Herodotus (440 B.C.) a somewhat better map of the world could be drawn. Gradually men found that it was not possible to get out into the Ocean River by way of the Strait of Kerch, but they did venture westward out through the Strait of Gibraltar. The Atlantic shores of Europe and Africa and a few of the Atlantic islands became known vaguely. By the time of Eratosthenes (200 B.C.) a greatly improved and enlarged map of the world could be drawn.

Man's idea of the world in which he lived improved and enlarged slowly. Ptolemy's map (160 A.D.) adds a small Indian Sea and a good deal of Asia to the world. (See Fig. 4.) For many centuries after this man's geographic ideas did not improve much. Indeed during the "Dark Ages" in Christian Europe man's ideas actually became narrower rather than broader. In Mohammedan Africa men did a little better intellectually, because they were not so fearful that new ideas might be wicked. Even as late as 1307 A.D. an Englishman named Richard of Aldingham made a map of the world which is not very different from maps in the days of Eratosthenes.

All through this long period of flat wafer existence, a few men dreamed of a larger and better geography. They did not quite believe the Ocean River to be the final boundary of the world, nor were they entirely persuaded that the world was flat as a disk. There was speculation among the scholars and philosophers of ancient Greece, but the general run of folk made fun of such men and regarded them as visionaries. Such men did, however, plant a few small ideas of a possible world beyond the Ocean River. By the fifteenth century, therefore, knowledge had expanded and the world disk had become considerably larger in size. The world was still a disk or flat wafer, though, and anyone

Fig. 4

The world according to Ptolemy

in those days would have assured you that it would always remain one. (See Fig. 5.)

World Geography, A.D. 1492

In 1492 Christopher Columbus more or less fearfully sailed westward across the Atlantic Ocean in the hope of reaching Asia. Columbus did not, of course, originate the idea. He got it from a map of the world drawn by the geographer Toscanelli in 1474. Toscanelli, in his turn, got it from the supposedly empty theories of long-dead scholars such as Roger Bacon, Aristotle, and Anaximander and from ideas of certain Moslem geographers

and mathematicians. Columbus left the known world, crossed the ocean, and found new land which was not part of the wafer world known to Europeans. Thereupon people's orthodox geographical ideas fell to pieces all at once, and a new concept of the world was made imperative.

Columbus had tried to interest the republics of Genoa and Venice (two great maritime and naval powers of his day) in the venture. They rejected his ideas flatly, probably not so much because they thought those ideas were wrong as because they were inconvenient. They felt that they could not afford to take

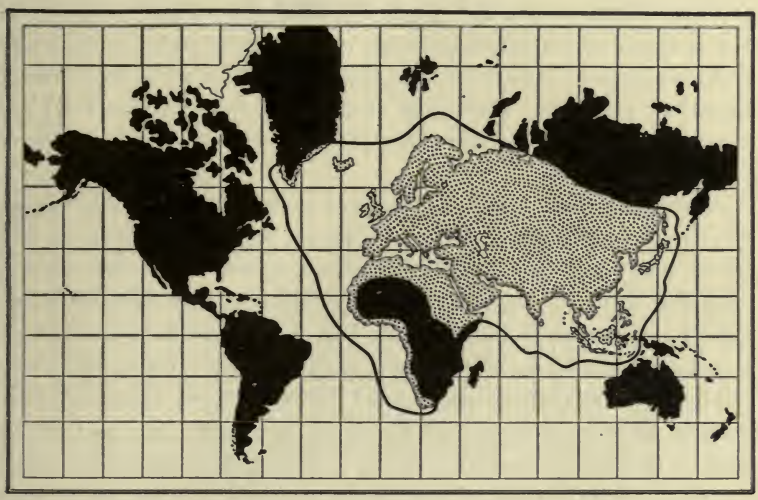

Fig. 5

The known world in 1492

the chance that the ideas of Columbus might be right. The navy and merchant fleets of Venice and Genoa were built for sailing the enclosed Mediterranean and the coastal waters of the Atlantic. If Columbus were right, then vessels would have to sail the open oceans, and the Venetian and Genoese navies would have to be rebuilt — a calamity too terrible for their government leaders to face. The old geography was too convenient to be discarded. Spain and Portugal had less at stake, and anyway, they were becoming anxious to compete for the trade which the Italian republics had held so long. A year after Columbus' voyage,

a Portuguese sea captain, Vasco da Gama, sailed clear around Africa and into the Indian Ocean. A few years later the Portuguese navigator Magellan sailed a Spanish flotilla around the world.

Immediately a new geography came into being, because the world was seen to be round rather than wafer-shaped. Very shortly after 1492 Behaim made a small globe to serve as a model. But globes were too clumsy for general use, and a new kind of map was needed. A world centered about the Mediterranean no longer existed; every existing map of the world immediately became obsolete. A new type of map was made by bending a sheet of parchment paper around the globe until its two ends met. Next the outlines of the lands and seas on the globe were "projected" onto the paper. This latter was then unrolled, giving us the now familiar cylindrical map. The commonest map of this kind we have come to call the Mercator Map in honor of one of these early map-makers.

After 1492 man ceased to live on a wafer, and mentally began to live on a cylinder — a cylinder whose width was about 12,000 miles and whose perimeter was about 25,000 miles. On such a map the lands fell naturally into a western and an eastern hemisphere, separated by oceans. (See Fig. 6.) The polar seas formed the northern and southern edges of the cylinder. Upon this map the earth's wind belts were plotted — trade winds, westerlies, doldrums, monsoon winds, and so forth. Commerce was carried by slow wind-driven sailing vessels. These sailed westward with the trade winds, eastward with the westerlies, and north and south by tacking as best they could.

First, of course, came the struggle to colonize the western hemisphere, *i.e.* the west end of the world cylinder. Then, connecting the two hemispheres, there developed a whole series of trade routes running every-which-way across the oceans. In general, however, most of them ran east and west between the two "ends" of the world. These routes were long and the vessels were slow. The time consumed by any voyage was great. Consequently all the island stopping points along the way became very important. Large peninsulas, isthmuses, archipelagoes, and oceanic islands were important in the new geography. A 400-year scramble to control the islands of all the oceans ensued. Wars were fought over remote islands, atolls, and reefs — any place

which would supply food, water, and anchorage to break the long, slow ocean voyages. We may trace through modern history the exchange of islands during each war. Nation after nation became a collector, a holder, a dominator of islands. England, Holland, Portugal, France, and Spain divided up the supply of islands. At one stage of history, Martinique was a greater colonial prize than Canada; St. Helena, Fiji, or Tristan da Cunha preferable to Congoland or Liberia; Curaçao better than Venezuela; Cuba more desirable than the Mississippi Valley.

All this, of course, looked like a final geographical picture of

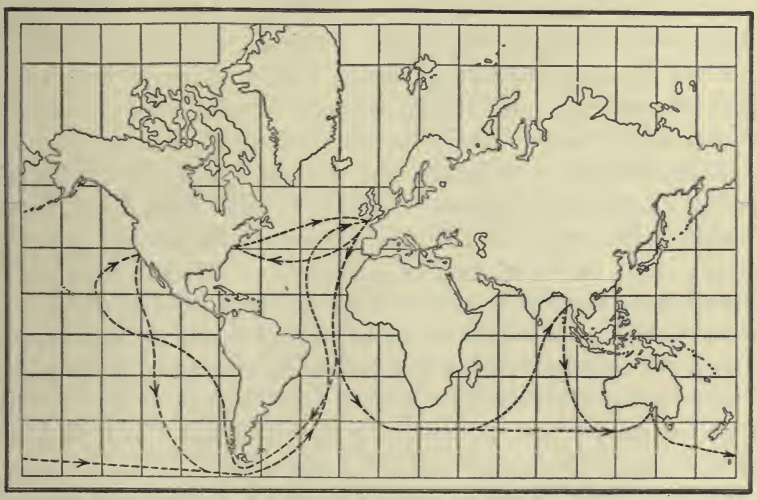

Fig. 6

Cylindrical map with some typical sailing routes

the world. It looked so permanent and real that it became deeply rooted in men's minds. Nations developed a cylinder world, two hemispheres, island-possession obsession.

World Geography about A.D. 1915

This cylinder world was no more permanent than was that represented on the disk map of Homer or on the generally similar maps made by men who came after Homer. The fast ocean steamer rendered cylinder geography as out-of-date as an Elizabethan haircut or a Colonial wig. In 1861 a tremendously im-

portant invention was made; ships were put inside of a jacket of iron or steel armor. Before long entire ships were built of steel. Somewhat earlier the steam engine had been placed in the ship. We therefore had steel oceangoing ships driven by mechanical power, as the highest common factor in geography.

With the invention of the steel power-driven ship, speed became the essence of things geographical. Wandering sailing-vessel routes over the seven seas gradually became outmoded. No longer did man think of the world in terms of a slow ship following along a series of islands from one end of the cylinder to the other. Long voyages around the Horn or the Cape of Good Hope became more and more rare. Canals at Suez and Panama were constructed. Other canals at Nicaragua, Florida, and the Kra Isthmus were planned. The world wind belts lost their significance, and remote pelagic islands were by-passed by modern commerce. European island colonies became economic liabilities rather than assets. The United States, starting late, picked up a few unclaimed islands, took some from Spain, and bought a few more from Russia and Denmark. Speedy, power-driven ships, however, became independent of wind belts and island stops. Regular schedules of travel along definite sea lanes were developed. Considerations of speed became so important that if we could pare off a few hours we were often willing to risk the safety of a ship. The Titanic disaster prior to the World War was an example of what sometimes happened in trying to achieve the cutting of schedules by a few hours.

In developing the new lanes of commerce a discovery which had been made long before became important. This discovery was that the shortest distance between two points on the surface of the globe was usually not a straight line on the cylindrical map. Instead, the shortest distance between any two places on the earth is actually to be found by drawing an equator, *i.e.* a full 25,000-mile circle, through them. This is a full earth circumference line, or as it is usually called, a great geometric circle. When such a line on a globe is transferred to a Mercator map, it is usually not a straight line, but a very curved one. It looks like a long round-about way between two points rather than the shortest route. What was worse, the cylindrical map shows both the lands and oceans pulled clear out of proper shape and in places enormously exaggerated in size. Obviously such a map

could not show a picture of a world which depended upon streamlined ocean trade around the edges of the ocean basins.

The misfitting of great-circle routes on a Mercator map should have given the common man a hint that cylinder geography was out of date and should have warned him that his psychology based on an idea of the world as a cylinder was apt to get him into trouble, but apparently it did not. Scholars, however, began to search for some kind of map which would illustrate or rather would provide a basis on which we could show these new streamlined trade routes to better advantage. This search gave us equal-area (homolographic) maps of the world.

One of the best of these has been made by an American scholar, J. Paul Goode of the University of Chicago, and it is known under the name of ocean-basin homolographic map. He got this by stenciling the world map on a big "grapefruit," splitting the rind in the middle of each continent, and then peeling it. For each ocean, the pieces of rind were kept as nearly continuous as possible. Then the peeling was flattened, and the outline on it was traced off on paper. This gave a new world map to represent a new world geography.

This map does not show the world as a cylinder at all; it shows it rather as three great ocean basins, the Atlantic, the Pacific, and the Indian. The continents do not fall into an eastern and western hemisphere. Rather they become mere rims of land around the ocean basins.

On this map (see Fig. 7) the principal great-circle routes of fast traffic are shown as curved lines, the width of the lines being roughly proportional to the amount of traffic carried. You can see that the North Atlantic great-circle route carries perhaps 45 percent of the total world trade. The great-circle route of the North Pacific carries much less. When one looks at that map, he sees that the great-circle routes radiate preponderantly from northwest Europe, a plain diagram of the very "foreign entanglements" which isolationist-minded Americans have often sought to deny.

During one period of our national life it was popular to state that America must have no foreign entanglements. This map shows an "octopus" of trade routes which is one of the finest demonstrations of foreign entanglements which all the people of the world were ever entangled in.

With world geography based upon a map like this, old-fashioned naval war to control islands, and military war at home to back up the naval war, became as obsolete as the dodo. The new world strategy for war (and for peacetime control also) had therefore to be based, not upon sovereignty along sailing-vessel routes, but upon control of the great-circle trade routes. In this connection, note from this map that you cannot move a single ton of cargo from one ocean to another, or from one ocean across two others, without passing through one or more of some twelve geographical bottlenecks, or narrow passages between oceans. Wherever an island or a peninsula happened to lie in the path of one of the great circles of trade, it became important as a coaling station, a fuel-oil station, or a ship-repair base. The really strategic places on earth were the bottlenecks or gateways leading into and out of the three great ocean basins. It is interesting to note that there are only twelve of these important gateways in the entire world.

The British, after a long struggle with the Dutch, Portuguese, Spanish, and French, had seized control of all the natural bottlenecks. Or rather they had seized all but two small ones, and these two were left in the hands of their little ally Holland. Then the British performed some continental surgery and made a bottleneck at Suez. The United States did likewise at Panama. Thus the geographical picture of the world came to consist of rims of land around three ocean basins, with these basins connected by twelve maritime gateways — ten of them natural and two of them man-made. The entire flow of world trade and the entire strategy of naval power came to hinge upon the control of these twelve vital points. We controlled one, the Dutch controlled two small ones, and the British controlled all the rest.

A ship cannot get into or out of the Indian Ocean without passing the Cape of Good Hope (Capetown), southeast Australia (Sydney), the Strait of Malacca (Singapore), or the Strait of Bab el Mandeb (Aden) and the Suez Canal (Alexandria). To enter or leave the Atlantic, the way lies past Capetown, the Falkland Islands (Port Stanley), Scapa Flow, or Gibraltar. Gateways to the Pacific are Port Stanley, the Panama Canal, Singapore, Sydney, and Auckland. There are three other small entrances in the southwest corner of the Pacific through Sunda Strait, Lombok and Macassar Straits, and the Timor Sea, but these were

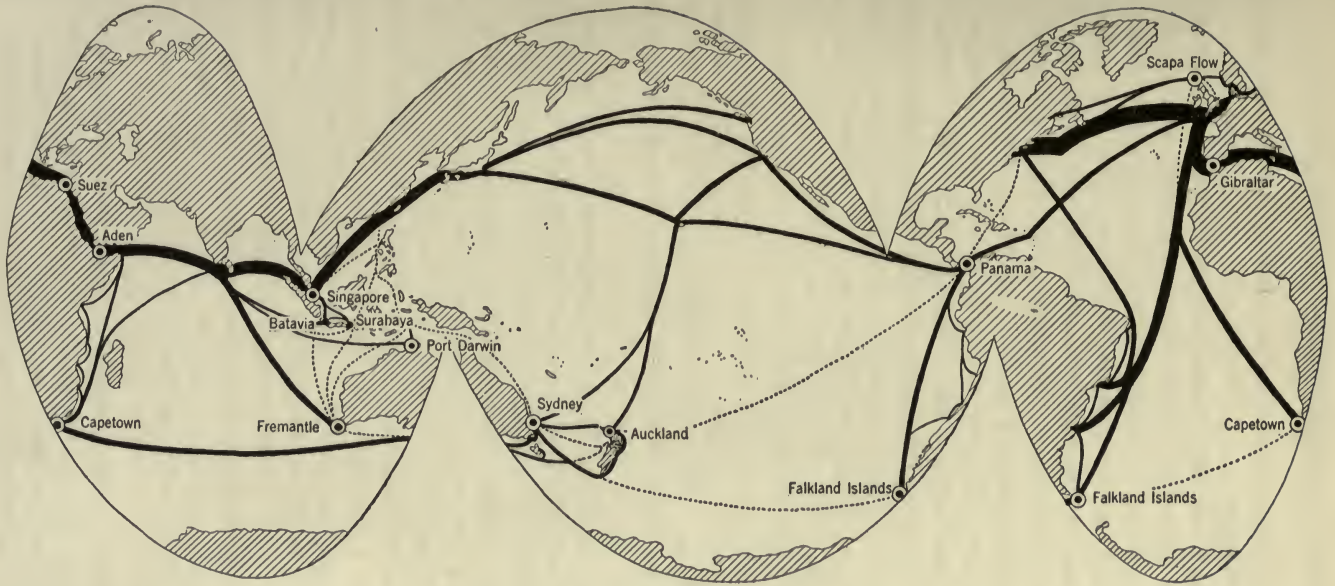

Fig. 7

Goode's ocean-basin map showing major trade routes and the points of strategic naval control

guarded by British allies at Dutch Batavia and Surabaya, and Australian Darwin.

Britain not only held these ocean gateways, but she developed an immense navy to enforce complete control over them. This was the famous "Pax Brittania" which gave freedom of the seas to the world for over a hundred years. Behind this system we were completely safe from invasion. Wherever the might of the British navy could reach, peoples all over the world were likewise safe. Since Britain held the gateways, it did not matter much who controlled the islands in the oceans themselves. Portugal held the Azores in the middle of the Atlantic, France held Réunion in the Indian Ocean, and Tahiti in the South Pacific. Germany held Yap in the western Pacific and parts of Samoa in the South Pacific, and the United States held Hawaii and a few other islands in the North Pacific. Such islands could be armed to the teeth without doing any harm — or any good either.

Nearly every person on earth believed that this geography of the world was permanent. In 1914, however, Germany tried to break it down. The attempt failed, and so in 1919 the world went back to its Pax Britannica and its comfortable ocean-basin geography.

Germany, however, had been unsuccessful only by a narrow margin. The Germans, beaten and smarting under a galling defeat, set about to break that control. The Second World War marks their second attempt to do so. Had we understood that map as long ago as twenty years and more, we could have foreseen the fact that any challenge to the existing control of the oceans must be aimed at the three powers which controlled the bottlenecks — the Dutch, the British, and the Americans.

What happened was that those geographical bottlenecks became bottlenecks of national psychology. In the United States we did not conceive of them in their right light. We thought all the time that ocean distances were isolating us from the rest of the world and making us safe. Actually what was making us safe was the control of those strategic points by our relatives the British.

On the basis of this geography we rejected the League of Nations, our leaders having talked the American people (most of whom had studied little geography) into believing that it was an unnecessary thing. Doctrines of national self-sufficiency also

flourished, and our people went right on believing that geography was protecting them fully and had the situation well in hand. Actually it was the British Navy holding the bottlenecks and patrolling the sea lanes between them which had the situation in hand — or at least *appeared* to have it in hand.

Well-informed geographers did not believe this. The reason they did not believe it was that Langley, the Wright brothers, Bleriot, Curtiss, and their contemporaries had taught man to fly. By its very nature the airplane is not confined to land routes nor to seaways. It can go in any direction, including upward. The map of the world is no longer a diagram centered around the ocean basins, any more than it is a cylinder or a flat wafer.

Actually the basis for the ocean-basin map of the world began to go to pieces as early as 1930. But since the airplane had made that map no longer valid, the geography which it represented was also no longer valid. Moreover, any war strategy which was based upon such geography was necessarily invalid likewise.

World Geography, A.D. 1939

In the early nineteen thirties the airplane really began to be efficient. This gave us a three-dimensional world, and our ocean-basin map is not a three-dimensional picture. It is very much a two-dimensional picture. It is a much broader and more meaningful picture of a two-dimensional world than the old cylinder world of Mercator was, but nevertheless it is still a picture of a two-dimensional world. And so the whole burden of the German military-minded geographers' theme was, "If you can't break those bottlenecks, you can fly over them, and you can march behind them."

The fact that the airplane has given us a three-dimensional world has very largely nullified the value of controlling formerly strategic points. Moreover, it has made the control of some of them very difficult or even impossible. We now have an entirely new geography — an aviation-created geography. Ocean-basin geography and the ocean-basin psychology based upon it have become out of date, even dangerous. Unfortunately we have been entirely too slow in discarding this old geography.

The unprovoked Japanese attack upon Pearl Harbor, Territory of Hawaii, U.S.A., was a real catastrophe, but it was not important in terms of the fate of America. A nation which possessed

an adequate air force, or which had been thinking in terms of a world of air power, would not have pinned its hope of defense on naval fortifications at such a geographical location. The Pearl Harbor debacle was the result of a nation's having its mind focused upon an out-of-date picture of world geography. Pearl Harbor, in terms of modern geography, simply does not have the importance our people thought it did.

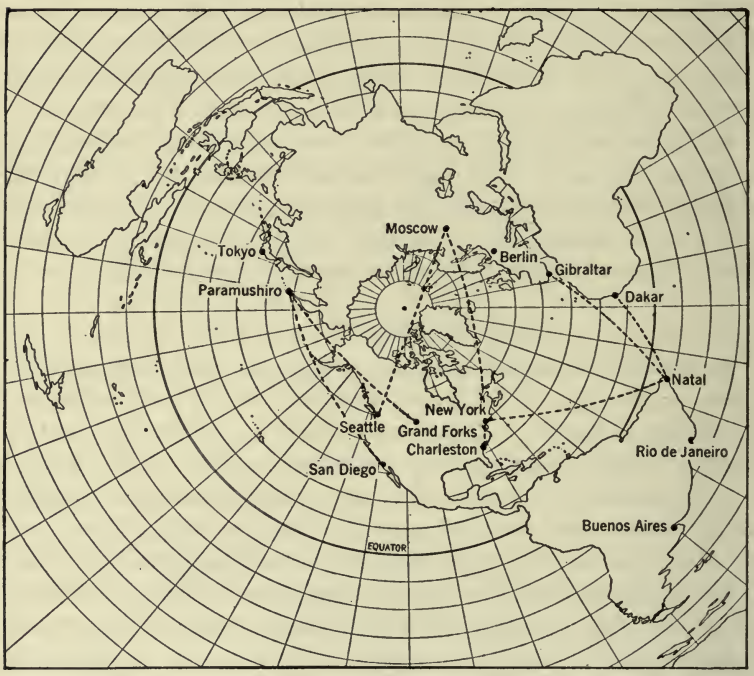

Fig. 8

A north pole-centered map best shows relationships in an aeronautical world

The map of the world is no longer a diagram centered around the ocean basins, any more than it is a cylinder or a flat wafer. The airplane has knocked the rims off the cylinder; it has squeezed the northern ends of the ocean basins back together again; it has created a monosphere (a single, undivided sphere) on a new pattern.

The world created by the airplane can best be shown on a map which radiates outward from the north pole. (See Fig. 8.) Sup-

pose you had a globe covered with a rubber skin. Trace the continents and oceans on the rubber skin. Then drive in a thumb tack firmly at the north pole and cut a hole at the south pole. Stick your hand into this hole, seize the rubber, and pull. Let a dozen people take hold of the edges of the slit in the rubber and pull outward in all directions. Let everyone keep pulling until the rubber skin is stretched out into a flat circular sheet. On it you will see the outlines of the earth's land and water. At the north pole, where the thumb tack is, the skin is not stretched at all. At the outer edge, which was once the south pole, it is very much stretched. The amount of stretching becomes less and less inward toward the center. Then place a sheet of thin paper over the stretched rubber skin, trace off the outline underneath the paper, and you will have the map demanded by the Air Age. (See Fig. 9.)

Now just what is this map like? In the first place, the north pole is the center of the map. Around it, a short distance away, is a small circle (the arctic circle). Farther away is a larger circle (the tropic of Cancer). Still farther away, the equator forms a yet greater circle. Outside that is a still larger circle (the tropic of Capricorn). The outer edge of the map is the south pole (which in the process of making this map has been stretched from a point into a circle twice the circumference of the earth). Between each of these named circles are various others representing the parallels of latitude.

Thus the north pole lies at the center like the hub of a wheel. The meridians radiate outward like spokes, while the parallels form concentric circles. If you construct such a network, you can then fill in the outlines of the continents and islands. If you give each line and point of the outline its proper position with respect to the meridians and parallels, the resulting picture is quite different from that shown on most maps. Inside the equatorial circle the land and water outlines look very much like those on the globe itself. Outside that circle the lands and seas are badly stretched lengthwise. Fortunately there is only a small proportion of the earth's land surface outside it, so the stretching is not serious.

With a map like this before us, it is not good sense for Americans to talk about limiting our trade or confining our national defense activities to the western hemisphere. There isn't any

western hemisphere; there is only a northern hemisphere with a southern one having much less land and consisting mostly of water, outside it. "But," cries the average American citizen, "what about America's neutrality policies which we debated so solemnly?" The answer to such a question is: "Well, what about it? The basis for it is on the cylinder map of 1492, but not on the airplane-dominated map of the 1940's." "But what of our *splendid isolation* and our *two-ocean safety*?" cries another citizen. The answer to those questions is that they lie on the grapefruit-peel map of 1914, but they do not exist in the geography of today. These are stern and confusing answers. Confusion may be removed by restating that we have been neither "air-minded" nor geographical.

Most assuredly the airplane has made a new geography. The world is no longer a wafer, a cylinder, or an orange peel. It has become a global shell. In one sense it has shrunk back to a wafer, but it is not flat. It is a curved shell. It is no longer just a surface, it has thickness. The earth shell is for all practical purposes six miles or so thick. It is getting thicker as man's improved planes navigate higher and higher.

This new world is not hemispheric; it is monospheric. Most of its lands are clustered about a world mediterranean sea. The name of this small but important central body of water is the Arctic Ocean. Outward from this global basin the lands radiate like the points of a star, a pole-centered world indeed.

What additional ideas can we get from this map? Well, most Americans along the Atlantic Coast always feel nearer to any European war than do those in the Middle West or on the West Coast. As an idea, this is a very frail Maginot Line. Suppose three long-range bombers take off from German-held North Cape in Norway. One bomber flies toward Washington, D. C., another toward Des Moines, Iowa, and the third toward Seattle, Washington. They cover approximately equal distances and arrive at about the same time. Any civilian defense organization in the United States which isn't based upon this fact is pretty unreal.

Now take a compass; place one of its legs on Moscow and the other on Charleston, South Carolina. As you swing the second leg, it will come close to Seattle on Puget Sound. In other words, Seattle and Charleston, American ports on the east and west coasts, are roughly equidistant from Moscow.

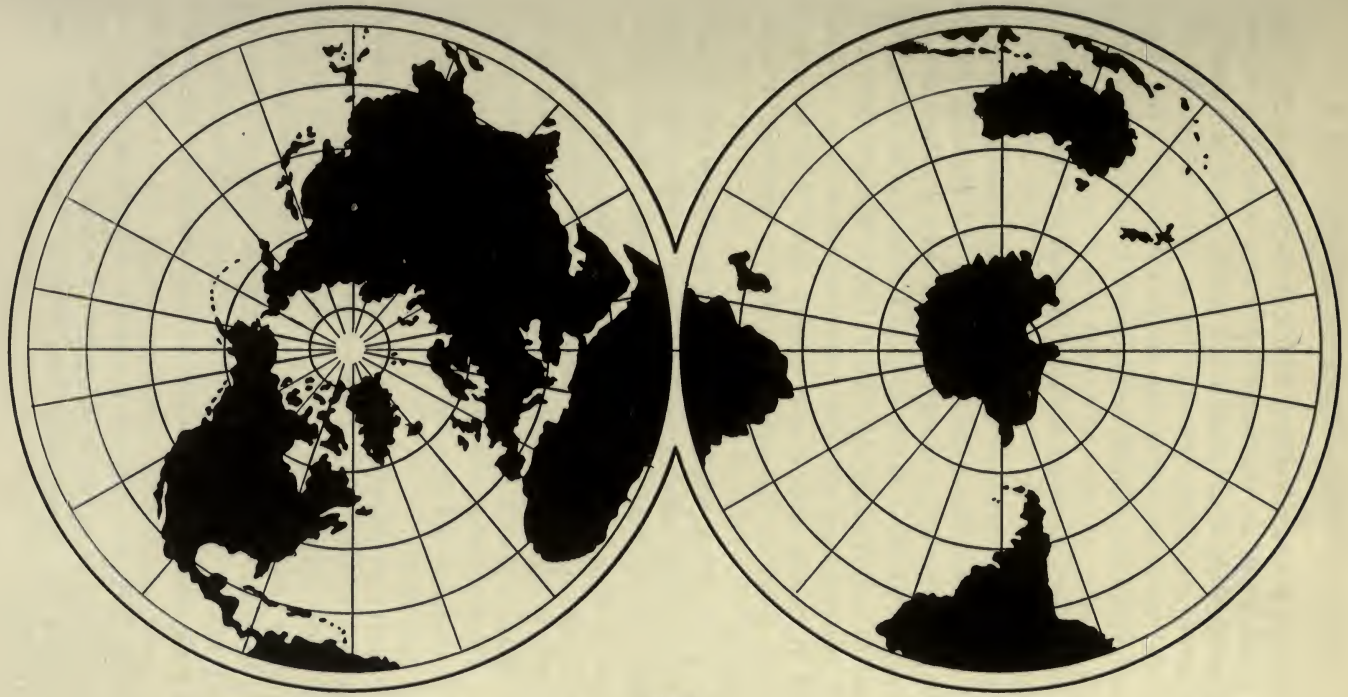

Fig. 9

A south pole-centered map shows the relative lack of land and population in the southern half of the earth

America's perennial enemy has been Japan. The Japanese have said so, and we can assume that they know. The nearest Japanese territory is an island of the Kurile group just south of Siberian Cape Lopatka. Put one leg of your compass on this island and the second leg on San Diego, California. Then swing the second leg to the right. It will fall close to Grand Forks, North Dakota. In short, southern California with its naval base and airplane factories is no closer to Japan than are the Dakota-Minnesota wheat fields.

During the last few years the people of the United States have heard much about Hemispheric Solidarity and the Good Neighbor Policy. That is an excellent policy, but it is not enough. Washington, D. C., is nearly as close to Moscow as it is to Rio de Janeiro, and considerably closer than to Buenos Aires. Why not Russo-American solidarity? Minneapolis is closer to every capital in Europe than it is to Buenos Aires. Why not a good neighbor policy on our part for Europe in addition to South America?

The people of the United States have also heard some leaders talk much about how we should confine our national defense measures to "our own hemisphere" because South America, Central America, and North America constitute a special province of world power. Now on this map of ours suppose we draw lines from New York or Washington to the "elbow" of Brazil. Then draw a line from the same point in Brazil to southern Spain where Germany's friends, Franco and Suñer, are in control. Comparing the lines, we find that the Nazis are closer to Brazil than we are.

We should, of course, object with all our might to any concept of "defense at home" in a world where the supposed "home" is closer to the enemy than it is to ourselves. We should be more than ready and eager to defend Brazil, as well as all the rest of Latin America, because it is good for the welfare of all concerned, but we should not do it on a basis of fooling ourselves with false ideas. The pole-centered map made the ocean-basin map out of date. But the ocean-basin map is not yet in common use. The Mercator map of the world is still generally accepted. Now, we must bring our thinking from a cylinder world of about 1812 down to the present-day air world in a terrifyingly large mental jump.

If, once more, we turn to our new world map, we see that Brazil is very close to French West Africa. There, at Dakar and St. Louis, the men of Vichy (the puppets of our Nazi enemies) are in control. In defending Latin America, we do not want to see those bases used by the Nazis. No nation can afford to undertake policies without knowing the geography on which they are based.

On a Mercator map Hawaii seems to stand between us and our enemy Japan, while Bermuda and the Bahamas appear to lie between us and our enemy, the Italo-German Axis. Accordingly, we fortified Pearl Harbor in Hawaii, and just before war broke out, we began to construct defense bases in Bermuda and the Bahama Islands. The whole idea was as geographically unreal as a mountain range made of sugar or an ocean of rubber. One glance at our monosphere map will serve to show that Nova Scotia, Newfoundland, Greenland, Iceland, and the British Isles stand between ourselves and Germany. Another glance at our map shows that Kodiak Island, the Alaska Peninsula, and the Aleutian Islands stand between ourselves and Japan. And yet, when war broke out, it appeared that most of our guns were at Pearl Harbor (Hawaii) rather than at Dutch Harbor (Alaska).

Implications of Changing Geography

The 1914 World War represented an attempt to challenge British and American control of the seas. The 1939 World War represents an attempt to gain complete control of the globe through a combination of air power, mechanized land power, and undersea power. Despite this, we still study meaningless little lessons based on cylinder geography. Our nation still thinks in terms of cylinder geography. Many of our leaders have been thinking the same way. We entered the war with many of our political leaders thinking in terms of ocean-basin geography. Many of our military and naval leaders still thought in these same terms. We live, however, in a world where most of our enemies are operating on the basis of a monospheric "aviation" geography.

All through human history, geography has been whatever man thought it to be, whatever he made it. We can only conclude, therefore, that geography always has been and always will be man-made. The nations which make the best geography for

themselves will control the world. Such an idea means considerable mental readjustment for us Americans. We must recondition ourselves psychologically. We must rescale ourselves geographically.

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CHAPTER 3

THE NATURE OF GEOGRAPHICAL IDEAS

Geographical Thinking: Nine Basic Concepts

TO LIVE in an Air Age requires that we do a great deal of geographical thinking of a fairly high order. It may be said that the purpose of geographic study is to learn to think geographically. Such a statement implies that people who have studied geography think differently from those who have not. It also implies that an idea with geography in it is different from an idea without any geography in it. This statement and its two implications are true. It is one thing to say categorically that a statement is true. It is quite another thing to show why it is true. Let us, therefore, examine the matter closely.

People think geographically when, and only when, their ideas contain the things which geography has to teach. In general the study of geography teaches or develops some nine concepts or basic ideas, as follows:

A concept of the world
A concept of place
A concept of position
A concept of situation
A concept of location or space relation
A concept of environment
A concept of geographical adjustment
A concept of region
A concept of place continuity

Each of these is so important that it deserves some explanation and discussion.

A concept of the world. Chapter 2 shows how man's concept of his world has changed almost beyond recognition from age to age. In each instance mankind's idea of the world has depended upon the things within its collective mind. Every important dis-

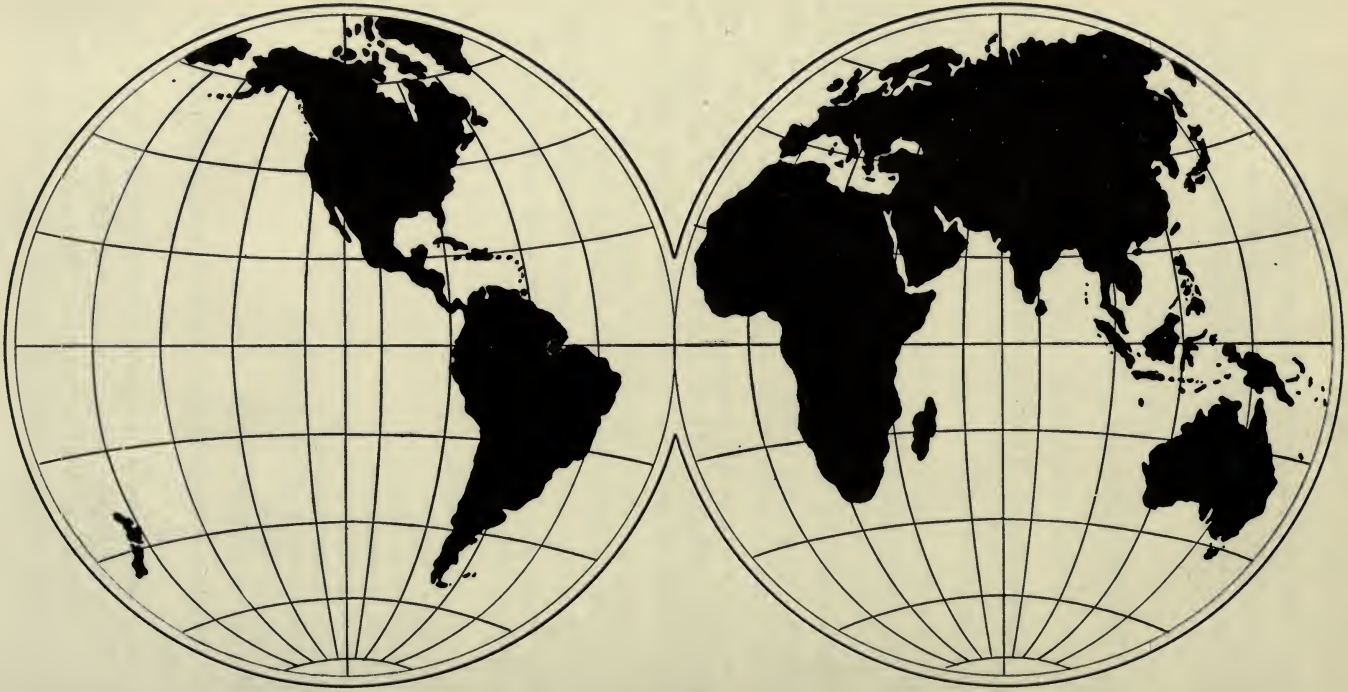


Fig. 10

The world shown as two hemispheres

covery or invention which man has ever made has changed what was in his mind and caused him to visualize his world in a different light. Despite the number of times the world map has changed, we have no reason to think that our present one is its best or the final form. Unforeseen future changes will very likely give us new and different concepts of the world, and new kinds of maps will accordingly be made in order to depict those concepts.

Most Americans believe firmly that there is an eastern and a western hemisphere. Perhaps *you* do. (See Fig. 10.) These, however, do not physically exist. In the first place, there is no East and no West except by common agreement in human minds. In the second place, there is no division of the earth into hemispheres save as people visualize it that way and represent it so on man-made maps. In the present world there is nearly every reason for not visualizing the earth as two hemispheres.

Figure 11 is a map showing the world divided into three tritispheres. It looks just as good as two hemispheres — maybe a little better. If some geographer had loved a good joke, he might have gone down to Washington and tried to persuade the ungeographical members of Congress to vote for "tritisphere defense."

The airplane has abolished a world of tritispheres and hemispheres; it has created a monospheric world. (See Fig. 12.) The only completely true picture of the earth is to be obtained from the globe itself. To obtain a really adequate concept of the earth, one must study the globe carefully. Some of the things needed in building up that concept are:

Shape of the earth
Size of the earth
Outline of land and water features
Relation of the globe to map projections
Scale or ratio in representing distances
Movements of the earth as a sphere
Features related to earth movements:
  poles, equator, tropics, polar circles,
  parallels, meridians, circle of illumination
Results of earth movements:
  night and day, changing sun elevation,
  the seasons, standard-time zones,
  the International Date Line

A concept of place. To think geographically also means to have a fairly accurate concept of place. Not to know where places are

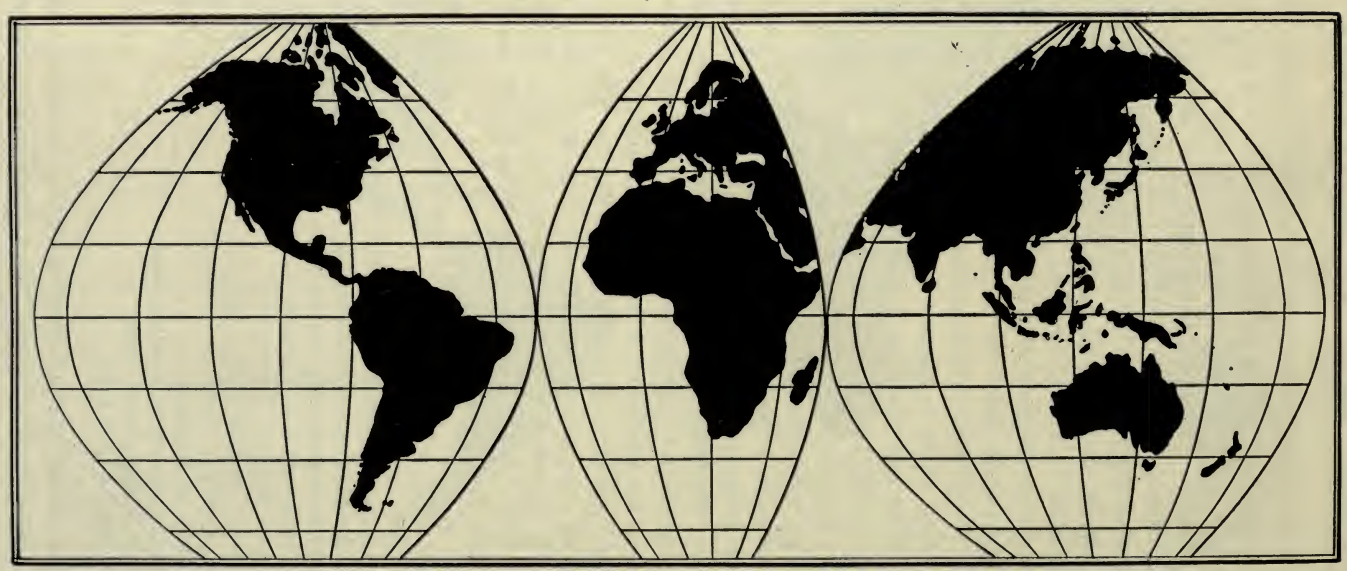


Fig. 11

The world shown as three tritispheres

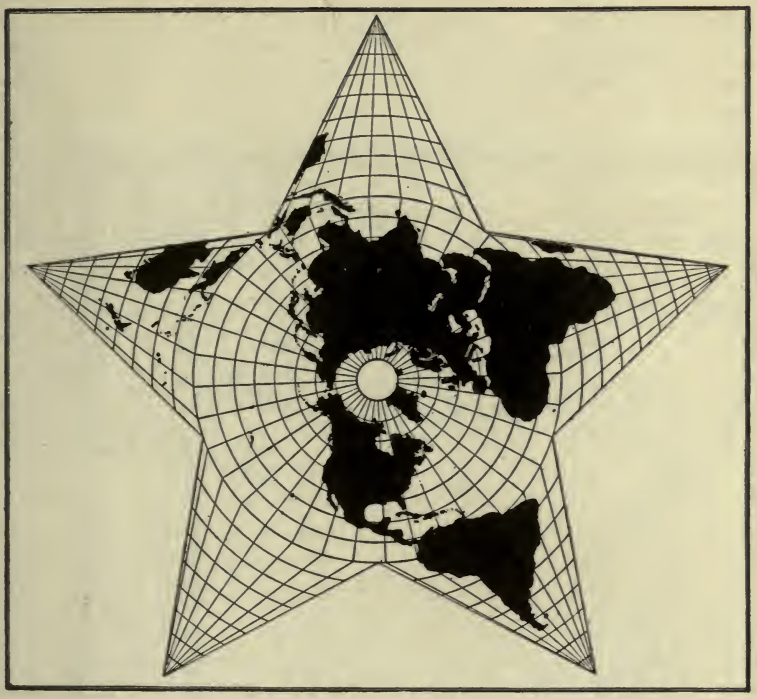
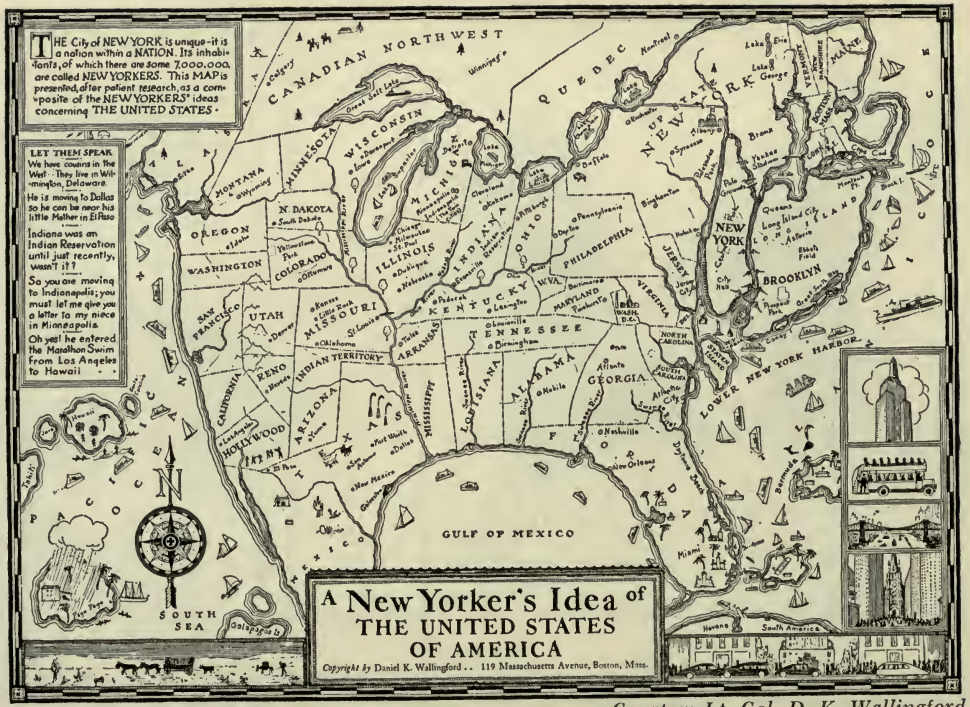


Fig. 12

The world shown as a monosphere

is a very common form of illiteracy. The notorious, almost famous, map of the United States as a New Yorker sees it which was sold at the New York World's Fair is a good illustration (Fig. 13). This map is funny, terribly funny. The only thing not funny about it is that many people in every other part of the nation have similar place concepts in their minds to work with in their reading, voting, and understanding of current events. A map showing Guam as a place not to be fortified is not quite so funny. A map of the air bases which were *not* at Kiska, Dutch Harbor, and other American communities in the Pacific is not even remotely funny. A map showing how we *did not* arrange for joint defense of the Pacific with the British and the Dutch is not funny either. A map of what the American people were thinking when they *did not want* their officials to arrange for that joint defense is tragic.



Courtesy Lt. Col. D. K. Wallingford

Fig. 13

A New Yorker's idea of the United States of America

To many people the cure for not having a concept of place is to buy a map and look at it. This is only a small part of the answer. For every place which might be mentioned, there are several things which need to be known. That is, in order to "understand" a place it is not enough to find it on a map. Learning a place implies answering some three questions: Where is it? What is it? To what is it related? Sometimes it becomes necessary to add two more questions, namely: Who is there? What are they doing?

For example, when Chicago appears in the news, does it find you "place" conscious? Let's try it. (See Fig. 14a.)

Fig. 14a

Chicago: Where is it? What is it? To what is it related?

Chicago is in North America, in the United States, in the State of Illinois, in Cook County, at the southwestern corner of Lake Michigan. It is a city, a multimillion city, one of the dozen largest in the world, exceeded in size in the Americas only by New York. It grew up on a flat strip of lake plain at the mouth of the Chicago River at a stopping point along an old French voyageur fur-trading route. It developed as a small port on Lake Michigan. It later became a terminal point for many railways from the East. As the midlands developed into the greatest agricultural region on earth, Chicago became a primary market and a focusing point for a giant web of railways. These concentrated many raw materials, and lake traffic brought in many more, making Chicago one of the great manufacturing centers of the world. This caused a vast growth of business — merchandising, banking, publishing, and so forth. Chicago is therefore related to the mouth of a small river, to an old lacustrine plain, to Lake Michigan, to the fertile soils of the Mid West, to the Illinois waterway, and to a strategic east-central location. (See Fig. 14b.)

"All very elementary," you may say. Yes, it is elementary — for you, but it is not so elementary for a Mexican or a Belgian or a Rumanian. Suppose you try it for Mexico City, Carácas, Sydney, Moscow, or Shanghai. Or perhaps you would like to try places

like Schlüsselburg, Smolensk, Vyazma, Orel, Kharkov, and Taganrog, upon which the fate of the world once hung and hangs again. Or perhaps you would like really important places such as Martaban, Kiska, Changsha, Khyber, Chittagong, and Diarbekr; that is, they are really important under certain conditions.

Obviously, few people know anything like all the places in the

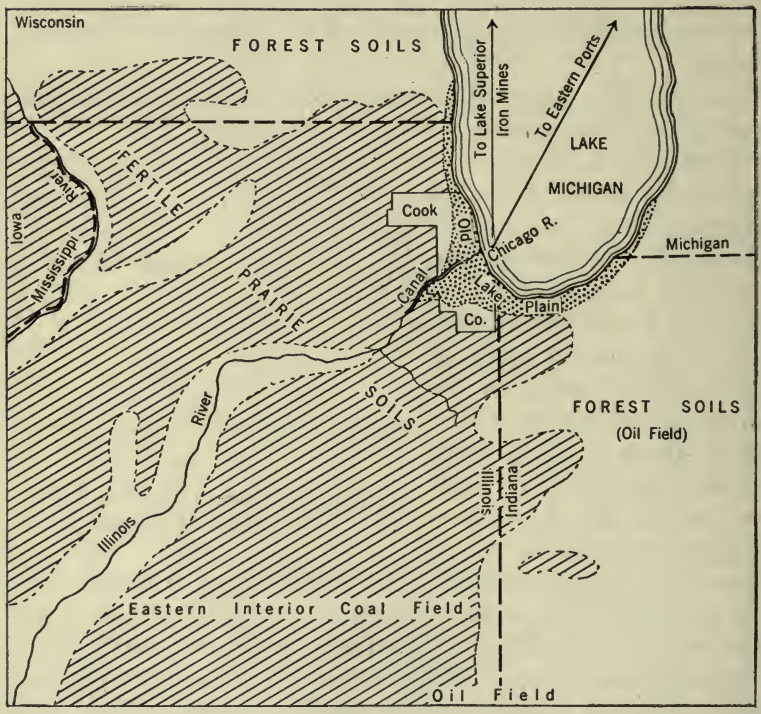


Fig. 14b

General place relations of Chicago

world; certainly no one knows them all. But the educated person should know a great many. What is more important, he can be taught the method for learning places. Certain kinds of maps show only names, but other kinds show land surface, rainfall, temperature, native vegetation, transportation, economic activity, population density, and many other data. A good school atlas or set of wall maps will show all of these and will enable a class to see not only what most of the important places and

features of the world are, but where they are, to what they are related, and with what they are to be correlated and compared.

A concept of position. The geographical term *position* comes from the Latin verb *pono* (place or put). Since the earth has no ends, corners, edges, or guide lines on it, where a place *is* becomes literally a question of where we place it. The earth's spinning motion establishes points which we call poles. Midway between these poles we can draw a line around the world called the equator. Between each pole and the equator we can draw more circles. These are all parallel to, but smaller than, the equator. They become smaller and smaller as one goes toward each pole. Running at right angles to the first set of circles is a second set. The circles of the second set are not parallel to one another. Instead they are drawn so as to intersect one another at each pole. Each one is a complete earth circumference. Looked at in another way, they all radiate outward from the north pole, curve around the world, and again intersect at the south pole. Each circle is an equator, only it is not called that. Instead it is called a meridian circle.

Since all of these circles are alike, it was necessary to choose one of them as a starting line. The meridian which runs from pole to pole through London was chosen as the zero line or Prime Meridian; the other half of this circle, in the Pacific Ocean, is largely co-extensive with the International Date Line (Longitude 180).

Thus the earth is covered with a mesh or network of imaginary lines each with its proper number. This network is used to express position. (See Fig. 15.) A fly on a screen door, reporting his position to another fly on the ceiling, might logically say: "I am on the eleventh wire above the base of the screen door, and on the twenty-eighth wire to the right of the frame of the door. In other words the coördinates of my position are 11 wires up x 28 wires right." In precisely the same manner a ship at sea may report its position as Latitude 11° N, Longitude 28° W.

Intelligent geographical thinking employs and interprets correctly such expressions of position. The position of Chicago is 41°18′ N, 87° 50′ W. To one who understands this, it means that Chicago is a little farther north than New York, Madrid, or Peiping; almost as far north as Boston or Rome; more than 400 miles farther from the equator than is Buenos Aires or the

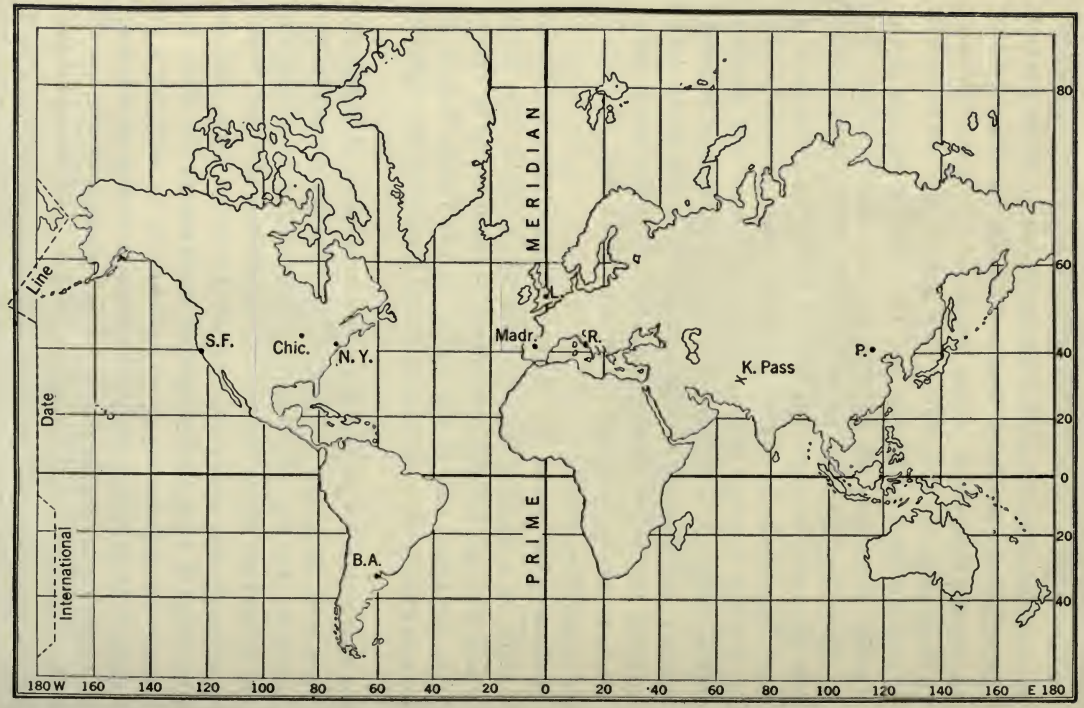


Fig. 15

Geographical position in the world is obtained from a mathematical grid of lines

Khyber Pass. It also means that the length of daylight in Chicago varies from about 16 hours in midsummer to about 8 hours in midwinter. It also means that local sun time is an hour earlier in Chicago than in New York, about six hours earlier than in London, and about two hours later than in San Francisco.

There are some other interesting results of position on the earth. As most everyone knows, the earth turns from west to east. A point on the equator moves around in a circle more than 24,000

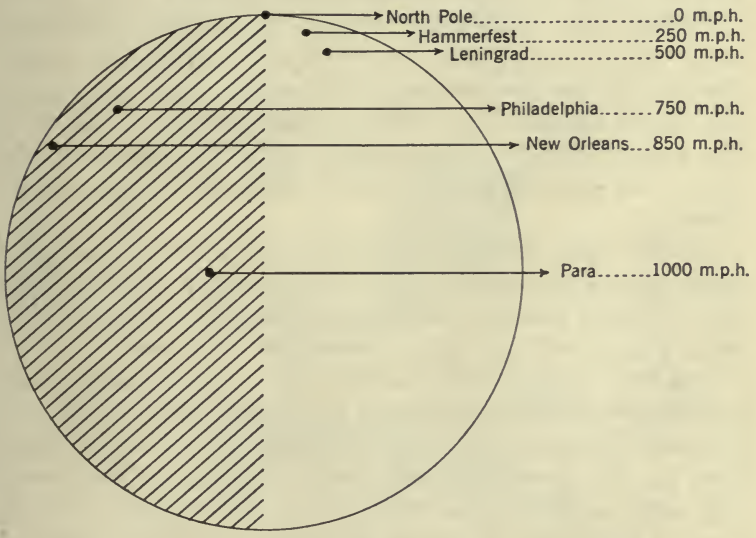


Fig. 16

Rotational speeds on the earth

miles in one day (24 hours). A point at either pole merely turns about upon itself. A point in latitude 60° turns eastward through more than 12,000 miles. All three points, however, require the same time (24 hours) to complete the turn. Therefore the point at the equator is moving 1000 miles per hour, the point at latitude 60° is moving 500 miles per hour, and the point at the pole is moving no miles per hour. (See Fig. 16.)

A point at 70° latitude, such as Hammerfest, Norway, is moving eastward at the rate of 250 miles per hour. If an aviator started from Hammerfest at 11:30 A.M. on March 21 and flew west at a speed of 250 miles per hour, the sun would neither rise nor

set. If he had orders to eat his lunch at noon he would never get to eat it unless he disobeyed. If he altered his course a little, hour by hour, day by day, the time would always remain 11:30 A.M. Noon would never arrive. Every twenty-four hours, Hammerfest, well-fed and rested, would pass beneath him while he would continue to fly, starving and weak from loss of sleep — the sun still at 11:30 A.M. In the latitude of Leningrad or Seward, he would have to fly 500 miles per hour to do this. At the equator he would have to fly more than 1000 miles per hour.

On March 21 daylight and darkness are of equal length anywhere in the world. And yet if an aviator were to leave Oslo, Norway, or the Shetland Islands, Scotland, and fly westward around the world at a speed of 250 miles per hour, daylight for him would last 16 hours while night would last only 8 hours. If he flew eastward, night would last 16 hours and daylight a mere 8 hours.

In other words the man in an airplane can slow the passage of earth time, he can speed it up, or he can stop it altogether. For that and other reasons, we have an International Date Line. We call it a day, every time the sun passes over it at noon.

And now let us look at another aspect of geographical position. Suppose you lived at Havana, Cuba, practically on the tropic of Cancer. The sun would be directly overhead at noon on about June 21. This would be midsummer. If, however, you moved 17½ miles southward each day for the next 183 days, the sun at noon would still be directly overhead. If you then began to move 17½ miles northward each day, you would still find the noonday sun directly above you. By moving from Havana to Rio de Janeiro and back annually, you could always keep the season at midsummer. For this and other reasons, we have a calendar to record the passing of the seasons. The airplane provides us with the chance to shift ourselves quickly from midsummer to midwinter if we so desire.

A concept of situation. The geographic term *situation* comes from the Latin word *situs* (site). The site or situation of a place is its natural location, its location in terms of features made by nature. *Situation* thus is natural or physical location, whereas position is mathematical and cartographical location. Measuring the parts of Greater New York in terms of situation, Brooklyn, Manhattan, and Richmond are islands; Bronx is a peninsula, the

cities on the New Jersey side of the Hudson are coastal or littoral.

In Europe one may see clearly the different kinds of situation enjoyed or endured by different countries (Fig. 17). Britain is insular, Norway is peninsular, Holland is coastal or littoral, Germany and Russia are largely continental. The situation of Italy is quite complex; most of it is insular-peninsular, the Riviera is littoral, northern Italy is continental. In her aggressive dreams of empire, Italy hopes to expand clear about the Mediterranean Sea so as to obtain an around-the-sea situation. Some geographers have a word for this kind of situation — *circumthalassic.*

Fig. 17

Types of geographic situation in Europe

The situation of most countries is inadequate in some respects. Dissatisfaction with its situation often explains a great deal of a nation's behavior. Germany, for example, is almost wholly continental. In 1914 this led her to try to break out to the sea. In 1939 it led her to try to conquer the entire continent of Europe. Russia's continental situation has led her into a two-hundred year attempt to obtain a warm-water port on the world ocean, an attempt which has produced several wars and a dozen bitter diplomatic struggles.

The case of Japan struggling against her natural situation is

most interesting of all. One hundred years ago, Japan's situation was purely insular. She fought wars with China and Russia, annexed Liao-tung and Korea, and became partially peninsular. Next she received the pelagic possessions of Germany as mandates. These possessions are islands, but they are not insular in the sense that the main islands of Japan are insular. They are tiny specks in a wide ocean — pelagic in situation. Japan's dream, of course, was to become completely circumthlassic about the Sea of Japan, but Russia stood in her way. Thwarted in her ambition, Japan boldly annexed the littoral parts of south China, and continental Manchuria and north China, and finally undertook to conquer the whole Orient. A year later her composite situation had become amazingly complicated — insular, peninsular, littoral, continental, isthmian, and pelagic.

The territory of the United States illustrates various kinds of geographical situation quite clearly. Florida is peninsular, New Jersey littoral or coastal, Delaware peninsular, western New York (and adjacent parts of Ontario) an isthmus between lakes Erie and Ontario, Nantucket insular, Hawaii pelagic. It may truly be said that a clear concept of geographic situation is part of geographical thinking.

A concept of space relation. More important than concepts of either position or situation is a proper idea of space relation. Other names for this are *locus, geographical location, vicinal location,* and *relative location.* Whatever you may call it, it means the location of a place or area as seen in relation to other places or areas.

For example, in terms of the great transcontinental land area which we know as the United States, Chicago, Omaha, St. Louis, and Kansas City are centrally located (Fig. 18). In other words, they lie in a large central area which might be thought of as America's "heartland." Around this is a wide zone of adjacent location, containing such places as Atlanta, Fort Worth, Denver, Duluth, Scranton, and Richmond. Still farther away on the outer fringes lie the parts of the United States which have peripheral location — New England, Delaware-Maryland-Virginia, the Carolina capes and sounds, Florida, the Rio Grande Valley, the Far West, the northern Great Lakes country.

In Europe, Germany, Poland, Switzerland, and the Danube states are centrally situated, comprising the general area which

the Germans call "Mittel-Europa." Around this is an adjacent or marginal zone comprising Britain, southern Scandinavia, the Ukraine, the Balkan states, Italy, northern Spain, France, and the Low Countries. Peripherally located are northern Scandinavia, Finland, eastern Russia, Greece, Sicily, Portugal, Iceland, and a few other areas.

Australia offers a sharp contrast to Europe and North America.

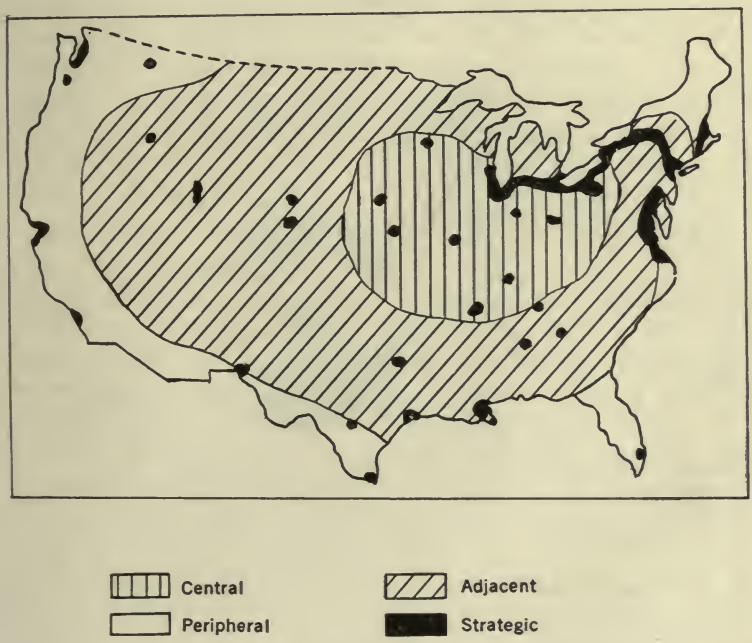


Fig. 18

Types of geographic location in the United States

Its central area is practically all desert; its adjacent zone is mostly semiarid; only its periphery is very productive or densely populated.

When we examine geographic location on a pole-centered world map, some surprising things come to light (Fig. 19). The lands around the Arctic Ocean (particularly those about the Norwegian sea) and the lands of northwest Europe and eastern North America which face the North Atlantic form a zone of central location in the world. Latin America, Australasia, and

southern Africa are peripheral. An intermediate zone of adjacent location includes northern Africa, most of Asia, and western North America.

If we examine the world map carefully, we can see some points with an entirely different kind of locus, namely strategic location. Near the center of the map are Iceland and Greenland. At present they are undeveloped, but as the Air Age develops, they

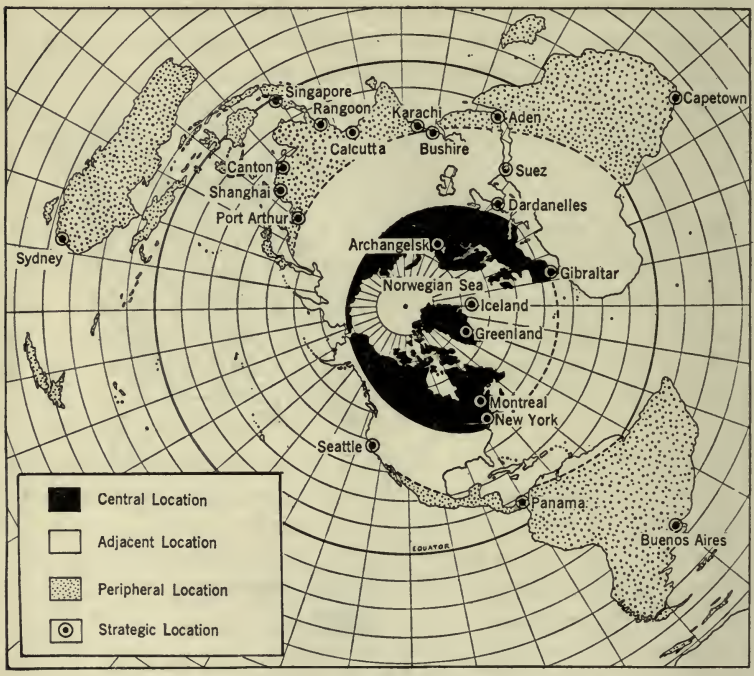


Fig. 19

Types of geographic location in the world

promise to become the foci of air traffic between Eurasia and the Americas. Their location is potentially, highly strategic. Around them but some distance away is a ring of other strategic locations: Montreal, Seattle, and New York — gateways to North America; Shanghai, Canton, Port Arthur, Arkangelsk, Rangoon, Calcutta, Karachi, and Bushire — gateways to Asia; the Channel ports and the Dardanelles — portals to Europe. Out beyond these is a second ring of strategic loci: Panama, Gibraltar-Suez-Aden, and Singa-

pore. Far out, at or near the ends of the radiating points of land, are Capetown, Sydney, and the River Plata ports. Some of these are strategic because they are focal points, some because they are gateways or portals, some because they are nodes on lines of transit, some because they lie between productive and populous areas and hence act as corridors for traffic.

In many respects geographical location is the most important environmental factor in the world. It governs the building of roads, railroads, canals, and communication lines, and the routing of airways. These man-made things, in their turn, then become factors which help to create or modify geographic location. For example, from 1775 to 1825 Cumberland Gap (in the Southern Appalachian hill country) was probably the most strategic location in the United States. After the construction of the Erie Canal, it lost its significance almost entirely, and the lowland from New York Harbor to Lake Erie usurped its importance. Along the latter strategic corridor now lie the cities of New York, Rochester, Buffalo, Cleveland, Toledo, Chicago, and scores of lesser places. When men crossed the West in covered wagons, Independence, Missouri, was a strategic place. When transcontinental railways were built, Chicago became preëminent.

When commercial life centered in the Mediterranean Sea, Venice at the head of the Adriatic was the gateway to Europe, and Brenner Pass became the doorway between north and south Europe. When commerce moved to the North Atlantic, the mouths of the Weser, Elbe, Rhine, and Thames became Europe's portals. Venice in normal times is a tourist's paradise, and Brenner Pass today is a place where pseudo-Caesars meet for their tub-thumping antics in a "war of nerves."

Czechoslovakia, almost enclosed by a curved mountain range, was during the ages of ground warfare known as the "Citadel of Europe." With the coming of the airplane it became merely the prison of Europe.

When sailing vessels were the vogue, the Canary Islands, the Azores, and the Virgin Islands were important locations. Later the steamship made the Isthmus of Panama so important that a gigantic canal was cut through that isthmus. Now with the coming of transoceanic air service such points as Miami, Havana, and Carácas are growing in importance.

And so it goes, all over the world. Geographic location, being

a matter of relative values, seldom remains fixed; it ebbs and flows with the tides of men's affairs, with the streams of human ideas and values. But it is nonetheless real at any specific time and place. It must underly a nation's thinking, its trade, its public improvements and works, its international relations. It must create and guide its national defense and its military and naval undertakings.

A concept of environment. Most Americans are fully aware that any one of us is born into the world with a natural animal equipment which is determined by our complex heredity. Most Americans know, too, that as soon as a person is born, he begins to live in, and be acted upon by, a set of surroundings which we call environment. What is usually meant is the social or human environment — the home, the school, the church, the community, the state, and the general "climate of opinion and thinking" made by other people. This social environment is highly important in so far as it affects the individual human being.

Outside the social environment, however, is another much bigger and wider environment which is usually ignored or overlooked. This is the *natural environment.* We must observe and study it, watch and come to know and understand it, if we are to think geographically. It affects tribes, clans, communities, states, nations, and empires of people vitally. The social environment plays a large part in shaping individuals, while the natural environment often affects them only indirectly and in a secondary manner. But the natural environment affects big groups of people in direct and important ways. For example when Germany talks about "Lebensraum," it means that she has become dissatisfied with her natural environment. When Japan announces her Greater East Asia Co-Prosperity Sphere, it means that she has overpopulated her small island environment. When Italy tries to conquer the Mediterranean Basin, it means that her policy of encouraging the Italians to have big families has run bang up against the fact that her rocks are barren of coal and iron and copper and oil, that her agricultural lands are all developed. When the Irish emigrate to America, and blame England for most of their troubles, it means among other things that the Irish weather is cooler and damper than usual and that the potato crops have failed. When five or ten million Chinese are drowned by floods or die of starvation, it indicates that they have been

unable to cope with their environment. And so it goes, day after day all over the world: the natural environment is ever-present and powerful; it constantly has, not a finger, but a whole hand in man's affairs.

Now the natural environment includes a great number of things — all the elements, forces, factors, materials, and resources of the world of Nature. The list is bewildering until one classifies and sorts it into some simple pattern. When one does this, it is not difficult to comprehend. For example, in any locality or portion of the earth's surface the natural environment consists of the following fourteen elements:

mathematical position
geographical situation
relative location
size
form
climate
soil
minerals and rocks
land surface features
water features
underground water resources
the ocean and its coasts
natural plant life
native animal life

These combined give man his natural environment in any place or area. (See Fig. 20.) And the ways in which they are combined are almost endless. No two places on earth have exactly similar environments, although sometimes widely separated areas do resemble one another in many ways.

Geographical thinking requires that we know, understand, and be able to appraise the environment, to see it always as a background for men's affairs, to perceive its role in the behavior of nations.

A concept of geographic adjustment. Men in southern New York have a little soil, almost no minerals, a humid continental climate, but a fine harbor on a broken protected coast zone, a strategic relative location, and comparatively good access to the interior of the United States. As a consequence they have developed commerce and manufacturing on an unsurpassed scale. Men in northern New Jersey, with a little more soil, humid continental climate, no coast zone and a less strategic location, have developed dairying and market gardening. Men in Iowa with humid continental climate and much good soil have developed a corn and livestock agriculture. Farther west, with semi-arid continental climate and much good soil, man has developed wheat farming. Still farther west, with much good soil and a dry

continental climate, man has developed sheep and cattle ranching.

Man in Norway takes to the sea and becomes a merchant sailor or a fisherman. Man in Belgium takes to the land and raises

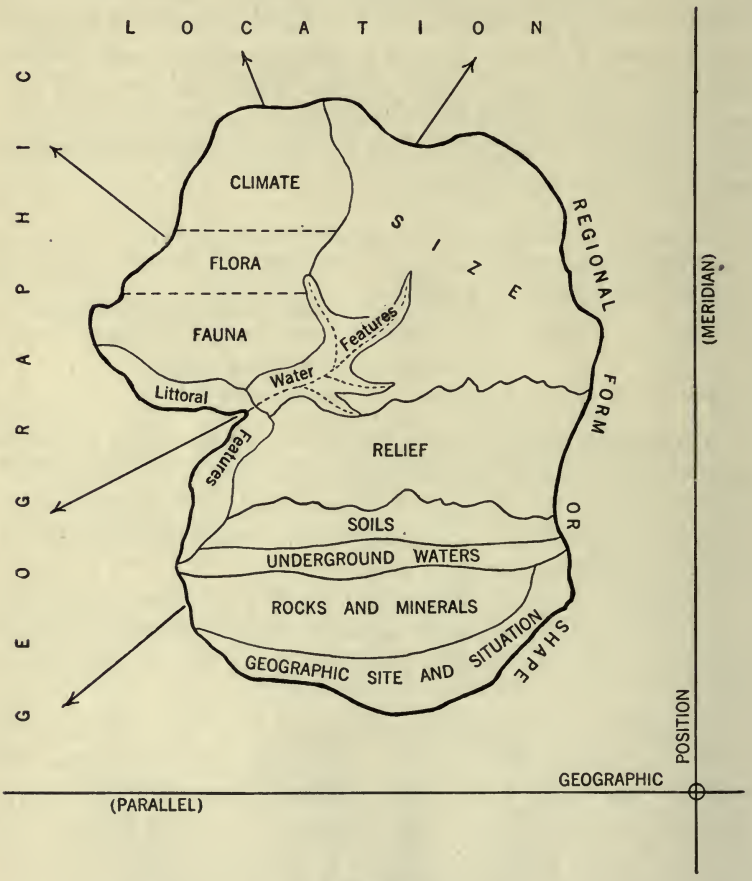


Fig. 20

The elements of the natural environment in any region

potatoes, sugar beets, cabbage, and rye, or he works in a mill or factory. Man in southwestern or northeastern Pennsylvania mines coal. In Wisconsin he feeds and milks cows, in central Oklahoma he drills oil wells, in Thailand he works in the rice fields. Why does he act this way? Not entirely from choice, certainly. What

he does unquestionably bears some relation to the natural environment. We have learned to think geographically when we are able to recognize and understand this fact. The industries and behavior of man are not strange; they are natural. They are natural because they result from his adjusting himself to the natural environment as reasonably as he knows how.

Man adjusts himself to nature in innumerable ways. The picture of man and environment appears at first glance to be as complicated as a scrambled egg. To the geographer, however, the picture is fairly easy to read and interpret. In the first place, everything man does falls into one or the other of three kinds of activities — economic, social, and political.

Economic activities lie at the very roots of society, because mankind exists only because of its ability to produce economic goods. Economic production, therefore, is to be found wherever there are human beings. Economic production is nothing more nor less than a process wherein man uses the natural environment to obtain the means of life. Each separate industry represents the use and exploitation of certain specific elements and resources in the environment. For example, where man utilizes the soil and the climate, and to a lesser extent land relief, drainage, groundwater, and location, the result is agriculture — of many kinds and types. Where man utilizes mineral resources and other secondary factors, the result is mining or quarrying. Where he utilizes the native grassland through the medium of domestic animals, the result is pastoralism. Other forms of utilization result in besticulture (wild-life exploitation), nemoriculture (forest exploitation), manufacturing (exploitation of power, geographic location, etc.), and commerce (exploitation of geographic location, the coast zone, waterways, and many other factors). All these represent geographic adjustments to the environment toward economic ends — activities wherein man and nature become closely related.

In addition to these economic adjustments mankind also makes social adjustments to its environment. These include accommodations to nature in the matter of population density and distribution; social habit (whether nomadic or sedentary, for example); in settlement form (temporary camp, farm, village, city, or metropolis); land ownership, organization of the social group,

social classes and castes; and culture traits such as clothing, diet, houses, religion, customs, and so forth.

The economic and social processes in society make necessary a great number of activities in governing, regulating, and policing society. They also result in migrations, colonizing projects, and contacts and conflicts with outside societies and human groups. Such activities represent political adjustments to the natural world.

Human society is, by its very nature, compelled to adjust itself to the area which it occupies. A society supports itself by suitable economic adjustments to the natural environment, it distributes and organizes itself by suitable social adjustments, and it regulates and maintains itself by effective political adjustments. The invention of a multiple plow or a substitute for silk may wreck its economic adjustments, the automobile or the skyscraper may cause its social adjustments to decay, or an invention such as the airplane may shatter its political adjustments, but such instances only reaffirm the fact that geography is primarily man-made — but made from the elements and resources of nature.

Despite these tough and undebatable facts, there is an almost universal habit of regarding our social and economic institutions as being man-made without any regard for the natural environment. The German war machine in 1939 looked impressive — to some it appeared irresistible. And yet it was only an assemblage of iron, coal, wood, leather, petroleum, rubber, chromium, copper, nickel, nitrate, lead, zinc, aluminum, and other materials, dug, squeezed, and gleaned from the natural environment. It was as geographical as a wheat field, a stone quarry, or a tourist resort.

Locomotives, ships, airplanes, houses, telephones, asphalt streets, axes, pocket knives, saws, files, and can openers are made of physical-resource materials. A cheese, a dose of quinine, a kilowatt of electricity, a geography textbook, a suit of clothes, or a ride in an airplane are made from certain materials of the environment and with the aid and coöperation of certain others.

All of our structures and institutions have arisen through man's adjustment to his natural environment. All owe their origin, and continue to function, only because of the ceaseless exploitation of natural resources. Intelligent geographical thinking requires that we recognize that all such institutions (and all social and political events, too) are related to the environment and its resources. To

think of them together, as things inseparably related geographically, yields a perspective which most Americans do not now possess.

A concept of region. There is almost nothing we can say about the United States as a whole except that it is populated by Americans. When we meet an American, however, one of the first things which we say to ourselves is, "He is an Easterner, a Southerner, a Midwesterner, a Westerner."

The reason for this is that the United States, despite all the

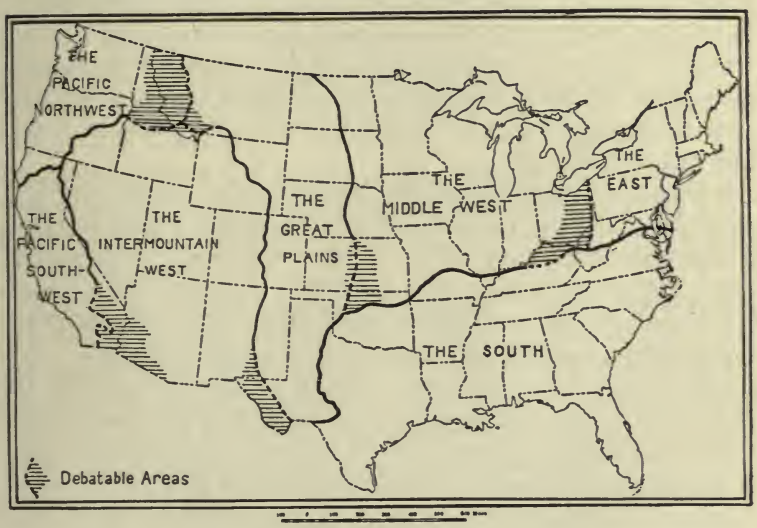


Fig. 21

Major geographic regions of the United States

standardizing forces at work in modern life, shows an amazing amount of geographical differentiation. This differentiation has occurred because people have reacted to their environment differently in the several parts of the United States. This has always been true, but it was not so constantly noticeable during the past. Today with the airplane, the habit of flooding Congressmen with letters from the voters, and the practice of conducting popular polls and straw votes, regional differences become very significant. Geographical thinking demands that we know these regions and be able to think and reason in terms of them. Figure 21 is a map showing in quite definite fashion the seven great regions of the

United States. A few words of explanation regarding each may be useful.

The East. The East includes the New England States, New York, New Jersey, Pennsylvania, Delaware, most of Maryland, and parts of the Virginias. Climatically it resembles northern Japan along the coast, and Czechoslovakia inland. Physically it is generally hilly. Originally it was covered with unbroken forest.

The East is dominated by manufacturing, coal mining, and commerce. Agriculture is a miscellaneous composite of fruit growing, dairying, and market gardening. The East is dominantly urban, but there are small backwaters of quiet rural life. It contains great masses of unassimilated or only superficially Americanized foreigners. It is full of social cleavages and religious tensions. It is marked by enormous contrasts in standards of living and ways of thinking.

The East is politically divided, tending to be conservative Republican in the rural areas, whereas most urban centers are predominantly Democratic. There is much political interest in Europe. Political ties with that continent are often quite close. Naval and maritime tradition is strong. Interventionist sentiment toward European affairs runs strong during war periods.

The South. The second great American region is the South. Its climate is humid subtropical, very much like that of central China and southern Japan. It is the North American cotton belt. It is also the cane-sugar belt and the tobacco belt. It is a huge producer of pine lumber, corn, and petroleum. For long, this region was almost completely rural. On the fertile lowlands an almost feudal society of cotton, sugar, and tobacco planters survived there until less than a hundred years ago. In contrast a rude pioneer life existed on the sandy and hilly lands. During the War between the States the feudal part of Southern society was broken up, but the South still has its full share of social and economic problems. Its 12,000,000 Negroes are to a large extent socially and politically submerged. Land depletion, soil erosion, sharecropping, and mountain-district living conditions all present problems. The South has largely escaped the complications of foreign immigration, but industrialization is now bringing shocks to the life of the region.

The South is basically Democratic in its party politics. Considerable importance is attached to local politics. The ablest men

are attracted to political careers. Military traditions are higher than elsewhere in the nation. Interventionism and realism are the keynotes to its foreign political attitudes. State rights and state pride are emphasized on all sides.

The Middle West. Climatically, the Middle West or American Midlands resembles Hungary, Rumania, and Poland, or perhaps south Manchuria. This region is the nation's bread basket and meat barrel. It produces vast amounts of iron, and its cities are doing an increasing amount of manufacturing.

Agriculture here is distinctively American, being neither peasant nor feudal. The population is a well-blended mixture of British and Teutonic, for the melting pot has worked and is working here. American bourgeois life is here to be seen at its best. There is a rather stable balance between rural and urban living. In politics the Midlands are basically Republican but with a tendency toward right-wing Progressivism. Attitude toward foreign affairs is fairly evenly divided between isolationism and interventionism.

The Great Plains. In climate this region resembles the western Pampas of Argentina or the Kirghiz Steppes of Asia. It is far from being arid, but it is dry enough to be the domain of short grass. For the same reason it is the domain of cattle and sheep, alfalfa, kaffir, and wheat by dry-farming. Here life is chiefly rural, for it is the only great American region without large cities.

It forms a transition zone between the arid West and the humid areas to the eastward. Yearly, cyclical and irregular fluctuations in rainfall, winds, temperature, hail, and insect life bring upsets to man's economic life. Consequently the region has been marked by social crises and periods of upheaval.

The Great Plains are also politically unpredictable. In favorable years crops are good and men reinvest their earnings in the production of more wheat or more livestock. In bad years their surplus disappears and poverty increases. The Shortgrass Country has therefore seen a long pageant of political and social movements and projects of varying degrees of progressiveness. The region, being preoccupied with its own problems, has been largely isolationist with regard to the outside world.

The Intermountain West. This enormous area is geographically an American counterpart of Persia and Turkestan. Its landscape is predominantly semi-desert, with forested mountains

and plateaus here and there. Its economic life is dominated by mining, ranching, and irrigation agriculture.

This is one of the most democratic regions of the nation. To a greater extent than in other regions land and other resources are owned by the Federal Government. Consequently men are likely to be ardent federalists. The Government in return is beneficently paternalistic.

The Pacific Southwest. This is climatically an American Mediterranean. It is the land of the grape, the olive, the prune, and the citrus fruits. The Pacific Southwest is a new American melting pot, a new American center of education and culture. Great new cities are arising, cities full of tourists, airplane factories, shipyards, movie industries, and commerce.

Large minorities of Filipinos, Mexicans, Chinese, and Japanese are present. Anti-Oriental feeling is at times intense. Japanese war scares have been numerous. There is a lively interest in foreign affairs, but this interest centers in Asia as well as in Europe. Local and state consciousness is intense.

The Pacific Northwest. The coastal parts of this region are clothed in magnificent forest; inland this gives way to a plateau of bunch grass and sagebrush. In its climate the Northwest west of the mountains resembles the British Isles and east of them Mongolia. It is an empire of sawlogs, fish, and dairying, with a circle of fruit-growing valleys ranged about an inland wheat area.

This region is economically new. It has not yet reached its full social development. Its people are energetic, imaginative, and almost pugnaciously American. All through society there is a conflict between the old exploiters of resources and the growing power of labor. Regional consciousness is strong. External interest focuses in the Orient and Alaska.

Subdivisions of regions. A geographic region is the largest part of a nation which has general characteristics in common. In other words it is the largest area which is noticeably homogeneous in its life and culture. If, however, we examine any one region carefully, we soon see that it is only relatively or comparatively homogeneous.

For an example let us examine the Middle West or American Midlands. Within it are six distinctly different subdivisions such as the Spring Wheat Belt, the Winter Wheat Belt, the Corn Belt, the North Central Dairy Belt, the General Farming Belt, and the

Central Industrial Belt. We call such subdivisions of regions *sub-regions.*

Within each sub-region there are, in the same way, smaller subdivisions, which we may call *sections* or *districts.* For example, within the Corn Belt Sub-region there are nine sections. These are: the Eastern Corn and Small-Grain Section, Western Corn and Small-Grain Sections, Corn and Oats Section, Central Intensive Livestock-Feeding Section, General Farming, Dairy, and Crop-Specialty Section, Southern Pasture and Livestock-Feeding Section, Northern Livestock and Dairy Section, Livestock and Winter-Wheat Section, and the Western Transition Section.

Within each section there are in turn distinctly different localities or communities. Even a community may be differentiated into distinct neighborhoods.

Regions in other countries. The United States is not the only country which possesses regions. The geography of Mexico shows the existence of distinct regions. That of Canada does likewise. France, Germany, Russia, or Japan, indeed every country on earth possesses clearly marked regional differences. To think geographically means that we can recognize regional differences and similarities, evaluate them, think in terms of them.

A concept of place continuity. There will always be a United States, in the sense that there will always be a central part of the North American mainland, full of people working in relation to their environment. Whether our descendants possess it is another matter. That all depends upon our use and conservation of our natural resources, our safeguarding of the better qualities of our population, and the kind of ideas in our heads regarding ourselves and the rest of the world — particularly the ideas concerning the relations between ourselves and the rest of the world. If we neglect resource conservation, human biology, and the cultivation of proper ideas of geographic relations, then our hold upon the area known as the United States can collapse with astonishing rapidity.

Such a catastrophe has happened time after time. The history of central and western Asia is full of accounts of the rise and collapse of civilizations. The Romans built a resplendent culture in the lands about the Mediterranean Sea, and their empire lasted many centuries.

H. G. Wells, the British historian, writes: "In one field of

knowledge we might have expected the Romans to have been alert and enterprising, and that was geography. Their political interests demanded a steadfast inquiry into the state of affairs beyond their frontiers, and yet that inquiry was never made. . . . The Romans do not seem even to have inquired what manner of men wove the silk and prepared the spices or collected the amber and pearls that came to their markets. . . . Rome was content to feast, exact, grow rich, and watch its gladiatorial

Fig. 22

The Roman Empire at the time of Trajan

shows without the slightest attempt to learn anything of India, China, Persia, or Scythia, Buddha, or Zoroaster, or about the Huns, the Negroes, the people of Scandinavia, or the secrets of the western sea." [1]

This almost sounds as if it had been written about the United States. Hordes of barbarians finally poured into the Empire and took it away from the Romans. (See Fig. 22.) The world still contains hordes of barbarians, highly organized, equipped with vast air power, utilizing the finest and most complete geographic

[1] WELLS, H. G., The Outline of History, Third Edition, pp. 461-462, Macmillan, New York, 1921.

knowledge available. It is entirely possible that they could take our empire away from us. It is more than time that we begin to think in terms of place and place continuity.

Conclusion

To live safely in the world, any nation and its people must think geographically. To live in that world in an Air Age, correct geographical thinking is more essential than ever. For us this implies more than possessing and reading maps; it means that we must do our thinking from thoroughly geographically-conditioned minds. It means that we must possess the nine basic concepts which underlie geographical thinking, and use them intelligently in our reasoning about ourselves and the rest of the world.

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CHAPTER 4

THE WORLD'S FRAMEWORK

Place Sense Versus Time Sense

DO YOU possess a mental space scale? Every one of us needs one. The minute we try to think geographically about either ourselves or the rest of the world, we find that we must have one. We need it when we try to understand current events and situations within our own country; we need it even more than we try to appraise foreign affairs or to evaluate international relations. Most of us do not possess such a mental space scale as part of our intellectual equipment. American education has spent a vast amount of effort in trying to give us a time sense, and it has succeeded fairly well. It has never seriously attempted to teach us space sense. As a consequence, when anything important occurs, we are able to view it only from an historical angle. That is, we look at it only as part of a sequence of happenings. When we seek a cause for it, we look for something which happened or existed yesterday or the day before, or last month, or last year, or even longer ago.

Usually, prior events are only part of the cause. Today's events *are* partially explained by past events, but they are also partially explained by situations which exist right now. Some events have almost no causes or precedents in time; their reasons are almost all in the present. Some of these reasons may be right here, some may be short distances away, still others may be far off; but these may all be working together to produce a situation or an event.

For example, Japan bombed, burned, and pillaged the cities of China during the 1930's, but this had almost no relation whatever to Japan's attack on America. The fact that China lies on one side of the Asiatic Mediterranean (*i.e.*, the China Sea) and American islands lie on the other side, coupled with the fact that

Japan desired to expand southward along that Mediterranean, does explain why the United States and China found themselves war allies in 1941. (See Fig. 23.)

During the Napoleonic Wars Europe was cut off from supplies of cane sugar, so a beet-sugar industry was developed. This, how-

Fig. 23

Japan in relation to the continents of Asia and Australia and the Pacific Ocean. Note how American island possessions hem Japan in on the west. Note, too, how the enclosed corridor of seas along the eastern edge of Asia points Japanese psychology of expansion southward to the Indies

ever, has almost no relation to the fact that more than a hundred years later Cuba produces cane sugar while Poland produces beet sugar; or to the fact that Colorado produces less sugar than Hawaii; or to the fact that we Americans got sugar ration cards after Japan made war upon us.

Bananas became scarce in American markets during 1942,

whereas apples did not. This bears no relation to the fact that American apple growing started during colonial times whereas American banana growing developed in the twentieth century, and it has only a very remote relation to the fact that Robert Fulton built a submarine shortly before the year 1800 and tried unsuccessfully to interest the Government in it. It was really the result of two facts: first, that bananas grow successfully only in rainy tropical regions, and second, that there were submarines in the waters between us and the rainy tropics.

The fact that oranges do not grow in Greenland, that rubber does not grow in Vermont, that corn does not thrive in British Columbia, that American anticyclones are not formed over the South Pacific, that Nazi armies froze east of Smolensk, that oil wells in northern Canada were sealed shut while there was a shortage of gasoline in Boston, or the fact that Georgia had a soil-erosion problem and voted for Roosevelt in 1936 while Vermont did not, are not matters to be measured historically, or economically, or sociologically, or politically. Rather they must in the main be measured geographically. There is just no sense in stumbling over geographical stone fences while we are engrossed in chasing historical and institutional butterflies.

In the present Air Age, the need for this ability to reason in environmental terms and to think on a space scale is sharply emphasized. There is no historical precedent for the airplane, or at least not much of one. Nor are there any very convincing institutional or historical explanations for some of the new events and relations which it has thrust upon us. Hence we find ourselves searching desperately for some sort of new framework on which to hang our ideas and problems. This is not a new search; it has been going on for a long time, but our present needs have intensified it. To find a geographical framework which is both useful and simple has not been easy. Several have been formulated and used.

The Search for a Framework

Long ago, in America, Guyot worked out his pattern of the earth's physical framework — triangular continents with major and minor mountain axes. Later, Davis and his successors developed a "scientific" physiographic framework for use in studying human affairs. Other men developed the idea of hemispheres,

grand divisions, and continents, as a background of reference. Still others undertook to study human affairs from a basis of political units — provinces, states, nations, alliances, and empires.

Guyot's "grand pattern" turned out to be of no great significance. Davis's scientific physiography led into still more scientific geomorphology (the science of land forms) which was of primary interest only to geologists and other physical scientists.[1] The hemisphere concept was smashed by the airplane and the unity of the continents turned out to be a myth. Studying geography by countries and other political units is, for certain purposes, very useful, but for most purposes it is of almost no use whatever. To visualize a world of political divisions, moreover, does not create nor even lend itself to geographical thinking. When we note that rice is exported from Hongkong or rubber from Malaya, we can see no reason why this should be so. When we learn that Finland produces forest products and the Ukraine does not, no explanation is implied. North Carolina has cotton mills, while Kansas has flour mills, but the causes are not contained in the words North Carolina and Kansas.

Knowing these things, other men have continued the search for a worldwide framework which would provide both a background of reference, and a ready means of explanation for world events and situations. About the beginning of the twentieth century, Supan divided the world into what might be called natural regions. Each region included all the land in any one part of the world where natural conditions were in general homogeneous. The finished product was a world map divided into 35 regions, each given some fitting name. Since natural conditions were roughly similar throughout any one of these divisions (and quite different from those of adjacent divisions), it was felt that such a scheme would be of considerable value. For example, to one knowing Supan's map, to learn that on a certain day a hurricane had wrecked French copra trade in the Polynesian Region would not come as a surprise. Copra production there is a normal activity, and hurricanes are a natural and expectable occurrence.

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[1] In 1930 Dr. Davis, then nearing the close of his long and productive life, told the writer that if he had his life to live over, he would be a "real geographer, not a physiographer, because the world of men needs explanation more than the world of land forms" — a remarkably keen observation for an octogenarian who had fathered a whole branch of physical science.

They were already associated with the region in the mind of the person who had studied Supan's map. Hence, when the current event was announced, such a person was already prepared not only to accept and locate it, but to understand it in all its implications.

Such a frame of reference had very great value, but it also had some disadvantages. First, there was no visible causal factor underlying the divisions which Supan had made. Second, an ordinary person could not make another map roughly like it except from memory. Third, the names of the divisions were purely arbitrary and hence difficult to learn. In 1905 Herbertson made a simpler and improved map of natural regions, based upon groupings of several factors of the natural environment, and gave his regions names which were logical rather than arbitrary.

A Framework of Climatic Regions

Herbertson's world framework can, however, be still further simplified, and a regional picture of the world (which will serve as a frame of reference for human affairs) can be constructed by dividing the earth on the basis of some *one* important factor. Several different factors have been selected from time to time for this purpose, but among them climate seems to be the most significant.

In the first place, climate is, in the majority of instances, the most important element in man's environment. Not only does it affect his industries, *i.e.* his ways of making a living, but it also has a bearing on his health, mental and physical energy, and bodily comfort.

In the second place, climate exercises a major control over the kind of natural vegetation, native animal life, and soil which occurs in a region. These factors in turn play a dominant role in man's life.

In the third place, if one be willing to generalize to a large enough degree, a map of the world's climatic regions is surprisingly simple, surprisingly meaningful, and surprisingly easy to learn and to use as a reference for one's thinking.

The world is climatically bilaterally symmetrical. In other words, the equator cuts it into two halves; if you flop the northern hemisphere upside down on the southern, the different kinds of climate will fit over one another. That is, they will fit as nearly

as the different shapes of the continents and their unequal proportions of lands will allow them to fit.[2]

At first thought the number of kinds of climate might seem to be almost endless, but when data on all parts of the world have been assembled, it appears that climatic conditions are fairly uniform over large areas. In many cases the same kind of climate occurs on different continents. As a consequence, when the climatic regions of one continent have been learned, the learning of those on another continent has already been partially accomplished.

World Climatic Regions

The four great zones. Figure 24 shows a map of the climatic regions of the world. When we examine it carefully, we see that the earth's types of climate fall into some four great zones or pairs of zones: tropical, subtropical, cyclonic, and polar. The tropical zone is characterized by continuously high temperatures and by the absence of a cold or even cool season. The subtropical (or warm temperate) zones are characterized by a long, almost tropical summer and a short, cool winter. The cyclonic (or cool temperate) zones possess a hot season, a cold season, and two intermediate seasons, and in addition, exceedingly variable weather. The polar zones are characterized by low temperatures most if not all of the year.

Within each of these four general types of zone, there are such significant differences in rainfall, temperature, wind, humidity, etc., that it is necessary to divide each zone into several types of climate. In the tropical zone the chief differences are in amount and seasonal distribution of rainfall. On the other hand, differences in temperature and not in precipitation constitute the basis for recognizing types of climate in and adjacent to the polar zone. In the subtropical and cyclonic zones, variations from place to place in both precipitation and temperature are significant.

Thus we see that the world is not one world at all climatically; it is some thirteen kinds of a world, and these thirteen types of climate are distributed over the earth more or less systematically, according to the causal factors which underlie climate. As the

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[2] The northern hemisphere contains more than three-fourths of the world's land surface.

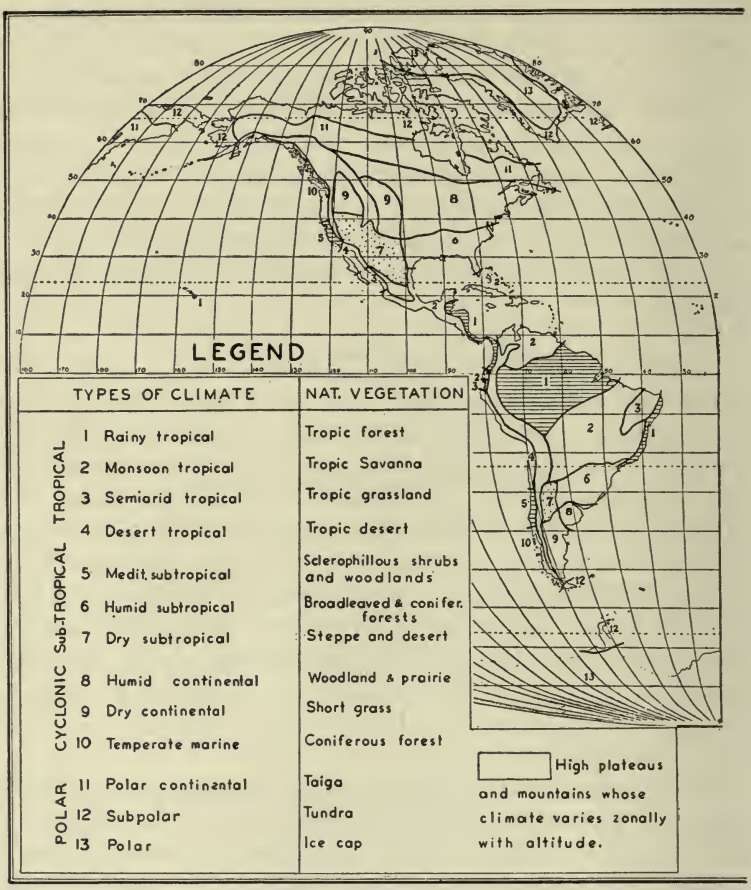
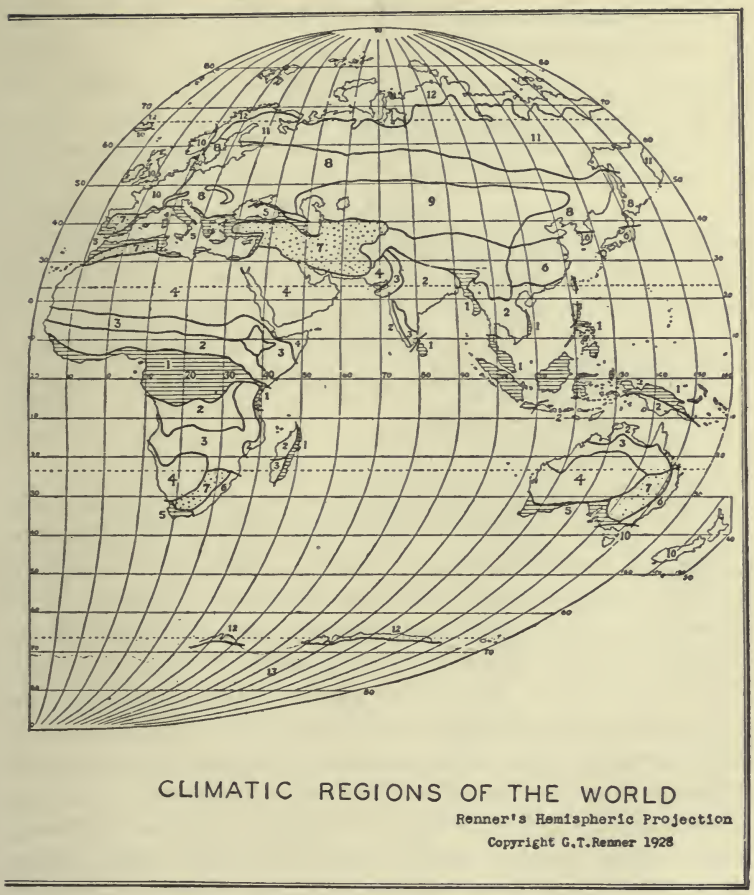


Fig. 24

accompanying map is studied, the bilateral symmetry of the world's climatic system becomes more and more evident. The theoretical mathematical boundaries of the climatic zones of the earth are set by the tropics, latitude 40°, and the polar circles, but since Nature abhors straight lines, she pays no attention to such limits; hence the boundaries of the climatic zones are very irregular lines. The boundaries as indicated between individual climatic regions are rather arbitrary, for one type of climate actually grades into adjoining types. Thus the climatic regions shown



Climatic regions of the world

on the map (Fig. 24) include many minor variations. In the main these have been disregarded and only those types of climate are recognized which differ greatly enough from one another to be noticed in their effects on man's health, energy, and activities.

The following climatic types of the world are discussed, and outlined on the accompanying map:

(*a*) Tropical types:
  (1) Rainy tropical
  (2) Monsoon tropical

(3) Semiarid tropical
(4) Desert tropical

(*b*) Subtropical types (warm temperate):
(5) Mediterranean subtropical
(6) Humid subtropical
(7) Dry subtropical

(*c*) Cyclonic types (cool temperate):
(8) Temperate marine
(9) Humid continental
(10) Dry continental

(*d*) Polar types:
(11) Polar continental
(12) Subpolar or tundra
(13) Polar ice cap

(*e*) Areas not classified under any of the above, mainly highland areas, the climates of which show a minute zonation with altitude.

Tropical types of climate. *1. Rainy tropical type.* In regions with this type of climate the sun is overhead or nearly so at all parts of the year, the sun's noonday rays fall on the earth almost vertically at all times, and the days and nights are very nearly equal at all seasons. Hence such regions are hot throughout the year, and freezing temperatures are unheard-of. The coolest temperatures occur at night, and yet the nights are only a few degrees cooler than the days. The air is damp and muggy, for the relative humidity is high throughout the year. There is much cloudy weather, indeed many places are cloudy nearly all year round. Heavy rainfall occurs every month of the year, although the equinoctial seasons are usually rainier than other parts of the year. The rains usually come in the afternoon, when the rapid ascension of heated air is most vigorous. This afternoon shower is such a regular occurrence that it is often used in place of a clock for dating engagements for business or pleasure. The portions of the rainy tropics near the equator are noted for their lack of wind; those lying in the higher latitudes are swept by the rainy trade winds.

The natural vegetation in these hot, wet regions is luxuriant forest—a forest of huge trees, supporting countless parasitic plants and tied together with a tangle of climbing vines. Since there is no cold or dry season to cause stoppage of growth, the

trees, though broad-leaved, are green all year. Since there is no rhythm in the climate, a tree may carry blossoms, green fruit, and ripe fruit all at one time. The trees develop no annual growth rings, and hence their wood is particularly valued for cabinet-making purposes. While the natural vegetation is rain forest in the main, an impenetrable jungle grows along the streams or wherever the virgin forest is destroyed.

Native animal life is mainly arboreal — monkeys, apes, birds, bats, sloths, etc., which are best equipped to live in the tree tops where most of the food supply occurs. The lack of sunlight beneath the forest eliminates grass, so ground animals are almost lacking. Fish and water-loving animals are abundant in the rivers.

In the more remote parts of the tropical forests some of the most primitive types of human beings may be found. They wander about in small bands, living on fruits, nuts, roots, grubs, fish, and small animals. Their shelters are rock ledges, trees, or a few sticks and leaves. Such people, knowing nothing of agriculture, stone working, or pottery, are exceedingly primitive and can here survive only because of the genial climate. Examples of such survivals are the Punans of Borneo, the Veddahs of Ceylon, and the Batwa Pygmies of central Africa.

Most of the natives are, however, far above this level, living by agriculture and handicraft arts. Even among these more advanced peoples life is simple and rather primitive. A clearing is made in the forest by girding or felling the trees. Later the dead wood is burned and the ashes are scattered over the ground. A few beans, melons, yams, or cassavas are planted. Coconuts, breadfruit, bananas or plantain trees, and fish contribute most of the food. Huts of poles and palm thatch supply shelter. Clothes are few and hard work is unknown. The jungle soon chokes out the garden patches, so the village may move and make a new clearing every few years. Such settlements are usually near the streams which, owing to the difficulty of maintaining trails through the forest, are the chief means of communication. Left to themselves the natives would never develop these regions, but peoples of the cyclonic zone need the products of this climate — cacao, rubber, copra, bananas, hardwoods, gum, etc. As a result great European and American companies have established trading posts and plantations for producing and exporting these

products to the cyclonic zone, and the Great Powers have taken over these lands as colonies and protectorates. The few Europeans who go there as governors and plantation overseers find the climate so enervating, disease so prevalent, and insects so abundant that they must return to temperate lands on long vacations or at least spend parts of the year on near-by cool highlands.

2. *Monsoon tropical type.* This type of climate resembles in temperature the rainy tropical type, for it, too, is relatively hot all months of the year. On the other hand it possesses a marked seasonal distribution of rainfall. The rainy season is from four to eight months long, during which moderate to heavy rain falls. The rest of the year is often completely without rain.

The natural vegetation in this climate is deciduous forest or tall grassland sprinkled with clumps of deciduous trees, often called *savanna* or *parkland.*

Arboreal and aquatic life is abundant, and ground animals are numerous. Rhinoceri and hippopotami inhabit the watercourses; elephants, giraffe, okapi, wart hogs, and other animals range the tree-dotted savannas.

This is the land of real tropical farmers. The dry season, which is cool for a short period, gives man more energy than in the rainy tropics. Then, too, the task of clearing and maintaining a farm is relatively easy. The young trees and dry grass are burned near the close of the dry season. The ground is then stirred with hoes, and crops are planted at the beginning of the rains. Since this is a land of grass, the crops which are planted are the grains, which are domesticated grasses. Rice, many varieties of millet, guinea corn, kaffir corn, sorghums, maize (introduced by traders and missionaries), wheat, and others are sown. Cotton and sugar cane are also important. Where the rainy season is rather short, irrigation is often practiced during part of the year.

This climate extends, in general, for a distance of ten or fifteen degrees of latitude on either side of the rainy tropical regions near the equator. Leeward shores in the trade-wind belt also have this climate.

The monsoon tropical climate results from the change of the earth's relation to the sun. Since the earth is tipped on its axis at an angle of nearly 24°, it follows that as the earth progresses around the sun, the sun's rays will strike the earth at a constantly

varying slant. Any place not on the equator will thus have a high-sun period and a low-sun period. At a distance of ten or more degrees north and south of the equator this variation in the sun's altitude begins to be felt appreciably — partly as a slight seasonal rhythm in temperature, but more so in the marked seasonal distribution of rainfall. During the high-sun period (the low-sun period on the opposite side of the equator) the air is heated, expands, and rises, and moist air moves in from the oceans in great monsoonal movements, bringing rain. During the low-sun period the dry, parching trade winds blow over the land.

The monsoon tropical climate occurs in India, Thailand, south China, the northern coast of Australia, eastern Java and the Sunda Islands, the southern Sudan and the southern part of the Congo basin, the campos of Brazil, the Orinoco basin, the coastlands of Mexico and western Central America, and the West Indies and the southern tip of Florida. Many of these regions have reached a considerable stage of development and population density. India, south China, northern Nigeria, Java, and Cuba are particularly important producers and exporters of such commodities as sugar, rice, and cotton.

3. Semiarid tropical type. This climate is characterized by a long dry season and a short period of medium to scanty rain. There is but a moderate seasonal range in temperature. The short rainy season occurs when the sun is directly overhead, and during this period the climate is as enervating and trying as that of the rainy tropics. During most of the year, however, the air is hot and dry and sunshine is as unbroken as in the desert.

The native vegetation is tropical grassland with trees almost absent. The landscape becomes brilliantly green during the rains but assumes a dusty, dull brown, withered aspect during the long dry season.

This is the land of "big game" described by Theodore Roosevelt and others. Scores of varieties of grass-eating animals inhabit the tropical grasslands — antelope, gazelle, zebra, hartebeeste, and wild cattle. Preying upon these are the carnivores — lion, tiger, leopard, etc.

The tropical grasslands are scantily populated, for the season of rains is too short to favor agriculture. The population is chiefly nomadic and is engaged in the grazing of cattle and sheep. Occasionally, on wetter ground or near stream courses, small

patches of sorghum, barley, or peanuts are raised. Regions with this type of climate are often subject to famine, for in occasional years the rains fail altogether and pastures become depleted. The grasslands of Queensland, Rhodesia, and East Africa have already become important producers of meat, hides, and wool.

4. Tropical desert type. The arid tropical climate, unlike the other three tropical types of climate, is dry or nearly so all months of the year. The range of temperature from day to night is often great because of the extremely low relative humidity and the small amount of cloudiness. Some of the highest temperatures in the world have been recorded in this climate, but night temperature may sometimes fall almost to the frost point.

The natural vegetation in tropical desert regions possesses many peculiarities which are, in the main, adaptations to enable them to survive in this type of climate. The bunches of harsh grass and the low thorny bushes are spaced widely apart with intervals of bare ground between. Root systems are large and spreading; leaves are small, waxy, thick-skinned, varnished, or hairy to prevent loss of moisture. Some plants, such as the barrel cactus, possess facilities for storing considerable amounts of water.

Animals also show an adjustment to environment. The camel and fat-tailed sheep are able to store up excess fatty tissue. The camel and ass can go long distances between drinks; the terrapin and lizard require very little water. Even the fish in many desert streams can survive in moist earth during periods when the watercourses are dry.

Tropical deserts are very sparsely populated; indeed large areas are uninhabited. A few nomadic tribes pasture their animals on the edges of the deserts or in the desert highlands and dry watercourses. Permanent habitations occur in oases which are occasioned by streams and springs. In the oases date palms, cotton, rice, wheat, fruits, and melons are raised by intensive irrigation agriculture. Perhaps the best-known oases in hot deserts are the Nile Valley in Egypt and the Imperial Valley at the mouth of the Colorado River. Most oases, however, are small, varying from a few acres to a few square miles in extent. The date is the chief oasis product, while the nomads export rugs, blankets, and leather goods. Most of the commerce of desert regions is carried by caravans which thread their way from oasis to oasis.

Summary. In general, the tropical zone is characterized by high temperatures at all times of the year and by a lack of stimulating changes of weather. The four types of climate have been distinguished by the amount and distribution of rainfall, the types varying from that with rain at all seasons to that which is dry all the year. The tropical climates of all kinds seem to have discouraged the progress of man socially, politically, and economically.

Subtropical types of climate. *5. Mediterranean subtropical type.* Five parts of the world possess this climate — the lands about the Mediterranean Sea, southern California, central Chile, the region about Capetown in South Africa, and southwestern Australia together with the lands about Spencer Gulf. This type of climate occurs on all western coasts of countries in the subtropics (*i.e.* latitudes 30°-40°), but is usually called "Mediterranean" because its most extensive occurrence is about the Mediterranean Sea.

This climate possesses a very moderate seasonal range of temperature, much greater than that of any tropical climate but much less than that of most temperate-zone climates. This climate can scarcely be said to possess a winter, for the low-sun period is cool rather than cold. The growing season is usually twelve months long, for while the nights of the cool season are often frosty, killing frosts are rare. The other nine months are warm to hot. Most areas with this climate receive less than thirty inches of rain annually. The rains are practically confined to the cool season, during which fogginess, cloudiness, and relative humidity are high. The rest of the year is characterized by low humidity and almost unbroken sunshine.

Natural vegetation is sparse, scrubby, and palmlike in type owing to the long season of drought. During the cool rainy season the landscape is made brilliantly green by grass and shrubs, but during the summer the countryside becomes a dull yellow or brown. Many of the thick-leaved trees remain green all year round, for they are able to withstand drought by their large root systems, thick or corky bark, and special leaf structure. The olive, myrtle, laurel, holly, madroña, and cork oak are examples of this type of tree.

Agricultural crops in this climate are of three kinds: winter crops, like wheat and barley which are planted in the fall and harvested after the rains; drought-resisting perennials, such as

the olive, grape, and carob; and irrigated crops of either annual or perennial nature — oranges, lemons, pomelos, deciduous fruits, corn, rice, and vegetables. Manufactures, except in southern California with its highly diversified industries, are in the main confined to wine, olive oil, and dried fruits. The last mentioned is particularly favored by the high percentage of sunshine.

Perhaps no climate in the world is more delightful and pleasant than the Mediterranean type; hence the Riviera, southern California, the Crimea, and other regions with this climate are noted playgrounds and winter resorts.

6. Humid subtropical type. Regions with this type of climate occur in the same latitudes as those with the Mediterranean type, but they are, on the contrary, confined to the east sides of the continents. Thus these two climates differ in several ways. The humid subtropical climate is characterized by an abundant rainfall which is distributed through all months of the year. The maximum rainfall, however, comes during the summer in contrast to the winter rainfall of the Mediterranean climate. During the summer, with its tropic-like heat, sharp, quick thundershowers occur, but during the winter rainy weather occurs over periods of several days, alternating with periods of dry, sunshiny weather. Light snowfalls may occasionally occur, and periods of fairly cold weather may be expected during midwinter. Thus the growing season is limited to a period of nine to eleven months. Cloudiness and relative humidity are high most of the year. The winters are cool and bracing, but in most sections the summers are too hot and humid to allow the white man to work very hard.

The native vegetation in this climate is abundant, ranging from broad-leaved evergreen forest on the tropical side to broad-leaved deciduous on the cool temperature side. Coniferous forests occur on the porous soils, and prairies of heavy grass cover the wetter areas.

Agriculture is favored by this climate to a greater extent than by most other types of climate in the world. Not only can it produce most temperate-zone crops, but many tropical commodities can also be grown during the long, hot, humid summers. The most important staple crops are cotton, rice, corn, tobacco, tea, mulberry leaves for silk, and peanuts. Cotton assumes great importance in the American Gulf states and in central China, but

is relatively unimportant in other areas because of an insufficient labor supply.

7. Dry subtropical type. Lying between the Mediterranean climate on the west and the humid subtropical on the east are the interior regions with a dry subtropical climate. These lands are in the main desert or steppe-desert and receive too little rain for agriculture. Their population is very sparse except in local spots where irrigation enables man to carry on agriculture. The limited amount of irrigated land compels a very intensive agriculture on these oases. Peaches, pears, apricots, figs, some citrus fruits, vegetables, long-staple cotton, and alfalfa are the chief crops grown by irrigation. Some of these irrigated spots are the Jordan Valley in Utah, the Salt River Valley in Arizona, the Jujuy, San Juan, and Mendoza districts in northwest Argentina, and the ancient irrigated city-oases of central Asia. Outside of these oases the country is mainly given over to the grazing of sheep, goats, and other livestock. In slightly better watered areas such as the Spanish plateau, the high veld of Transvaal, and the Murray-Darling basin of Australia some dry-farming is practiced. These arid and semiarid lands of the subtropics are much like tropical deserts except that their short winters make agriculture seasonal instead of continuous.

Summary. The climates of this zone are characterized by hot, almost tropical summers, by short, mild winters, and by only mildly changeable weather. Conditions here are much more conducive to human advancement and civilization than in tropical climates. Indeed most of the ancient civilizations developed here — Greece, Rome, Carthage, Phoenicia, Israel, Persia, Media, Babylonia, China, Japan, and the Aztec Empire.

Cyclonic types of climate. *8. Humid continental type.* This type of climate is characterized by (*a*) four well-marked seasons during the year, (*b*) great contrasts in temperature from one season to another, and (*c*) great changeability of weather from day to day. It is found in the cool temperate zone in the interior and eastern parts of North America, South America, Europe, and Asia. Their climatic characteristics are due to two causes: (*a*) to the rapidity with which land masses in these latitudes heat up during the summer and cool off during the winter, as compared with the oceans, and (*b*) to the continuous procession of cyclonic and anticyclonic storms (low and high barometer) which move from west to east

around the earth between latitudes 40° and 60°. The winds produced by these cyclonic and anticyclonic storms are variable in the extreme. Within a short time marked changes in wind direction and velocity, temperature, and state of sky are produced by these moving pressure areas. In general, in the northern hemisphere, southerly and easterly winds bring warmth, cloud, and moisture, while northerly and westerly winds bring clear skies and cooler weather. Thus spells of clear weather and stormy weather alternate every two or three days both summer and winter. This climate is characterized by hot summers; indeed, occasional spells of summer weather are hotter than that experienced in tropical regions. The winters are cold. For days and even weeks at a stretch the weather may be as cold as that of the polar zone. The spring and fall seasons are delightful and invigorating but are apt to be broken by sharp freezes and cold waves. The growing season, *i.e.* the period between the last killing frost of spring and the first one of fall, varies in length with the latitude. In the south five or six months are frost-free, while in the north the growing season is reduced to three or four months in length. The annual rainfall, while moderate in amount, is ample for agriculture, coming as it does mainly in the summer. Winter precipitation comes mainly in the form of snow.

The natural vegetation in the humid continental regions varies from treeless grassland of the prairie or meadow type in the drier sections of the interior, to dense forests in the rainier sections. To the south are forests of mixed deciduous hardwoods, such as oak, maple, ash, black walnut, hickory, beech, and others. The trees in this climate are deciduous in habit because of a dry season, as is the case in the monsoon tropical climate. To the north these hardwood forests give way to forests of pine and other conifers.

This is an agricultural climate par excellence. Any humid-climate crop not requiring too long a growing season may be raised here. Corn, wheat, oats, rye, barley, millet, sorghum, clover, soy beans, and timothy hay are all important. In the southern part where the summer is longer and the winter less severe, corn and winter wheat lead in importance, but toward the north, where the summers are shorter, corn will not mature and is not grown except for silage. Likewise the colder winters in the pole-

ward portions eliminate winter wheat, and therefore spring-sown wheat and rye take its place. In regions with this climate grain is abundant and pastures excellent. Hence the livestock industries assume large proportions. Hogs, cattle, and horses are here raised or fattened in vast numbers. On the inland margins of these regions where the climate grades into that of the dry continental lands the frequency of drought renders agriculture somewhat hazardous.

9. *The dry continental type.* In temperature this climate is much like the humid continental type, but it is strikingly different in its rainfall. Roughly the line of 20 inches of annual rainfall forms the boundary between these dry or semiarid continental lands and humid continental lands. While there is not enough rainfall in this climate to allow man to farm with the same methods as in the humid continental climate, there is usually enough rain to produce grass. This grass is of short, fine type, such as the buffalo grass of the Great Plains of North America or the steppe grass of Eurasia and western Patagonia. In many parts the scanty rainfall produces only bunch grass and sage-brush. Trees grow only along the creeks and rivers, and are mainly willows and cottonwoods. In most areas the precipitation occurs mainly during the spring and early summer and so comes when most useful to growing plants. This allows man to cultivate certain favored areas by dry-farming methods. By dry-farming is meant the use of certain agricultural practices to conserve moisture such as summer fallowing, deep plowing, frequent surface cultivations to produce a dust mulch, the planting of drought-resisting crops, etc. The seasonal distribution and dependability of rainfall and the rate of evaporation are as important in their bearing on the success of dry-farming as is the total amount of rainfall. The great diurnal range in temperature and the long periods of rainless and cloudless weather are also important characteristics of this climate.

The dominant occupation of peoples in the dry continental climate is grazing. Often, because of the necessity for moving the animals about in search of fresh pastures, nomadism is the result. In dry-farming regions such as Columbia Plateau, the eastern Great Plains, and parts of western China, or on irrigated lands, homes are permanent and man is sedentary.

10. *Temperate marine type.* This is the mildest climate in

the world for its latitude. Although it lies in the same latitudes as the continental climates, it has a surprisingly small annual range of temperature. Owing to marine influences, the summers are warm rather than hot and the winters cool rather than cold. Consequently this has often been called the mild-winter, mild-summer type of climate. Freezing temperatures occur only a few times each winter and snowfalls are rare on the lowlands. However, mountains in this climate receive abundant snowfall.

This climate is characterized by heavy rainfall on the lowlands and excessive rainfall on the highlands. The maximum rainfall occurs in the winter because at that season the cool land chills the oceanic winds and gentle, drizzling rains, which fall all through the cooler months, are the result. Cloudy and foggy weather is almost unbroken save in summer during which time occasional periods of beautiful sunshiny weather occur. The native vegetation in this mild, rainy climate is heavy forest of coniferous trees. In wet, poorly drained areas trees give way to a thick turf of grass. On porous soils, forests of mixed hardwoods occur.

People in this climate are rather energetic and are much given to outdoor recreation the year round. The grass is brilliantly green and hardy flowers bloom outdoors in midwinter. Even the rains of winter do not usually interrupt outdoor activities, because most of the time the raindrops are so small and mistlike that they do not soak into the clothing. Lumbering and other forest industries are important in most of the regions with the temperate marine climate. Fishing is also important. While the growing season is seven to nine months long, the rainy, cloudy, cool weather is not favorable to agriculture. The summers are too cool and cloudy for corn and too wet and cloudy for wheat, although in such leeward positions as eastern England, the Paris Basin, the Willamette Valley in Oregon, and the Canterbury Plain in New Zealand some wheat is grown. Rye and oats thrive, as do potatoes, root crops, and berries. The fine, year-round pastures and the mild temperatures are exceedingly favorable to dairying. The abundant waterpower affords the basis for such manufacturing.

Summary. The climates of the cyclonic zone are characterized by shorter summers and colder winters than those of the subtropical zones. They also exhibit much more variable weather.

Conditions here are most favorable for human industry and advancement. Civilization was rather late in developing in these zones, but after man learned to use coal, build better houses, and make better clothing the cool temperate zone rapidly rose to supremacy in world leadership. Most of the world's manufacturing, commerce, and political leadership is now centered in the cyclonic or cool temperate zone.

Polar types of climate. *11. Polar continental type.* The contrast in temperature between winter and summer is greater in this climate than in any other on earth. This is because regions with this climate lie in the very heart of huge land masses in a latitude where continental conditions reach their most extreme development. Added to this is the fact that the days are very short during the winter and very long during the summer. In northeast-central Siberia the annual range of average monthly temperatures is 120° F. At Verkhoyansk in this region there has been recorded the lowest temperature on earth (—94° F.) while summer temperatures occasionally go as high as +90° F. Places in central North America occasionally record temperatures nearly as extreme as those in central Siberia. The winters are bitterly cold, but the sensible temperatures, owing to the low relative humidity, are not as low as might be expected. The daytime temperatures of summer are quite high. Indeed it may be almost as warm at noonday as in the continental climates of the cyclonic zone, but frosts may occur any night during summer. Precipitation is rather scanty but, owing to the low rate of evaporation, it is almost all available for plants. Precipitation is about equally divided between snow in the winter and rain in summer.

Natural vegetation in this climate is taïga (northern coniferous forest with a few hardwoods such as birch). Such trees are able to withstand the intense, dry cold of winter. The summers are so short, however, that tree growth is slow and the trees are not large.

These forests have remained almost untouched except in Finland and northern Sweden, but they are a valuable reserve for the future. Fur-bearing animals are numerous and furnish the basis for a large trapping industry. The growing season is but two or three months long, and no month is frost-free; hence agriculture is negligible. On the southern edges of the great

northern forests in certain favored spots such as southern Finland and the Yukon Valley of Alaska, barley will usually mature and hardy, quickly maturing vegetables and berries will ripen.

12. Subpolar type. This type of climate is found along all the coasts and on peninsulas and islands of the arctic and antarctic areas. In these regions the sun is very low in the sky during most of the year. Indeed during midwinter daylight disappears altogether for a period. During most of the year the ground is frozen and covered with snow. During midsummer the days become longer and longer until, for a short time, darkness disappears altogether. For a period of a few weeks the snow melts, the ground thaws out to a depth of a few feet, and the landscape becomes brilliant with sedges, mosses, lichens, bushes, and flowers. This vegetation is known as tundra or arctic pasture.

The tundras of the northern hemisphere are occupied by scattered tribes of Eskimos, Lapps, Samoyedes, Chuckchees, and other Mongolic folk. No agriculture is possible during the short cool summers, so these hyperborean peoples depend mainly upon fishing or hunting. Fish are abundant and sea birds, whales, seal, walrus, and caribou are usually obtainable. The reindeer, or domesticated caribou, is bred and herded by the Lapps, Chuckchees, and other peoples. The mosses and lichens of the Eurasian tundras support perhaps several million reindeer. Recently the Moravian missionaries in Labrador, and the United States Government in Alaska, have imported reindeer from Eurasia and taught reindeer herding to the Eskimos of North America. So meagre are the resources of this climate and so difficult is the struggle for existence that man on the tundras has not been able to develop much of a civilization. The development of a market for surplus reindeer meat in the cyclonic zone would mean much to these people. Already a reindeer meat-packing plant has been established at Nome, Alaska and a small beginning has been made toward commercial development.

13. Polar ice-cap type. At times during the earth's past the polar ice caps have extended over much of the polar climatic zones, but at present they are confined to the interior of Greenland and all of Antarctica and the polar ice floes. During several months continuous darkness reigns, while at the opposite season there is a period of continuous light extending over several months. Between these two seasons are transition periods with

alternating light and darkness. The land is always covered with ice and snow, for even during the period of continuous light not enough heat is received to melt the snow and ice. Temperatures are below freezing practically all of the time, and hence vegetation is absent. What animal life exists in this climate is in the ocean.

In general, the climates of the polar zone are cold and rigorous. As a result, the lands of this zone are at present very scantily populated. Up till now the inhabitants of this zone have been compelled to use their energies so completely in adjusting themselves to their meagre environment that they have been unable to advance. The tundras may someday supply much meat to the rapidly growing population in the cyclonic zones. Similarly the polar continental lands constitute a vast reserve of timber, furs, and minerals. Man's ancient seats of empire were in the subtropical zone; his present centers of activity are in the cyclonic zone. The "Northward Course of Empire" sums up human history. What use man will make of the polar zone in the future is problematical. The polar ice caps and the adjacent polar seas are almost sure to become important in the age of world aviation. Extensive areas there furnish excellent landing conditions. Weather conditions are fairly stable over many parts. The stratosphere, with its excellent flying conditions, descends to comparatively low altitudes over the polar regions. The northern polar lands are located centrally to a large portion of the world's land area.

Using the Framework

Compare the Americas. When these climatic regions are learned and the world map is examined in detail, some interesting relations and comparisons come to light. As an example, let us examine, in Figure 25, the west coast of the two Americas: western Colombia resembles Panama; the west coast of Central America and the south coast of Mexico have their counterpart in coastal Ecuador; the semiarid west coast of Mexico resembles the dry district about the southern part of the Gulf of Guayaquil; coastal Peru and northern Chile are tropical desert, as are the lands about the Gulf of California; central Chile duplicates southern California; southern Chile resembles our Pacific North-

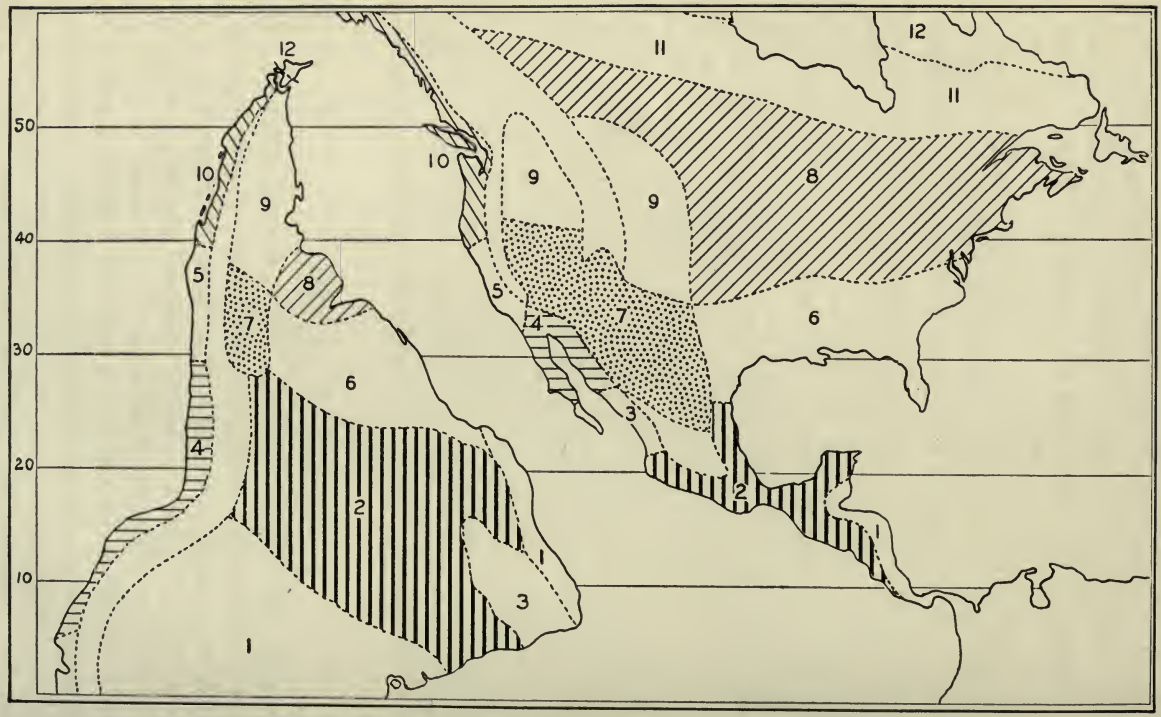


Fig. 25

Comparison of the climatic regions of North America and South America (inverted)

west; the Alaska Peninsula repeats the conditions of Tierra del Fuego.

On the east coast of the Americas a comparable story is recorded. Conditions in the West Indies are repeated in southern Brazil; our Gulf States are duplicated in South America's Paraná Basin; our humid continental Northeast is repeated on the Pampas.

Compare other continents. These similarities between the Americas are repeated again and again over the world. The cli-

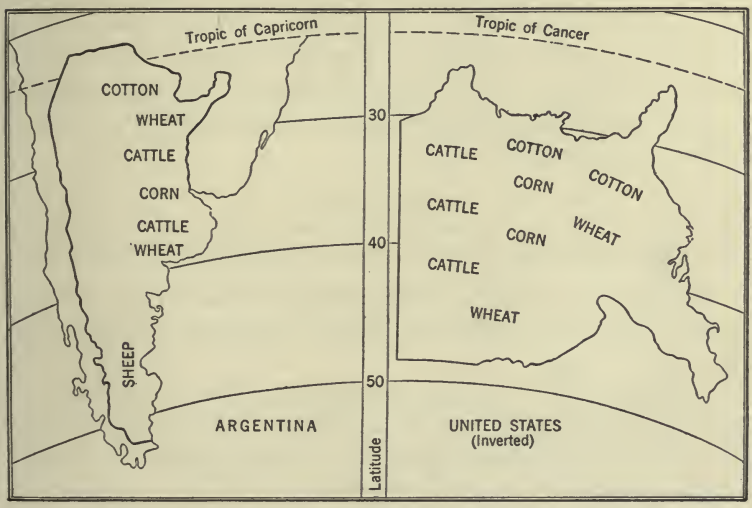


Fig. 26

The agricultural products of Argentina and eastern United States (inverted) are similar for natural reasons

matic framework of South America is reproduced with variations in Africa, in Australasia, in Asia. That of North America reappears in Europe, in Asia, and in part in the southern continents.

The regions of Mexico, Caribbean America, and most of South America differ from, and hence supplement, those of North America. Those of southern South America resemble and hence compete with those of North America. North America and Europe very largely duplicate and hence tend to compete. Africa and Europe tend to supplement each other because they are regionally so different.

These facts tend to explain why Europe has divided Africa up into colonial possessions, and why the United States likes to consider tropical America her own sphere of influence and trade. It also explains why "Hemispheric Solidarity" is really solid north of the Tropic of Capricorn, and why it is very un-solid south of it (Fig. 26). Throughout the world such considerations as these lie at the very root of world situations and events. Nearly every world happening can be at least partially clarified and comprehended when thrown against the world's regional framework. Current events are, of course, current history. They are to an even greater extent current geography. They become history, properly, only after they have happened. But while they are happening, sometimes even before they happen, they are geography — to be measured and understood in terms of their immediate regional background.

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CHAPTER 5

DYNAMIC GEOGRAPHY

Analytical Versus Descriptive Knowledge

Measuring Japan Regionally. Most of us have a very sketchy idea about Japan. Often our ideas are as ludicrous as they are sketchy. Japan, some say, is a little tropical country in the Orient. It is a land of rice, kimonos, paper houses, wooden clogs, and cherry festivals. The Japanese are funny people; they build imitation battleships, erect makeshift factories in which to make toys, they are all near-sighted so they are not good aviators or gunners, and they spend much of their time painting meaningless little pictures.

Now this is a peculiar concept to have of a nation of 80,000,000 people who are neither tropical nor ineffective. Somebody is to blame for this idea, and it is *not* the Japanese. Particularly interesting is the part about rice, paper houses, and cherry festivals. It is precisely comparable to a concept of America which would make of us a nation of wheat, California bungalows, and football bowl games. The wheat part does not fit Alabama, which likes its bread made from corn and plants its fields to cotton, velvet beans, and numerous other crops. The bungalow is scarcely appropriate for Maine or Michigan; and perhaps nine out of ten Americans have never seen a "bowl" game.

Figure 27 shows Japan as it would appear if it were moved out of the Pacific and placed in its correct latitudes just off the east coast of the United States. Now, here is a chance for us to use our world regional framework as an intellectual measuring stick. The southern Japanese island, Taiwan, lies alongside Cuba; the Riu-kiu Islands string up along the Florida Coast; Kiushu, Shikoku, and most of Honshu lie opposite the South Atlantic states. Northern Honshu faces New York City. Hokkaido more

or less duplicates New England; Karafuto repeats Newfoundland, and the Kuriles extend up past the Labrador Coast to Greenland. With these stark facts in front of us, the rice myth

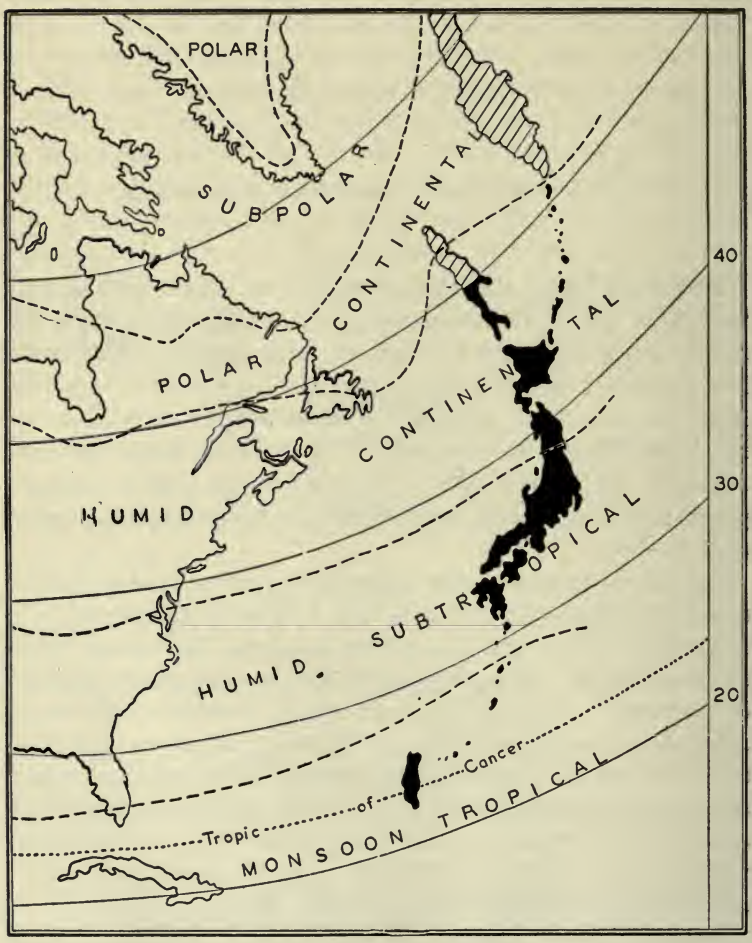

Fig. 27

Japan compared climatically with the United States

begins to fade out a bit in the New York and New England parts of Japan, and the paper houses seem a bit cold in Labrador and Newfoundland. The "inefficient tropical peoples" idea also appears a bit spurious in Washington, Philadelphia, and New York.

It is recommended that the great American concept of Japan be remodelled a bit.

Five southern Californias. The Chamber of Commerce of a southern California city once published a bulletin. This presented in considerable detail, illustrated with numerous pictures, the manifold beauties and attractions of the region. These were all described truthfully, but the impression created was that the southern part of California was unique, the only one of its kind in the world.

Southern California, however, is not a unique area. It is but one of five such areas in the world. The Mediterranean climate is roughly the same whether it occurs in San Diego (U.S.A.), Santiago (Chile), Santiago (Spain), Jerusalem, Capetown, Perth, or Adelaide. Wherever it occurs, there are the grape, the olive, the orange, the raisin. There too are the fruit-drying industry, wine making, and the resort industry.

The case of cotton. Similarly our cotton-belt states do not constitute an exceptional geographical phenomenon; there are four other actual or potential cotton belts just like it in the world. Central China is a heavy producer of cotton. Southern Japan formerly produced cotton but has converted most of its cotton lands into rice fields. Australia's potential cotton belt lacks labor. The beginnings of the industry have been made in Natal, South Africa. Southeastern Brazil has a vigorous, growing cotton industry. Cotton can, of course, be grown in other climates than this: tropical desert, tropical semiarid, and dry subtropical lands can produce it under irrigation; and cotton is a native perennial shrub in some of the tropical monsoon lands.

A regional knowledge of the world is sometimes of high significance. During the depression the United States Congress passed a law the effect of which was to restrict American production and raise the world price of cotton. Almost immediately the South American cotton belt increased its production 700 per cent Southeast Africa also stimulated its production. Japan, faced with prospects of higher-priced raw materials for her cotton mills, undertook the conquest of the Chinese cotton belt and began to cast greedy eyes upon the almost empty potential cotton lands of Australia.

Obviously, neither the Senator who drew up this bill nor the members of the Congress which enacted it into law ever visual-

ized any of the world consequences of their actions. Certainly they had no regional picture of the world in their minds.

No country is a region unto itself; no country or part of a country is wholly unique — certainly not enough so to enable it to act without careful thinking with respect to the rest of the world's regions.

Economic Geography. The human race lives because of its economic geography. Economic geography is, however, not altogether a result of human whims. It *is* largely a matter of human choices, but such choices are always made from a list drawn up by nature herself. To a very large degree, the climatic regions of the earth are the lists written by nature. Then, when man elects to grow bananas, he grows them in a banana climate — *viz.* the rainy tropical type. If he elects to do it in the monsoon tropical type, he gets poor bananas. If he tries it in the semiarid tropical type, he is further penalized by the extra labor and cost of irrigation. If he chooses to do it in the humid continental type, nature freezes his plants. And so it goes, through the entire range of industries and commodities of the earth. Economic geography merely enumerates and describes, until it is done against a background of the regional framework of the world.

The Relationship Sequence in Geography

Geographic relationships. The world's economic geography is very much a result of the earth's regional framework; and so too is its social or cultural geography — in short, its whole human geography.

This connection between human geography and the world's regional pattern is, however, only part of an enormous and extensive realm of relationships between causes and results (or between partial causes and results) which we may see in operation all about us. This realm of relationships is the very stuff and substance of geography. Not all relationships, however, are geography. Most relationships of natural things to other natural things are not geographic; quite a few of them are, though, as for instance the relationship between higher elevations and increased rainfall, or the relationship between high latitude and increased length of summer day. Also the whole complex set of relationships between the forms and distribution of plant life and the factors of the natural environment are geographic. They

constitute what we are wont to call plant geography. Similar is the field known as animal geography.

Most relationships of human things to other human things are not geographic. Usually they are sociologic, or psychologic, or economic, and so forth. A few such relationships are geographic — as for instance the relation between density of population and intensification of land use, or between racial minorities and political policies related thereto.

Practically all relationships of natural things to human things are geographical. So, too, are almost all relationships of human things to natural things. Thus geographic relationships include some natural to natural relations, a few human to human, and practically all human to natural and natural to human relations.

Such relationships often operate in a chain or sequence, wherein results, in their turn, become causes. Indeed they do this so regularly and predictably that we may permissibly recognize a relationship sequence. Such a relationship sequence becomes extremely useful in a generalized way in connection with the world's regional-climatic framework. To all practical purposes it constitutes a sort of *space scale* which the geographer uses, in much the same way that an historian builds up and uses a *time scale.*

Using the relationship sequence. For example, when a businessman puts his pencil upon a spot on the map and asks, "What can I import from this place?" most people would be compelled to say they did not know. One who is able to think geographically can, however, return a fairly satisfactory answer. The pencil indicates the place; the map gives the position. Then knowing the position, the picture of the world framework gives the type of climate in which the designated place lies. (See Fig. 28.) Knowing the climate, the general plant geography follows almost automatically (as do the soil and water resources). When one knows the plant geography, the general type of animal geography may be deduced. Then, knowing the climate, flora, soil, water resources, and fauna, one may reason what the human geography is apt to be. Knowing the human geography, it is not difficult to give a list of what commodities are apt to be available for export. The final result may appear quite mystifying to the bystander, but it is actually quite simple — if you know how.

Qualifying factors. This process of relationship-reasoning is

highly useful in countless instances. It is not, however, to be used without qualification. For one thing, geography is always a dynamic, not a static thing. Two places which are naturally similar are not always humanly similar, and even if they are, they do not stay that way. For instance, Fukien and South Carolina are very similar in many ways. Both lie in a continental east-margin situation, both have a humid subtropical climate, both are potential cotton belts; they have about the same area; both have a mantle of "good earth" — red and yellow soils. Both can grow cotton, corn, rice, tea, and mulberry for silkworms. South Caro-

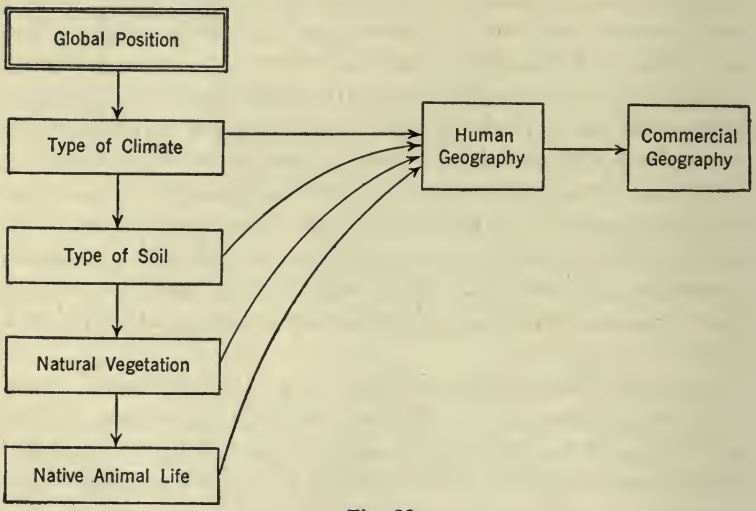

Fig. 28

Diagram of the relationship sequence in geography

lina has 1,500,000 inhabitants; Fukien has 15,000,000. Fukien grows much rice and a little corn for food, some cotton for clothing, and produces much tea and silk for sale. South Carolina tried rice, tea, and silk as early as colonial days. She gave up tea and silk and has about abandoned rice. She grows corn for food and cotton for sale. The answer lies not in nature, but in the number of Fukienese as compared with the number of South Carolinians. When and if South Carolina has 15,000,000 inhabitants, her geography may look a great deal like that of Fukien. The burden of this whole argument is not to deny the potency of geography, but to emphasize its dynamic quality. There are

numerous changeable and mobile factors which thrust themselves into the relationship sequence and modify its specific operation with regard to human affairs.

Such volatile factors, however, are hardly potent enough to transform a Japanese liking for rice or the general scarcity of wood and metal into a standard "paper house, rice diet, tropical climate" pattern for the nation. Any realistic view of Japan must see Taiwan as the sugar, camphor, and tropical-products part of the country. The middle islands raise rice, but they raise barley, vegetables, soy beans, tobacco, and many other crops also. The northern portion of Japan is very much more a picture of substantial wood and stone houses, potatoes, sawmills, root crops, dairy cattle, and so forth. The Kuriles are veritably a string of Labrador fishing villages.

Moreover, the tea groves, fruit orchards, and silk-mulberry industry represent geographical adjustments to a hill country, even mountain environment, by a land-hungry, industrious people. The great smoking industrial cities represent adjustments to a plentiful labor supply, water power, cotton and silk fibre crops, copper ore, and at least modest supplies of coal and iron ore. The great shipyards represent adjustments to a ragged coast zone, to the need for trade to supply an excess of population, and to the need to utilize the products of Japanese basic industries. The almost unbelievably large fishing industry is an adjustment to a long coastline, a scarcity of land resources, a lack of suitable natural forage for meat animals, to rich fisheries offshore, and to an insular situation. In all these ways, and more, we see that the geography of the Japanese people is part and parcel of their regional framework.

The case of Holland. An unbelievable amount of time and effort has been spent in teaching us to visualize Holland as a cunning little land of tulips, windmills, wooden shoes, cheeses, balloon trousers, dikes, and black-and-white cows. From this one would almost think that Holland were a museum piece and that the Dutch were purposely trying to be funny.

Actually the Dutch are about the most serious people on earth. They have had to be. Long ago a small part of the German people settled at the mouth of the Rhine. Now, the Rhine has built an enormous mud flat in its mouth — built it from the silt and clay obtained through carving out the Rhine Valley up in Austria,

Switzerland, and Germany. This mud flat is called the Rhine Delta. Across it the Rhine breaks up into many distributaries before it reaches the sea. Around the outer edge the sea waves threw up a long low barrier beach island. At the inner edge the delta shades into the low rolling coastal plain and the old hilly uplands. Much of Holland is just at or slightly below high-tide level. Several centuries ago severe storms over the North Sea breached the barrier beach and cut it into a series of islands (the Frisian Islands). It drowned the lower parts of the delta, forming Zuider Zee. The cool misty winds from the west pour over Holland, giving it the rains, fogs, and cloudiness of the English climate. The land is low, wet, and waterlogged. Now what kind of geography have the Dutch made from these inferior scraps of environment? They have made some very good geography. Above all, it is a *sensible* geography.

Much of the land has been drained by big ditches. These have been protected by dikes and sluice gates. Large areas are too wet for grain growing, and the climate is too cool and moist to favor it anyway. Hence potatoes, root vegetables, cabbage, and other crops tend to dominate. The wet land and the cool wet climate makes grass, and grass will feed cows. Cows make milk; milk makes butter and cheese. A steady stream of butter rolls into Germany. In peace times the docks are piled high with cheeses for England, the United States, and other distant buyers.

The land is so nearly level that the water cannot run off as fast as the rain falls. It must be pumped out of the ground into the drainage ditches. Holland has no coal or petroleum, but she does have brave winds pouring in from the North Sea and the Atlantic. And so, long ago, the winds were put to work pumping water (and turning the churns in the dairies).

The Dutch have increased in numbers until there are now some 9,000,000 of them. They could not expand inland because the Germans were there. They could not expand southward, because the Flemings, Walloons, and French were there. The sea lay to the west and north; they could go in that direction. They built little boats and went out into the fogs, mists, and storms to fish. Every coastal town became a fish market. Later they built larger boats and went to trade. Finally they built fleets of ships and carved themselves an around-the-world empire — from New Am-

sterdam to New Guinea, from Curaçao to Surabaya. The Dutch cities became world trading centers. The Dutchmen who stayed at home became more and more crowded. Lacking coal, iron, copper, cement, and other materials, Holland could not become a great manufacturing nation. Her people simply had to till the land more and more intensely. Tulips and other flowers, dairies, market gardens, sugar beets, and so forth all represent intensive use of land.

A few hours away across the North Sea lies Britain. Now Britain had also gone to sea and was building an empire. The two clashed, and Britain took some of the Dutch empire away from Holland. Then the two empires made peace, and for more than a century Britain's navy has protected Holland's colonial possessions.

From her colonies a stream of cacao, coffee, tea, rice, sugar, rubber, tin, teak, quinine, copra, gums, spices, gems, petroleum, and other products has flowed back to Holland. The cacao she added to the milk from her dairies, and the sugar from her island of Java. She made chocolate, cocoa, and candies and sold them all over the world. She went into the oil business with the British and the Americans. She became the spice merchant for the world; she became the earth's diamond-cutting center. She traded with Britain on the left and with Germany on the right.

Dutch markets lie mainly in Germany. Dutch raw materials come from her empire, which is spread around the world alongside the British empire and which is protected by British guns. Dutch coasts lie open to British ships; her land frontier lies open to German armies. Holland has, therefore, long been neutral in Europe's quarrels. (See Fig. 29.) She even went so far as to renounce war forever as a way of settling disputes. During the World War of 1914-1918 Holland managed to stay neutral, blockaded by Britain and drained of food and raw materials by Germany. During the Second World War, she hoped to remain neutral once more. But in 1940 she was savagely overrun by the Germans in the course of a few weeks. The airplane had changed the geography of Europe.

Dutch seaports are less than one hour by air from Hamburg and other German cities, and only three-quarters of an hour

Fig. 29

Holland and its colonial possessions

from England. Germany reasoned that if she conquered Holland, she would have airfields from which to bomb Britain and harbors in which to prepare troop-carrying barges with which to invade Britain. The Germans invaded little Holland without warning. The Dutch fought bitterly; they cut their dikes and flooded their lands. But the Germans flew over the flooded areas and bombed the Dutch cities. They dropped thousands of parachute-borne soldiers onto the Dutch airports, and the battle was over.

The Dutch fishermen fled to England. Other Dutchmen got away in boats, in old airplanes, on rafts, or on foot to France. The Dutch merchant fleet retreated to America, to Britain, and to the Dutch East Indies, there to aid the British side in the war. Britain found it necessary to bomb the German-held Dutch ports into ruin. The Germans compelled most of the Dutch to work to produce food and supplies for the German war machine. Thousands of Dutch people were taken to Germany to work in German war factories. Anyone who objected was imprisoned or shot.

This seems to be the fate of a small nation in a world of undisciplined air power. This kind of world has become unsafe for small, industrious, peaceful nations. They cannot defend themselves. They cannot manufacture airplanes enough to fight back against big aggressive neighbors.

Other examples. The cases of Japan and Holland are but two out of a world which is full of similar examples. Norway illustrates how man has built a remarkably fine, progressive, and democratic nation out of fiords, forested highlands, water power, fisheries, and little scraps of flat land at the inner ends of fiords and bays. The nomads of Central Asia have built a whole civilization out of grass, a little water, and space. Iowa represents the flower of present-day American civilization erected on black prairie soil and humid continental climate — together with bits of water power and a poor grade of coal. Switzerland represents a world-renowned achievement in democratic nation-building from a miscellaneous collection of economically poor environmental materials. New York City, the largest urban concentration on earth, represents a set of geographical adjustments to a location, a coast zone, and to accessibility with respect to the

interior of North America and to the great-circle route of Atlantic trade.

Analytic and synthetic geography. In a world where the airplane has moved foreign nations into our front door yard, where it has caused wars and peacetime events to batter at our very door, geography becomes powerful and useful stuff. No nation can hope to live, much less to prosper, unless it can think in geographical terms. Funny, feeble, and static geography of a descriptive variety is worse than useless. It deludes our national mind into thinking things which will betray us.

Germany realized this a long time ago. She developed and subsidized geography in education and in research. During peace time she has, therefore, competed with the British who controlled the seas. She has competed with the United States in Latin America — in the very area which we like to regard as our own special sphere of influence. For war, Germany has used the strategy of geography. Her plans are based upon the situations of a geographical world, not upon military traditions from an historical world.

During the interval of peace after the Second World War, the United States will have an opportunity for world leadership which has seldom come to any nation. Whether we grasp this opportunity or flunk it ingloriously will depend upon whether our national head is full of innocuous descriptive geography or equipped with dynamic geography; whether or not we are equipped geographically to analyze and synthesize world situations, resources, and events in a practical manner.

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CHAPTER 6

THE AIRPLANE CREATES A NEW ECONOMIC GEOGRAPHY

The Geography of an Airplane

SHORTLY before the United States was catapulted into the Second World War, Mayor LaGuardia of New York City had perishable commodities for a public banquet arrive simultaneously at New York's municipal airport after being conveyed overnight from every state in the Union. This novel stunt created something of a sensation. Aside, however, from the highly perishable nature of some of the products brought to the mayor's celebration by the airplane, no basic problem was involved which had not already been solved by land and water transportation. An ordinary suit of clothes represents the products from a score of countries. The ordinary breakfast is assembled from amazingly far-flung sources, while a telephone, an automobile, or an airplane is a veritable geographical museum.

Materials assembled. The airplane is indeed a global product. Into it go dozens of different materials. A list of two dozen articles, mentioned more or less at random, which commonly go into a plane's construction is as follows:

Material	*Possible Source*
1. Aluminum	Guiana
2. Antimony	China
3. Asbestos	Canada
4. Chromium	New Caledonia
5. Copper	Rhodesia
6. Cryolite	Greenland
7. Gutta percha	Borneo
8. Hemp	Philippines
9. Iron	Sweden
10. Kapok	Java
11. Lacquer	China

12. Lead and zinc	Australia
13. Leather	Algeria
14. Linen	Ulster
15. Linseed oil	Argentina
16. Manganese	Brazil
17. Mercury	Spain
18. Mica	India
19. Platinum	Russia
20. Rubber	Ceylon
21. Spruce wood	Alaska
22. Tin	Malaya
23. Tungsten	Burma
24. Wool	New Zealand

To this preliminary list we might add cotton, petroleum, and plastics – from the United States. The worker who builds the airplane probably breakfasted on toast made from Dakota wheat, milled at Minneapolis. He buttered it with Wisconsin butter flavored with Kansas salt and spread it with Oregon jam. He drank California or Florida orange juice or Arizona tomato juice. He had a baked apple from Washington or New York or a piece of Texas melon, and perhaps a dish of Iowa oatmeal, or an Ohio egg and a bit of Illinois bacon. Then he washed it down with a cup of Brazilian coffee, Assam tea, or Gold Coast cocoa sweetened with Cuban cane and stirred with Peruvian copper, plated with Mexican silver; the cup made in Japan from Chinese clays baked with Manchurian coal in a kiln made from Yap Island bauxite. The other meals of this factory worker were probably even more far-reaching than his breakfast, while his tools, his clothing, his house, and his personal effects were collected from the far corners of the earth.

Men concentrated. Not only does the airplane industry require concentration of many materials from widely different sources, but it also requires the concentration of many people. Under the urgent demands of war, airplane manufacturing mushroomed astonishingly. By February, 1942, no less than 83 companies were engaged in plane manufacture, nine in glider manufacture, and two in lighter-than-air craft manufacture. To obtain labor for their new and enlarged plants, the automobile industry was robbed of its skilled and semiskilled workers to a considerable degree, but additional thousands were needed. They were recruited from farms, schools, the railroads, and other industries; even housewives were enrolled. To train this new labor supply

quickly was one of the greatest tasks which a nation ever faced. To build the factories and house the great concentrations of new labor was an even more stupendous task. Some of the social problems resulting from these concentrations of labor were almost insurmountable. Automobile manufacturing had grown over a period of several decades; plane manufacturing grew up almost overnight.

New industrial districts. The automobile industry developed within the general Northeastern Industrial Region, in part as an

Fig. 30

The plane-manufacturing industry in the United States

inheritance from the carriage, wagon, and agricultural-implement industries. It centered in the Detroit area, with minor clusterings about Cleveland, Chicago, southern New England, and New York.

The plane-manufacturing industry, however, shows no general tendency to cling to the older areas of automobile manufacturing. In part this has been the result of wartime need for decentralization and the need to squeeze dry the high-grade labor reservoirs in all parts of the country, but in larger measure it probably is a result of the stirrings of all those factors tending to produce a new economic geography in the world today.

Plane manufacture is now located in twenty states, with plants

projected for several others. The industry shows a marked preference for four areas, southern California, the vicinity of Seattle, Pennsylvania, and Kansas. (See Fig. 30.) In southern California it centers in and around the two metropolitan districts, Los Angeles and San Diego. In Pennsylvania there seems to be no tendency to concentrate unless we regard the Delaware, southern New Jersey, eastern Pennsylvania, and some of the Maryland plants as a rather loose clustering about the Philadelphia metropolitan area. In Kansas there is a marked concentration in Wichita. Elsewhere lesser concentrations are forming about Detroit, Kansas City, Chicago, and Greater New York (especially on Long Island). Centers worthy of note are Baltimore, Bristol (Virginia), and a few others.

Glider manufacture is carried on in Elmira, St. Louis, Detroit, Wichita, and in southern California cities. Akron (Ohio) and Aurora (Illinois) are the seats of balloon, dirigible, and parachute manufacture.

Some Critical Raw Materials

The list of raw materials which enter into the fabrication of an airplane merely typifies the complexity of most products in the modern economic world. This complexity is not only an industrial complexity, it is even more a geographical complexity. The roots of many of our commonest manufactured articles literally reach around the world.

Aluminum. During the Second World War the first industrial commodity in which we felt a wartime scarcity was aluminum. When it became apparent that air power was of necessity the basis of our national rearmament program, immense amounts of aluminum were immediately required for plane construction. Domestic production of bauxite, the most commonly used ore of aluminum, accounts for only about 25 per cent of our normal peacetime needs. About 90 per cent of this domestic bauxite is mined in central Arkansas, while 10 per cent is mined in Georgia and Alabama. The remaining 75 per cent of our requirements was met by imports. Of these, in 1938, Dutch Guiana supplied 85 per cent, British Guiana supplied 13 per cent, and Greece supplied 2 per cent. America was immediately faced with an aluminum shortage. A huge nation-wide drive to collect aluminum junk and scrap was carried out in August and Septem-

ber of 1941. Domestic production of bauxite was greatly increased, and Americans became concerned over their foreign supplies from the Guianas. Moreover, Americans were compelled to think politically about the bauxite deposits in France, Italy, Yugoslavia, Hungary, Rumania, Russia, the Dutch East Indies, and Japanese-owned Yap Island.

In the final stages of aluminum reduction, a substance known as cryolite must be added to the alumina. Most of the world's supply of this mineral comes from Greenland. Since Greenland was owned by Denmark, and the Nazis had just conquered Denmark, Americans were compelled to think — and act — politically with regard to Greenland, the source of cryolite.

Rubber. Rubber is made from juice obtained from certain trees. These trees grow wild in the forests of the world's rainy tropical regions. The best yielder of rubber is native to Brazil. For many years most of the world's rubber was obtained from the wild trees of Brazil. Now hardly any of it is obtained that way. Several decades ago seeds of the Brazilian rubber tree were taken to England and planted in a greenhouse. Seedlings were carried to Ceylon which, like much of Brazil, has an Amazonian climate. From Ceylon seedlings were taken to Malaya, to the Dutch and British East Indies, to India, Burma, Indo-China, Siam (Thailand), to Liberia, and elsewhere. Now most of the world's rubber comes from domesticated rubber trees, planted in neat rows on huge plantations. (See Fig. 31.) In 1940 the export of crude rubber to the markets of the world looked like this:

Country	*Tons*
Malaya	540,417
Dutch East Indies	536,740
Ceylon	88,894
Indo China	64,437
British East Indies	52,789
Siam	43,940
Amazon Basin	17,601
India	11,510
Burma	9,668
Liberia	7,223
Congo Basin	7,200
Mexico (from Guayule)	4,106
Nigeria	2,903
Philippines	2,267
Total	1,389,695
1939 synthetic rubber	77,370

Of this, the United States took about three-fourths, amounting in value to nearly $180,000,000. This was a large proportion of the world's output and it was 8 per cent of our total import trade, but we never gave it much thought; the battle of Thermopylae, the campaigns of Caesar, the poems of Longfellow, and the Law of Diminishing Returns were considered educationally more important.

When Japan struck at the Indies, it removed our rubber supply

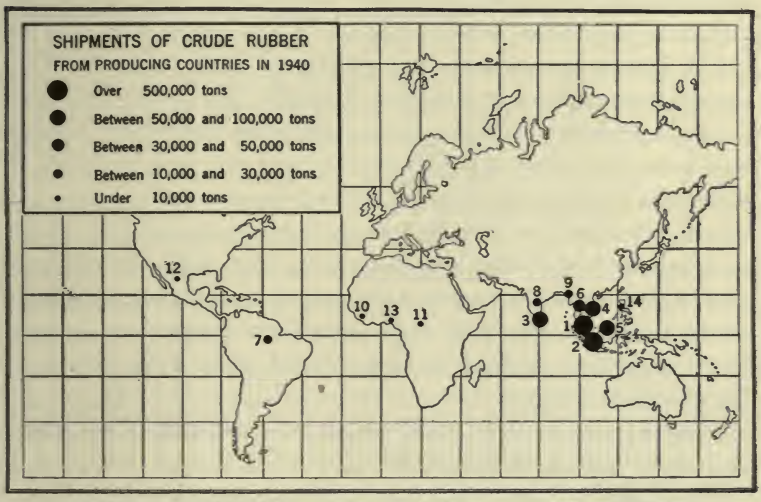

Fig. 31

Rubber-export map of the world

almost at one stroke. In less than six months our enemies were in control of 90 per cent of the rubber production of the world, and their submarines rendered much of the remaining supply unavailable or precariously accessible. Within a few weeks all rubber stocks were "frozen" and rationed to manufacturers. New tires were severely rationed to consumers. Even retreaded and recapped tires were rationed. The owners of America's 39,000,000 automobiles were in distress. Makers of military cars, armored vehicles, tanks, airplanes, and other articles requiring rubber could see a shortage looming some twelve months ahead. The

outlook for the manufacturers of surgical and dental supplies, fountain pens, electrical equipment, rubberized and elastic clothing, boots and overshoes was gloomy indeed.

Plans for encouraging the redevelopment of the wild-rubber sources in Latin America were quickly made. But by the most lavish encouragement it was found that no more than 10,000 to 15,000 tons could be produced in 1942, 25,000 tons in 1943, and using all-out methods, not more than 100,000 tons in 1944. Processes for making artificial rubber from corn, from petroleum, and from vegetables were examined. It was found that international patent agreements had prevented such processes from having been utilized in America. It would take money and time to get them into operation. Some Americans regretfully remembered the thousands of C.C.C. boys setting out pine seedlings in Colorado, Idaho, and elsewhere during the depression years, and wondered why some of them had not been used to set out rubber seedlings in Brazil. It would, of course, have been entirely possible had we been a nation accustomed to thinking geographically, and as it takes only eight years for a rubber tree to yield latex, seedlings planted in 1934 would have been relatively mature trees in 1942.

Hardly had America found herself at war before *Time* magazine made the following remark:

> The U.S. male, his pants and socks dragging, his sports ruined, his wife bulging in the wrong places, his balloonless children, teething on wood, his car tire-less in the garage, riding off to work on a hard-benched bus or subway, unable to erase mistakes or snap a band around them, could now really get down to hating Japan and the Axis.

Perhaps the vital importance of rubber in a warring world is best indicated by the following bit of doggerel:

> For want of geographical knowledge, our rubber supply was lost.
> For want of this rubber, a tire was lost.
> For want of a tire, a car was lost.
> For want of a car, work was lost.
> For want of work, a bomber was lost.
> For want of a bomber, a battle (and maybe the war) was lost.

Clear, geographical thinking is called for to prevent the losing of the war.

Gasoline. Gasoline is one of the many products made from petroleum. Its chief use is to furnish power for automobiles, trucks, tanks, and motorcycles.

Petroleum fields occur in all of the regions of the United States except the Atlantic Seaboard and the Pacific Northwest. From these fields it is distributed by railway tank cars and by pipelines to refining centers and thence to consumers. The Pacific Northwest, however, was to a large extent supplied from the Southern California fields by tank ships. The Atlantic Coast area was likewise supplied by tankers from the Gulf Coast region, from Mexico, and from South America. The enemy began submarine warfare upon American and Allied tanker fleets immediately. This was so successful that within four months after America's entry into the war a serious gasoline shortage loomed in two portions of the United States. Harold Ickes, Secretary of the Interior, had, months before, asked for a pipeline to be constructed from the central oil fields to the East. Americans, unaccustomed to thinking geographically, refused his request, even ridiculed his ideas. The war was a long way off; America had plenty of oil; nothing need be feared. By May, 1942, the East and the Pacific Northwest were on a severe gasoline-rationing program. Moreover the world petroleum situation was not promising. Germany had seized the Polish and Rumanian fields and was driving toward the Iraqi, Persian, and Russian Caucasus fields. Japan had seized the East Indian and Burman fields, thereby severing Britain and China from important supplies. South American and Near Eastern supplies were being cut into by submarine attacks. China could be supplied with truck and aviation fuel only by air transport. Protection against attacking submarines was furnished mainly by air patrols.

Tin. Tin is a beautiful and comparatively rare metal. Few people realize its scarcity because ease of mining and processing make it rather cheap in price. It is utilized in the manufacture of solder, bronze, type metal, babbit bearings, tin foil, tin plate (food containers), and terneplate (non-food containers, roofing, etc.). About two-thirds of all the tin produced annually (150,000 to 200,000 tons) is used by the United States, and half or more of that is used for plating of metal for various kinds of containers.

The United States imports its tin; unfortunately we produce almost none at all. The aerial conquest of Thailand, Malaya, and

the Dutch East Indies put Japan in possession of more than half of the world's tin. Bolivia, Nigeria, China, and a few other tin-producing districts lay outside the area of Japanese conquest. Within five months after Japan's entry into the world conflict a tin famine had descended upon the United States. Tin foil had disappeared from cigarettes and candies; canned foods were beginning to become scarce; and the American people were being urged to salvage all "tin" cans. No one could buy a tube of tooth-paste or shaving cream unless he traded in an empty tube. American industry began increasing the production of dried, dehydrated, and quick-frozen fruits and vegetables. American businessmen began to stimulate the production of tin in Bolivia and to search for tin sources in Alaska and elsewhere.

Sugar. The sugar consumption of the United States is one of the measures of the high standard of living of the American people. It is also one of the achievements of our modern economic system. The average American per-capita consumption of refined sugar in 1870 was only 37 pounds; by 1941 it was approximately 112 pounds. As Harold McCarty so graphically put it, "The average American consumes a one-hundred pound bag of sugar each year. In this bag are more than thirty pounds derived from abroad (chiefly Cuba), forty pounds from American possessions, and twenty-five pounds from beets grown in the continental United States. The remaining four or five pounds are grown on the low marshy soils of southern Louisiana, in a section known popularly as the Sugar Bowl." [1]

The sugar trade of the United States results from a rather delicate balance between men, markets, and nature. A comparatively small amount of land in the United States is climatically suitable for sugar-cane growing. Much more beet sugar could be produced, but only under a higher price per pound for sugar, which would of course tend to lower the per-capita consumption. The Philippines normally supply about 15 per cent of American sugar demands. Methods used there are rather crude and primitive, and increased production in the near future is not expected. Puerto Rico and the Virgin Islands are already developed practically to their full capacity, supplying us with about 12 per cent

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[1] McCarty, H. H., *The Geographic Basis of American Economic Life*, Harpers, New York, 1940.

of our sugar. Hawaii exports all of its crop to continental United States. This amounts to about 14 per cent of our annual consumption. The Hawaiian industry represents the greatest intensification of culture in the world, and can be expanded but little more. Cuba, where a large amount of American capital is invested and where conditions for cane growing are excellent, leads the world in sugar production. The American tariff is set low enough so that Cuban cane growing is not ruined, and yet high enough so that American domestic beet growing is not ruined. Under this arrangement one-third to one-half of Cuban sugar comes to the United States. Normally small amounts of sugar also come to this country from Central America, Dominican Republic, Brazil, Java, and a few other lands.

The Japanese quickly conquered the Philippines and Java, the latter being the second largest exporter of sugar in the world. Transportation from Hawaii to the mainland of North America was rendered hazardous and many sugar-carrying ships from Latin America and the West Indies to Britain and the United States were sunk by submarines. Simultaneously, much of the shipping necessary to transport sugar imports was required elsewhere to carry war supplies. To make matters worse, war itself brought a tremendous demand for sugar in alcohol and powder making. The total result of these factors was to create a shortage in the United States. Consequently nation-wide sugar rationing was put into effect less than five months after America entered the war.

Silk. Silk is a fibre made by a worm eating mulberry leaves, which grow best in a tropical or subtropical climate. It is the best and most beautiful fibre on earth, but it can be prepared at a profit only by workers paid an exceedingly low wage. Consequently more than one-half of the world's silk is produced in Japan, one-third in China, one-tenth in France, and one-tenth in India and the Mediterranean countries.

Japan exports more than two-thirds of its silk output each year. Ninety per cent of this normally goes to the United States. Considerable amounts of Chinese silk also are purchased in the United States. All told we probably consume one-half of the world's raw silk (about 55,000,000 pounds). In 1939 silk imports amounted to $121,000,000 or more than five per cent of our

national imports. With America's involvement in the war, silk imports ceased.

Normally silk is used for dresses, hosiery, pajamas, house furnishings, underwear, millinery, neckties, parachutes, silk powder bags, flags, and various industrial uses. In most of these lines a silk shortage soon developed. Silk mills were forced to close. Stores reported hysterical "runs" on their stocks of silk hosiery. The rayon industry was greatly stimulated. Experimenting was undertaken with nylon and other synthetic textiles in the making of parachutes, powder bags, and other essential war materials.

Tea. Tea is the dried leaf of a bush which is native to the hill lands of the moist tropics and subtropics. It is somewhat like silk in that it requires abundant, dextrous, cheap labor.

The production of tea is practically limited to the Orient, the East Indies, and southern Asia. During a recent year the world export of tea was as follows:

Country	*Pounds*
India (mostly Assam and Bengal)	351,000,000
Ceylon	217,000,000
Dutch East Indies	120,000,000
China	110,000,000
Japan	47,000,000

In 1941 the Japanese exports ceased. China was unable to get her tea to outside markets. The Javanese and other East Indian tea groves fell to the Japanese invaders. Ceylonese and Indian exports were seriously curtailed because of lack of shipping space. Gradually a tea shortage developed in the United States — the second largest importer of tea in the world.

Other agricultural products. Although the United States is the world's greatest consumer of coffee, bananas, cacao, copra, hemp, jute, and opium, she produces none of these commodities. Coffee is the product of fairly dry tropical highlands, and the United States has no tropical highlands. Copra comes from the wet trade-wind shores, and she has no such areas (save perhaps small coastal strips in southern Florida and Puerto Rico). Cacao and bananas are the product of the rainy tropical regions, and she has no rainy tropical land. India produces almost all of the world's jute, and the Philippine Islands practically all of the world's hemp. The Philippines were conquered. India was hard pressed for shipping facilities. America could get no hemp or

jute. The Indies, the Philippines, and much of Oceania were conquered; America could get no copra. Submarines lurked in Atlantic and Middle American waters; America's supply of cacao, coffee, and bananas was curtailed. Opium, from which morphine and other pain-relieving drugs are derived, was practically unobtainable from China and southeastern Asia.

Forest products. The United States is the leading consumer of cork, but she produces none of it. The entire world supply derives from France, Spain, Portugal, and North Africa. The war shut America off from most of this supply and thereby produced serious shortages and inconveniences. America was also cut off from her supplies of teak, Philippine mahogany, gutta percha, and many other forest products.

One of the most serious results of Japan's conquest of the Indies was the loss to America of her source of cinchona bark from which quinine is extracted. The cinchona tree was originally native to the Andean countries of South America. From there it had been transplanted to the East Indies, and Java had developed a world monopoly in the production of quinine. Japan defeated the American Navy off Java through her air power and conquered Java by her air force. American troops held out on Bataan Peninsula in the Philippines, but malaria broke out among them. Supplies of quinine might have been flown in to them except for this same Japanese air force. The lack of quinine to check this outbreak of malaria contributed to the American surrender of Bataan.

Other minerals. There is a fairly long list of critical and strategic minerals necessary for American industry, but which we either do not possess at all or possess in insufficient amounts. Some of these are chromium, manganese, mercury, antimony, graphite, magnesium, asbestos, nickel, mica, platinum, quartz, tungsten, and vanadium.

China as a source of antimony and tungsten was quickly rendered inaccessible. The Philippines as a source of chromium were lost. New Caledonia as a source of nickel and chromium was almost inaccessible. Russia as a source of manganese, chromium, graphite, and platinum was practically cut off. Burma as a source of tungsten and nickel was lost. Transportation from India, a source of mica and manganese, was seriously jeopardized. Italy and Spain as sources of mercury were lost. These circumstances

soon created serious lacks. Latin-American, Canadian, and African sources were stimulated and enlarged where possible; Alaska was reëxamined. Domestic low-grade ores were exploited. Scrap metals were salvaged and reused where possible. In other cases America hunted substitutes or simply went without.

The wealth of the Indies. Southeastern Asia and the East Indies are possessions of Britain, France, and Holland. Americans thought they had no stake there. The plain facts of economic geography tell us that America's stake there was enormous. Our failure to know this area, to provide ahead of time for its defense

Fig. 32

The East Indies superimposed upon the United States

or to help maintain some form of world machinery to make attack upon it impossible, or to build air power with which to fight any nation which might seek to conquer it, led to a serious situation.

Within a few months after she began her attack, Japan controlled an enormous conquered area. (See Fig. 32.) She had cut America off from 50 per cent of her chromium supply, 45 per cent of her tungsten supply, 80 per cent of her rubber supply, all of her kapok, teak, silk, and quinine supplies, more than half of her copra and coconut-shell char supplies, and two-thirds of her tin supplies. Moreover, she had seriously disturbed America's trade with India, Ceylon, Australia, and the South Sea Islands.

More significant than this, Japan had come into possession of vast sources of rubber, cotton, tin, rice, iron, coal, petroleum, timber, fish, sugar, and vegetable oils. These resources when monopolized and developed would make her practically invulnerable, perhaps the strongest nation on earth. We had thought that this great realm was secure because of British and American sea power, but Japan conquered it with air power.

National planning necessary. The Second World War drove America into a remarkable program of conservation — for some resources. This program should not be abandoned. We have long been the greatest wasters on earth. War itself is a stupendous waste, but it will serve at least one good end if it teaches us the lesson of resource conservation.

But even more important than conservation is our need for a program of national planning. When war came upon us we had no plan for getting along without things, or for salvaging waste materials, or for developing low-grade sources of needed substances. We had no plan for using substitutes, we had no national stock piles of vital commodities. In some instances we found that we had no inventories or surveys of important resources. The new economic geography demands that we make national planning a serious part of our governmental structure.

The Airplane Removes Barriers

The Appalachians. Dr. Ben D. Wood once described his first plane trip over the Appalachians; said he:

> My plane left the Washington Airport about noon on a hot July day, and I rose quickly above the level Coastal Plain. I winged my way over the rolling Piedmont Belt whose nicely peneplained surface is being marred by a gang of irresponsible little streams. Here and there, I saw an ancient monadnock rising smugly above its skyline, as though to say, "I alone have outwitted time."
>
> I crossed the stark Blue Ridge, flew above the beautiful Shenandoah Valley, and beheld the tortuous loops of the river, Daughter of the Stars, meandering through fertile fields far below (Fig. 33).
>
> Next I flew straight across the long parallel wrinkles of the folded Appalachians, with their triumphant water gaps, and defeated wind gaps, with their nicely fit two- and three-cycle topography. I saw the decapitated anticlines and the canoelike synclines. I marveled at mountains which had become valleys and valleys which had become mountains as though to prove that nature could upon occasion be as silly as man. I saw mountains opened up to

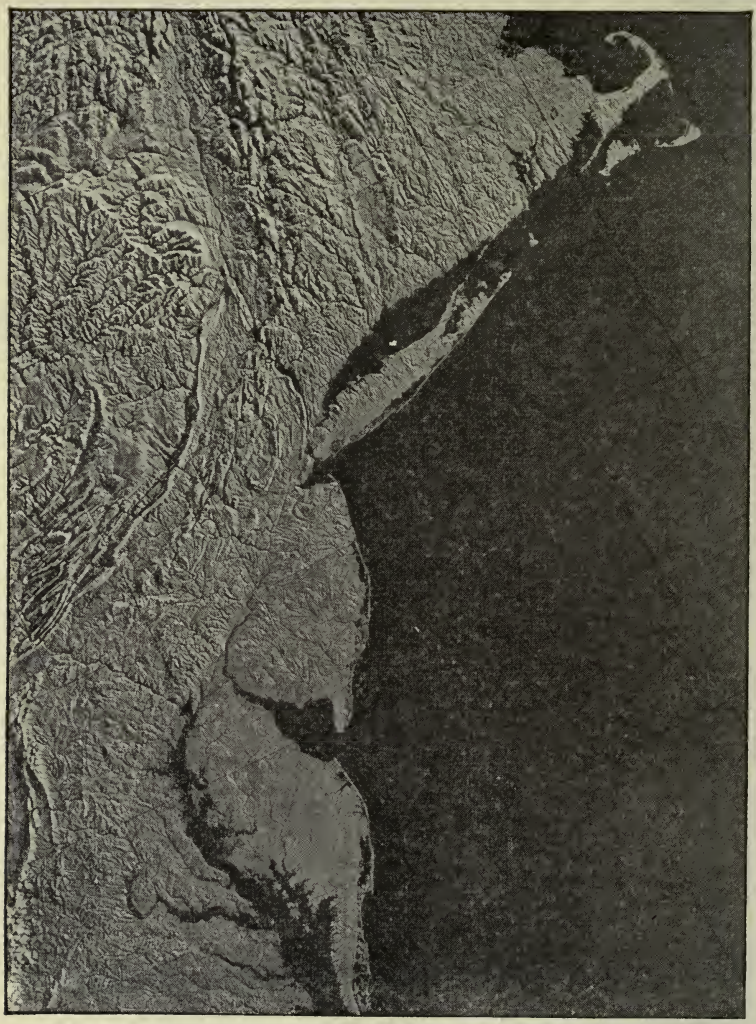


Photo by Dmitri Kessel
Courtesy of "Life"

Fig. 33

Relief model of Chesapeake Bay and a portion of Appalachia

human gaze, for all the world like the pictures in the old physiology book where the insides of man had been laid bare to the vulgar schoolboy's gaze.

My plane rose to clear the bold Allegheny Front, and I found myself above the Allegheny Plateau. My eye traced out a branching stream pattern, the boisterous rivers of which have cut profound V-shaped gorges and valleys, leaving flat-topped hills between. A hundred miles west of Pittsburgh the chopped-up plateau fell away in a ragged west-facing escarpment.

We were over the gently rolling Prairie Plains of the American Midlands, which stretch unbrokenly westward for another thousand miles. I did not follow them westward to the heart of the American Empire, for I was upon more prosaic business. I saw far below a great city sprawled on mud flats and sand. Chicago, her back to the prairies, her feet in the blue crescent of Lake Michigan, her head in the smoke, and her roots in America. Steel at one end, Gold Coast at the other, stockyards in her belly; product of one of the world's most superb geographical locations.

I was engrossed and fascinated by the face of my Mother Earth. Her every groove and wrinkle was a dialectic of nature's science, inviting me to see and read, daring me to understand. I had at my command only a little knowledge of geomorphology, only a smattering of geography, and so I understood what I saw but imperfectly. I saw and understood enough, however, to interest me thoroughly. I was surprised and chagrined to notice that my fellow travelers in the plane saw nothing to excite them. They took an apathetic look or two, and then returned io the serious business of thumbing through *Life, Look,* or *Pic,* or reading the *Washington Post.*

Crossing Appalachia took but two hours or so of effortless, luxurious traveling in the air. As I looked at the terrain below, I could not help but think of the toiling American pioneers who had made this Air Age possible. It took them 150 years of persistent sweating, plodding, freezing, fighting, dying, and giving birth, to get through this great Appalachian barrier. A large fraction of our national history lies written on Appalachia's rugged bosom. It remains recorded in our human geography whose cultural landscape today overlies nature's older physical landscape.

The Appalachians are a great physical barrier, just as all rugged, high, barren, or inclement areas have always been — to the man on the ground. It took the writer's family seven generations to migrate from the Atlantic Seaboard through the Appalachian Hill Country and to reach Kentucky. But once trans-Appalachian Kentucky had been reached, the rest came more easily. The eighth

generation reached Illinois, the ninth reached Missouri. The tenth was born in Kansas, the eleventh on the Pacific Coast. Eleven generations to span the continent; but the first seven to struggle through the Appalachian Barrier. This was the great American epic. Now the barrier may be crossed in an hour or two, the whole distance spanned in less than one day. (See Fig. 34.)

Other mountain barriers. Air travel has already leveled off most of the mountain barriers of the world. German and Russian planes regularly reach Kabul, capital of mountainous Afghanistan. American and German airlines cross the Andes on regular runs between Argentina and Chile. Transcontinental airlines in the United States cross the Rockies, the Wasatch Range, the Sierra Nevada, Cascade, and Coast Ranges. Other North-American airways cross the high Canadian Rockies and the almost impassable Alaska Range. French lines cross the Pyrenees, and before the war French, British, Dutch, German, and Italian lines crossed the Alps.

Deserts and enclosed seas. The Sahara, long one of the most impassable barriers on earth, is now in times of peace crossed by no less than four international airways. Russian airways span the deserts of Turkestan and go part way into the Gobi Desert. British and French lines span the Arabian Desert. Americans, Australians, and South Africans have conquered their desert areas by regularly scheduled air routes.

In similar manner the American Great Lakes, the Caribbean Sea, the North, Baltic, Mediterranean, Adriatic, Aegean, and Black Seas are disregarded by modern air routes. The Madagascar and English Channels, the Korean Strait, the Gulfs of Arabia and Siam, the East China and South China Seas, the Bay of Bengal, and the inter-island waters of Indonesia are in times of peace flown over as though they were so much land.

Development of isolated regions. Air transport is relatively independent of the surface conditions of the earth, in a way that land or river transport is not. As a consequence it is, in many instances, the most feasible and the cheapest form of conveyance for many remote regions. One of the most interesting examples of this is afforded by the Republic of Colombia. This country fronts upon two oceans, sits astride the Andes, and extends far eastward into the forested Orinoco and Amazon lowlands. Bogotá, the capital city, stands upon a not inconsiderable plateau

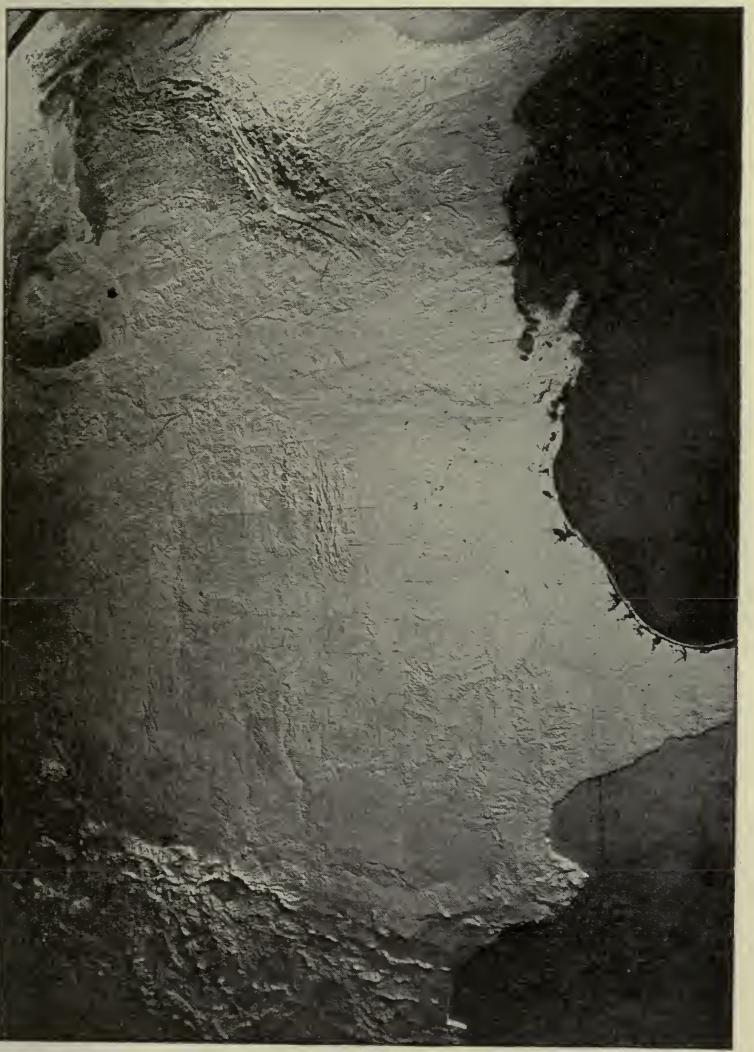


Photo by Dmitri Kessel
Courtesy of "Life"

Fig. 34

Relief model of the United States

which is the center of economic, social, and political life in the nation. Bogotá, however, is relatively isolated both from the outside and from the other smaller cultural centers at Cali, Popayan, Medellin, and elsewhere within the nation. It is reachable (except by air) only after a trip of many days over short bits of railroad and a long uncomfortable passage by river boat. In all, an ascent of several thousand feet is made. The highlands produce wheat and mill it into flour, but Minneapolis flour exported from New York is cheaper in coastal Colombia than is native flour from the country's own highlands. This is but one example of the cost and difficulty of surface transportation in Colombia.

As a consequence, one of the first air-transport companies in the world was organized there. In 1919-1920 a group of Germans who had been military fliers during the First World War organized a company known as SCADTA (Sociedad Colombo-Alleman de Transportes Aeros). They built up a web of airways connecting most of the urban centers of Colombia, with outlets to the coast and branches extending to the neighboring nations Ecuador and Venezuela. This company was instrumental in building up the economic life of Colombia to a considerable degree. Not only did its planes carry passengers and mail, but they experimented with the haulage of all kinds of freight. Metals, choice coffees, gems, Panama hats, and bulky goods of many kinds were carried out. Dismantled pianos, automobiles, and industrial machinery were brought in and assembled.

In 1931 Pan American Airways bought a controlling interest in the line. In 1940 it was taken over by the Colombian Government in the interest of national defense, and German officials and employees were dismissed.

New Guinea, just north of Australia, is by and large the most primitive area on earth. It is the second largest island in the world, ridged by tremendous mountain ranges, trenched by the Sepic, Ramu, Fly, and other great rivers; two-thirds of it is buried in deep equatorial rain forest. Large areas of the interior long remained unexplored, its stone-age inhabitants still unknown and uncounted. Roads and railways were nonexistent.

In 1926 rich placer deposits of gold were discovered near Wau in the highlands of the eastern interior. A gold rush soon developed to the coastal town of Salamaua, but transportation problems defeated man's efforts to develop the region's resources on

any large scale. Great dredges were needed. An Australian, C. J. Levien, organized an air-transport service known as Guinea Airways, Ltd. Dredges and other mining machinery were flown in piecemeal and assembled where needed. Food, clothing, building materials, automobiles, farm implements, horses, cows, chickens — everything in fact to create and maintain a modern community — were and continue to be flown in by plane.

Wau is high enough to be a cool, healthful, and invigorating place. Agriculture has been started. Numerous mining companies with more than fifteen thousand employees have located there. Communications with the outside are good. Guinea Airways has grown into one of the greatest private air-freight organizations in the world. After the gold has been exhausted, interior New Guinea will be a place suitable for white colonization in the tropics — by air-minded people.

Air transportation will be increasingly important in the economic development of all localities in the tropical and polar lands where transportation by highway and railroad is poor or absent. Thus Mexico, Guatemala, Honduras, much of Brazil, Bolivia, Ethiopia, and East Africa may be expected to repeat the story of Colombia and New Guinea. Already Alaska, northern Canada, and the U.S.S.R. are writing a different version of the same story in the higher latitudes.

In Alaska, as Lissitzyn points out, "a trip by dogsled from Fairbanks to Nome takes 30 days and costs $500, while by air this distance may be spanned in four hours; the passenger fare is $78. Carriage of freight by air is common in Alaska." Pan American Airways maintains nearly 1,800 miles of air route in Alaska. Numerous other companies operate in the territory also, with a fleet numbering between 150 and 200 planes. Statistics of Alaskan air traffic in 1939 were as follows: [2]

Passengers carried	29,699
Pounds of mail carried	544,847
Total miles flown	3,232,931
Pounds of freight carried	4,174,551
Passenger-miles flown	5,260,524

The remoteness of arctic and subarctic Siberia has long hampered the development of that part of the U.S.S.R. Russian and

2 *Civil Aeronautics Journal*, Vol. I, No. 78, March 15, 1940.

Cossack colonization of that area has been spotty, being centered about placer workings, mines, fur posts, and occasional trading centers. Separating these "islands" of Russian life are vast stretches of wilderness thinly populated by an assortment of more or less primitive peoples. Siberian rivers are unnavigable for much of the year and hence are of little use. Road and railway service to most of these islands of Russian settlement and development would be far too costly to be seriously contemplated under present conditions. Accordingly the Russian national planning board worked out a program of air service for them during the early 1930's, a program which for ambitiousness surpassed any other transportation scheme on earth. Presumably much of it is now in more or less regular operation.

In northern Canada much the same conditions obtain. Of late years supplies have been moving northward to the widely scattered fur posts, and furs have been moving southward. Far more important, however, is the airplane's service to mining communities. "The freight carried by aircraft consisted largely of machinery, supplies, etc., for mines in the northern part of Quebec, Ontario, and the western provinces and the Northwest Territories. Many of these mines are accessible only by canoe in summer and dog team in the winter, or by aircraft, and aircraft transportation will probably be the cheapest and most effective method of transportation during the life of a large number of these." [3]

A New Concept of Distance

Geometrically, distance is a fixed quantity; it is invariable. Geographically, however, it is extremely variable. Distance is to be measured geographically in terms of *time* and *cost*, and only in these terms.

Time-distance. The economic history of America has recorded the increasing mastery of man over time. Travel in colonial days was by canoe, horseback, or on foot. Under such conditions of travel Plymouth was closer to England, via sailing vessel, than it was to Jamestown. The stagecoach and later the river barge and canal boat moved the American states into a much closer community. In point of time the railroad and the automobile tied New York closer to California than the stagecoach had tied New

[3] *Canada Year Book*, 1938, p. 719.

York to Maine a few decades earlier. The plane and the radio have brought the United States closer to the Philippines than New York was to Boston in the days of the stagecoach.

The American Constitution provided for presidential elections to be held on the first Tuesday after the initial Monday in November. Furthermore, it provided for the new President-elect to take office on March 4th. This interval of four months allowed one month for the election returns to come in, one month for a messenger to reach and notify the successful candidate, one month for that candidate to prepare his affairs, and one month to make the trip to the national capital. In 1940 the interval of lag was legislatively shortened to two months in recognition of changes wrought by modern transportation.

The radio and the plane, however, make even this interval increasingly unnecessary. Election returns are reported instantly over the radio. By the following day the votes can be officially counted, and the candidate, who has been sitting by his radio listening to the incoming returns, can be officially notified. He can then fly to the capital within one to ten hours. In the Air Age inaugural day could easily be held on the first Thursday after the first Monday in November.

Cost-distance. In economic geography, distance is almost always a matter of transportation cost rather than miles. Iron ore from Minnesota moves over the far-from-straight course of the Great Lakes to Gary or Lorain instead of by more direct rail route. So important is the cheapness of water haulage that more tonnage goes through the Soo Canal between Lakes Superior and Huron than through Panama and Suez combined. Before the war oil from Rumania bound for Germany moved through the Dardanelles, across the Mediterranean, northward along the Atlantic Coast, and through the English Channel and North Sea to Hamburg rather than being hauled directly up the Danube Valley to Germany, for precisely the same reason.

Sometimes a commodity, in order to reach market, must travel over both land and water. In such instances some interesting comparisons in rates are revealed. Eugene Staley points out that, using 1939 rates, "the *wheat-distance* between Kansas City and New York, expressed as the cost of shipping 100 pounds of wheat in carload lots, was 33½ cents to 42½ cents, while it was only 13 cents from New York to Liverpool. In mileage, Liverpool was

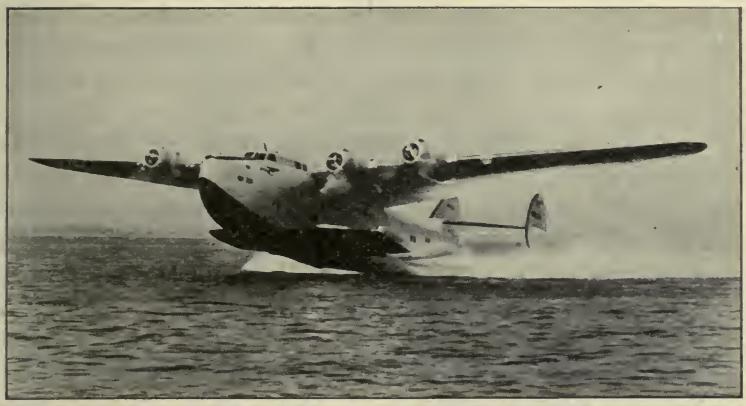
three times as far as Kansas City, but Kansas City was nearly three times farther than Liverpool when it came to economic relations in wheat." [4] In analyzing the cost of shipping crude rubber from Singapore to Akron via New York, Staley says: "The overseas route from Singapore to New York is more than twenty-five times longer, in miles, than the rail route from New York to Akron, Ohio. Yet the distance measured in freight cost for transporting a 240-pound bale or case of crude rubber was $1.50 from Singapore and $1.03 to Akron. In other words, Akron was two-thirds as far away from New York as Singapore, in *crude-rubber* distance." Therefore, concludes Mr. Staley: "Given the same separation in miles, there is less economic distance across water than across land." [5]

The airplane enters the picture. So far, the plane, save in special instances, has been relatively unimportant as a carrier of freight. Lower carrying capacity and higher operating expenses actually increase rather than diminish the cost distance between two points. This tends to decrease as the load limit increases and as the length of haul is increased. Up to now, therefore, planes have tended to haul freight under conditions where they have a *time-distance* advantage rather than a *cost-distance* one. This same factor seems to operate in the hauling of passengers also. In 1940 Pan American-Grace Airways (see Fig. 35) report the following types of passengers carried: [5]

Classes	*Per cent of Total*
Businessmen	46
Tourists	27
Engineers	10
Diplomats	4
Educators	2
Physicians	2
Lawyers	1
Others	8
Total	100

Pan American-Grace Airways also reports the following types of freight carried out of Peru, Chile, and Bolivia in 1940: [6]

[4] STALEY, E., "The Myth of the Continents," *Foreign Affairs,* April, 1941, p. 6.
[5] *Op cit.,* pp. 6-7.
[6] *Op cit.*



United Air Lines Photo

Fig. 35

A transoceanic seaplane—Pan American Airways Clipper

Classes	*Per cent of Total*
Gold, platinum, currency, etc.	22
Medicines and drugs	16
Films	10
Cut flowers	8
Commercial samples	8
Newspapers	7
Printed matter	6
Documents and legal papers	4
Spare machine parts	4
Clothing and personal effects	3
Other	12
Total	100

Railroad freight rates in America average about a cent per ton per mile; water rates are even lower. Rates for air freight average between 50 to 100 cents per ton per mile. If, however, larger planes built without luxurious trimmings and especially designed for freight were employed, much of the difference in cost between land and air transport would disappear. Indeed some engineers today state flatly that properly built cargo planes can carry freight more cheaply than railroads can carry it. For more valuable goods and passengers there is no longer any question that planes will carry them. Grover Loening feels that they can even displace railways except for the carriage of bulkier, lower-valued types of commodities. Said he, "A cargo plane flies at 250 miles an hour,

where a cargo vessel chugs along at ten. The cargo plane can make twenty-five trips while the cargo vessel is making one." [7]

The present Douglas B-19 can carry a cargo of twenty tons, or as much as a freight car. Glenn Martin recently declared that he could build a transport plane capable of carrying eighty tons of cargo to Europe at a speed of more than 300 miles per hour. One 10,000-ton freight steamer costs about $2,500,000. It can make about six trips from America to Europe annually, thereby carrying some 60,000 tons of exports. A huge cargo plane could be constructed for about $300,000, and about eight could be built for $2,400,000. These eight planes could carry about 62,000 tons of exports annually. In other words, slightly more tonnage could be built for slightly less money.

Grover Loening makes the statement that "all the surface ships in the United Nations' pool, now running with an aggregate cargo capacity of 20,000,000 tons, could be retired by 40,000 of the present B-19 planes in a little over three years. Or, using Glenn Martin's projected super-aircraft, only 8,300 would be needed to equal the cargo-carrying capacity of the surface merchant marine of the entire world." Moreover, "the 1,900,000 freight cars in the United States could be replaced by 45,000 aircraft of a type now being flown day after day." He also points out that "to keep the 300,000 pilots that we are going to have by the end of the war at work, and the millions of mechanics also, and in order to use some of the thousands of highly usable aircraft that we are going to inherit from this war, as well as to keep our factories going in some way after the war — air transport will have to invade the heavy freight field of the railroads and the heavy cargo field of the international shipping companies right away." [8]

The World Shrinks

Distances in the United States. In 1776 the young nation of the United States extended north and south from Georgia to Maine. The airline distance from Portland, Maine, to Atlanta, Georgia, is 933 miles. A man journeying between these two points on foot might perhaps average 25 miles per day. On horseback or in a

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[7] "Planes are Seen Replacing Shipping," *New York Times,* May 21, 1942, pp. C1 and C9.

[8] *Op. cit.*

horsedrawn vehicle he might average 50 miles a day. By train he might have averaged 35 miles per hour or 840 miles per day. By plane he can now fly at an average of 150 miles per hour, or 3,600 miles per day. Within a few years a stratospheric airspeed of 300 miles per hour, or 7,200 miles per day will be possible.

Thus in 1776 the United States (from Maine to Georgia) was, under the most favorable conditions, perhaps 37 days long. In 1830 it was about 19 days long. In 1890 it was a little over one day long. In 1940 it is six and one-fourth hours long, while in 1960 it will probably be no more than three hours long.

In 1776 the westernmost American settlements lay in Kentucky — about 500 air miles west of Philadelphia. This meant that in 1776 the American portion of North America was about 20 days wide. In 1830 this same distance was only 10 days. In 1880 it was less than one day. In 1940 it is a little over three hours. In 1960 it will probably be an hour and a half.

If we regard the distance from Portland to Atlanta, and the distance from Philadelphia to Boonesborough, Kentucky, as the length and width of our country in 1776, then we may consider that its area in 1776 was approximately 460,000 square miles. But this area really represented a time-distance of 37 x 20 days, or 740 square distance-days. This square distance-day area of the original expanse of the United States has, because of increasing speed of travel, been decreasing in the following ratios:

1776	740.0
1830	190.0
1880	.60
1940	.032
1960	.008

Since we have estimated the geometrical area of the country to have been 460,000 square miles in 1776, the time-areas at later dates can be easily computed from the ratios. When this is done, the results are as follows:

1776	460,000 sq. mi.
1830	118,108 sq. mi.
1880	373 sq. mi.
1940	20 sq. mi.
1960	5 sq. mi.

In other words, if the original occupied area of the United States were 460,000 square miles in 1776, then that same area to-

day has shrunk to about 20 square miles. (By this, of course, is meant square colonial time-miles.) Moreover, it gives promise of shrinking still further in the not too distant future. (See Fig. 36.)

Today, of course, the United States is much larger than the original area of settlement or occupation. At the close of the Revolution a large amount of unsettled western land was obtained. At intervals thereafter other additions were made by purchase, discovery, cession, and so forth. Today the United States extends clear across the continent, a distance of nearly 3000 miles. From Portland, Maine, to San Francisco the air distance is 2725 miles. This distance, however, has several different meanings, depending upon the kind of transportation and travel used.

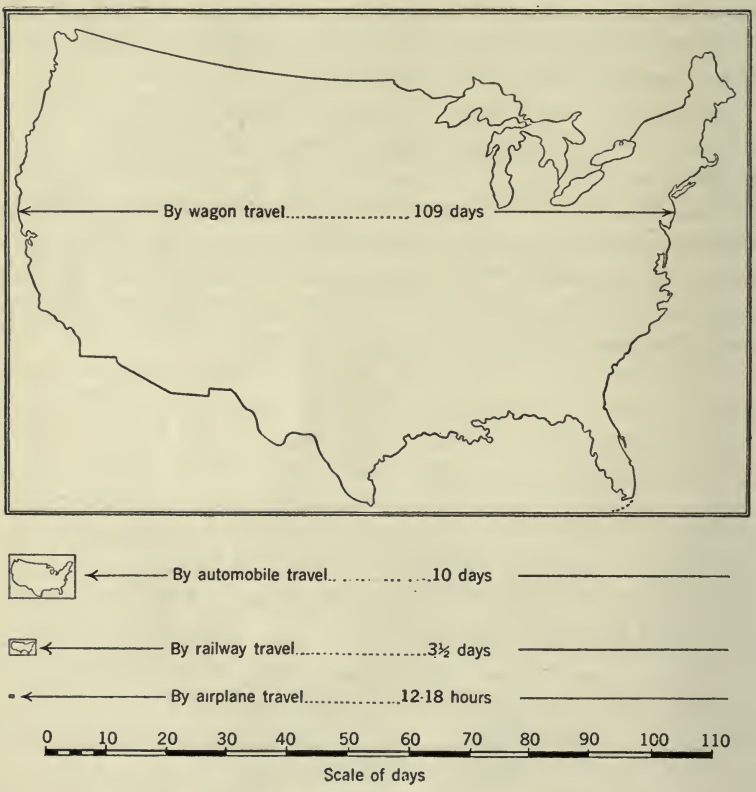

Fig. 36

Travel-time sizes of the United States

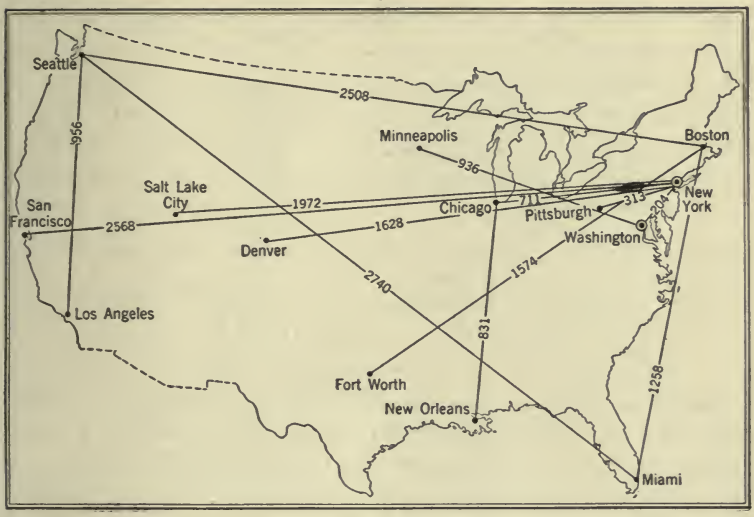

Fig. 37

Some air distances in the United States

If one were to make the trip by wagon over fairly good roads, he could perhaps average 25 miles per day. At that rate the continent is 3½ months wide. If one were to make the trip by family car and trailer, he could perhaps average between 275 and 300 miles per day. At that speed, the continent is 10 days wide. A train will usually average between 30 and 35 miles per hour for twenty-four hours per day. Crossing the continent by train, therefore, requires about 3½ days. At an airspeed of 200 miles per hour the continent is only 13½ hours wide.

This shrinking in size of the United States requires a new evaluation of distance on our part. No longer can the man in St. Louis think of Boston, New Orleans, and Los Angeles as lying on the remote periphery of his world. No longer can the man in Seattle lump all places east of the Coeur d'Alenes and Blue Mountains into a vague region known as "Back East." No longer can the New Yorker hold the view that everything beyond Pittsburgh is the distant "West." The plane has irrevocably created "a more perfect union" on our continent.

Some air distances in the United States (see Fig. 37) and their time equivalents are:

Points	*Air Distance*	*Time at 200 m.p.h.*
New York to Washington	204	1
New York to Pittsburgh	313	1½
New York to Chicago	724	3½
New York to Denver	1628	8
New York to Salt Lake City	1972	10
New York to San Francisco	2568	12¾
Boston to Seattle	2508	12½
Boston to Miami	1258	6¼
Boston to Fort Worth	1574	7¾
Chicago to New Orleans	831	4
Washington to Minneapolis	936	4¾
Seattle to Los Angeles	956	4¾
Seattle to Miami	2740	13¾

European distances. Owing to the fact that Europe is divided into many small nations, nearly everything which happens on that continent is an international rather than a domestic event. Consequently we have come to possess exaggerated ideas of distances and areas involved in European affairs.

For instance the air distance from London to Scapa Flow covers the length of Britain — some 530 miles. In American terms this represents the distance from Boston to Cleveland. London lies 220 miles from Paris, a little more than the distance between New York and Washington, D. C. London lies from 100 to 200 miles from the much-bombed "invasion ports" on the French side of the English Channel. At times, hatred of great intensity has been concentrated between Moscow and Berlin. The two capitals are, however, only 1010 miles apart. This is slightly less than the distance between New York and Des Moines. With so much hate concentrated into such small time-space (Moscow to Berlin — 5 hours by air) it is no wonder that Europe is both explosive and bloody. There is a vast difference between German "Kultur" and the urbanity of the French people, but Berlin and Paris are only 545 miles apart — less than the distance of Atlanta from Nashville.

From London to Oslo is 715 miles, a distance which checks very closely with the 724 miles between New York and Chicago. London is 2000 miles from Alexandria, Egypt — slightly less than the distance from Boston to Salt Lake City. London is only 890 miles from Rome, less than the distance from Richmond to New Orleans, and only 1300 miles from Malta. From Gibraltar to Moscow is 2400 miles, as compared with 2563 miles between Portland, Oregon, and Portland, Maine.

From Berlin to Rome is 730 miles — no more. This is the geometrical length of the "Axis" about which the world's New Order was supposed to turn. At 200 miles per hour for plane travel, the Axis is only 3 hours and 39 minutes long. Yet that same Axis is long enough to cost the lives of many Americans, disrupt our national life, and saddle us with a heavy public debt for generations to come.

Fig. 38

Some air distances in Europe

Some air distances in Europe (see Fig. 38) and their time equivalents are:

Points	*Air Distance*	*Time at 200 m.p.h.*
London to Dunkirk	105	½
Helsinki to Leningrad	190	1
London to Paris	220	1¼
London to Scapa Flow	530	2¾

Berlin to Paris	545	2¾
London to Oslo	715	3½
Berlin to Rome	730	3¾
London to Rome	890	4½
Berlin to Moscow	1000	5
London to Malta	1300	6½
London to Alexandria	2000	10
Moscow to Gibraltar	2400	12

The oceans shrink. As we have already pointed out, the shortest distance between any two points on the surface of the earth is a piece of the arc of a complete earth circumference, known as a great circle. Planes can follow great-circle courses because they are virtually independent of ordinary surface barriers. By air routes Moscow is some 600 miles closer to New York than to Seattle or Tacoma. The sea route from Seattle to Calcutta is 12,000 miles; the air distance is only 7225 miles. From San Francisco to Liverpool, via Panama, the sea distance is nearly 8000 nautical miles; by air the distance is 5200 miles. By rail and water from Calgary to Liverpool via Quebec is 4750 miles; by plane along the great-circle route it is only about 4250.

Even more important than this saving of distance by air travel is the shrinkage of time. Airline speeds up to 300 miles per hour, on long journeys, are probable within the next decade or so. Assuming the establishment of definite airways with all navigation aids, it would be possible to travel from New York to Cape Town in 26 hours as compared to 25 days for the most speedy sea travel. From Seattle to Calcutta would require 24 hours instead of a month or more. From San Francisco to Singapore would require 29 hours instead of 22 days.

In 1942 an American pilot flew a bombing plane across the Atlantic Ocean in 6 hours and 40 minutes in violation of military regulations. This won him a military rebuke, but it did reveal that the Atlantic has shrunk amazingly in time-distance. Simultaneously the time-distance from Seattle to Tokyo had shrunk to 14 hours and 15 minutes. With the Atlantic shrunk to a width of 6 or 7 hours and the Pacific to a width of 14 hours, geometrical distance and proximity become largely meaningless. In the era of sea-borne commerce, the economical exchange of most commodities depended upon mileage along water routes. Geometrical

nearness was of considerable importance when sailing time was to be measured in weeks or months, but when oceans may be crossed in hours, and America's trade centers are less than a day from trans-Atlantic and trans-Pacific ports, geometrical nearness in land or sea miles has little or no meaning. The world is, indeed, rapidly becoming an economic community.

The Geography of Airways

Limiting factors. From Phoenician times down to the present, civilization has very largely developed along accessible seacoasts and about enclosed or partially enclosed seas. From there it has spread up the estuaries and the river valleys and across fertile, easily accessible lowland plains. Such regions as these have seen heavy concentrations of commercial and industrial development, while the interior regions have witnessed lesser development of their resources, depending upon the quality of their access to the world ocean. In accordance with this distribution of economic development, the great sea lanes of commerce and the great trunk land routes of commerce were traced out. The narrows between the three major ocean basins cause the concentrations of sea ways, and locations such as Gibraltar, Panama, Suez, and Aden became immense vantage points from which to participate in, and even to control, the world's commerce.

In the three-dimensional world of air commerce, these vantage points are of little significance in the world flow of trade. Indeed every seaway on earth could be cut, and after a few years there would be no decrease in tonnage of freight carried. There would eventually even be an increase.

While it is true that the freight or passenger plane of tomorrow can and possibly will fly anywhere, it is hardly probable that major air routes will be laid out in complete disregard of environmental conditions. The airplane is relatively independent of land barriers and ocean expanses, but there are numerous fairly inelastic factors which must enter the picture.

In the first place, the atmosphere itself has an invisible but nonetheless real topography all its own, and the airplane is not and probably never can become able to disregard it. For an example of this, examine an annual average pressure map of the North Atlantic Ocean. (See Fig. 39.) Over the north pole and Greenland lies a great dome of heavy air, and off this winds blow

radially outward with the right-hand deflection characteristic of all winds north of the equator. South of these Northeasterly Polar Winds stands the huge Icelandic Basin — a great depression in the atmosphere. Then comes a wide belt of Southwesterly Winds blowing down the north slope of the vast Azores-to-Bahama High Pressure Ridge and into the Icelandic Basin. Off its southern slope the Northeast Trade Winds drain into the long shallow Equatorial Trough which extends from Africa across to Brazil.

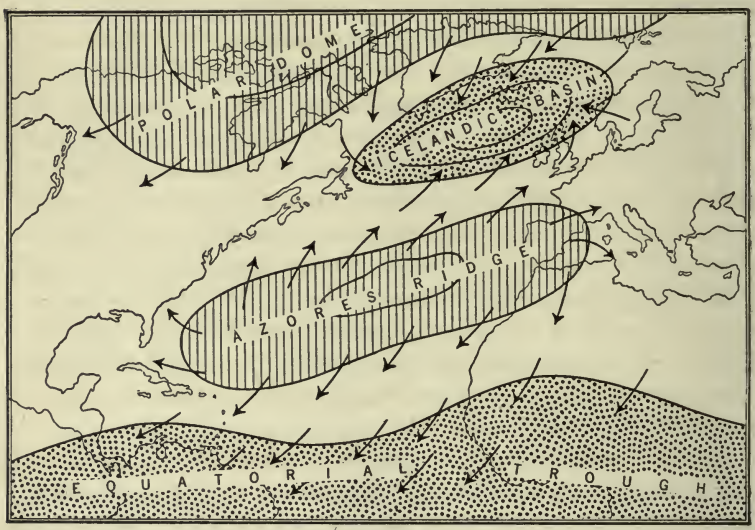

Fig. 39

Atmospheric "topography" and wind belts over the North Atlantic

In discovering the continent of North America, the Norse vikings used to sail westward with the Polar Winds around the north edge of the Icelandic Basin, and back eastward with the Westerlies around the south edge. Columbus reached the New World via the Trade Winds along the south slope of the Azores Ridge. Cabral reached it by working westward via the Trade Winds on either side of the Equatorial Trough. Soon the established route of trans-Atlantic sailing ships was down the West African Coast and thence westward south of the Azores Ridge, making use of the Trades. On the return trip they went north of the Ridge via the Westerlies. Steamships, independent of winds,

developed a great-circle path between Europe and America. But even the steamship was not entirely independent of weather conditions, and as a consequence the Atlantic shipping lanes are shifted slightly northward and southward with the seasons. It is not yet apparent just how air lanes will be adjusted to the winds and the pressure-topography of the atmosphere, but presumably they will not be able to disregard them.

A second limiting factor is the element of storminess. Running clear around the world between latitudes 40° and 60° in both hemispheres are two strips of great storm frequency. There, endless processions of eastward-moving "highs" and "lows" bring ceaseless changes in weather conditions and render aerial navigation tricky—at times extremely dangerous. A path along the crests of the great ridges of high pressure just outside the tropics, however, runs almost always through clear, relatively placid conditions. It seems likely that transoceanic air lanes will avoid the stormy cyclonic zones wherever possible.

Navigation hazards, such as areas frequented by typhoons or hurricanes, regions frequently mantled by deep fog, localities marked by vigorous air currents rising over high mountain ranges, arid regions with much atmospheric dust, and all other comparable phenomena will tend to be avoided by airways. Stratosphere planes can, of course, fly above such hazards, but even they are not independent of them in taking off and landing. Moreover, not all flying in the future will be stratospheric, by any means.

At the present time, chains of islands exercise a considerable influence in locating an air lane. Such island chains are of considerable advantage as emergency landing fields, for they provide an immense increment of potential safety for both passenger and cargo. As longer-range planes are developed, they will not be needed as fueling points, but it is doubtful if they can, because of the safety factor, be entirely disregarded. Other things being equal, it seems reasonable to think that a plane routed from central United States to eastern Russia will go via Baffinland, Greenland, Spitzbergen, and Novaya Zemlya rather than more directly across the open Arctic. There are many such lines of stepping stones which may possibly help locate the air lanes of tomorrow.

A fifth factor is the configuration of the continents and the pattern of their physical arrangement in the world. Cargoes will

Fig. 40

The strategic corridor areas in future world relations

originate on the continents and flow across water to other continents. Where two continents approach one another, there a set of airways is apt to develop, particularly if these narrow water spaces are studded with islands. Figure 40 shows that there are some six regions of this kind in the world: (a) connecting Europe and North America is the Labrador-Greenland-Iceland air bridge; (b) connecting North America and the Orient is the Bering Strait-Aleutian-Kurile air bridge; (c) connecting Asia and Australia is the Malay-Indonesian bridge; (d) uniting the Americas is the Panama-Antillean bridge; (e) connecting Europe, Africa, and South America is the Gibraltar-Canary-Cape Verde-San Roque bridge; (f) between Europe, Africa, and the Near East is the eastern Mediterranean island-and-peninsula bridge area. Intercontinental airways are already showing a disposition to trace out these six general zones of contact between land masses.

A sixth factor in determining the location and course of an air lane is the availability of cargoes and passengers. From this consideration, the most populous and most highly developed regions will become the termini of the greatest airways. To a certain extent, therefore, the future location of air routes will tend to obey the same influences that have traced out our major sea ways and trunk rail routes in the past. Air transport will tend to shift the centers of population and industry somewhat, but to what extent cannot as yet be foreseen.

Airways in the United States. The pattern of airways in the United States is not yet mature, but its outlines are already well established. It bears certain resemblances to both the railroad and highway systems, but in many respects it is distinctly unique.

In the first place, there are four great east-west transcontinental airways. (See Fig. 41.) The northernmost of these is served by Northwest Airlines from Seattle and Portland to Chicago, and from Chicago eastward to Boston, by American Airlines. The central route is served by United Air Lines from San Francisco to Salt Lake City, to Cheyenne, to Omaha, to Chicago, to Cleveland, and to New York. The south-central route is served by Transcontinental and Western Air from San Francisco to Albuquerque, to Kansas City, to St. Louis, to Cincinnati, to Pittsburgh, to Philadelphia. The southern route is served by American Airlines from Los Angeles to Tucson, to Fort Worth-Dallas, to Nashville, to Washington. An alternative branch of this southern route is served by Delta Air Lines from Fort Worth-Dallas to Atlanta, to Charleston and Savannah. The Gulf Coast route from San Antonio and Brownsville eastward to Florida is served by Eastern Air Lines and National Airlines.

Crossing these at right angles is a set of north-south trunk routes. The Atlantic seaboard from Boston to Miami is served by Eastern Air Lines. An eastern interior route is provided by American Airlines from Buffalo to Cincinnati, by Delta Air Lines from Cincinnati to Atlanta, and by Eastern Air Lines from that point to Tallahassee. A central route from Chicago to St. Louis, to New Orleans is served by Chicago and Southern Air Lines. A western interior route is provided through the Missouri Valley by Midcontinent Airlines, and thence southward by Braniff Airways. A Great Plains route from Great Falls to Denver to El Paso is serviced by Inland Air Lines and Continental Airlines. Farther

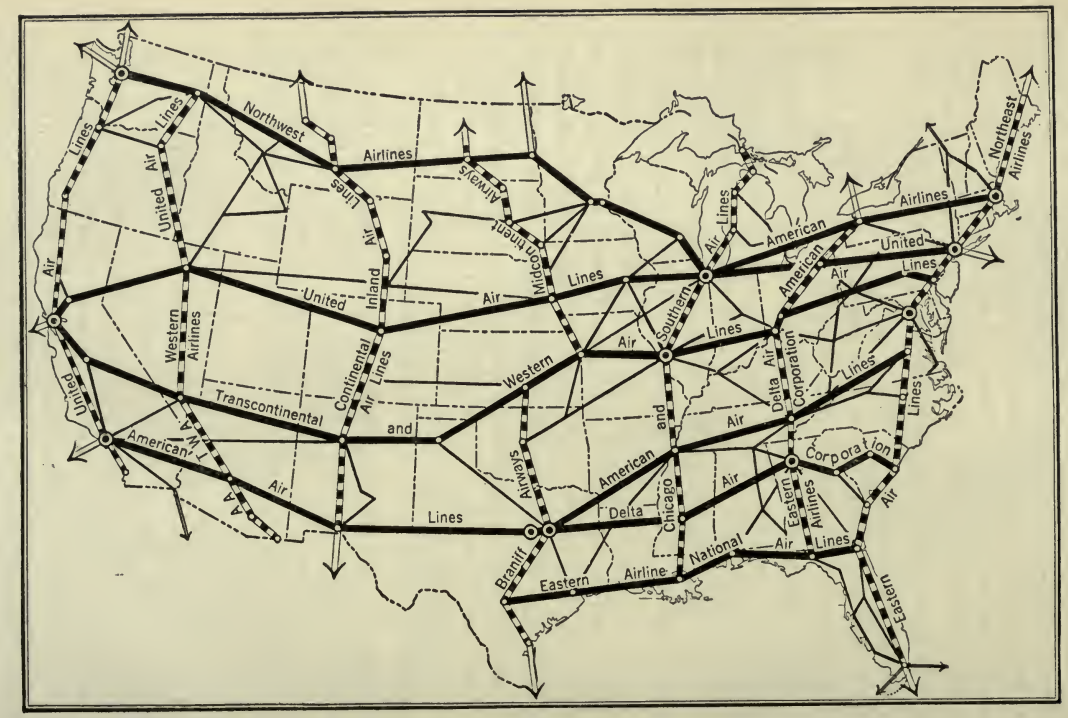

Fig. 41

The transcontinental air lanes of the United States. (Branch, diagonal, and connecting routes shown by narrow lines)

west an Intermountain route is served by Western Air Express and United Air Lines. The Pacific seaboard route is provided by United Air Lines. Duplicate, branch, diagonal, and connecting services are provided by all these and smaller companies, some seventeen in all.

There is quite expectably a great concentration of air services in the rectangle formed by New York, Washington, St. Louis, and Chicago. Outside this, certain cities have developed into regional foci and from them airlines radiate like the spokes of a wheel: Boston for the New England area, Atlanta for the Southeast, St. Louis for the Middle West, Fort Worth-Dallas for the Southwest, Omaha for the Missouri Valley, and Salt Lake City for the Intermountain country.

A few cities are so located that they are fast becoming "jumping-off" places for international trade. Boston is the exit for North Atlantic and subpolar flights to northern Europe. New York is the exit for middle Atlantic flights to western Europe. Miami and Brownsville are points of departure for planes to South and Middle America. Seattle serves Alaska and northern Asia. San Francisco serves Hawaii and the Orient. Los Angeles serves Hawaii and Australasia.

International air lanes. Most highly developed countries had, even before the war, built up well-knit networks of domestic airlines. In addition to these, however, a world system was already taking shape. (See Fig. 42.)

Noteworthy among these were the British Empire Lines running across Europe to Egypt, through the Near East, across India and Malaya and eastward to Australia. A branch of this extended from Egypt southward to Cape Town and southwestward to West Africa. A German line ran from Berlin to Athens to Baghdad and on to Siam, and was to have been extended to Tokyo in 1940. A branch of this German line ran from Baghdad to Kabul in Afghanistan. The French air route ran from Marseilles to Beirut, thence across southern Asia to French Indo-China, and thence northward to Hong Kong. Another line trended from Marseilles to Algiers, thence across the Sahara to Ft. Lamy, across equatorial Africa, to Madagascar. A third line operated down the west coast of Africa to St. Louis and Dakar.

Earlier than any of these, and following the same general route, was the Amsterdam-Batavia line, operated by the Dutch.

Fig. 42

The international airways of the world in August, 1939

An Italian line extended from Italy to Libya and Ethiopia; another ran from Italy to Albania, to the Persian Gulf and was planned to continue on to Siam and Tokyo; a third, developed by LATI, ran down the West Africa coast and across to Brazil.

The Russians operate a transcontinental line clear across Eurasia, from Moscow to Vladivostok with extensions into Sweden (in peace times) and into China. Japan had by 1941 built up a complete coverage of her own island empire, and in addition had established several lines to the Asiatic mainland and into Micronesia. She had made plans for other lines to the Philippines, Siam, the East Indies, Australia, and eventually to North America. Other nations were also making ambitious plans for transcontinental and transoceanic airlines.

On the continent of Europe the French had built up the most extensive network of international airlines, connecting most of the important cities from Portugal to Poland, from the Baltic far southward into Africa. This made Marseilles, in effect, the international air capital of the world.

In the Americas the United States early took the lead in transoceanic flying. Pan American Airways established a remarkable international air loop around the Caribbean and Latin-American areas. In addition its Atlantic Clippers have beaten out a northern and a central route across to Europe. More recently they have been using the southern Brazil-to-Africa route also. In the Pacific, Pan American Airways has established services to Alaska with projected extensions to Russia. Farther to the south its Philippine, China, and Australian Clippers have pioneered in establishing trans-Pacific air transportation. The new mobility bestowed upon us by the airplane is, indeed, rapidly creating a new commercial geography.

The Geography of Industries

Agriculture. The airplane has already begun to influence agriculture. The "dusting" by plane of cotton fields to combat the boll weevil has been in use for a number of years. Spraying of various crops and the laying of smoke blankets over orchards to prevent frost may become successful.

Heretofore market gardens, greenhouses, and gardens-under-glass have been located in or upon the outskirts of the cities whose markets they serve. The airplane offers these industries a new

mobility. Presumably they can now move to rural locations where lower ground rents obtain. In short such forms of agriculture may soon cease to be metropolitan industries.

Extractive industries. The airplane has already been pressed into service in several of the extractive industries. Timber cruising is frequently done from the air. Fire-spotting patrols now locate fires much earlier than men in stationary observation towers have ever been able to do. Parachute fire fighters are promptly dropped around a forest fire before it can become a conflagration.

In the northern forest country the plane is of almost incalculable usefulness to the trapping industry. Provisions and medical supplies are brought to remote posts and even to isolated cabins of trappers. Transportation of furs to the "outside" is beginning to be effected by plane.

Even more important is the service rendered to the mining industry. A clear example of this may already be seen in the gold-mining districts of northern Ontario. Portions of Siberia, Alaska, the Andean countries, and New Guinea are further outstanding examples. Petroleum fields in northwest Canada and eastern Bolivia have been known to geologists for fifteen years or more. The airplane will undoubtedly aid in bringing about their utilization.

The resort industry. Many localities have superb possibility for recreation, but are not utilized because of lack of accessibility. Others are so far away that they are unavailable to those whose vacations are short. The airplane solves both of the problems, and these solutions are so important that an entirely new geography of recreation may be the result.

Business. The airplane has caused business transactions to speed up very greatly. Statistics of air travel show that between 40 and 65 per cent of all air travelers are businessmen. Airmail and the sending of commercial samples by air express facilitate the placing of orders immensely. Shipments of movie film, X-ray photographs, blueprints, and contract papers likewise aid in the process.

Railway transportation. At present the airplane is not a direct competitor of the railway. As a carrier of freight its function to date has been in opening up new and otherwise inaccessible regions, in providing new outlets for perishable products, and in creating new businesses through reducing the need for dealers to

carry large inventories. "In these three aspects, air-freight transport may be instrumental in developing new trade. To some extent the increase in air-freight traffic may represent diversion of goods from railroads and steamships, but if the new means of transport is cheaper and more satisfactory it will tend to increase the total volume of goods exchanged." [9] On the contrary, plane traffic might conceivably put both railway and seaway almost entirely out of operation.

Manufactural industries. The manufacture of women's dresses and millinery has always been an industry which geographically clung close to its chief markets, the metropolitan centers. Market demands and consumer whims have always been fickle in regard to such items. Dress and hat designers have had to be located in the "fashion centers" of the world, for new ideas and crazes are translated into apparel almost overnight. The designer must still be able to walk along Connecticut Avenue, Hollywood Boulevard, Market Street, or Fifth and Park Avenues, but the factories no longer need to be there. The factories may be in Scranton, South Bend, Hutchinson, or Puyallup, and still be promptly reached by the designer with his up-to-the-minute ideas. This industry is but typical of many others which may be affected by the decentralizing influence of the airplane. Just how far it will go in decentralizing the city, and the metropolis in particular, is difficult to forecast. It may almost completely destroy it. Already many factories are being built, each adjacent to an airport. Delivery of spare machine parts promises to locate many factories in even out-of-the-way places.

In 1942 Albert Warner was able to say: "Automobile production is dead. The production of airplanes, mushrooming from almost nothing, spreads from plant to plant, enters home after home to draw its workers, converts thousands of small factories to its service, sucks in minerals and materials from the soil." [10] The automobile industry, once America's pride, has been reduced to nothing by the wartime need for planes. Airplane production had, under war conditions, become second only to the steel industry among American manufacturing activities. This can hardly

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[9] Lissitzyn, O. J., *op. cit.*, p. 54.
[10] Radio Station WJSV, Thursday, April 23, 1942.

be a permanent relationship, but we can never wholly return to the pre-war situation.

New industrial districts. The airplane in the hands of the Axis powers has cut off many countries from the free flow of American and European manufactures. Under Japanese blockade China is rapidly industrializing, Australia is building a whole new industrial region. Turkey is importing American machinery and machine tools, and India and Brazil are enlarging their manufactural capacity. Fear of bombing from the air has caused Australia to erect these industries in her Southeast. China is building hers in her Far West. Even in the United States new powder mills, arms plants, and plane factories are being located in the South, Middle West, and Intermountain West in order to minimize their exposure to bombing. More, they are being scattered widely in order to reduce their vulnerability to any one single air raid.

In Europe actual wartime bombing has caused many industries to move out of London and other industrial cities and to seek rural locations. Under constant Royal Air Force pounding from the air, German industries are also being moved. Germany's greatest pre-war industrial region extended from the Ruhr Valley, up the Rhine Valley to Cologne, up to Mainz and to Frankfurt in the Main Valley, up the Rhine to Mannheim, and southward to Stuttgart. By 1942 this Ruhr-Rhine-Main Industrial Region was well-nigh demolished since most of it lay between 300 and 400 miles from London. (See Fig. 43.)

Germany has a second industrial region in the central portions of her area, lying in Mecklenburg, Brandenburg, and Saxony, whence it continues southward across conquered Czechoslovakia and Austria. After 1941 this region, centering about the cities of Wittenburg, Magdeburg, Leipzig, Pilsen, and Linz, was greatly expanded. New factories were built and what industries could be moved were brought here from the western districts. Even this region, lying as it does 500 to 700 miles from London, was not safe from bombing. As a result some new industrial districts were built in Silesia and conquered Poland and Moravia. In the north the new district centers about Danzig and Elbing; in the south, about Breslau, Glotz, and Posnan. Still farther to the southeast, a third district centers around Rzeszów and Sandomierz. These new districts lie 700 to 1000 miles from London. In the future, however, even protected by such distances as these, industrial areas

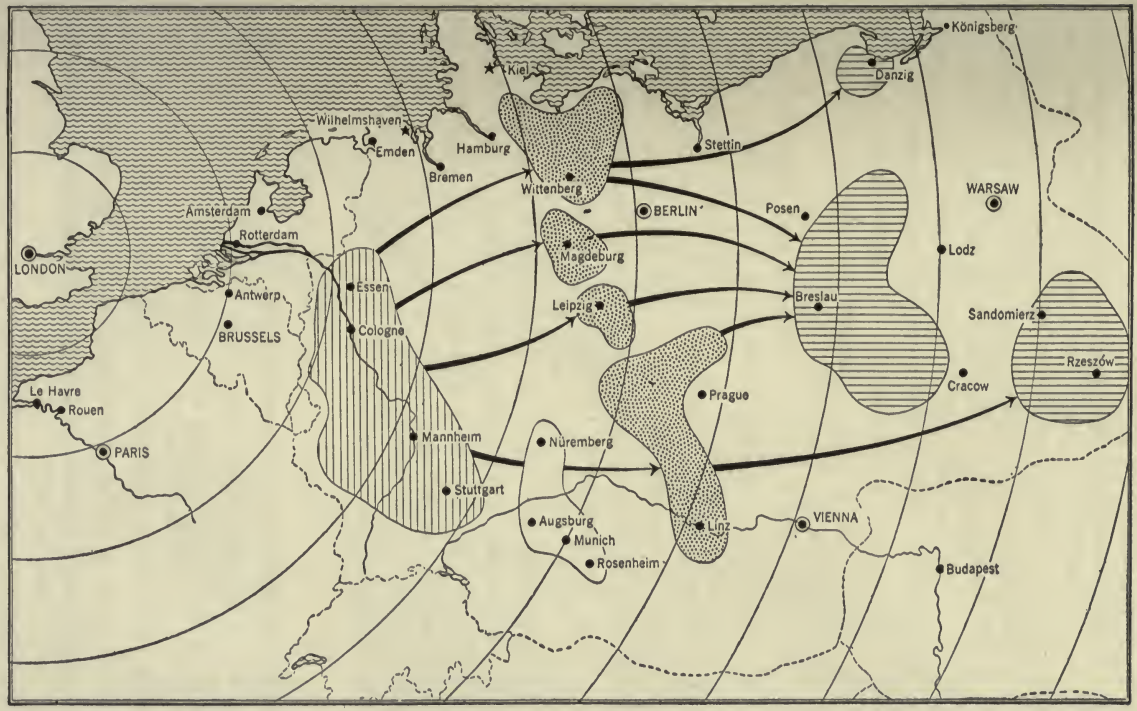

Fig. 43

German industrial districts flee eastward from British bombing

will be readily accessible to enemy bombing planes. Complete decentralization of industry, perhaps with factories underground, may be the answer; either that or the use of organized international force to maintain peace and world union. At any event, the bombing plane is creating an entirely new industrial geography.

Some of the results of this new industrial geography may be seen in Soviet Russia. Under the Czar's regime, most of Russia's industry was concentrated in the triangle formed by Leningrad, Moscow, and Gorki, while a small amount was situated in the Ukraine. (See Fig. 44.) The Soviet Government rebuilt this old industrial region and greatly expanded the Donets, Kharkov, Krivoy-Rog region of the Ukraine.

They distrusted the Germans, however, and realizing even then the power of the bombing plane, they decided to build entirely new industrial regions in their relatively inaccessible "heartland." When the Second World War broke out, these were well on the way to completion. The first of these lay in and just beyond the Ural Mountains. It centered about the cities of Solikamsk, Perm, Krasnouralsk, Chelyabinsk, Ufa, and Magnitogorsk.[11] A second region was also created in the Kuznets Basin and the Altai Mountains. It centered in the cities of Kuznetsk, Novo-Sibersk, Krasnoyarsk, and Semipalatinsk. Other smaller industrial districts were also begun in various places. In the future, however, even these new industrial regions will not be inaccessible to the bomb-carrying airplane, any more than to the cargo-carrying transport of the air.

Some Conclusions

It is perhaps difficult, as Robert Hinckley points out, "to visualize the time when great fleets of passenger and freight planes are plying back and forth between this country and South America, Africa, Europe, and the Orient," but that time is not far away. Moreover, that transportation of the future will not be related as directly as it now is to the great seaports. The natural resources and new markets of presently undeveloped continental interiors will be open to the skyways.

Military defense against air attack requires decentralization of industrial cities and districts. The large manufacturing centers,

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[11] Scott, J., "Stalin's Ural Stronghold," Barron's, January 5, 1942.

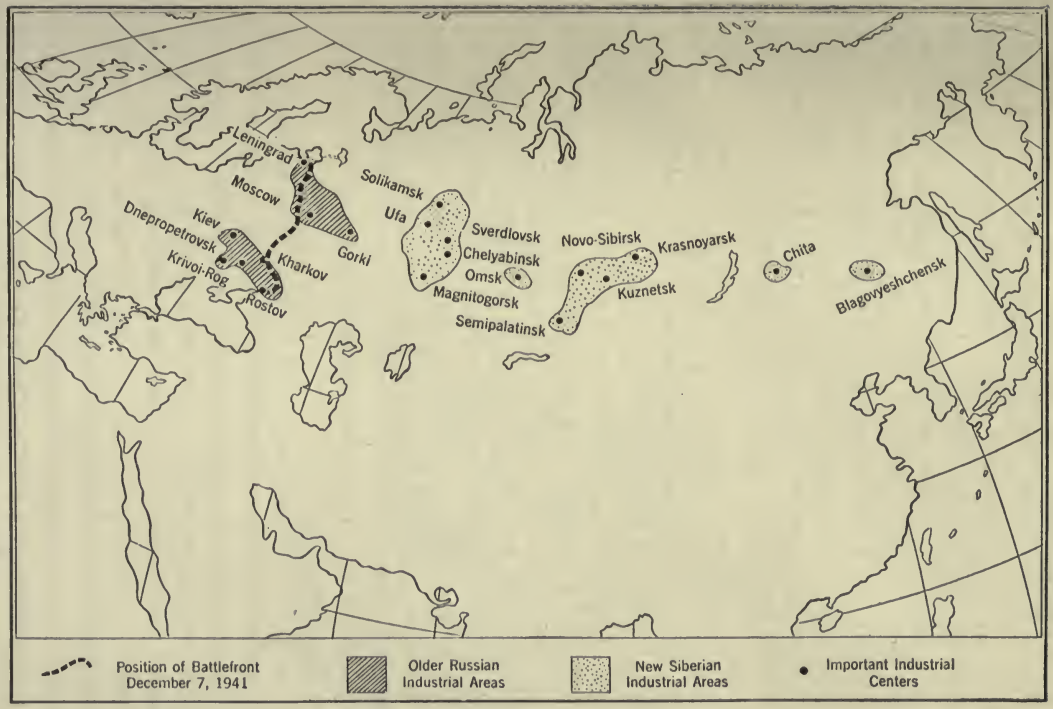

Fig. 44

The industrial areas of Soviet Russia

which developed from surface modes of transportation, are wide open to destruction by bombing planes which can strike before defenses can be organized and manned.

Moreover, it is true that the development of global air traffic may strip New York Harbor and other great seaports of their commanding commercial positions. "There is no shoreline in the air — no reason why Detroit should not be a great port also. Rubber from Brazil need not land in New York and then be sent by rail to Akron. It will land by air in Akron, alongside the tire factory. Great canals like those at Panama and Suez will cease to have any significance in trade or war — only as evidence to the historian that international traffic has at last left the surface of the sea for the air.

"A new wrinkle which gives us a tremendous increase in load capacity and a tremendous improvement in our economics is the use of the glider and the glider train. Gliders are the freight cars of the air. They give a versatility to the picking up and delivery of cargoes and passengers. We can visualize a locomotive plane that can leave New York, towing a train of six gliders.

"By having the load thus divided, it would be practicable to unhitch the glider which must come down in Philadelphia as the train flies over that place—similarly unhitching the loaded gliders for Washington, for Richmond, for Charleston, for Jacksonville, as each city is passed, and finally the air locomotive itself lands in Miami. During the process, the plane has not had to make any intermediate landings." [12]

The effect of national boundaries as barriers to international relations is decreasing very rapidly. "As natural boundaries lose their significance, international strains will probably increase. . . . The world of tomorrow may be a world of a few highly centralized Great Powers. . . . In such a world the United States, if it remains isolated within its present boundaries, will lose the advantage of size it has hitherto enjoyed. . . . In a struggle for world power, the possession of superior or at least adequate means of communication and transportation on a world-wide scale will be essential. . . . The control of the most advanced means, such as the airplane, may mean the difference between expansion and

[12] "Planes are Seen Replacing Shipping," New York Times, May 21, 1942, p. C9.

extermination. No state with a will to survive is likely to ignore these considerations." [13]

"The Atlantic has given us near access to Europe, and the 'American invasion' has followed. The Pacific has opened to us, though at longer range, the markets of the Orient, and the flag has been set up on an outlying fragment of the Asiatic continent. 'Enthroned between her subject seas' the United States has by reason of large area and geographical location, the most perfect conditions for attaining preëminence in the commerce of the world ocean." [14] These words were written many years ago, but they are still applicable in the Air Age if we readjust our national life to the new conditions and relations of geography. "There is no doubt about it, America will emerge from this war in possession of the most powerful air force in the world, and with the established capacity to produce planes in great volume. America will have the fuel necessary to the operation of this force, the desire of an industry to construct more planes, trained crews to fly them, and the urge of an air-minded people. . . . The airplane may be an instrument of war or peace, and in times of peace it may, unless intelligently managed, oppress, impoverish, and destroy peoples. The nation which gains supremacy in the air will assume grave responsibilities. . . . Americans will need great wisdom to manage successfully this colossal inheritance." [15]

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CHAPTER 7

THE AIRPLANE CREATES A NEW SOCIAL GEOGRAPHY

The Nature of Social Geography

PRIMITIVE man was almost entirely a creature of his local environment. He gathered his food where he found it. He occupied such shelter as was available. He mated, worked, rested, slept, and died after the manner of other species of mammals. Through eons of time he changed physically either through sudden mutations or through a slow, selective process as he was acted upon by his natural environment. Gradually nature improved him both physically and mentally. Gradually however, he began to invent and to adapt, thereby creating for himself a culture. This creation of a culture by man finally had two significant results: It set him off and distinguished him from the other animals, and it stopped his direct physical and mental evolution in response to environmental influences.

The other animals remain creatures of their environment and continue to be modified by it. Man has not by any means been freed from his environment, but he has instead entered into reciprocal relations with it. Through his machines, his crops, his domesticated animals, his clothing, his structures, his social organization, and his science, he has entered into partnership with nature. Here and there, in small ways, he has achieved mastery over bits of his environment, but by his very inventions and his increased utilizations of the resources of the environment he has at most other points rendered himself more vulnerable to nature's vagaries. Every time he discovers a new way of utilizing his environment or of refining old utilizations he renders more binding his reciprocal relations with nature. Thus the lower animals are physically acted upon by the environment, whereas with man it is his culture, his society, his way of living, his ideas which are

acted upon and modified by the environment. Every fluctuation, change, or shift in nature creates repercussions in human society and culture. By the same token, every significant technological change in human society tends to disrupt and disestablish the existing reciprocal relations between that society and the environment, and calls out new adjustments and new relationships. Particularly is this true with respect to the field of transportation and communication. As Oliver Lissitzyn points out, "Modern civilization rests upon man-made means of transportation and communication; without such means, modern states could not exist. Man is a social animal, and human society is based upon communication among its members."

The whole story of human groups, their origins and group characteristics, their expansions, migrations, and struggles to achieve and improve long-distance communication and transportation, is told in a study known as social geography — or to use a more erudite term, *geosociology*. This is as true with regard to the realm of ideas as with material things. Roderick Peattie rather cogently remarks, "When the history of the diffusion of ideas is written, it will largely resemble a geography."

Very recently there has occurred an invention which so profoundly altered existing patterns of communication and transportation that man's whole equation of time-space relations must needs be reformulated. This invention is the airplane. It has so revolutionized the established relations between society, culture, and ideas on the one hand, and environment on the other, that it is creating an entirely new social geography of the United States, of North America, and of the world.

This statement is no pleasant, easy-going generalization; it is a cold, hard reality which must be faced by every student. Moreover, it should be faced squarely and ahead of time, before its full implications are upon us. This is a competitive world, and our nation and our culture can survive only if we seize upon the inevitable and use it as an opportunity rather than allowing it to become a fatal consequence.

The Assault on Provincialism

Early civilizations born in relative isolation. Most of the record of mankind is the story of provincialism in one form or another. Provincialism is the tendency of human society in one place to

differ from that in other places, usually for reasons growing out of isolation. Civilization itself was largely a by-product of isolation. Egypt, Mesopotamia, Phoenicia, the Greek city-states, Crete, Etruria, and other early civilizations were nurselings of isolation from the universal brutality and insecurity of a chaotic world of man and nature. There came a time, however, when civilization became strong enough to stand on its own legs, to defend itself, to spread beyond its provincial limits of isolation and to attempt the conquest and absorption of the barbaric outer world.

Recent civilizations based upon accessibility. Civilizations, during more recent times, ceased to be provincial and began to be world phenomena. The Macedonian Empire, the Roman Empire (see Fig. 23), the Chinese Empire, the Moslem domain, the realm of Genghis Khan, and still more recently, the British Empire, the American Federal Union, the German Greater Reich, and the Japanese Co-prosperity Sphere, all represent world systems of culture actual or projected. This is a curious historical reversal of geographic relations: Early civilizations were cradled in isolated spots, whilst savagery dominated the openly accessible areas; modern civilizations are centered in the large areas of maximum accessibility, whereas isolated and remote areas today are veritable museums of backward or obsolescent cultures.

There are some five great cultures in the world today. The Orient contains two: the sacred-state military-industrial culture of Japan, and the pacifist-agrarian culture of China and India. The Occident contains three: the commercial-industrial democratic culture of western Europe with powerful offshoots in Anglo-America and Australasia, and offshoots in Latin America and South Africa; the socialist-corporate-state culture of central Europe; and the soviet culture of eastern Europe, containing a curious mixture of social democracy, communism, and corporate statehood.

The remainder of the world — mountainous areas, high plateaus, deserts, oceanic islands, tropical forest and savanna regions, tundras, and equatorial selvas — contains hundreds of small culture patterns which have survived from the past in greater or lesser degrees of preservation.

In the past any great culture has tended to expand outward from some dynamic nucleus. It continued to expand as long as it was able to maintain adequate transportation and communica-

tion with the newly-won lands on its expanding margins. It reached geographical equilibrium and ceased to expand when it was no longer able to maintain close rapport between the nuclear area and the periphery. Seldom in the past did two great cultures come into frontal contact; there was too much space between them to be fully overcome by the transportational devices then in use. The Medes and Persians failed to conquer Greece, Rome conquered but failed to root out Hellenic culture, and she failed to conquer the Gothic peoples of northern Europe. The Mohammedan irruption penetrated but a short way into Christian Europe. Genghis Khan failed to overrun Europe. Europe never subjugated the Orient.

Between the areas occupied by these major cultures there was always plenty of room for small societies of men clinging grimly to their local provincial ways of thinking and behaving. Out on the periphery of the world there was even more room for the survival of minor culture patterns. Thus a few examples of the Old Stone Age survived into relatively modern times; the world today is rich in surviving cultures from the New Stone Age. Within the memory of men now living, social conditions from the American Colonial Period survived in Appalachia and Ozarkia. Numerous small areas within the United States are still backward and far below the national average in standard of living. The Basques on the slopes of the western Pyrenees still cling to their unbelievably primitive language, the Negro Tibbus eke out their existence on the Tibesti Highlands in the middle of the Sahara, the mountainous Shan States still refuse to consider themselves part of British Burma, islands of pre-Chinese Lolos and Miaotzes still remain in China, the Eskimos cling to their arctic fringe, and the South Sea Islanders are unhurried by the machine age. Thus the earth has been and is a quilt of several large and many small cultural blocks. There has long been a contest between the isolating and difference-producing factors in nature, and the access-improving and leveling inventions of man. The battle has been slowly going against nature, but so far she has not been routed.

The spread of great cultures. Roman culture was spread because of the invention of hard-surfaced roads. Mohammedan culture was spread by men on horseback. Genghis Khan conquered half the then known world because of the war chariot. Western European culture was flung around the world because of the

early invention of the sailing vessel. Middle European and Japanese cultures are now making a bid for world domination through the use of the airplane.

In the past no culture has ever become really worldwide. It was not even able to attempt to become worldwide. Geographic limitations doomed it to remain regional or provincial. No one could build a world road or highway. No one could build a world railway. At best a road or railway could be only transcontinental. No seaway is a world lane. The famed "British Life Line" seaway *is* more extensive than the Canadian Pacific, Berlin-to-Baghdad, or Trans-Siberian railway or even than the projected Cape-to-Cairo or Pan American lines, but it is not ubiquitous. It has, at most, been able to hold one-fifth of the world into a rather loose and precariously balanced union. Even the modern steamship cannot penetrate the "heartland" of Eurasia.

The airplane is an instrument of a different kind. It is three-dimensional, and hence is confined neither to the land nor to the sea; it is neither continental nor maritime exclusively. It is an instrument of world transportation, communication, and military assault. Under its impact, the whole mosaic of provincialism is threatened, because isolation is abolished.

Remote pelagic islands are visited by seaplanes and promise to become regular stops for tomorrow's freight-carrying airplanes. Every mountain valley containing enough flat land for an airport can be reached as quickly as the metropolis on the plain. The great plateaus with their forbidding marginal escarpments and their profound river-carved canyons are flattened out and subdued by the plane. The vast selvas of Amazonia cease to be a "green hell" to the man in the seaplane who can alight on the river wherever he chooses. The arctic ice cap ceases to be a barren and insurmountable waste to the aviator who regards it as a huge ready-made landing field on the main highway between Eurasia and the Americas. The most remote tribe or nation is brought into sharp contact with the stream of world affairs by the plane which alights in its midst.

Regionalism Is Weakened

In the modern political world each nation, being independent of other nations, tends to become a separate and distinct cultural province. Nationalism is of course only a state of mind, but it is a

factor powerful enough to struggle fairly successfully against both the leveling and differentiating factors of nature. The nuclei of a national culture are usually the large cities of that nation. From these urban communities emanate patterns of behavior and thinking which impinge persistently and vigorously upon the older prenational folk culture of the rural areas, a culture which has been produced by long ages of social and geographic adjustment.

Frequently a nation contains not one but several folk cultures, depending upon the number and character of the geographic regions which are comprised within its total area. In the United States there are some seven major geographic regions: the East, the South, the Middle West, the Great Plains, the Intermountain West, the Pacific Northwest, and the Pacific Southwest. (See Fig. 22.) Each of these contains or is developing its own characteristic regional culture. Regional cultures of this kind seem to be the product of a number of factors — physical, spatial, economic, and psychological. The tendency of the inhabitants of a geographic region to behave and think differently from the national norm has been called regionalism. Such a force may at times be powerful enough to disrupt a nation. Uusually, however, it distills off in political sectionalism or in parliamentary bloc-ism.

In Colonial days, when land travel was by horseback or stagecoach, regionalism was exceedingly powerful. New England was a far distance from Virginia. Mentally, it was even farther distant. During the Early National Period, when our Middle West was being colonized, these trans-Appalachian settlements were, by reason of poor means of communication, farther from the American seaboard than from the French and Spanish merchants in Louisiana. National turnpikes, canals, river steamboats, and later, railways, changed this relationship, but they were never powerful enough to obliterate Middle Westernism as a distinct culture. Even after northeastern and central United States was covered with a giant rail web and a network of fine roads and fast bus routes, the Middle West still remained from one to three days away from the East, the South, or the Great Plains. The airplane, however, puts it only hours or minutes away from its neighboring regions. This is equally true of the other regions of the nation.

It is not implied here that the Air Age will obliterate regionalism, but it is suggested that it will modify it strikingly. With the

plane to carry men, mail, and goods, and the television radio to carry ideas and pictures, the assault of regional cultures upon one another, and of national urbanism upon regionalism in general, is bound to evoke profound and startling changes in our national life.

Dividing a nation into cultural regions is a process which can be carried downward into almost infinite detail. Thus regions are divided into subregions, subregions into districts, districts into localities. Each stage in the demarcation process is based upon smaller and less significant cultural differences, because the areas are smaller and the degree of isolation among them is less pronounced. Thus the inhabitants of the Southern Appalachians, the Industrial Piedmont, the Agricultural Black Belt, and the Piney Woods are all Southerners, but they are different kinds of Southerners, culturally speaking. Their economic differences can be accounted for by differences in resources, but their social and mental differences are largely traceable to their isolation and separation from one another. Given instantaneous communication by radio and television and travel and transport reduced to matters of minutes by the airplane, social and mental differences are bound to be weakened.

The automobile has already leveled off many of these local differences; the plane cannot but level off still more of them. Perhaps no means of transportation and communication can ever blot out all cultural differences between localities, but the airplane has already demonstrated its potency in that direction. Certainly it has given a new meaning to American regionalism; it is compelling us to re-evaluate regionalism as a national factor, and it will compel us to undertake a new program of regional integration within the national whole.

Changes in Men's Ideas

Whatever the airplane may do to us physically, economically, and socially, it is certain to enforce upon us many new ways of thinking. The automobile compelled abandonment of horse-and-buggy ideas. The airplane denies us the privilege of thinking any longer in automobile or steamship terms. The process of change in basic ways of thinking is always painful; in this case doubly so because the airplane has come so closely upon the heels of the automobile. It is trebly painful because the airplane adds

a new dimension to our thinking, whereas previous inventions merely added more speed and facility to the already utilized two dimensions.

In general there are three major realms where human ideas face drastic changes. First, *geographic situation* must be re-appraised and revisualized; second, *geographic location* must be re-evaluated; third, *a larger type of citizenship* must be understood and practiced.

Geographic Situation Revisualized

In July, 1909 when Bleriot made his historic flight from France to England, British, French, and American newspapers hailed it as a feat of heroism. Some of the German newspapers, however, brushed aside this paltry aspect of the matter and were inclined to view it as in the light of the changed geographical relations which it portended. One newspaper in Germany declared flatly, "England is no longer an island," a statement which reveals that even then the Germans were more nearly aware of geographical values than the Americans or the British.

The idea of Britain's no longer being an island may appear to many as a far-fetched notion. If, however, we define an island as a piece of land which may be reached only after a water voyage, acceptance of the idea becomes easy. The airplane abolishes the water voyage and provides the same sort of transport between France and Britain as between France and Italy.

From this we may conclude that our entire array of concepts regarding geographic situation in the world has been based upon means of transport and intercourse which have been superseded by the airplane. For example, in the case of Europe, we are accustomed to think of France, the Middle European countries, and Russia as continental; the Low Countries, the Baltic States, Portugal, Dalmatia, Thrace, and so forth, as littoral; Italy, Greece, Spain, and the Scandinavian countries as peninsular; and Britain, Ireland, Iceland, Crete, and so forth, as insular in situation. And so they are, in terms of land and water travel. (See Fig. 17.) But in the Air Age, Britain becomes merely a European peninsula with subpeninsulas formed by Ireland and the Shetlands. The present-day peninsular countries of Spain, Italy, and Scandinavia simply move back to become coastal or littoral situa-

tions. Littoral countries move still farther back and become indistinguishable from other continental nations. (See Fig. 45.)

Similarly the Norwegian Sea becomes a small nearly enclosed gulf. The North, Baltic, Black, Aegean, Adriatic, and Mediterranean Seas become small lakes. Sicily and Tunis become an isthmus connecting Italy with Middle Africa; Crete becomes an isthmus connecting Europe with Egypt and Ethiopia; Gibraltar becomes an isthmus connecting Europe with West Africa.

Fig. 45

The airplane remakes the geographic situation in Europe

Looking farther, we see on the north the Arctic Ocean as a new World Mediterranean Sea, the opposite coast of which is North America. Looking westward, we see that the Atlantic Ocean has shrunk to a North Atlantic Sea whose southern and northern ends are nearly closed by the elbow of the Brazilian Bulge and by the Icelandic Peninsula which juts eastward from Greenland. Travel across the Atlantic Sea or the Polar Mediterranean is today no more formidable than was travel across the European Mediterranean in the year 1914. On the other side of the world, the South Atlantic and the Indian Ocean have

shrunk to the proportion of seas. The Pacific is the only ocean left, and it has dwindled to relatively small size.

Geographic Location Re-evaluated

We have long been accustomed to evaluate the great land mass of Eurasia in terms of its two ends rather than its middle. Western Europe and the Orient have for ages been the centers of world culture, world influence, and strategic importance; the central area has been a region of low accessibility and small importance. This evaluation of Eurasia was the inevitable result of geographic relations in a world measurable in terms of railroads and ships — inevitable because it could not logically be otherwise. The airplane, however, has upset these relations completely. (See Fig. 19.)

On any north pole-centered map, Eurasia (*i.e.* Europe and Asia) is shown curved about the Arctic Mediterranean in a giant semicircle. North America and its two outliers, Greenland and Iceland, very nearly complete the circle. The center of gravity obviously lies in the vast spaces of Russia, Siberia, Turkestan, and western China. These lands constitute a world core or heartland, approachable with difficulty over the land and inaccessible by ship, but centrally located in an air world. Whoever holds this area in the future must therefore play a dominant role in world affairs. Western Europe, Mediterranean Europe, the Near East, India, Southeastern Asia, and the Orient combine to form a "fringeland" of definitely secondary importance about this central core.

Across the Arctic Mediterranean a second but smaller heartland comprises most of Canada and the United States. This, too, has its fringeland consisting of Alaska, British Columbia, the American Far West, the Gulf and Atlantic Seaboard states, Maritime Canada, and Newfoundland.

Thus the new geographic location, expressed in world terms, depicts a *central* area embracing the two heartlands connected by a polar mediterranean sea. (See Fig. 46.) Encircling this is a disconnected series of fringelands enjoying *adjacent* location. Out beyond this is a zone of *peripheral* location, consisting of Africa, South America, and Australasia. Within this general zonal framework are still other areas which possess *strategic* location. Up to now, strategic location has been measured in terms of seaways and landways — great ports, railway or highway foci, nodes on

caravan routes or long rail lines, or breaks in river navigation. Suppose, however, we measure locational strategy in terms of airways. Greenland immediately springs into the foreground as a world focal point, while the English Channel, the North Sea, and American seaboard cities fall into the background.

New York, Le Havre, Shanghai, Yokohama, Hamburg, Philadelphia, Boston, San Francisco, and Calcutta cease to be great

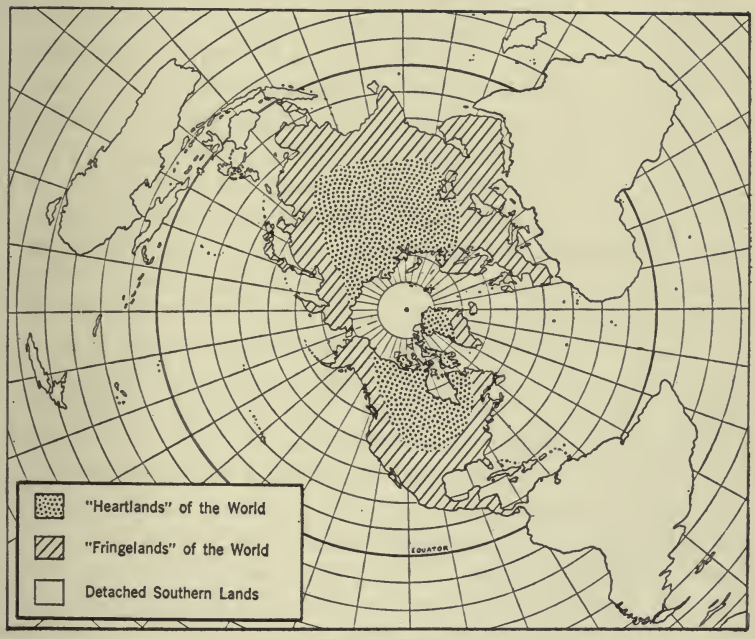


Fig. 46

The "heartlands" of the world surrounded by "fringelands"

portal or gateway locations. Minneapolis, Winnipeg, Fairbanks, Moscow, Omsk, Arkangelsk, and the Hudson Bay ports begin to compete for preëminence in intercontinental trade. Places where rail or caravan trade crosses a navigable river or where two or more railways intersect or where two navigable rivers form confluence, cease to be the great nodal points, and give way to points where two or more air routes intersect, or where airway meets seaway or landway.

A whole new set of intermediate points or areas also take on

strategic locational significance. In the ancient world perhaps the three most important such localities were the Fertile Crescent of Asia Minor, the Palestine Corridor, and the Bosporus-Dardanelles Gateway. In the medieval world these were superseded by the Danube Valley, the Rhone Valley, and the Belfort Gate, the Adige Valley-Brenner Pass Route, the Lowland of Flanders, the Poitou Gate, and the Indus-Ganges Plain-Khyber Pass Route.

In the world era now drawing to a close probably the three most important intermediate locations, from a commercial-industrial standpoint, are the Rhine-Ruhr-Saxony Corridor, the Hudson-Mohawk-Maumee-Lake Michigan Corridor, and the Japanese Inland Sea Corridor. From a commercial-industrial standpoint Panama, Suez, Aden, Gibraltar, the Skagerrak, the Dardanelles, and the Strait of Malacca area are also highly strategic locations. The impact of the Air Age has already been felt on all of these strategic locations. The latter group, *i.e.* the commercial-military corridors, have during the Second World War lost most of their military and naval value. In their place the airplane has substituted some six highly strategic intermediate areas. These are: first, the Norwegian Sea-Iceland-Greenland-Labrador Corridor, connecting Europe and North America; second, the Chuckchen Peninsula-Bering Sea-Alaska Corridor, connecting eastern Asia and North America; third, the American "Mediterranean" connecting the two Americas; fourth, the "Strait" of Dakar, connecting Africa and South America; fifth, the Indo-Malayan "Mediterranean" linking Asia with Australasia; and sixth, the eastern Mediterranean-Near East Corridor linking Europe, Africa, and southern Asia. The strategy of wars and commercial rivalries will be spelled out in terms of the air control of these corridors. (See Fig. 41.) Within them, presently little-known cities will rise to world importance: Cloncurry, Darwin, Saigon, Hanoi, Okhotsk, Nome, Carácas, Bogotá, Natal, Dakar, Casablanca, St. Johns, Port Churchill, Etah, Godhaab, Arkangelsk, Dudinskoe, Benghasi, Beirut, and Basra will be much on the tongues of men and the pages of newspapers.

A Larger Type of Citizenship

In ancient times men were citizens in only a very restricted geographical sense. When Greek civilization was at its height, the best philosophical minds were able to conceive of citizenship

only in terms of the city-state, *i.e.* in terms of a city and its small tributary area. Empires which arose from time to time in various places were not exceptions to this, because they were based upon conquest rather than citizenship. Even in the advanced times of the Romans, the mind of man was unable to go much beyond the idea of the city as the basis of citizenship.

With the improvement of transportation and communication, however, a larger sense of community began to develop, particularly in northwestern Europe. Men gradually became citizens of states and nations rather than localities. The British colonials in North America were able to think of a union of a dozen or more states. Such a union was made possible by their common situation along the seaboard where mutual access was provided by sailing vessels. Such a union was further expedited by the invention of the device of representative government through delegated franchise. As the country spread beyond its original littoral situation, it was saved from disintegration first by the invention of the steamship, and second by the coming of the railroad. Then it was that the American Union was able to become and remain a transcontinental nation. Indeed most of the world, aside from portions of Africa and Asia, also entered upon a period of intense nationalism. The automobile and the radio merely heightened men's idea of national citizenship. Men in the tiniest states jealously guarded their independence even to the brink of economic ruin; men in small states dreamed of becoming citizens of greater nations; men in great nations dreamed of planting colonies, of conquering small neighbor nations, of acquiring greater "living space" or "market areas," even of becoming masters of the world.

There was, of course, nothing wrong with such nationalism except that it led to Machiavellian diplomacy, power politics, and an endless sequence of bloody warfare. Such a situation was both natural and inevitable. It was natural because man did possess means of transport effective enough to unify fairly large areas around specific centers or nuclei and to make of them close-knit provinces of unlike cultures. It was natural, further, because man did not possess means of transport effective enough to destroy the power of one cultural province to defend itself readily against its neighbors. It was inevitable because there existed no agency of warfare with range and speed great enough to destroy world safety and therefore enforce a world community.

The airplane provides just such an agency. It has created a terrible new form of military mobility. Wars are no longer matters of conflicts between opposing armies. The distinction between civilian and soldier, combatant and non-combatant has disappeared. Women and children in the home and workers in factories are now on the front line of conflict and carnage. Bombs may be dropped anywhere — and are. Troops conveyed by plane, glider, and parachute descend in the very middle of a country. War ceases to be a frontier action and becomes a central action. The objectives of war are no longer matters of overrunning boundaries and destroying fortifications and military power, they are aimed at destroying economic life and disrupting social fabric. Its destructiveness is so terrible and its mobility is so great that many have cried out that we should be better off without the airplane. But, as Robert H. Hinckley points out, "This is an unrealistic attitude to take. Seven hundred years ago, Genghis Khan developed a mobile army on the basis of the horse-and-buggy (steed and war chariot), and with it, overran half of the then known world. The destruction and suffering which he wrought by this simple but unorthodox innovation was in nearly every way comparable to the military use of the plane today by the Axis Powers. The plane is a new mobility; the horse-and-buggy was, in its day, a new mobility. The latter, however, long ago settled down to serving man in the arts of peace. The airplane will just as surely, but on a vaster scale, serve him as an agency of civilization and progress. Time writes the story of man and then moves on." We cannot, as we have long attempted to do, continue to turn our backs upon the fact that the plane has not only become the highest denominator of war, but promises to become a powerful instrument for promoting a world-wide or global community.

We Americans have got into a dangerous national mental attitude, one which if not corrected speedily may very well betray us. Since our program of public education has contained almost no social geography, we have for the most part remained unaware of the reality that there are other culture patterns in the world which are very different from our own. Too, we have remained unaware that some of these cultures are exceedingly dynamic, and that they are inimical and antagonistic to ours. America was settled in the days of the sailing vessel, and as long as this agency

remained the measure of geographical accessibility, our two oceans provided us with considerable relative isolation and national safety. It is true that we became involved in practically every great foreign war, but the centers of struggle were far away and our entry into each conflict was slow and partial, and the time of such entry was seemingly of our own choosing. We, therefore, developed an ingrained attitude of separation from world events.

The native Amerindians in what is now the United States were not numerous, and their social geography was quite simple. We quickly dispossessed them and destroyed or submerged their cultures. During the next three hundred years a steady stream of immigrants flowed through our gates. Some of these were very different from ourselves; most of them we regarded as outlandish, even funny. Since these newcomers, with one or two small exceptions, constituted helpless disorganized minorities, we quickly assimilated them and gave them our own culture. We thereupon forgot the whole matter except to remain mildly contemptuous of other cultures which differed from our own. We never bothered to study other peoples and other lands, their objectives, needs, aspirations, or resources. When Japan wrested Formosa from China, we shrugged it off as no concern of ours. When she attacked Russia, we considered it a nuisance and hastened to negotiate an unwise peace between the two parties. When Japan seized Korea or Manchuria, or Italy seized Albania or Ethiopia, or Germany and Italy gave backing to an anti-democratic minority in Spain, we calmly regarded such affairs as local problems. When Austria-Hungary attacked Serbia or Germany seized Czecho-slovakia, we regarded it as no affair of ours.

This national habit of isolationism continued long after any excuse for it had vanished, because our national safety was in large measure provided by British control of the sea lanes. Long after the Atlantic had shrunk to a width of four or five days' travel, we continued to regard Europe as weeks or even months away. For years we ignored the fact that the airplane had moved the Japanese emperor and his authoritarian state of fanatical puppets to our Pacific doorstep, and that it had moved the neo-pagan corporate states of Germany and Italy to our Atlantic doorstep; that it had placed Soviet Russia where it was separated from us merely by a flight of a few hours over the "top of the

globe"; that it had made China and the East Indies our essential national allies; that it had placed our first lines of defense along the Rhine, in West Africa and in Iceland, at Changsha, Hongkong, and Commandorsky Island; that it had brought Spanish, Portuguese, Italian, and German authoritarian propaganda to our Latin American doorstep.

As a people we Americans have never made any effort to study other culture patterns in their environmental settings, but up to the present that fact did not affect either our safety or our happiness to any great extent. Now, however, continuing ignorance in this realm will prove disastrous. The Second World War caught us completely uninformed and mentally unprepared. By dint of almost superhuman effort we will weather this storm resulting from our faulty thinking. If we do not permanently correct our improper attitudes, however, we may not be able to weather another world crisis.

Our allies and ourselves won the First World War, but our leaders who had studied history, economics, political science, mathematics — everything, indeed, but geography — adopted a "hermit nation" policy and thereby lost the peace. This policy was the direct product of thinking based upon obsolete and fragmentary cylinder geography. It is of utmost significance that we Americans be made to realize that wrong ideas and ignorance in the minds of men, who may be well-intentioned, patriotic, and pious, in one decade, may lead to national catastrophe in a later decade. We can be as geographically cylindrical or wafer-form as we like, but global warfare may be the penalty. We can think in terms of hemispheres, tritispheres, or terrestrial quadrants, but the airplane has made our world inescapably monospheric.

The old social world is gone. Moscow is now closer to us than Boston was to George Washington, Burma closer to us than the frontier forts of the Revolution were to New York City. Germany is today only 15 hours away from the United States. Next year it may be only 8 or 10 hours away. Every German school child is taught this; every American child must know it also. Our near neighbors have moved closer. Widely separated nations have become neighbors. Contacts between different patterns of culture are increasing. Problems in mutual understanding are multiplied in number and severity. Possibilities of conflict and war are bound to increase unless met by preventive measures.

Obviously some form of strong and effective international organization is now imperative. International law must be revised and enforced. Certain aspects of national laws must be standardized, certain civil liberties made world-wide, currency and postage must be placed upon a common basis. In short, a world community is in the making, and a larger type of citizenship is going to be required of each one of us. In part this means expanding our loyalties, sympathies, and understandings; in part it means surrendering some of our outworn provincialisms and national prerogatives and sovereignties.

The airplane not only demands a new type of political thinking, but it requires that we think in new socio-economic terms as well. The scene of a great flood in Louisiana, a fire in Chicago, a hurricane in Barbados, a wreck off Iceland or an earthquake in Peru can be reached by plane within a few hours or minutes. Food may be flown to marooned flood victims, serums to the sites of epidemics, medicines and doctors to the sites of disasters, lifelines to ships in distress. This not only saves an increasing number of lives, but it brings sharply into focus the question of social responsibility, of who is my brother, and to what geographical extent am I my brother's keeper.

Bubonic plague, malaria, and yellow fever are no longer oceans away, but merely hours away. Oppression, injustice, starvation, and human misery are no longer oceans away, they are hours away. These are circumstances which demand an enlarged scope of civic responsibility.

Regional Changes

Recreation. Not all of the social changes engendered by the airplane are international in scope. The Air Age promises many regional changes within the confines of our own country.

The automobile created a vast recreation industry in America. In part this consisted of the growth of resorts, recreational hotels, national parks, spas, and seasonal residence areas. In other parts it consisted of the rise of roadside and highway tourism. Collectively these forms of recreation comprise one of the half-dozen leading industries of the nation. A great many localities derive more than half, in many instances nearly all, of their income from recreation. Some counties of northern Michigan, for example, report 60 to 75 per cent of their taxable wealth dependent upon

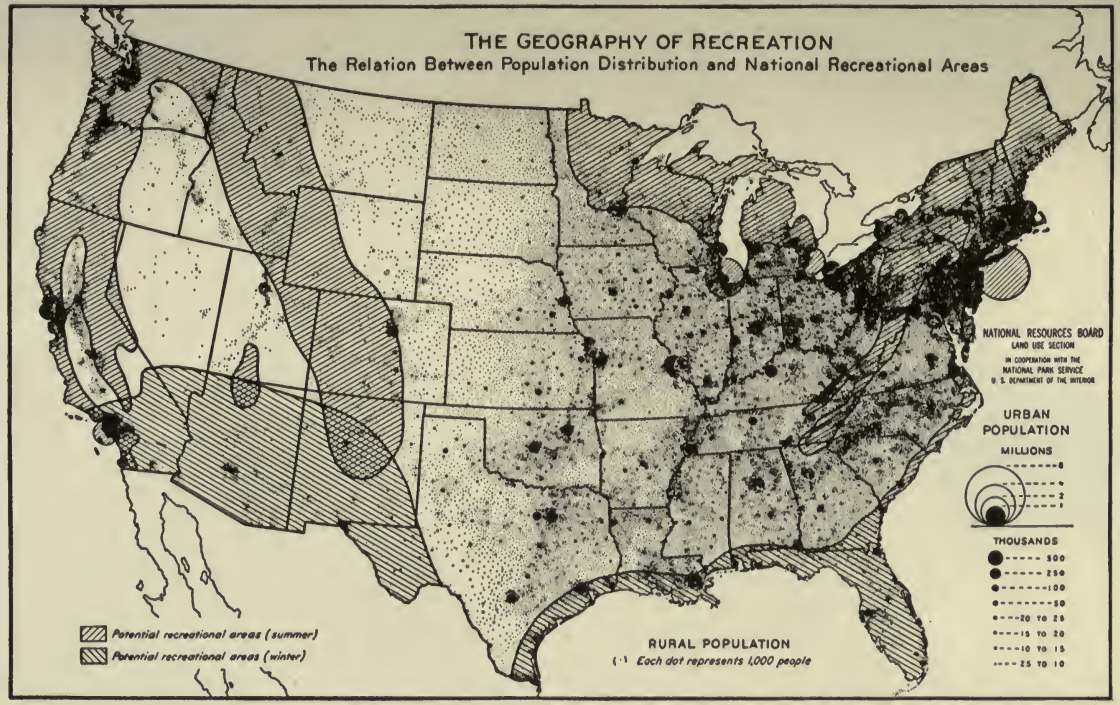
recreational industries. The airplane promises to make recreation the greatest by far of all American industries.

The facilities for recreation in the United States are as nearly inexhaustible as any resource can be. Play and exercise are consumer goods for which, theoretically at least, there is no visible limit. Careful study of the recreation map of the United States (Fig. 47) shows that northern New England and New York, the Great Lakes Forest Region, the Appalachians, Ozarks, Rockies, Black Hills, Sierra Nevada-Cascades, the Southwestern Highlands, beach areas in general, and the Pacific Northwest are primarily regions of summer recreation. Florida and the Gulf Coast, the Southwestern deserts, southern California and a few Northern localities specializing in winter sports (such as the White Mountains, the Adirondacks, Sun Valley, and Mount Rainier) are primarily regions of winter recreation.

When a map of these regions is examined in the light of the distribution of American population, striking inadequacies are revealed. The recreational regions are, for the most part, located at some distance from the great centers of population. The regions of sparsest population are richest in recreational resources; the most densely populated are poorest. Thus the Rocky Mountains are about six days from the Atlantic coastal cities by automobile; Arizona seven or eight days away; the Pacific Coast nine or ten. Florida is about three or four days from New York City. Even the Adirondacks or the White Mountains are a day from New York by car. Such distances defeat the week-ender in his search for recreation. Most areas are also inaccessible to the average American who has but two weeks in the summer and perhaps a week or ten days at Christmas time to find his vacation release.

The airplane, however, promises to change this very drastically. Huge transports capable of carrying one hundred or more passengers at very low rates will make the Middle Western, Southern, and Western areas as accessible to the northeast as the Catskills and Berkshires are at present. The social changes which are bound to result are well-nigh unpredictable.

Seasonal occupations. In the past, serious labor shortages have existed at times and in certain localities in the United States, while unemployment was a problem in other localities. Many employments are highly seasonal, as for instance the building trades in the Northern states, truck farming and cannery work



Bureau of Agricultural Economics

Fig. 47

Recreation areas in relation to the distribution of population in the United States

in the East, cotton picking in the South, sugar-beet labor and caring for tourists in the West, and fruit and hop picking in the Far West. Air transport offers considerable promise in helping to solve our interregional labor supply problems, particularly the very vexatious one of migratory labor.

Seasonal shifts of population. Few if any places on earth have an ideal climate throughout the year. Most places have at least one season of which they may rightfully boast. Air-conditioning of homes, office buildings, stores, schools, and factories offers a partial solution, but this is subject to serious limitations. Modern times have seen an increasing number of people who shift their residence and place of work with the seasons. The British Government official or Army officer sends his family to Simla, Kashmir, Darjeeling, or some other hill station to escape the hot season. The businessman in New York or Chicago may send his family to Florida or Biloxi in winter or to Cape Cod or Door Peninsula in summer. Dependent upon train travel, he sees them but infrequently. With plane travel available, he may commute back and forth daily. More than this, the airplane may make it possible to shift whole populations seasonally. In the future Columbia University may hold its winter session in Miami, may shift its summer school to Crawford's Notch or Lake Placid!

Development of backward areas — the case of Alaska. Poor transportation has heretofore doomed many areas to a state of social and economic backwardness. In some instances the construction of roads or railways is too difficult or costly to be presently feasible. In other instances the upkeep or maintenance on such routes promises to be far in excess of revenue returns for many years to come. The airplane offers a simple and cheap solution in cases of this kind. Airports scattered through a plateau, mountainous, forest, or rugged hill region, or placed on remote peninsulas and detached islands, may be constructed at relatively little expense. Small planes, obsolete for use on regular routes, may be utilized. Service need not be scheduled, but may be provided as demand arises.

All over the world, remote or isolated regions are feeling the stir of social change. Afghanistan, New Guinea, the northern forest regions of Russia and Canada, the high Andean areas of Colombia, Ecuador, Peru, and Bolivia, Brazilian Amazonia, Iceland, and China's Yunnan Plateau and Red Basin are being

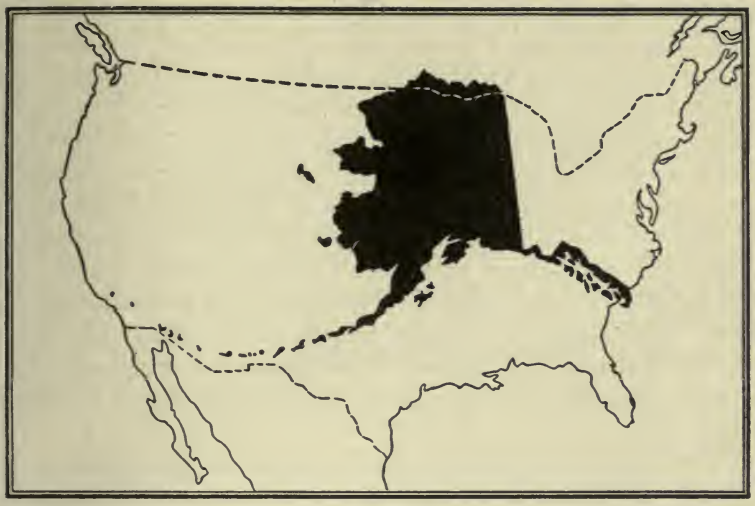


Fig. 48

Alaska superimposed upon the United States

changed by the airplane. In our own nation, the example of Alaska is most worthy of note.

Alaska is about one-fifth the size of the rest of the United States. (See Fig. 48.) It is a long way off from most of us. At its nearest approach, the southern "panhandle" of Alaska is more than 500 miles from the northwest corner of the state of Washington. Seward on the south coast of Alaska is about 1375 miles from Seattle and nearly 2000 miles from San Francisco. Fairbanks in interior Alaska is fully 3000 miles from St. Louis.

The great size of Alaska and its huge distance from continental United States have been the basic reasons for the slow rate of development in this northern territory of ours.[1] Inaccessibility of one Alaskan region to another and the isolation of a long and severe winter are additional reasons. Milder winters and superior ease of access have concentrated most of the population and the economic development in the panhandle and along the south coast. In contrast to this, most of the future potentialities lie in the interior Yukon Basin. There have been four main ways into and out of this basin: first, by ship to the mouth of the Yukon

[1] The following is adapted from a communication from Dr. H. A. Bauer of the Alaska Territorial Planning Board, 1939.

and thence by small river steamboat; second, from Skagway via the White Pass and Yukon Railroad to the headwaters of the Yukon; third, from Valdez to Fairbanks over an automobile road known as the Richardson Trail; and fourth, by way of the Alaska Railroad which the Federal Government has built over the 471 miles from Seward to Fairbanks. It is also possible, but difficult, to reach interior Alaska from Nome or St. Michael by dog sled.

The transportation facilities of Alaska were built not for the service or convenience of the scattered population, or for the purposes of planned future development. In the main they served only the immediate purpose of economic exploitation. The Alaska Railway was designed to aid pioneer development, but freight rates were so high that the primary purpose of the road was defeated.

The airplane arrived at a time when Alaska possessed only a patchwork of scattered roads, each of which was serving only local or regional needs, and when expenditures for maintenance of these roads absorbed practically all available funds. It arrived, too, when new capital was being invested in other mineral enterprises than gold mining, such as oil at Inisku Bay, tin on Seward Peninsula, platinum about Goodnews Bay, and mercury in several localities; at a time when the Territorial Government was trying to exercise its administrative function over a territory much too large to be handled with its meager funds.

In pre-airplane days it took mail from Seattle four or five days to reach Juneau on a semi-weekly (summer) or weekly (winter) basis. An additional three or four days were required to carry the mail to Fairbanks. More remote places received still poorer service.

Nome, on Seward Peninsula, was completely isolated for nine months in each year. Food and other supplies, imported directly from Seattle, had to be stored up during the ice-free summer months. Interestingly enough, Nome enjoyed better connections with Puget Sound than it did with the other parts of Alaska. Mail from Nome to Juneau had to go by sea from Nome to Seattle, and thence back to Juneau, a distance of some 3000 miles.

Mining, logging, and fish-cannery crews had to be brought in and provisioned directly from the Puget Sound or Columbia River ports in Washington and Oregon. Such a transportation arrangement prevented the agricultural regions of Alaska from becoming supply bases for the industries of the Territory.

The Federal Government was greatly handicapped in its program of topographic mapping, geologic investigation, protection against depredation, forest-fire fighting, and even in its purely administrative work. The cost for all governmental services and functions was exorbitant, and the short summer season for field operations made progress discouragingly slow.

Law enforcement was inadequate to say the least. Supervision of industries for tax collection purposes was becoming increasingly difficult, even though it was becoming ever more necessary in order to meet the Territory's mounting budget. Bootlegging of liquors to native Aleuts, Eskimos, and Indians was getting out of hand.

As a result of these general conditions, Alaskan economy had become practically stagnant except for two absentee-owned industries — the fisheries and the gold mines. The former persisted because of the increasing scarcity of fish, the latter because of the governmentally "reflated" value of gold. Local business was slack, seasonal, and economically insecure. Living costs were high. Public administration of social welfare, education, community health, and justice was poor — for whites and natives alike. Reindeer herds deteriorated through lack of proper herding and because of the inroads of wolves and wild dogs. Many economic possibilities remained untried, even unexplored. One-half of the Territory remained topographically unmapped, and most of what was mapped had been covered only by reconnaissance surveys. Population increased very slowly; in some localities it was actually declining. The national defenses of the Territory were scandalously neglected and inadequate.

The airplane has changed the social geography of Alaska almost overnight. (See Fig. 49.) Hubert Bauer sums up the outstanding changes within the Territory in the following fourteen points:

1. Air mail and passenger service from Seattle via Ketchikan to Juneau (with extension service to Fairbanks) has stimulated business by speeding up orders and deliveries. (Flying time from Seattle to Juneau is 5 to 6 hours compared with 3 to 4 days steamship travel.)

2. As a result of this continental air service, radiating air routes were established at all major ports, so that now the many islands of the archipelago with their hundreds of fishing and mining

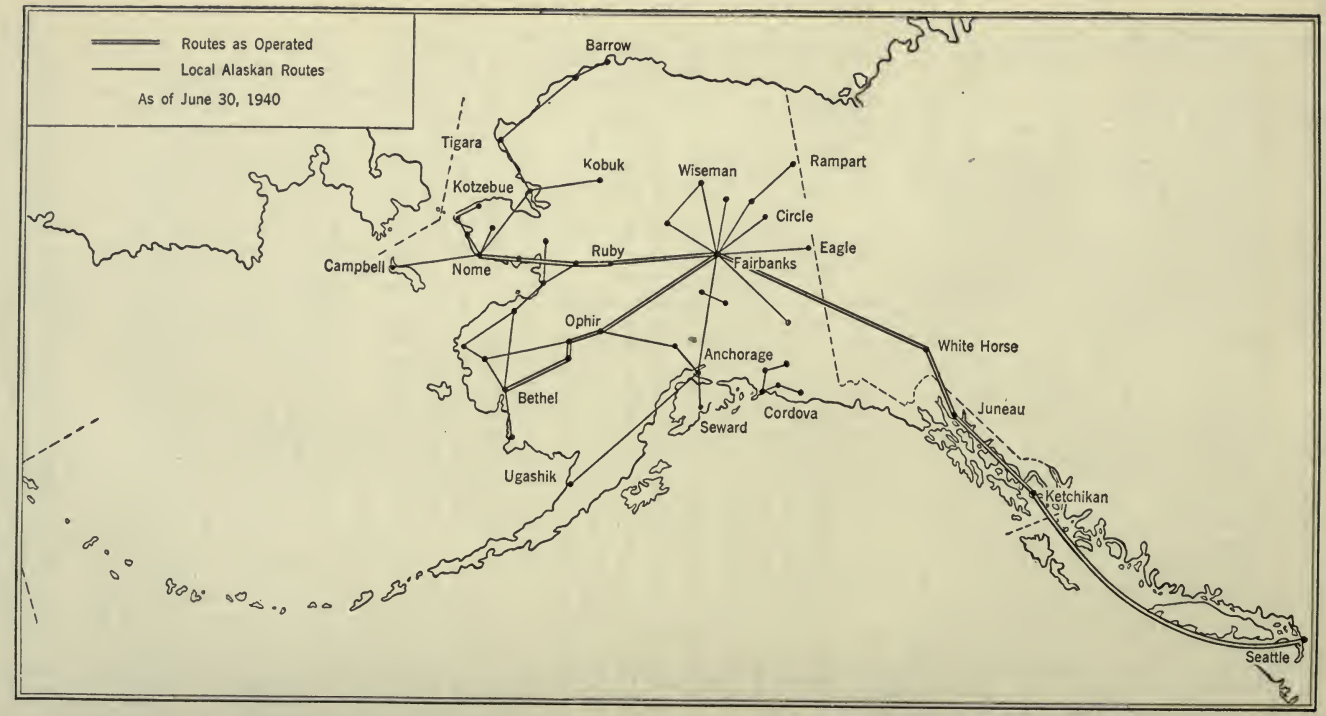


Fig. 49

The airways of Alaska

enterprises and isolated settlements have a daily instead of a weekly or fortnightly connection with the rest of the world.

3. A businessman from Fairbanks, Juneau, or Ketchikan can now visit Seattle, Portland, or San Francisco on a one-week round trip, whereas before, the same trip would have consumed a month or six weeks of time.

4. The airplane has linked the dismembered regional road systems into a continuous network of transportation.

5. Anchorage (even before the establishment there of the Army Air Base) had become a service center for a much larger mining area than it had served before. The entire rich southwestern mining field adjacent to Bristol Bay, the Kuskokwim, and the lower Yukon, formerly served either from Fairbanks or from the "Outside," has now become tributary to Anchorage. Anchorage has in fact become the hub of Alaska's economic life.

6. Nome has been especially benefitted by the airplane; it has daily connection with Fairbanks and Anchorage, both summer and winter. While its first air orientation was toward Fairbanks at the end of the Alaska Railroad, its business front is now changing more and more to Anchorage, which is located near the coastal terminus of the line, thereby eliminating the excessive railroad rates.

7. The Reindeer Service, centering in Nome, together with the Alaska Game Commission and the United States Wildlife Service, uses airplanes to spot reindeer herds, to provision isolated herders, and to hunt down wolves who prey on the reindeer.

8. Topographic mapping is now being greatly expedited through aerial photography. Soil and cover mapping in the Matanuska Valley in 1939 proved to be a tedious process until an accurate base map was obtained through aerial survey continuing over a short good-weather flying period.

9. Hitherto unknown, unexplored, and unmapped regions are now being covered by the Alaska Survey at a tremendous saving of time, personnel, and cost.

10. The Forest and Wildlife Services maintain their own airplanes or charter private planes on a contract basis for more efficient work in forest survey, fire control, wildlife research, restocking of wildlife breeding areas. These services formerly maintained large fleets of boats, operated at great cost; the number is now gradually being reduced as the plane takes over their tasks.

11. The Indian Service (Office of Indian Affairs) is making very efficient use of the airplane for its far-flung system of native schools, trading posts, and coöperative reindeer stations. Transport of sick natives to hospitals and mercy flights in emergency cases are some of the advantages brought about by the airplane.

12. Local business has extended its markets to formerly inaccessible mining camps hundreds of miles away. Fresh milk, butter, meat, and vegetables are now flown to these camps almost on daily schedules. Machine parts and other technical equipment in ever-growing volume and variety are also flown to these camps. This eliminates costly delays in operation which in former days often spelled the difference between profit and loss on an entire season's work.

13. The airplane pilots have adjusted themselves and their planes admirably to the often unfavorable flying conditions, weather as well as surface. They are quick to change from wheels to skis in order to land on snowfields or even mud flats if the situation demands. Their pioneering feats are innumerable but little known.

14. The airplane, it seems, is rediscovering and, at long last, conquering Alaska. If so, it will gradually eliminate America's last pioneer fringe. The tremendous aviational activity in Alaska by both the Army and the Navy during the Second World War promises to accelerate this process at a very rapid rate.

Community Changes

There is no question but that our great metropolitan centers represent the most conspicuous failure in Western Civilization. A large urban community is not, in and of itself, a bad thing, but the way in which our metropolises have grown and the social conditions under which their inhabitants live are decidedly bad; so bad indeed that they have become "dying out" places for the best elements in our population, and "drying up" points for our civilization. Statistics on housing, birth rate, health, juvenile delinquency, divorce, crime, vice, political "bossism," and production of educational, business, and scientific leadership all point to the social preposterousness of our present type of metropolitan community.

The present-day metropolis was created by the railroads during the middle and late 1800's and greatly augmented by the automobile during the early 1900's. Congestion and underprivileged living became so marked that suburbanism developed as a partial

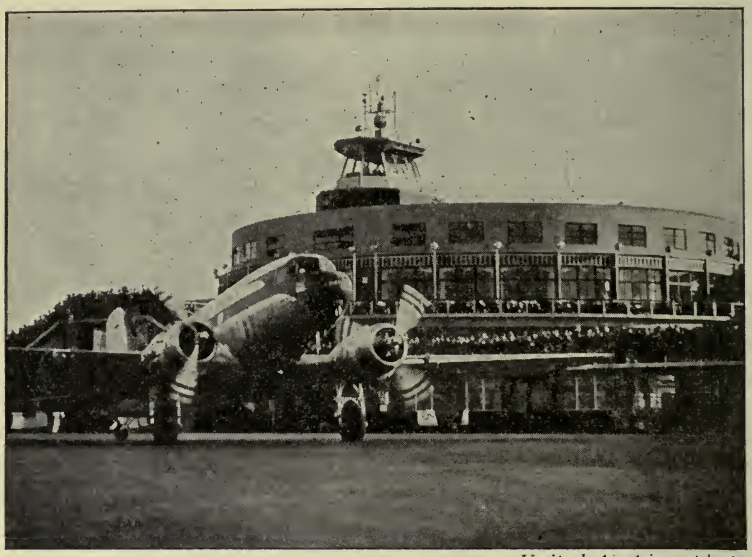
antidote. In this movement to the fringes of the metropolis the automobile has been a powerful instrument, for it has offered cheap, convenient, and flexible movement to and from the metropolitan center. Commutation trains on the railroads have also aided in the daily movements of population. Since the feasible limits of daily commutation varies from perhaps thirty minutes to an hour and a half, there is a fairly definite outer limit to suburbanism in terms of land transportation. At the inner or metropolitan end, there is also a fairly definite limit, a limit set by automobile parking space, traffic control, and width of city streets. In many instances both outer time-distance limit and the inner space-load limit have been reached or even exceeded.

Constant city planning and gradual remedial treatment have been and will remain only partially effective. They are only palliative, not curative. Moreover, employed on any really comprehensive scale, they are bound to be too costly to be met by public taxation. The result has been the beginning of the flight of certain types of industries from the metropolis to suburban or even rural localities. How far this decentralization of the metropolitan center might have proceeded in an automobile-dominated world we shall never know, because the airplane has now entered the picture and is producing its own changes.

So far, hardly a metropolis has fully realized what the airplane portends. Air transport was accepted and has now become a commonplace. It has, however, served only the wealthy and upper middle classes so far, and then only for intercity travel. Airports have been built outside the city, sometimes as far as fifteen miles outside, in the vain belief that the airplane was merely an auxiliary form of travel. Even in New York City it takes as long for a passenger to get to the airport from Times Square as it does for the plane to carry him from New York to Philadelphia. (See Fig. 50.)

Such lack of visualization of what the future role of the plane will be is as inexcusable as it is futile. In the case of New York or of any other metropolis, the future primary role of the plane will not be to carry long-distance travellers, but to convey the daily millions to and from work in a new large-scale form of commutation.

The narrow radius of the automobile has created about each metropolis a congested, unplanned disarray of misfit suburbs.



United Air Lines photo

Fig. 50

LaGuardia Airport in New York City

The plane offers a commuting radius of two or three hundred miles. Huge air transports can carry vast numbers of workers from country to city in comfort and perfect safety and can do so more cheaply than the automobile performs a like task. This implies that an airport should be located in the center of the metropolis of the future and that all other forms of transportation then in use be centered upon this airport. This may well result in the almost complete decentralization of the great urban center as a place in which to live, although it may augment it as a place in which to work and trade.

At the other end of the commutational air route some profound changes will also occur. In colonial days, the center of the village or semirural community was the tavern where the stagecoach made its scheduled stops and where casual wayfarers paused. At a later date, thousands of American towns were created by railroads. The main street often ran parallel to the railway. The "depot" became in a sense the civic center. On the station platform loafed the town's toughs; a card game was usually in progress in the baggage room. To it strolled the village couples

in the evening. Here the village busybodies collected to see the "Flier" go through or to scrutinize the drummers and travelling men who arrived on the evening local, or even to watch the "way freight" perform its prosaic switching functions.

More recently the automobile has been creating a new pattern. The livery stable has been replaced by a garage. Gasoline pumps have appeared in front of the stores; a few miscellaneous buildings have been razed to provide a parking lot across from the new cinema theatre. The social center of the American village of the future can scarcely escape being the airport. Here may be observed the transcontinental plane which goes over on schedule but rarely stops. Here alight numerous private planes, and helicopters; and once a year or so, a giant Army transport alights for repairs or refuelling. The main events, however, will be morning departures and evening arrivals of the commuters' transport conveying the workers and shoppers to and from the metropolis.

All of this suggests that America faces profound changes in its community life. It is imperative that we begin to teach the geography of city planning and of community design before these changes are upon us in unmanageable degree.

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CHAPTER 8

THE AIRPLANE CREATES A NEW POLITICAL GEOGRAPHY

Political Geography Defined

POLITICAL Geography is an old and honorable subject. It may be defined as "the study of the state or nation (and all its subdivisions) in relation to the earth environment." It is, however, an almost entirely neglected subject in the United States. American scholars generally have thought they could understand a nation by studying its institutional structure, its constitutional law, and the history of its diplomatic relations. They have, therefore, been unmindful of the fact that the basic key to understanding a nation lies in the use of the ecological (geographical) method. This method consists of examining a state against its earth environment — its locational, spatial, physical, and human resources, with a view toward discovering the problems of that nation. Such study enables one to discover who the people of a nation are, what space they inhabit, what resources are present in that space, and what use is being made of those resources. Carried a step further, it reveals what that nation is thinking and desiring, what strategies it is erecting, what problems it faces or thinks it faces, what are its relations to neighboring nations or states, and what its future relations are likely to be. The study of the political geography of any area, therefore, centers about some seven questions:

Who is there?
What resources are present?
What use is being made of these resources?
What stresses and strains exist?
What problems result from these strains?

What are the possible and probable solutions of these problems? What relation do these problems and their possible solutions bear to the future policies of one's own nation?

Like most branches of human knowledge, political geography is of use both in times of peace and times of war. Moreover, it is useful to both warlike and peaceful nations. A peaceful-minded man would define political geography as "the study of nations in order to discover and help solve their geographical problems." A warlike man would define it as "all the geography which can be used by a nation in waging war or exploiting peace." It amounts to the same thing, only the emphasis is different. Germany is an outstanding example of a nation which has used geography to wage war. Japan used it until recently to exploit peace. Russia has used it to build internal social and industrial strength. Britain and the United States do not seem to have used it very effectively for any purpose, although in the United States, such agencies as the National Resources Planning Board have begun to employ the principles of geography in a small way in connection with the conservation and improved use of our resources.

It is fairly obvious, therefore, that an understanding of political geography (or geopolitics as it is often called in Germany) is of immense value to the people of a nation which is willing to study it. It is of use in three different ways.

(*a*) It gives them a basic understanding of world politics, revealing their role in, and their relations to, the international scene. It prevents them from failing to perceive currents in which they are certain to be involved. It keeps them from overlooking events which are apt to affect them.

(*b*) It provides them with a basis for peaceful relations with their neighbors, for building up alliances, participating in world structures for maintaining peace, and for making diplomatic moves to prevent possible war.

(*c*) In the event of war, it gives them a basis for making intelligent strategy, and for prosecuting a military struggle effectively and with least waste and loss.

In short, proficiency in political geography aids a nation in understanding the current world political scene, in developing devices for maintaining world peace, and in successfully prosecuting a war in the event of its occurrence.

America's Past Wars

War is always highly geographic. It not only involves the struggle for geographical objectives, but the very lines of that struggle are, to a large extent, drawn by considerations arising from the environmental factors and the geographical relationships which are involved. The strategies of the two parties involved in any war are always different, because their objectives are different, and because they visualize their geographical relationship in different lights. So greatly is this true, that war may almost be defined as the conflict between two unlike human geographies. America's past wars reveal this quite clearly.

French and Indian Wars, prior to 1764. The French and Indian Wars were primarily struggles between two European powers, Britain and France, to possess the North American continent. The American colonists became involved because they were engaged concurrently in a frontier struggle with the native Amerindians for actual possession of the land itself. The limits of human geography in that day were set by small sailing ships on the sea, by canoe travel on streams, and by pack-train and foot travel over land. The Americans held possession of a narrow line of settlements along the Atlantic Coast, while the French possessed the maritime peninsulas of eastern Canada and the Valley of the St. Lawrence. Behind these the French were scattered thinly over the Great Lakes and Mississippi Valley country southward clear to New Orleans.

Actual fighting operations involved struggles to possess the Champlain Lowland, the only easy route from the British Atlantic colonies to French Quebec; struggles to possess Louisburg, which guarded the entrance to the Gulf of St. Lawrence and which also lay along the seaway to England; and struggles to possess Quebec City, which stood at the junction of river lowlands in eastern Canada. They also involved struggles to control the fortified French trading posts along the Great Lakes, which served as gateways from Canada to the Mississippi Basin. Lastly they involved struggles to possess a long line of little forts strung along the crest of the Appalachian highlands separating the British coastal settlements from the French fur-trading country inland drained by the tributaries of the Mississippi.

The Americans triumphed because their colonial settlements

were more compact and permanent, and because their lines of communication with and supply from the mother country were superior to those of the French.

The Revolutionary War. The American Revolution appears politically as a struggle between a great maritime power, Britain, on the offense, and a small weak continental nation, the United Colonies, on the defense. The result could only have been victory for the former under normal conditions. Britain, however, was at that time also engaged in a terrific struggle with imperial France, and hence she had little time or energy for what must have appeared to her as a minor backwoods war.

Geographically the Revolutionary War exhibited three phases: a sea phase, a coastal phase, and a frontier phase. The frontier phase included a series of conflicts to possess the Hudson Valley and the Champlain Lowland. These combined, form a low route to Canada, down which the British tried to move in order to cut off New England from the middle and southern American colonies.

The coastal phase of the war involved a contest for control of the major American seaports, Boston, New York, Philadelphia, the Chesapeake Bay towns, Charleston, and Savannah. It also involved a series of battles to possess the fertile, relatively level, and comparatively well settled lowland which stretches from New York across New Jersey and eastern Pennsylvania.

The sea or maritime phase consisted, in the main, of a series of small engagements between American privateers and British naval and merchant vessels. Every seaway between the West Indies, New England, and Europe was fought over time after time, from 1776 to 1783.

The War of 1812. In a sense, the War of 1812 was merely a continuation of the Revolutionary War, and the period from 1783 to 1812 was only an armistice. On the British side, the War of 1812 represented the belief that the young United States was still a dominion in the British Empire, and that, while she had won the right to self-government, her foreign affairs were subject to British supervision and her seamen liable for service in the Royal Navy. On the American side, the war represented a desire for complete national independence and freedom from the maritime restrictions and meddlings on the part of the mother country. On the part of some Americans, it also represented a desire to annex

Canada and to eliminate all British holdings in the western hemisphere.

The record of actual conflict reveals that the United States was peculiarly safe from outside attack. Britain, the dominant sea power of the world, could find almost no way of striking at the weak little continental nation so as to hurt her vitally. British attacks from the sea were made at Baltimore, Washington, and New Orleans. The United States, however, had no great seaports or highly industrialized districts which could be stricken. Britain was unable to land any huge, well equipped armies for large-scale territorial conquest. Battles were fought to control the Great Lakes frontier posts and to control the land approaches to the United States from Canada through the Mohawk and Champlain lowlands.

The British could and did blockade the American coast pretty effectively, particularly from Chesapeake Bay northward. Great numbers of American privateers were, however, outfitted and sent to sea. Confused and bitter sea fighting was carried on from Canada to Brazil, and eastward to the coasts of Portugal and Ireland. It occurred, too, along the east coast of South America, around Cape Horn, extending northward to Ecuador and westward to the South Seas.

The Mexican War. The struggle between the United States and Mexico lasted for approximately twenty years and went through some five phases. These were: The Texas Revolt (1835), the American Annexation of Texas (1845), the Black Bear Revolt in California (1846), the Mexican War (1846-48), and the Gadsden Purchase of territory (1853). These were the inevitable results of the American colonization of border areas in Texas, the contest for control of the southern land routes to the Pacific Coast, and the desire of the rapidly growing American nation to achieve a transcontinental situation. The results were to add huge amounts of land to the American domain, to prepare the way for an era of transcontinental railway building, and to bestow enormous mineral wealth on the United States. The exploitation of this mineral wealth later rearranged the entire world pattern of trade and finance.

The War Between the States, 1861-1865. Politically the War Between the States was a struggle between eleven Southern states and the Federal Government, between the principle of loose con-

federation or alliance on the one hand and the principle of tight federalization on the other, between the concepts of state sovereignty and national sovereignty (the original intent of the Constitution seems to have supported the former more than the latter). The two parties to the struggle were, however, largely divided by geographical factors. Indeed the war was at its base actually a contest between two discrepant systems of human geography which existed side by side in the nation.

In the South there existed a civilization which was almost wholly rural. On the more fertile lands a capitalistic and slave-holding landed gentry was engaged in planting. On the marginal sandy and hilly lands poor whites lived under conditions very much like those of early colonial times. The humid subtropical climate and the red-and-yellow subtropical soils were utilized primarily to produce corn for food and cotton and tobacco for export. In return, luxury and trade goods of a manufactured sort were largely imported.

In the East and Middle West (*i.e.* the so-called Northern states) the humid continental climate and the predominant brown forest soils could not be utilized for producing subtropical staple crops suitable for slave labor and plantation management. Instead there developed all through these sections a small yeoman type of agriculture. Along the coast and about the Great Lakes this was supplemented by the highly individualistic fishing industry. The absence of slave labor kept wage levels up, and this attracted landless immigrants from Europe. This in turn caused the rise of manufacturing, mining, and trade.

These two systems of economic and social geography produced continuous friction along the middle border which ran from Maryland westward to Missouri and Kansas. In the Congress it resulted in a long series of debates, partisan quarrels, and political compromises.

When war finally broke out in 1861, the South's strategy was to keep the sea lanes to England open, and because British mills depended upon the South's raw cotton, to elicit British naval support and political recognition. Meanwhile the Confederate armies planned to seize the national capital in the hope of demoralizing the Federal government, and thence to march northward across the northern Piedmont and the Pennsylvania-New

Jersey lowland in order to strike at the centers of northern industry and commerce.

The geography of Federal strategy was quite different. The plan was to blockade the southern coast and to seize the major export ports, Norfolk, Charleston, Savannah, Mobile, and New Orleans; to move gunboats down the Mississippi River, thereby cutting the Confederacy in two; and to march down the Great Appalachian Valley in order to reach the agricultural heart of the South.

Despite superior morale and military leadership, Southern strategy was doomed from the outset. The South could not break the blockade, and it did not possess the necessary industrial capacity for needed war manufactures. Full British support was not obtained. Confederate armies never reached the industrial centers of the Northeast. Much of Southern man power consisted of untrained Negroes unavailable for military service; the supply of white man power was exhausted at the end of four years of war.

The Spanish American War. The struggle with Spain in 1898-99 was, strictly speaking, America's first war abroad. It is almost a truism that a nation seldom fights a successful war on its own territory. The Spanish-American War was America's most successful and least costly war, and was fought wholly outside of our national limits.

The strategy of the war was exceedingly simple. It was to engage and defeat the Spanish fleet in the Caribbean, to land troops on Cuba and Puerto Rico, and to engage and defeat the Spanish fleet in the Far East and occupy the Philippines. After some blundering, these moves were accomplished.

Cuba was liberated from Spanish tyranny and became a republic. It has remained a field for American money investment, and an economic dependency of the United States. Puerto Rico remained an American territory and an economic headache for our Government. The war, however, placed the United States in a position to dominate the entire region known as Caribbean America and, to a lesser extent, continental South America. Already under the Monroe Doctrine we had come to regard the portion of the western hemisphere which lies to the south of us as our own special sphere of influence in world affairs.

In the Pacific realm the results of the war were even more pro-

found. Our early trade with China, our westward expansion to the Pacific Coast, and our purchase of Alaska in 1867 gave us an enormous stake in Pacific affairs, but we had no territorial stake there until 1898.

The American victory at Manila Bay and the resulting possession of the Philippine Islands compelled the United States to make certain far-reaching decisions. She might have set up the Philippines as an independent weak republic and then retired from Pacific affairs. She did not follow this course. Instead she kept the Philippines and also kept her commercial interests in China. This made it necessary to develop Hawaii, which had just been annexed, and to retain the formerly Spanish-held island of Guam to serve as way stations to the Philippines. More than half a century earlier, American mariners had discovered Wake and Midway islands, but it was not until 1898 that the United States annexed them. In 1899 she also annexed the eastern Samoan Islands. During the following thirty years, American sovereignty was also established over several smaller islands of the Pacific. By the end of the nineteenth century the American flag had been planted nearly halfway around the globe.

The First World War. The small but far-flung possessions of the United States and the development of American naval and merchant maritime power gave us an enormous stake in world affairs. The narrowness of the Atlantic gave us easy and immediate commercial access to Europe. Our chain of island possessions across the Pacific brought us to the very doors of Australia and Asia. Indeed our share in the international settlement at Shanghai actually placed the American flag on the Asiatic continent. Our possessions and investments in Middle America gave us a dominant position in much of Latin America.

Such a geographical arrangement brought us into active competition with only one nation — Britain. In an earlier age this might have resulted in a naval war of extermination, but in the twentieth century it had quite a different result. The colonial expansion of the United States was not dictated by a desire for territory for reasons arising from the internal geography of our nation. British territorial expansion had long since ceased. Moreover both nations had evolved in their political philosophy to a point where they regarded naval power as merely an instrument for maintaining world order and complete freedom for commer-

cial activity. As a consequence there existed for many decades a tacit alliance of the two navies. America's continental detachment, coupled with half a navy strung along each coast, gave her a feeling of freedom from any possible invasion. Friendly Britain's naval control of the exits from and entrances to all the oceans merely reinforced this feeling of security.

Britain, lying close to the continent of Europe, did not feel quite so safe. To render her landward side secure, Britain formed an alliance with two great military powers, France and Russia. Under the protection of this international combine for world stabilization, formed by naval Britain and military France and Russia, a whole flock of small nations huddled for protection. In its shadow the United States also sat comfortably protected.

In 1914 Germany challenged this arrangement. She formed an alliance with Austria-Hungary, Bulgaria, and Turkey. This central European coalition quickly overran Belgium and most of the Balkans. Its plan was to crush Russia and France and establish control over all Europe. As one may see from the map, Europe faces Britain with a semicircle of coasts, peninsulas, and enclosed seas. Making use of this fact of geographic location, and employing the combined shipbuilding facilities of Europe, the German coalition planned to challenge British sea power and destroy it. The next step would have been to engage and destroy the American Navy and assume dominance of the entire world ocean.

The citizens of the United States, knowing nothing about geopolitics and unused to doing any geographical thinking, failed to see the struggle in anything like its true light. From 1914 to 1917 they preferred to regard it as a European squabble. Moreover they insisted upon keeping aloof from it and carrying their own trade uninterruptedly all over the world. This trade, of course, included the selling and carrying of supplies to Britain and other European nations which were at war. German submarines began to sink American ships wherever they found them— a circumstance which caused the United States to declare war upon the central European coalition. She entered this war and sent an enormous expeditionary force to France, not as an ally of the nations already fighting Germany, but in the spirit of conducting a separate war of her own — one of the most amazing psychological phenomena in human history.

During the ensuing months, correlation between Allied and

American effort was effected, and the central European Powers were defeated. After the war America withdrew to the supposed isolation of her western hemisphere and refused to participate in any plans for world-wide security and enforced peace. The American people and their leaders, knowing no political geography, gradually came to feel, as they looked back over the war, that they had been fooled into entering the struggle. They were unable to see that they had helped to deliver themselves from a later disastrous naval struggle and a worldwide commercial slavery. Instead, reasoning from the non-geographical factors which were immediately visible to their eyes, they concluded that what they had done was "to pull British and French chestnuts out of the fire." In partial defense of such an attitude, it may be said that no other conclusion was possible unless one were able to reason in politico-geographical terms.

The German challenge to the world order which had been established by the Anglo-Saxons failed. This was, psychologically speaking, not wholly fortunate for the American nation. After Germany was defeated, we were able to retire to our own continent in the firm belief that our security was guaranteed by the widths of our two oceans. We also were able to believe that naval power would be able to handle any future challenges to world order and peace. Thus there became fixed in the American mind a belief that the oceans, rather than British sea power, were responsible for our security.

This was doubly unfortunate, because British strength itself had been greatly diminished. To be sure, the Royal Navy was as strong as ever, but British land allies were much weaker. Imperial Russia had collapsed and been replaced by Soviet Russia, a nation which certain groups in both Britain and the United States refused to have anything to do with.

France continued to support Britain in the interest of world security, but France had been much weakened by the War. The United States refused to support either of them politically. Hence they were compelled to hunt for new allies. Turkey and Greece, neither of them strong powers, rather doubtfully allied themselves with Britain. The new countries Poland, Czechoslovakia, and Yugoslavia supported France and Britain, but were too weak to make much difference. China began to feel the stirring of great new democratic forces, but Britain and America failed to aid her.

A democratic state was erected in Spain, but again Britain and America failed to help it to get established and grow strong.

Italy openly deserted the side of world order and began a series of shameless aggressions in Albania, in Spain, and in Ethiopia. Again Britain and America failed to make any move to keep order in the world. Meanwhile Japan in the East had been carrying on an equally open and shameless series of aggressions. Once again, Britain and America refused to take any direct responsibility. By this time the League of Nations, which had been set up to aid in maintaining order in the world, lost the last semblance of influence over the acts of nations. Germany began a series of open and flagrant aggressive acts against its neighbors. Holland, Switzerland, and the Scandinavian countries had become "pacifists." Belgium deserted France, and Portugal deserted England. The new government in Spain was openly hostile to democracy and world order. In France, traitorous elements were undermining French will to preserve democracy. Leaders in England were, incredibly enough, able to have a constitutional crisis over the question of whom the King was to marry, and quite ignore the approaching German-Italian-Japanese threat to the very existence of the British Empire. In the United States, we were busily trying to isolate ourselves from the rest of the world, and passing laws which would shut us off from taking any responsibility in world affairs.

The Second World War. In one important aspect, the First World War was a struggle for control of the seas, and was made possible because of the invention of the submarine. The German challenge failed because British and American sea power was too strong. The Second World War is a struggle for world control with especial emphasis upon that of the land and the air, made possible by the tank and the airplane. The strength of the German, Italian, and Japanese challenge lies in the recognition by those peoples of the changed geographical relations created by these two new instruments, and in a willingness to create their war strategy out of this new geography. French defeat, British initial failure, and delayed action by the United States were the results of thinking in terms of obsolescent ocean-basin geography, and operating under an outmoded ocean-basin psychology.

During the decade prior to the Second World War there was a good deal of argument as to whether a plane could sink a battle-

ship. It really did not matter whether it could or not. What did matter was that the plane was a factor of higher power magnitude than anything on the earth's surface. What if the planes of 1939, or 1940, or 1941, could not sink a dreadnaught? If they were instruments of greater power potential, then it was obviously only a question of time and human will until planes powerful enough to sink anything could be built. This realization should have guided the geography of all our foreign relations. Apparently it was guiding the behavior of our enemies.

As a basis for understanding the geography of the Second World War, it might be well to examine both Germany and Japan from certain geopolitical angles.

Germany after the First World War

The post-war settlement. When Germany was defeated during the First World War, the allied nations partially dismembered her in the hope of making her permanently weak. An area rich in minerals, forest, and waterpower, but inhabited by Germans, was given to Czechoslovakia. An important mining and industrial district was given to Poland. An inconvenient corridor was cut through eastern Germany and also given to Poland. The landlocked Germans of Austria were set up as an independent state. The great city of Danzig, the Memel District, and the Saar Coal Basin were put under League of Nations rule. The Malmedy and Eupen districts were awarded to Belgium. The Allies occupied the Ruhr industrial district for several years. A district containing Germans was even given to Italy, and Alsace-Lorraine including its predominantly German portions was given to France. The German navy was surrendered, the army disbanded, the colonies forfeited, and Germany was forbidden to fortify the Rhineland. Such a policy was perhaps *natural* considering the fact that Germany had broken the peace of Europe and had devastated her neighbors' lands.

Next to the Russians, however, the Germans are the most numerous people of Europe. They are also one of the best educated peoples in the world. It is difficult, therefore, to see how they could be permanently kept weak and divided. Indeed that policy eventually proved to be unworkable.

A national program. Before many years, the German geographers began asking over and over, "Why did Germany lose

the war?" They established laboratories to study the question, and organized a great geographical institute to discuss their problems and find solutions for them. Geography was made the basis for the education of the nation, from home geography in the elementary schools on up to world geography in the advanced schools. Out of this grew an important national plan, some of it bad, some of it good. Germany built a new merchant fleet. Deprived of colonies and with former markets gone, she began to study the commercial needs and desires of the peoples of Latin America, eastern Europe, and elsewhere. She trained thousands of her young men to fly, and a million of her schoolboys to use gliders. She built magnificent roads, improved her railways and canals, constructed huge municipal airports and housing units, and began replanning many of her cities. She taught her boys and girls to work.

She began systematically to study her natural and human resources, and the resources of her neighbors as well. She fertilized her fields, scientifically managed her forests, reclaimed her waste lands, and made lists of the resources which she lacked. As a result of what she found, she began to utilize low-grade ores of iron and other metals. She put into practice conservation measures and increased the reclamation of waste materials. She began to make herself ready for a great war of conquest. This effort included some six things: first, greater conservation of what resources she did have; second, development of substitutes for some of the things she lacked; third, encouragement of new industries where possible; fourth, purchase of enormous stocks of materials which she lacked; fifth, mobilizing the whole nation for work; and sixth, taking the lead in developing aviation.

Lacking silk, she developed rayon and other artificial silks. Lacking rubber, she developed buna and other artificial rubbers. Having a deficit of meat, she developed soy-bean growing. Lacking enough fats, she developed vegetable-oil processing. Suffering scarcities of wood, metals, wool, and cotton, she developed plastics and substitute textiles. Lacking petroleum, she developed processes for distilling gasoline and oils from coal. She purchased or traded for enormous amounts of tin, rubber, gasoline, motor oil, aluminum, copper, copra, quinine, nickel, chromium, tungsten, asbestos, tea, coffee, and other essential materials which her geography could not provide. By this time the Allies had evacu-

ated the Ruhr Valley and had allowed the Saar Basin to rejoin Germany.

Uniting the German peoples. The German geographers also began to study the distribution of German people throughout Europe, and indeed in other parts of the world (Fig. 51). Germany, herself, had a population of some 67,000,000 Germans. Austria contained nearly 7,000,000 Germans, Switzerland some 3,000,000, and Luxembourg and Liechtenstein about 300,000.

Fig. 51

The distribution of German peoples in Central Europe in 1939

Memel contained 150,000 Germans, and Danzig 400,000. France held 1,000,000 Germans, Belgium 100,000, Czechoslovakia 3,200,000, Italy 200,000, and Poland perhaps 2,000,000 or more. Far out in Russia were more than 600,000 Germans; another million or so were scattered through Hungary, Yugoslavia, and Rumania. From one-half to one million more were spread through the Baltic republics. Closely related racially to these are the Dutch of Holland and the Flemings of Belgium with their 15,000,000 population. All told, these peoples numbered almost an even 100,000,000. The Germans began to dream of uniting all

these into one huge nation. To accomplish this a politico-geographical plan was needed.

The national plan. Germany had already built several "pocket" battleships whose specifications outwitted the restrictions in size placed upon her ships by the Allied nations. She had also built fleets of submarines. She had trained a large army in a sort of militia organization. And so, suddenly, Germany mobilized an army and marched into her Rhineland and began fortifying it. She built a huge line of fortifications called the Westwall, opposite the French and Belgian frontiers. Then she defied the Allied nations and annexed Austria in March, 1938.

If you will look at the map, you will see how Czechoslovakia, in 1938, cut the whole southeast corner out of what would otherwise have been a compact rectangular Germany. Surrounded by a semicircle of rugged mountains, Czechoslovakia would have been hard to attack. This semicircle of mountains contains great resources of coal, iron, and other minerals, forest, waterpower, and many other things. Moreover, it contains some 3,000,000 Sudeten Germans who had been deliberately settled there centuries ago. After Austria was annexed, western Czechoslovakia was left almost completely surrounded by Germany. Threatening her with air bombardment from all sides, Germany compelled Czechoslovakia in October, 1938 to surrender her German-inhabited mountain rim. At first Britain and France refused to let Czechoslovakia be victimized, but Germany revealed her air strength and threatened war. Since neither Britain nor France was prepared to meet German air power, they were forced to acquiesce to the separation of Sudetenland from Czechoslovakia.

Annexation of non-Germans. As soon as this was done, the little republic was almost defenseless, and so Germany broke her promise not to molest her further, and marched in and took possession of the *whole* country with its munition and gun factories, shoe factories, textile mills, mines, rich farmlands, and all. This was morally quite different than the annexation of Germans to the Reich. If finally exposed the German plan for what it really was. The unification of all German areas in itself might have ultimately contributed to the stability of Europe, but the Czechs were not in any sense German. Thus the Nazi program stood revealed as plain, naked imperialism, following the ancient pattern.

Meanwhile the Reich had begun moving all Germans from

Italy and the Baltic countries into Germany. This showed that she might have done the same thing with the Sudeten Germans had she wanted to. But she had not wanted to; instead she had used the wish to "repatriate" the Sudeten Germans as an excuse to annex the strategic parts of Czechoslovakia. A few days after Czechoslovakia was occupied, Germany annexed Memel. The annexation of Danzig soon followed.

The war starts. A second glance at the pre-1939 map will show you that the Polish "Corridor" cut East Prussia off from the rest of Germany, and also that there are no natural barriers between Germany and Poland. In September, 1939 Germany began the conquest of the Corridor. The Poles resisted, and within three weeks the German forces overran the country as far east as the old Russian frontier. She did this by driving five great spearheads of tanks and armored cars, operating under a canopy of airplanes, eastward across the plains of Poland. (See Fig. 52.) The spearheads operated as giant pincers and crushed all resistance which remained after the planes had done their work. This was no reunion of German peoples; this too was conquest of a non-German nation. France and Britain, therefore, came to the aid of Poland, and a European war started. Eventually it became a world-wide war, as all such struggles are apt to do.

Germany's Second World War

Preliminary moves. The French had built an immense wall of fortifications from Switzerland to Belgium, known as the Maginot Line. They sat in it and fired at the Germans occasionally, while Britain used her navy to blockade the continent of Europe. In the spring of 1940 Germany suddenly took over little neutral Denmark and occupied all of her commercial airports. From these she covered the Kattegat and Skagerrak with a cloud of planes. Under this she moved troop transports to Norway, and within a few weeks succeeded in conquering that nation. The British navy, lacking planes, finally had to retreat.

Next Holland was attacked. The Hollanders cut their dikes and flooded wide areas. The Germans, however, flew over the floods and took the Dutch cities by air. A little later another great armored spearhead covered by planes cut the Belgian army to pieces and threw the British and French expeditionary forces into retreat.

Fig. 52

1939 Germany and her movements toward European conquest up to July 1, 1942

Air power conquers France. Meanwhile, the German armored units and planes began to punch at the French northern line, bulging it backward in several places. Finally a great plane-covered spearhead broke through and rolled west to the English Channel. From there, most of it turned north to help crush the British army in a great "pincer." A part of it turned south to cut off the French retreat. (See Fig. 52.) A fog fortunately descended over the English Channel, and through it a nondescript fleet of British vessels, tugs, ferry boats, fishing boats, motorboats, even pleasure craft, aided by British planes, got most of the British army out of the trap.

The French line also broke farther eastward at Sedan, and the German tanks, trucks, and planes rolled south to take the great Maginot from its unprotected rear. The Battle of France was over.

Air power conquers Southeastern Europe. During the following year the Germans and their Italian allies ferried an army and a great force of tanks across the Mediterranean, under a blanket of air power, to Tripoli. From there they moved into Cyrenaica and struck at Egypt. During this same time Germany lined up Hungary, Rumania, and Bulgaria as eastern allies, and attempted to coerce Turkey into joining her side.

In April, 1941 four German air-protected, armored spearheads, and one Italian spearhead, suddenly plunged into Yugoslavia, crushing nearly all organized resistance within a few weeks and bombing to ruin many cities. Three armored spearheads covered by dive bombers stabbed south into Greece, soon overrunning that land. The British army together with part of the Greek army retreated by boat to the island of Crete. A few weeks later a German army swarmed down into Crete by parachute and glider. The British, after suffering terrible losses, managed to escape by boat once more.

Germany turns eastward. On June 22 Germany struck eastward without warning into Russia. She attacked that country all the way from the Black Sea to the Baltic. Her more or less unwilling ally, Finland, attacked Russia from the Baltic to the Arctic. Germany used her usual tactics of armored troop thrusts under a protecting cloud of planes. Two spearheads went north through the Baltic states, two others went east toward Smolensk and Kiev, a fifth went east toward Odessa. At the end of a month these objectives had for the most part been reached. (See Fig. 52.) A second month was spent in straightening the line and pushing the jaws of the pincers farther. By the end of the third month a nearly straight line ran from Crimea to Schlüsselburg on Lake Ladoga; Leningrad was surrounded. By the end of the fourth month Leningrad was under siege, a spearhead had reached Kalinin, another had reached the suburbs of Moscow, and that city was being bombed. A third had reached Tula, a fourth was outside Kharkov, a fifth was approaching Stalino, and a sixth was reaching for Rostov.

Plans for World Conquest

Conquest of Eurasia. Less than a month later the Russian winter arrived, and the Russians began to resist more effectively. A short while before, a military mission had been sent from Ger-

many to Japan with a plan for the Japanese to follow. This plan had been prepared by the German geographers, and was a strategy for conquering all Europe and Asia. The Japanese were secretly to strike the American Pacific fleet and at least temporarily disable it. Then, convoying troops southward under air power, she was quickly to conquer the Orient, turn westward, and overrun Burma and India. For the spring of 1942, Germany planned a similar drive eastward through southern Russia, across the Black Sea, and even through Turkey, to Iraq. Japanese and German forces were to meet in Persia. (See Fig. 53.) Then, using air-based

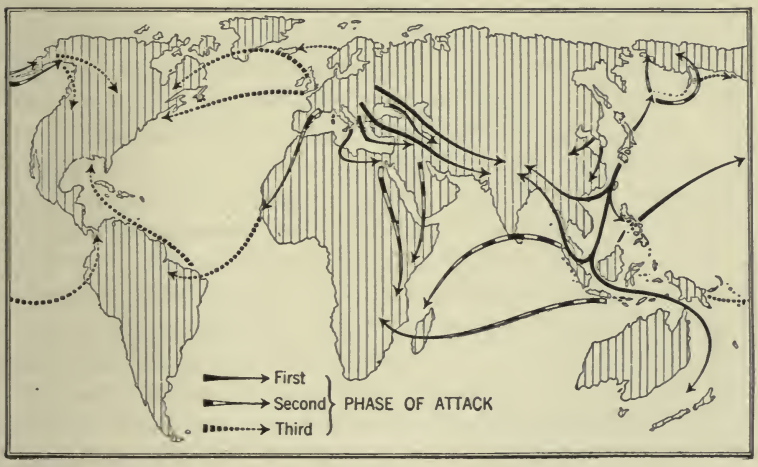

Fig. 53

Axis strategy for world conquest

planes, they were to drive the British fleet out of the Indian Ocean. Finally Japan was to strike into eastern Siberia and seal Russia off from possible American supplies from the east; Germany and Finland were to seal her off from British and American help via the White Sea. Thus surrounded and isolated, Russia and China were to be slowly strangled.

As soon as this should have been accomplished, the German armies were to be re-equipped in Russian factories and fueled with Iraq and Persian oil. Meanwhile fleets of submarines were to infest American waters. A vast new air fleet and troop-carrying barges would then be constructed and Britain would be knocked out of the war. Then the German army would roll south and,

aided by the Japanese navy, would overrun eastern and southern Africa.

A second army of Germans, Spanish, and Vichy French were to roll southwest to occupy western Africa. German airfleets would also occupy Spitzbergen, Iceland, and Greenland. The Japanese would occupy Australia. The conquest of the Old World would be completed.

After such a result should have been achieved, it is easy to see that the Japanese fleet, an enlarged German fleet, and a reconditioned French fleet covered by a huge air force could then begin the slow conquest of the New World. In this the Germans undoubtedly expected to be aided by thousands of German, Italian, and Japanese settlers and the several million Franco Spanish sympathizers in Latin America. In the United States the 30,000,000 or so Americans of German or partial German descent were probably also expected to aid.[1]

Conquest of the Americas. Even without the aid of such "fifth columnists," conquest of the Americas was entirely possible, simply through the use of geographic facts and relations. Southern South America is a natural competitor of the United States because of similarities in climate, soil, and vegetables. With Dakar, St. Louis, and Freetown in her possession, Germany could offer the southern South American countries much more attractive trade relations than we could hope to offer. Across the narrow middle of the Atlantic the conquest of Brazil would be entirely feasible. With the Axis in control of South America below the bulge of Brazil, most of the Latin American countries could then be expected to desert the American-Canadian-British-in-Exile camp.

From then on, a slow strangulation of North America would begin. Eventually actual conquest would be undertaken. A vast German air armada would strike from the North Sea via Scotland, Iceland, and Greenland. A combined German, Italian, Spanish, Vichy-French fleet under air protection would move up the Caribbean from the southeast. A Japanese fleet with plane carriers would move through the islands of the South Pacific to

[1] This stupidly overlooks the fact that many of these Americans of German or part-German blood are descendants of democratic refugees from various kinds of past tyrannies in Germany, and hence have scant affection for anything German.

strike from the southwest. A swift Japanese striking force would fly and sail along the Alaskan islands to strike from the northwest. Most of Canada, Alaska, and Caribbean America would go down quickly. The United States and southeastern Canada would then become the world's greatest battlefield. (See Fig. 53.)

This is no alarmist's dream; it is sober military strategy. Study your new world map, analyze the world's resources. Ponder the force of the tank and the armored car operating under the airplane. Man's relation to space and distance has been changed by aviation. War strategy is, and always has been, the geography of space, distance, and resources in conflict. To those who argue that naval power is supreme, it must be said that the German geographers have demonstrated that a nation may march around the oceans, and behind the great naval fortresses; that it may fly over the naval bases and across the narrow gaps between the continents. The airplane is only one of countless engines and agencies of war, but it is at present the highest factor in the equation of human struggle for power.

Man, Environment, and Politics in Japan

Old Japan. Japan is insular in its geographical situation. It consisted originally of four large and several hundred small islands located a short distance off the eastern coast of Asia. These large islands, Honshu, Kiushu, Shikoku, and Hokkaido together with their small neighbors were inhabited by the Ainus, a non-Mongolian stone-age people. To these islands from the Asiatic mainland came the ancestors of the modern Japanese — yellow-skinned Chinese and pre-Chinese folk, and brown-skinned Malayan peoples. Their first capital was located in Kiushu facing the mainland. Later it was moved to the shores of the Inland Sea, the small "mediterreanean" sea lying between the three southern main islands. Still later it was again moved inland to a position south of Lake Biwa. In the nineteenth century it was removed to Tokyo on the Quanto Plain, near the center of the largest island but facing the Pacific. Starting long before the Christian Era, the Japanese invaders began the slow conquest of the Ainus. As fast as these were subdued, the Japanese intermarried with them and colonized their lands — a process which continued steadily up to the present century. During these many centuries the Japanese developed a very careful agriculture, tea and silk

production, a managed forestry system, some mining and cottage industry, a great fishing industry, and considerable commerce with the Asiatic mainland. They also became a nation of many million people with several large cities and numerous villages.

After the time of Magellan's voyage an increasing number of Europeans came to Japan to trade. These were followed by missionaries and other classes of Europeans. The Japanese accused one sect of missionaries of conspiring to seize the government, whereupon they expelled all foreigners and closed their doors to other nations. About a hundred years ago the American Navy, aided by the Germans and British, forced Japan to reopen her doors to all foreigners.

New Japan. Japan, smarting under this compulsion, laid plans to modernize herself and become a great and powerful nation. She sent students abroad to learn modern science and business methods. She built schools and universities, railways, power plants, huge mills, factories, and shipyards. She expanded her fishing industry, reclaimed every possible bit of land for agriculture, and constructed a vast merchant fleet. She organized a great army modelled after that of Germany, and built a huge navy modelled after the navies of Britain and the United States. Still later she built up a very powerful air force.

Great cities arose and population increased rapidly. By the early 1920's the net increase of people in Japan was nearly 1,000,000 annually. This increase in population was encouraged by the government. It was made easy by the religious beliefs of the Japanese people. According to Shintoism, the state religion, the Japanese are heaven's chosen people, and the emperor is of divine origin, rules by divine backing, and is infallible in his decisions. This doctrine of infallibility and special divine sanction has, in the case of Japan, led to a particularly blind obedience of the individual to the state, and to a belief that to rear large families is a religious as well as patriotic duty even in the face of dire poverty. No harm can come of encouraging large families if a nation has plenty of land, minerals, raw materials for manufacturing, and other means of supporting an increasing number of people. If a nation does not have these things, it means a falling standard of living for its people, and eventual overpopulation of the country. When that point is reached, there are only three things which a nation can do: First, it can change its beliefs and

practices and limit its birth rate as do France, Holland, Norway, and certain other countries; second, it can continue to increase in numbers and sink into hopeless poverty and misery, allowing starvation to check human numbers at the poorer levels in society; or third, it can continue to become overcrowded and push outward to take the land and resources away from weaker nations. Japan, like Italy, has followed this third line of action.

As Japan became overcrowded, she turned her cotton, fruit, and tobacco fields into rice and vegetable fields in order to obtain more food. Increasing numbers of Japanese went forth to fish. Their fishing fleets have dotted the Pacific Ocean, frequented the Siberian rivers, scoured the coasts of Alaska, Canada, United States and Mexico, and infested the islands of the South Seas. Increasing numbers of men, women, and children have gone to work in mills and factories at pitifully low wages. Japan has bought larger and larger quantities of Indian jute and sugar, Siamese rice, Chinese and American cotton, Chilean nitrates, Peruvian copper, Malayan tin, Philippine hemp, American iron and steel, Mexican, American, and East Indian oil, and American lumber in order to supply her industrial centers.

As the Japanese population grew and grew, the supply of these vital raw materials became more and more of concern to the nation. Japan worried particularly when American-educated Chinese began building cotton mills in China, and when the Agricultural Adjustment Administration in the United States undertook to raise the price of American raw cotton. Finally the Japanese bombed and burned the Chinese mills and began the conquest of some of China's richest cotton and food producing lands. Wars, of course, are almost always a result of such faults in the human geography of nations.

Japan's mainland policy. As early as the 1890's Japan began to cast covetous eyes toward the mainland of Asia. She fought a short war with China and took from her the large island province of Formosa. Five years later Japan declared war on Russia and took from her the naval base of Port Arthur and the Liao Peninsula in southern Manchuria. She also gained control of the South Manchurian Railway. It was easy for Japan to defeat Russia because the Transiberian Railway was not yet completed and supplies and soldiers could not be brought from European Russia. Only a small Russian army and naval force were then stationed

in Asia. As a consequence a Japanese victory was easy. By this victory Japan gained the coal pits at Fushun, the iron mines of Anshan, the lumber industries of the Yalu Valley, and the exports of wheat and soy beans from the vast plains of Manchuria. She also seized the southern half of Karafuto Island with its oil, forests, and fisheries.

Ten years later Japan conquered Korea, and in 1912 she annexed that little country. During the First World War Japan conquered German-held Kiachow Bay on the Chinese Peninsula of Shantung. After the war she was given mandate control of the formerly German-owned Pelew, Ladrone, Caroline, and Marshall Islands and the German share in the international settlement at Shanghai. A few years later she tried to seize all of Chinese Shantung, but the other Great Powers of the world compelled her to abandon her plans. Meanwhile Japan had begun to plant a large colony of her people at Davao in the southern Philippines. In 1932 Japan undertook the conquest of all Manchuria and began to look covetously at the American-controlled Philippines, at the Russian coastal lands between Korea and the mouth of the Amur River, at the coastal plains of northern China, and even at the rich islands of the East Indies and the empty lands beyond that in northern Australia.

The geographical pattern of Japan's expansion. What Japan had been doing all through this period was to expand according to very obvious geographical principles. She was, herself, a group of islands, and so she added all the nearby islands from which she could have been attacked. Then she attempted to add all the peninsulas which the continent of Asia thrusts out toward her. She felt that such peninsulas were ready-made avenues of attack by other nations. As her sea power increased, Japan seems to have felt more and more insecure in the Sea of Japan, because Russia held part of the western shore and had built a giant naval base at Vladivostok. If she could but possess this Russian coast herself, her territory would completely enclose the Sea of Japan. Her army on the mainland would then form a first line of defense and her navy in the Sea of Japan a second line of defense.

The coming of the Age of Air Power, however, made such ideas geographically inadequate. Japan soon realized that to be safe, in any military sense, from possible reprisal from the other nations which she had herself previously attacked, she would have

to conquer all of the lands of eastern Asia. To support a military machine sufficient to control such a vast area, she saw that she must gain control of the resources of Malaya, southeastern Asia, the Indies, and Australasia. To accomplish this, it was plain that she must drive the Dutch out of the Indies, drive the British out of India, Burma, and the Chinese ports, and drive the Americans out of the western Pacific. This meant war on a grand scale, bitter relentless war, a struggle to the death between great nations.

Japan sets her geography in motion. December 7, 1941 found us, the people of the United States, up to our ears in a great war in the Pacific. We had built a huge navy in anticipation of the possibility of such a war. Unfortunately, we built that navy to defend the continent of North America, not quite realizing the fact that we should have built to control two oceans. The oceans are highways to the continents, not barriers as they once were long ago. Hence, in terms of military and naval strategy, our oceans, not the continent, have to be defended. This, of course, is but a plain geographical fact, and fortunately it was known to our military and naval leaders, although many of our political leaders did not see the matter in that light.

American Geography of the Pacific

Normally the British Navy could be counted upon to dominate the Atlantic Ocean. This left the American Navy more or less free to concentrate upon controlling the Pacific. Figure 54 shows a diagram of American naval power in that ocean. As preparation for understanding this diagram, certain preliminary facts need to be recalled.

The Pacific Ocean is a huge four-sided body of water covering nearly one-half of the globe and rimmed about by the continents of Asia, Australia, Antarctica, and the two Americas. Across this big basin Japan and the United States face each other. Japan, however, is a chain of islands squeezed against Asia and is unable to move a ship out of the Pacific without sailing it past a British, American, or Dutch position. The United States fronts on the Pacific but has an even more important coastline upon the Atlantic. She cannot, therefore, be bottled up in the Pacific.

In her national growth Japan expanded in a north-south direction until she came to occupy all the islands between the Philippines and Kamchatka. The United States, on the other

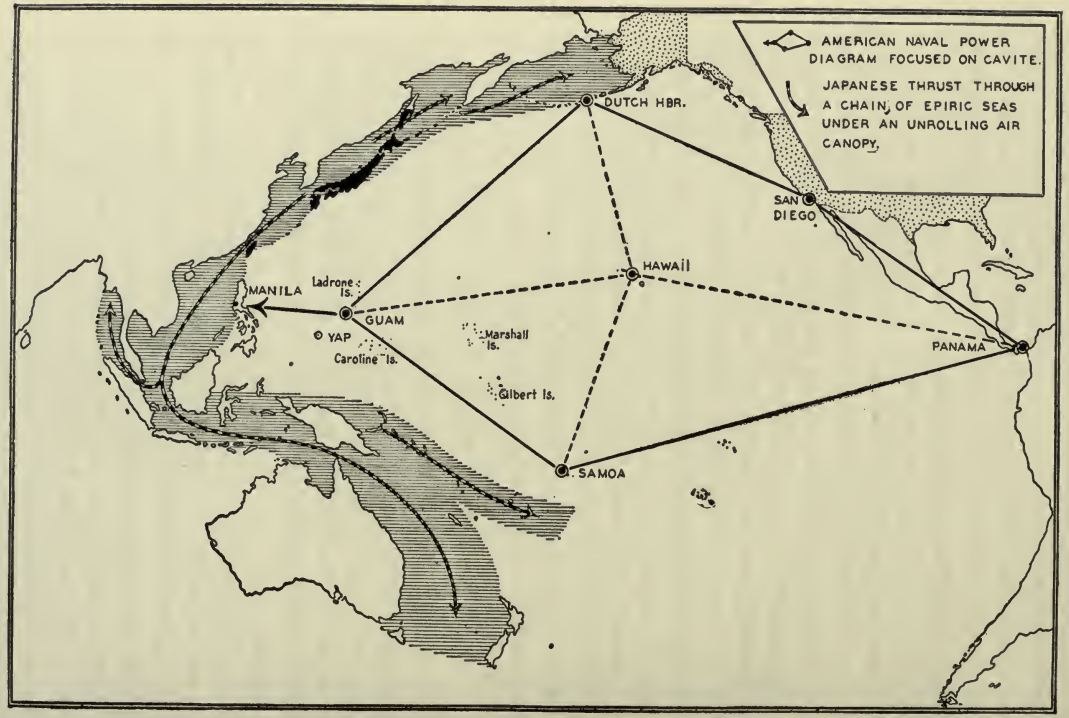

Fig. 54

The American naval-power quadrilateral in the Pacific and the Japanese air-protected corridor of attack

hand, had expanded in an east-west direction until she came to control most of the strategic points in the mid-Pacific. Partially offsetting this was the fact that Japan was protected by outlying islands in Micronesia, whereas our own west coast lies exposed to the open Pacific. The American problem was, therefore, to build bases upon her island possessions in such a way as to be able to dominate the mid-Pacific while she and the friendly British held all the bottlenecks leading into and out of that ocean. In contrast, the Japanese problem was either to try to break out of the Pacific or to accept the situation. Figure 54 shows the arrangement of island possessions whereby America held control of the Pacific Ocean. It shows a huge four-sided figure whose northeast side stretches from Panama through San Diego to Dutch Harbor in Alaska. The southeast side runs from Panama to American Samoa in the South Seas. The southwest side extends from Samoa to the island of Guam. The northwest side reaches from Dutch Harbor to Guam. The axial mid-line of the quadrilateral trends from Panama to Hawaii, to Guam, and on to the Philippines, where it focuses on Manila Bay. At the center of this structure, we built a huge naval fortress in Hawaii from which to clinch our domination of the mid-Pacific. There were certain geographical weaknesses in this arrangement. Guam at the western corner was only partially useful because its harbor had never been dredged. Indeed the Congress had refused to dredge it, despite the request of our naval leaders. Two large swarms of Japanese-mandated islands also lay inside the American zone of control — and these Japan proceeded to fortify despite her promise not to do so. More important still was the fact that we did not own the island of Yap which lies between Guam and the Philippines. Yap used to be a German island. After the First World War it could have been obtained by the United States, but our diplomats, knowing little or no political geography, refused it. To the distress of our admirals and generals, it went to Japan.

Despite these weaknesses this piece of naval geography was sufficient to keep the Japanese backed up in the western Pacific. All the Japanese could do was to construct a defensive naval geography against us. This consisted of a plan for fighting a delaying action along the northwestern side of the American quadrilateral, while the main Japanese fleet fell back to their one line of island bases. If that line failed to hold, the Japanese

could only withdraw to the Sea of Japan for a final stand. Japan's geographic situation was, therefore, hopeless as a basis for attack and aggressive action — as long as the battleship was the highest factor in the struggle for power.

Japanese Geography of the Pacific

As soon as the airplane became a military reality, the political geography of the Pacific changed almost overnight. It changed from one of mid-ocean control to one of marginal control. The airplane gave man the power to march and ferry armies around the ocean margin. It gave him the power to invest and seize the exits and entrances to the ocean basins. If once this were accomplished, it gave the wielder of air force the power to compel the wielder of purely naval force to retire to the center of the oceans in near-helplessness. The American people have not generally known this because very few of them were studying the variable factors in geography.

During the period of surface naval power just finished, the American geographical location and situation in the Pacific was very strong, whereas that of Japan was so hopelessly weak that she was compelled to be "good." The Japanese were, however, quick to see that the airplane gave them the power to construct a new geography of the Pacific Basin — one wherein their position would in natural terms be relatively stronger than that of the United States.

Figure 55 shows also the Japanese geography of the Pacific based upon air power. It consists of regarding the center of the ocean as relatively unimportant, and aims instead at the control of the oceanic margins. The first phase of action designed toward such control would consist in establishing Japanese holdings all along the western rim. For this nature herself had provided a long corridor of protected seas along the edge of Asia, clear through the East Indies, and on around Australia almost to Antarctica. The East China, the South China, the Java, the Banda, the Arafura, the Coral, and the Tasmanian seas make a chain of nearly enclosed water bodies which nature has placed end to end so as to reach almost 8000 miles. This chain of water bodies forms a sort of Asiatic Mediterranean, or perhaps it would be more accurate to call it an Asiatic Baltic. Just as Germany had had her own way in the Baltic Sea of Europe during the Second World

Fig. 55

New aeronautical geography of the Pacific

War, Japan reasoned that she could, in the same manner, be relatively safe to conduct her war operations in this Asiatic Baltic. All that Japan needed to conquer this natural corridor was a powerful air force to control the sky above it, a huge transport fleet to bring up troops and supplies, and an efficient navy to convoy it.

Japan already controlled the first few thousand miles of off-

shore islands, so she spent several years conquering the east Asiatic coast. This gave her a double line of air bases roughly parallel to one another. The Japanese plan was to spread a protecting canopy of land-based planes between these lines of air bases and convoy the army southward under it. From the Philippines southward they planned to seize islands along the eastern side, and from Singapore southward they planned to seize islands along both sides, rapidly building air fields and unrolling their air canopy as they went. Once this were achieved, they believed that they could ferry their troops and supplies down this maritime corridor, safe from attack by any navy operating from the Indian or Pacific Ocean. This strategic concept had the same geography as did the German attack upon, and conquest of, Norway. It was, of course, much bigger in scale; but it was even safer than Germany's Norway movement because it was protected by outlying lines of fortified islands in Micronesia. These Micronesian islands had been converted into "stationary airplane carriers" which could keep a hostile navy some 2000 miles away from the Japanese flank.

As soon as this southward movement should have been completed, the Japanese plan called for a similar movement northward around the Pacific rim to Bristol Bay, the Yukon Valley, and the Gulf of Alaska. These two movements would, if successful, put Japan in control of a very large part of the Pacific rim, and into a position where she could begin to close the jaws of a giant pincer.

The Japanese strategy would have been a dangerous scheme if the United Nations had planned a new aeronautical geography of the Pacific for themselves. Japan, however, wagered everything she had, including her whole national future, on a belief that they had not. From the very moment the war started the struggle in the Pacific revealed itself to be a highly geographical conflict.

This new political geography of the Pacific was designed not only for oceanic conquest, it was part of Axis global strategy as well. In Figure 54 it will be noted that a branch of the Japanese "corridor" runs northwestward through the Strait of Malacca and between the Malay Peninsula and the Andaman Islands into Burma's Gulf of Martaban. Accordingly, as soon as Singapore fell, the Japanese moved up this branch corridor and embarked upon the conquest of Burma. The Axis global plan called for the Japa-

nese later to continue on westward through India and effect a junction with German armies moving eastward from the Caucasus and the Near East.

All this, of course, was sound military geography; and any sound geography must always succeed unless it is opposed by a better geography. Against this Axis-made plan, therefore, the United Nations carefully worked out an opposing geography.

America's New Air Geography of the Pacific

The geography of defense. In response to new conditions of warfare, we Americans have accomplished two things with record speed. First, we have taken stock of the new instruments of tactics, the new weapons of warfare. Second, we have worked out an entirely new conception of the geography of the Pacific and built a large part of our national strategy upon it.

The airplane carrier has been elevated to a central position in the fleet. Carrier-based planes have assumed important new roles of scouting, overhead protection, and destroyer duty on the fleet's periphery. The short-range land-based fighters and bombers are recognized as preëminent for operating in narrow seas and landlocked waters. The long-range bomber is being emphasized for operation against distant sea and land objectives. The long-distance cargo plane is being considered as a substitute for transport- and merchant-vessel tonnage. The torpedo boat has demonstrated its effectiveness for defensive surface action in narrow waters. The necessity for integration of army, navy, marine-commando, and air force into a working unit has been recognized.

A new geographical theory of naval warfare has rapidly been taking shape in the minds of American strategists. In the first place, the war has been visualized on a polar map (see Fig. 8). This shows readily that the Pacific, Atlantic, and Afro-European conflicts are part of one global pattern. Any pole-centered map shows that the strategic points lying directly between us and Japan are Kodiak and Afognak, the Alaska Peninsula, the Aleutian Islands, and Russian Kamchatka — not Hawaii. In the Atlantic the strategic barrier points between ourselves and Germany are Newfoundland, Greenland, Iceland, and Ulster — not the Azores. Accordingly we have occupied these Atlantic points and have established a subpolar supply line to northern Russia. We have begun to pour men and materials into Alaska, and have

started an inland highway, and are planning an inland rail line, to Alaska. To help keep the Axis pincers from closing across Eurasia, we have begun pouring men and supplies into Egypt, the Levant, Iraq, Persia, and India, supplying them across the middle Atlantic and thence by air across Africa, or across the South Atlantic and thence via the Indian Ocean, the Red Sea, and the Persian Gulf, or across the South Pacific and into the Indian Ocean.

In dealing with the Japanese thrust around the Pacific margin, we have invented something new in warfare — the aerial barricade. Perceiving the direction of Japanese movement, we have erected aerial dams across her path at both the southern and the northern ends of Japan's corridor. The first of these extends from New Caledonia to New Guinea and thence across northern Australia. The second extends from Seward Peninsula to Dutch Harbor. A third aerial dam is being developed along the Bengal-Assam border from Chittagong to the Chinese boundary. In the eastern Pacific a continental defense line has been developed from the Gulf of Guaquil, to the Galápagos Islands, to the Alaskan Peninsula. All of these measures are, however, defensive. A geography of American offense is also emerging.

The geography of offense. In the age of land warfare, an enemy could be attacked along natural lowland corridors, and confined by seizing control of topographic barriers. In the age of sea-surface warfare, an enemy could be blockaded by seizing control of maritime bottlenecks and strategically placed islands; it could be attacked by forcing entrance into enclosed or partially land-locked waters.

In the Air Age these maneuvers are no longer the primary means of blockade and attack against an enemy. An aggressor's moves are not confined to land corridors or strategic sea lanes and entrances. The aggressor, possessing offensive air power, has the ability to strike outward radially in all directions. The geography of counter-attack must, therefore, consist of striking focally inward at him from concentric positions. At the outset these inward blows have to be delivered indiscriminately; as soon as a vulnerable angle is discovered it should be followed up and a directional attack pressed home at the "soft" spot.

With this principle of encirclement in mind, let us examine the map in Figure 55. On the landward side Japan is confined by

Russia, China, and British India. On the seaward side the island possessions of the United Nations are arranged naturally into four concentric rings about Japan. The geography of strategy from the American point of view requires at the outset an alliance between the various land powers and sea powers involved in the picture.

Immediately after the outbreak of war an American, Dutch, British, Free-French naval alliance was effected. Full military cooperation between America and the British in India was soon worked out. A few months later a military alliance with China was consummated. A diplomatic understanding with Russia was reached a little later. The welding of four insular rings about Japan has, however, not been easy.

Within six months all points on the innermost ring (Hongkong, Manila, Guam, Wake, Midway, Kiska), except Midway, were in Japanese hands. Similarly the western half of the second ring was in enemy hands and the remainder had been attacked. The western end of the third ring also was gone and the ends of the fourth ring had been attacked in a preliminary manner. One obvious formula for Allied victory calls for the immediate strengthening of the outer ring. From these points as bases a series of task operations under overwhelming air power can retake the enemy-held points on the third line. From these in turn the western end of the second ring can be retaken. After a pause for reorganization a series of assaults can be made on the inner ring. From the vantage point of the positions on the inner ring, and in close coöperation with the land powers opposing the Axis, long-range bombing can begin the softening-up process. From this point on the operations will presumably be guided primarily by considerations of military and naval tactics.

This is, of course, only one of several possible strategies for an American victory over Japan. It illustrates, however, as do all the other possible plans, that war is geographically conditioned to a high degree. Indeed warfare is possible only because two belligerents have unlike geographical concepts of the area in which the struggle takes place.

Future Wars

The preceding survey of America's wars should serve to show that many, if not most, of the issues and situations which cause

war are geographical; that very many of the objectives fought over are geographical, that war strategy must always be formulated in geographical terms, however inadequately visualized; and that even tactics for battle must needs be executed in conformity with geographical relationships to the features of the environment. Moreover, to be successful, the offense and defense of a nation in the world struggle for power must be conceived in terms of the highest technological factors which are then operating to create and mould the framework of world geography.

Our colonial wars were fought to possess the land; our two wars with Britain were fought to destroy the fetters of mercantilistic economics; the War Between the States was the result of the internal conflict between two discrepant systems of human geography. The Spanish American War was fought to eliminate objectionable colonialism in the Americas. The First World War was fought primarily to maintain control of the seas. The Second World War is being fought primarily to decide the control of the land and the air.

The issues involved in these wars do not establish any consistent pattern for war. The only thing which a study of them reveals is the principle of change. That is, the causes of war and the objectives fought for change as world issues change and as the geographical relations among peoples alter. To the man who refuses to accept this clear fact, the next war, and the next, will always come as a surprise, its issues will not be understood, its weapons and methods will be strange and dismaying, and the geography of its strategy will catch him unprepared and throw him on the defensive.

When water power shall be fully developed, petroleum exhausted, and coal seams largely depleted, the world will not give up its mechanical industry, but will look for new sources of power. In that not too distant future, nations may wage war to possess the Bay of Fundy or the coast of British Columbia where huge tides are potential sites for tidal power generation. The tropical deserts of the world offer hot cloudless skies where acres of solmotors could create heat, light, and power for industrial nations. Windward coasts in the Trade Wind Zone or exposed locations in the Cyclonic Zone offer other potential industrial sites.

When the air age is fully developed, commerce from Eurasia

to the Americas and vice versa, will very likely flow across Greenland, the Franklin Archipelago, and the Arctic Sea. When that day arrives, it is conceivable, even quite likely, that wars will be fought to possess this future Polar Mediterranean.

These and other prizes may be the bones of contention in the world of tomorrow. Again, they may not be. It would be folly to forecast the causes for future war. It would also be folly to rule them out and quit thinking about them. The only protection which any nation can have is to study the realities of the world, its spaces, its locations, its resources, and to keep abreast of the politico-geographic relations which currently exist between men on one hand and space, location, and resources on the other.

A nation must also constantly reëxamine its machinery for offense and defense in the light of the latest scientific and technical advances. Above all else, it dare not at any time permit its own psychology and mental inertia to become a barrier to change. Inventions are sometimes made which alter the whole framework of world relations and values. Because the First World War was fought on the basis of battleships, small submarines, and machine guns, there were many otherwise able leaders who refused to recognize the possibility that wars might be fought with planes, tanks, big submarines, and torpedo boats. There are many today who would refuse to admit even the possibility that wars could be fought with rocket ships and earth-boring subterraneans; or that they could be fought bloodlessly with propaganda and nerve-exhaustion rays. The student of political geography does not necessarily believe that the day of rocket ship and nerve-ray geography is coming, but he does believe in keeping abreast of technological changes as they occur, and in offering no mental barrier to the acceptance of those unpleasant world realities which his enemy or possible enemy has already accepted and is planning to use against him. The American politicians who immolated General Mitchell for insisting upon our taking the lead in developing air power before Hitler thought of doing so, were not necessarily blind. They were merely hindsighted rather than foresighted. Most of them would have earnestly continued to gaze backward if the Axis Powers had not hit us over our national head in a very painful and awakening way. From that point on we had to accept the new world.

Nations, all through history, have often been caught off guard

in a changing world, betrayed by their own refusal to accept what were accomplished facts. America, the inventor of the airplane, was caught without sufficient air power, but the British, who invented the tank, were caught without tanks in Belgium. Admiral Perry's fleet nearly a century ago caught Japan armed only with swords, spears, bamboo guns, and flimsy boats. Japanese humiliation was well-nigh complete; but they learned from their humiliation.

When Columbus conceived of a larger world, he offered his idea to Genoa and Venice, two great sea powers of that day. They rejected it, because they were not interested in or informed about things geographical. They refused, therefore, to have anything to do with the idea propounded by Columbus. Spain accepted it and gave Columbus the necessary backing. As a consequence Spain became the richest nation on earth and remained a colonial power for more than 400 years. Genoa and Venice disappeared from the list of nations. Their navies had been built for Mediterranean and Atlantic coastal waters only. The Genoese and Venetian leaders of 1490 may not have believed Columbus to be wrong; but they could not bear to face the possibility of having to build a new type of navy and merchant fleet for open-ocean navigation. Such a possibility was too disturbing to face. Hence they argued Columbus' idea out of existence. Judging from the decisions of the leaders of Genoa and Venice, however, one may guess that such men are little concerned with scientific and geographical questions no matter how important they be.

The Germans had lost their navy after the First World War, so they accepted the idea of air power because they had no vested interests to oppose it. The Japanese had a navy, but they realized that they could not defeat either Britain or the United States by naval surface force alone; so they, too, accepted the idea of air power. The Russians, having practically no navy and lying in the very shadow of German attack, accepted it also.

Perhaps it was easier for Germany to accept the idea of power through control of the air because German education had long been interested in the study of geography. The Institute of Political Geography in Munich under the direction of Major General Professor Haushofer had, indeed, carefully explored all the geographical possibilities for German conquest in an air-power world. German war strategy was, therefore, not only conditioned

for aviation, it was geographically conditioned as well. German counsel and guidance likewise helped to inject a good deal of political geography into Japanese war and pre-war strategy. The influence of Professor Mikhailof and other geographers is apparent in Russian war strategy also.

The use of political geography by the Axis powers does not indicate that geography is bad, but it does show that an application of geographic thinking to politics and war is so useful that it made the otherwise hopeless schemes of Germany, Italy, and Japan almost succeed. Meanwhile the democratic nations have been most ungeographical in their thinking.

Political Geography for Peace

While a knowledge of political geography has very great value to a nation at war the subject finds its maximum usefulness in times of peace. Once involved in war, any nation has but one task — to win. During a period of peace, however, a nation has two tasks — to reap the full harvest of peace and to strive to prevent the occurrence of war.

Despite assertions to the contrary, there is nothing glorious about war. Often war does hasten the advent of needed social and economic changes, but the benefits of these are usually offset by war's essential destructiveness. A nation, therefore, which expends its efforts toward the maintenance of peace is twice commendable. War is the result of socio-psychological and geographical pathology. Moreover, socio-psychological pathology is often rooted in the geographical realm. The peace-time political geography of a nation is, therefore, worthy of constant and earnest scrutiny by its citizens.

"To know is to condone" is an ancient French proverb. In the political geography of international relations, it is a major truth. International good will is the very essence of peace, but it is present only where mutual understanding of, and respect for, unlike cultures exist. To regard the behavior of another nation as queer is one thing; to regard it as the natural attempt to solve its geographically conditioned problems is quite a different thing. The political aspirations and demands of one nation upon another often appear to be unreasonable. Examined and understood against the background of geographical relationships which are involved, those same aspirations and demands usually look em-

inently reasonable. In instances where they do not, they are at least understandable and logical in relation to the premises employed. Since these premises are usually politico-geographic, rather than being derived from the abstract philosophy of political science, possession of a working knowledge of political geography on the part of national leaders and diplomats is an absolute essential for maintaining international amity and profitable intercourse between nations.

Not all activities in the interests of peace are strictly peaceful in character. Diplomacy at its best is a polite but deadly-serious business involving alliances, coalitions, and all the moves and countermoves of power politics. The success of a normal nation's diplomacy is measured by its ability to avoid war. Thus a nation's choice of friends, the kind of alliances into which it enters, and the extent of its participation in world peace structures are the factors which create successful or unsuccessful diplomacy.

The American people, if they really desire peace, must see to it that our schools give us an education which presents intimately and understandingly the facts about other lands, other peoples, and other cultures, and which acquaints us with world resources, world tensions and sore spots, and with world space relationships and strategies. Moreover it must teach us to think realistically about possible wars, to anticipate the way war would be likely to come upon us, to perceive, ahead of time, the geography of the enemy's strategy against us, and to know who our friends are going to be and where our lines of defense will have to lie.

Furthermore we must know enough geography to be able to appreciate what a new instrument, such as the airplane, can do to change our geographical location and our formulas for national defense. Moreover we must be able to evaluate the political implications inherent in such changes. For instance, in a world of military and naval surface power, large nations found it advisable to be separated by small national states. They, therefore, permitted small buffer states to grow up. Sometimes they even went so far as to create them and jointly guarantee their independence, in total disregard of racial or economic considerations. This resulted in a definite formula for world peace. Some of the resulting small states have developed into model democracies and have existed for a century or more as definite assets to the world.

We should, however, never confuse historical verities with

geographical verities. A new machine can alter time-space strategy and create a new political geography overnight. Belgium in the war of 1914-18 was the savior of France and the advance guard of England. Belgium in 1940 was a trap for its British defenders, and the total undoing of France. In the days of two-dimensional wars, Britain and France could afford to underwrite Belgian independence. In the present era of three-dimensional warfare a separate Belgium may even constitute a threat to Britain. Lissitzyn suggests that the use of the airplane in war may compel the democracies to reorganize their national units on a larger pattern. This does not mean that the people of small nations such as Belgium will lose their liberty; it means that they may have to preserve it within a larger type of national framework, in a manner at least comparable to that devised by the American Colonies in 1783.

There are implications in this for the United States. Many Americans are now talking of peace in terms of returning to the pre-war map of the world — with its "Balkanized" Europe and its old colonial pattern. To return to the 1939 map is entirely possible, but who is to guarantee the existence of the small states? France and Britain alone were unable to do it in 1939 and 1940. A vigorous future coalition of France, Britain, and the United States probably could accomplish it. But are we as a people psychologically willing to enter such a coalition? If not, then there is an alternative — world organization for collective security, with group guarantees for all states, big or little. Are we as a people prepared to sacrifice enough of our national sovereignty to participate in such an organization? If we are not, then there is a further alternative — national individualism in a world of power politics — with the devil taking the hindermost. If we adopt such a premise are we prepared to accept the eternal vigilance required for survival? Are we prepared to survey the world and pick out our potential enemies, build up an alliance to checkmate each, and develop a set of strategic plans for defeating each should the occasion arise, and constantly practice a program of war games aimed at each hypothetical enemy?

It is not the function of political geography to advocate the following of any of these alternative lines of action. Instead, its function is to evaluate the world factors in operation, to identify the stresses and strains present, to explain and appraise the world situation, and to point out to the citizen what will be the

implications of his own choices and decisions, insofar as they constitute mandates to his political leaders.

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CHAPTER 9

GEOGRAPHY AND NATIONAL THINKING

Three New Ideas

IT IS human to resist change, and therefore to discount predictions of major changes in the social and economic life of our people. It is equally human to limit the horizons of one's own imagination. Consequently the history of aviation is studded with achievements which became realities despite the sincere conviction of most people that such things could not happen. By the same token, just as people are daily discovering in the columns of their newspapers and in their radio news broadcasts, feats of military aviation which strain their credulity, so tomorrow will there be many more surprises in the post-war expansion of commercial aviation."[1]

The Air Age, however, is upon us whether we are ready to accept it or not. Nothing which we do or think can alter this blunt fact. The way we think, though, will have much to do with our success or failure as a nation in the world of tomorrow. During peace time, ideas may be tremendous assets. They are a form of wealth which can be capitalized, invested, and made to yield abundantly. During war time, ideas are powerful weapons as well as strong defensive armor. As a people, we have not always realized this.

The Air Age has already progressed to the point where we are faced with, and compelled to accept, three new and disturbing ideas.

First, there is relatively no such thing as isolation in the modern

[1] Patterson, W. A., "The Airlines in a Nation at War." Address delivered before the Seventh Annual Central States Group Conferences of the Investment Bankers Association of America, Chicago, March, 1942.

world. The plane has made travel three-dimensional; and in a three-dimensional world the doctrine of national, or even of continental, isolation turns out to be a myth. With isolation vanished, constant and persistent contact between different cultures must be expected and accepted. This is a geosociologic idea. That is, it deals with sociological facts but is created by geographical relationships.

Second, the flow of certain kinds of trade and traffic has been freed from physiographic and hydrographic controls. This means that existing trade routes face realignment, and many of our present trade centers face a declining strategic importance in the commercial world. This is a geonomic idea. That is, it is geographic in origin but economic in result.

Third, peace is maintained and war prevented by attention to geographical relationships. Moreover, wars are now won by the aid of, rather than in spite of, geography. This is a geopolitical idea. That is, it is political in nature but geographical in origin.

Such ideas, be they geosociologic, geonomic, or geopolitical, all spring from the same source, for they originate in the conditioning effect of the earth environment on men's affairs. They spring from the three phases of human geography. It will be advantageous for us to realize, then, that man helps to make his own geography, and that a nation prospers only when its leaders can anticipate geographical changes before they are upon that nation with disastrous effect. Every time man makes an important invention, he creates a new geography. He does so because he alters the existing strategy of men, space, and resources. The airplane was such an invention.

The New Economic Geography

The passenger airplane and the air freighter have given the world a new carrier service, a new instrument for shifting men and goods. We entered the Second World War nearly twenty-five years after our experience with the sinking of merchant ships during the First World War. Despite this, we had not explored the possibility of carrying freight and military supplies in air transports. Sooner or later, however, the possibility of doing this will be explored. Already, new trade routes and travel lanes have appeared upon the world map. New foci of air traffic have begun to emerge — Wichita, Miami, Saigon, Marseilles, Bethel, and so

forth; former trade centers have begun to be by-passed. The airplane threatens to redraw entirely the commercial map of the world.

We have accepted the Air Age, but we have built our airports far outside our present cities, where they are of minimum usefulness and where they cannot be easily integrated with other existing means of transportation. This is neither economic realism, nor is it good business.

The warplane has created a whole set of new threats to the sources of many of our essential raw materials. Similarly, it has threatened to deprive us of many of the market areas which furnish outlets for our manufactures. This calls for drastic revising of our national policies. A new program of alliances and protectorates will have to be devised. The colonial policy of the world will have to be revised upon a new pattern. Our national participation in a world economic order of some kind can hardly be avoided.

The New Social Geography

The rearrangement of world routes of trade and travel has brought us and will continue in the future to bring us, a whole new set of neighbors. It has also brought us a new set of enemies, and made imperative a new set of allies. The breakdown of isolation and the multiplication of our contacts with other cultures are beginning to mean that the whole success of our American diplomacy must increasingly rest upon an intimate knowledge of geographic affairs. The time-space dimensions of the world have shrunk so markedly that the whole earth is becoming a relatively small community. The terrestrial globe is today smaller than was the United States one man's lifetime ago. Air-Age United States is now the size of Railroad-Age Pennsylvania. There are new intellectual, social, and political implications in these facts which we can scarcely avoid accepting.

While the Age of Aviation has been bringing about these modifications in the terrestrial community, it has likewise begun to promise great changes in every small local community. As yet we have made no move to meet these. Nowhere have we boldly begun the redesigning of the community to meet the new conditions.

In our view of citizenship and civics we have persisted in re-

taining a concept so narrow that it is incompatible with present realities. "Once, American citizenship was a lesson in history; today it is a lesson in geography. In the modern world of today, American liberty is being assaulted as directly in the Sahara, on the Crimean Peninsula, in the Coral Sea, and off Murmansk, as it was at Bunker Hill and Valley Forge."[2] Many of our present difficulties arise from our failure as a nation to recognize this. We have not been familiar with other peoples, we have not evaluated other resources, we have been indifferent to other cultures, we have remained unaware of changing geographic adjustments and relationships, we have not thought in terms of the necessary global political strategy. We have remained provincial in a world of tightening interrelationships. Strategically, commercially, culturally, and intellectually we have remained backward, while mechanically, industrially, and esthetically we have forged ahead.

From the standpoint of money and effort expended, America has the most elaborate educational system in the world. Intellectually, however, it has been based upon a false assumption which is as astonishing as it is fallacious. That assumption is that training for citizenship need not be based upon geographic education.

Accordingly, we have based our training for citizenship upon history, and social and political science. That same history, incidentally, has not been a progressive record of the human geographies of the past, as it might well be. Instead, it has been a study of human institutions and a record of human wars and diplomatic chicanery. Our whole program of social science has been as innocent of real geography as a frog's back is of hair. It presents a little economics which may be economic theory on the one hand, or a study of the consumer's problems and budget on the other; but it has had little relation to the earth on which economics presumably occurs. In short, it has had no real basis in geonomics or economic geography. It presents some sociology, but that sociology is a study of institutions, social problems, and welfare; it contains no social geography. It presents some facts on government and civics, but no political geography. It presents a great

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[2] Walter Winchell in a radio broadcast, Station WJZ, 9 P.M. Sunday, May 17, 1942.

deal of history, but that history is a record of man, not of the world and man.

Our whole approach to the problems of democracy has been institutional rather than geographical. The problems raised are pertinent enough, but the child and teacher alike are all too often denied access to much of the materials necessary for solving them. No hint is ever given that the actual causes for many of these problems arise from man's faulty relations to, or use of his environment; or that the solutions to these same problems are more often than not, largely matters of human geography.

The American often goes to great lengths to avoid thinking geographically. In this respect, the contrast between Americans' and other peoples' ways of thinking on matters geographic, would be funny if it were not so nearly tragic. The educational results of our non-geographical thinking are all about us in the United States. They are manifested in false isolationism, long neglect of military air power, ignorance of other peoples, lands, and cultures, unrealistic diplomacy, misdirected foreign policies, domestic sectionalism, lack of conservation and regional planning, unplanned urbanism, and national conceit.

Recently, under the impact of a great world war, many Americans have become much interested in the field of international relations. Some of them are studying it diligently, but all too often they are doing so without any reference to geography as *a systematic field of knowledge and thought.* And so it is, all through our intellectual life; everywhere we use the historical or the institutional approach to our problems, but fail to employ the geographical approach. The former are valuable and useful within their own spheres, but they are not applicable to all problems and situations. Nor do they yield all the answers to even a majority of society's problems. Even in many cases where they *seem* to yield complete answers, they may engender wrong or unrealistic attitudes. As we have seen recently, these same historico-institutional frames of mind do not stand up under the stress of world forces and events. We got into trouble when problems based upon man-to-earth relations descended upon us. It would seem that we should at least supplement our present historical and institutional points of view with some geographical attitudes.

The New Political Geography

The impacts of the new economic and social geography upon our lives are indeed violent, but the impact of the new political geography is inexorably ruthless. Proper appreciation of and adjustment to the first two is essential to our success and well-being; proper accommodation to the third is essential to our very national existence.

In the years before the Second World War, many of us failed to perceive who were our enemies or what were their intentions. In the debate over the proposed fortification of Guam, the Congressional Record contains the following statements: "I want to emphasize that there is no country in the world thinking of attacking us; no country that has the ability to attack us if they wanted to do so."[3] Again: "Japan, Italy, and Germany have all assured us time and again that they have no designs whatever against the United States."[4]

Similarly, we were often unable to recognize who were our friends — in the sense of what other nations were committed to the same general objectives in world relations. One American leader declared, ". . . I protest against the fatalistic un-American doctrine now being built up . . . that America must fight on Britain's side in any war in which that empire may become involved."[5] Another leader, speaking from a real understanding of the world scene, wrote: "With respect to a war in the Far East which is most probable at present . . . such a war should be undertaken only in conjunction with Great Britain, France, and the Netherlands."[6] This latter statement, however, went practically unheeded, and in general we failed to make proper alliances with friendly nations. In general, too, we were unable to perceive correctly the strategic politico-geographic value of various locations in the world: ". . . as far as I am concerned, rather than go over there and have a war about a coral reef, I would be willing to let them (the Japanese) have it (Guam)".[7] Again: "There

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3 Congressional Record, Vol. 84, part 2, p. 1708, Feb. 21, 1939.

4 *Ibid.*, p. 1835, Feb. 23, 1939.

5 *Ibid.*, p. 1719, Feb. 21, 1939.

6 Admiral Yarnell in a letter to Rear Admiral Snyder, dated Jan. 10, 1939. United States News, Feb. 20, 1942.

7 Congressional Record, Part 2, p. 1706, Feb. 21, 1939.

is no danger of attack from an Asiatic power by way of Guam."[8] And again: ". . . the island of Guam has nothing to do with the Philippines."[9] Finally: "To fortify a tiny island . . . against an enemy in the East . . . to aggravate Japan . . . to satisfy Great Britain."[10]

For the most part, we Americans failed to see and evaluate the forces at work in the world. We could not see that the Axis plans were of necessity aimed at us as well as at Europe. We were unable to appraise the Indo-China betrayal, the Thailand sell-out, or the magnificent Trojan Horse at Davao Bay. These things were simply too far away to concern us.

It is expectable, then, that we were never aware of where our *defensive frontiers* lay. To the eastward, we were never sure whether our first line of defense lay along the Rhine, in the mid-Atlantic, at the three-mile limit off our coast, or along the Hudson and the Chesapeake. To the westward, we did not know whether it lay in China, in Hawaii, or at the San Diego, Mare Island, and Bremerton naval bases. Consequently the thinking of the American public resembled the knight who mounted his steed and rode off in all directions. In the days of sailing vessels and nine-pound cannon, the frontier of a nation which faced the ocean lay at the three-mile offshore limit. In the days of steam-driven, steel-clad warships equipped with modern guns, the frontier was moved out to the twelve-mile limit. As battleships got bigger and faster, as armor got thicker and tougher, and as twelve, fourteen, and sixteen-inch naval guns were designed, there has been talk of a twenty-five and even a fifty-mile limit.

With the advent of the warplane, however, the frontier zone of a nation has become for all practical purposes well-nigh unlimited. As early as January, 1939, a great American wrote, "In the Far East a situation has arisen which definitely threatens our national interests. The independence of the Chinese nation is in imminent danger. . . . The consequences are of such vital importance to us as a nation, that I strongly feel that we are warranted to take steps, economic, financial, and if necessary, use of force, to preserve the independence and integrity of China."[11]

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[8] *Ibid.*, p. 1719, Feb. 21, 1939.
[9] *Ibid.*, p. 1749, Feb. 22, 1939.
[10] *Ibid.*, p. 1719, Feb. 21, 1939.
[11] Admiral Yarnell, *op. cit.*

During this same period, President Roosevelt indicated that in his judgment American interests were equally in need of defense along the Rhine in Europe. For the most part, we the people were thinking in terms wholly different from these. The debate over fortifying Guam shows how we were thinking. "Is that for defense . . . 6000 miles away? This little island of Guam is farther from Hawaii and Honolulu than we are from the Rhine. Yet we propose to go out there and spend $5,000,000 to dredge that little harbor of Guam . . . against whom?"[12] Again: "Our concern is primarily with the defense of the *Continental* United States,"[13] and: ". . . the security and safety of the American people lies solely in the Western Hemisphere."[14] When the final vote was taken, it failed to authorize the fortification of Guam.

The general habits of American thought carried far beyond matters of national military strategy, and on into the realm of national economic policies. We continued to sell steel scrap, gasoline, and machine tools to Japan long after her aggressive intentions became known. We developed no plan or policy for defending our vital source of raw materials in the Indies. We had no adequate pipeline facilities to supply gasoline to the coastal areas of the United States, and the Florida Ship Canal project lay abandoned. We had no war rubber plan for Brazil, no war sugar plan for Cuba, no war alcohol plan for American agriculture, and no wartime commodity market plan for Pan American cooperation. In short, we failed to study the geography of raw-material strategy.

We Americans thoroughly dislike the use of force and instinctively condemn aggression, and yet we have not seen the necessity for our helping to mobilize force to compel peace. We want political independence for small states, but we have been unwilling to help guarantee it. We earnestly desire world peace, but up to now, we have not been willing to help build a permanent structure with which to achieve it. We have even refused to coöperate in checkmating Germany, Japan, Italy, or their allies in Spain.

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12 Congressional Record, *ibid.*, p. 1706, Feb. 21, 1939.
13 *Ibid.*, p. 1753, Feb. 22, 1939.
14 *Ibid.*, p. 1713, Feb. 21, 1939.

Ideas and the Future

Fifty years ago the great German scholar, Friederich Ratzel, pointed out that "when one speaks of a sound political instinct, one usually means a correct evaluation of the *geographic bases* of political power." If this were true then, it is no less true today. This, however, is no static formula for national security, because geographic bases are not fixed factors. Geography is man-made stuff, and therefore its bases must be re-surveyed and re-evaluated over and over as times and the instruments of power change. We Americans have certainly not done this. We have taught only a little geography to our very young children, during the very period when Germany's Institute of Political Geography has been drawing up Axis plans for taking the world away from us Anglo-Saxons.

We have all too often thought, therefore, in terms of row-boat geography rather than airplane geography. It was simply too fantastic for us to believe that America's first line of defense in the Pacific ran from Hongkong to Alaska, and that (in terms of our international relations with Japan) the Chinese, British, and Dutch were our next-door neighbors much more than were the Canadians, Mexicans, or Brazilians. It has, consequently, been impossible for us to exhibit the necessary geographic discernment in viewing our problems. All too often we have failed to think realistically, or to operate, in the light of geographic realities.

In reviewing the book, "America's Strategy in World Politics," the eminent American scholar Isaiah Bowman declares: "It will be found tough reading by isolationists. It will not satisfy the person who is already tired of hearing about the Burma Road, Rangoon, Singapore, Chungking, Panama, Kiel, Smolensk, Libya, Malta, Natal, and Dakar. It will disgust those who think the goals of life are a safe competence, a rose garden, music, books, leisure, 'culture' in short. We are going to walk in gardens and enjoy culture only in snatches after we have toiled and bled on distant geographical frontiers. Our way of life is now planetary. . . . What a frightful price we shall yet pay for viewing our geographic position narrowly!"[15]

[15] BOWMAN, I. "Political Geography of Power," a review of America's Strategy in World Politics, by Nicholas J. Spykman, Geog. Review, Vol. XXXII, No. 2, April, 1942, pp. 349-352.

"The problems with which Europe and Asia are struggling concern us intimately, and much as we desire, we cannot as a nation dissociate ourselves from them. It is a time that calls for clear thinking, free discussion, and the fullest possible knowledge of the elements involved in the present world situation.

"In spite of our desires to remain aloof from international problems, we cannot do so. The world has shrunk too much."

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GLOSSARY FOR STUDENTS

A

adjacent: as applied to a geographic region, near or next to the central or heartland region.

agrarian: as applied to a culture or to a geographic region, primarily devoted to the pursuit of agriculture, and more especially to grain production.

Amerindian: the American Indian.

arboreal: pertaining to trees.

archaeologist: One who studies man's remote or prehistoric past.

B

besticulture: hunting, fishing, trapping; exploitation of wild animal life.

bilaterally symmetrical: having two sides that are similar; having its parts so arranged that if a flat, scaled diagram of it were folded along a central line the representations of parts on one side of the central line would coincide with the representations of corresponding parts on the other side.

C

cartographically: with respect to map making; from the viewpoint of the map maker.

circumthalassic: as applied to a geographic region, surrounding an ocean body.

cyclical: coming in cycles or at more or less regularly recurring intervals of time.

D

deciduous: as applied to trees having leaves that fall, in contrast to evergreen.

dialectic: a formal lesson.

distributary: one of the several forks into which a stream divides at its delta.

diurnal: as applied to temperature range, within a 24-hour period.

E

ecological: with respect to, or from the viewpoint of a student of, ecology (*see* next item).

ecology: a science which deals with the relations between plants or animals (including human beings) and their environment.

environment: the sum total of all surrounding influences.

escarpment: abrupt drop in elevation extending along a line of considerable length, as between a plateau and an adjoining plain.

F

fauna: biological term for the sum total of all forms of animal life occurring within a designated region.

federalist: one who, in his view of the principles of government, favors federal or national as contrasted with local or state control.

flora: biological term for the sum total of all forms of plant life occurring within a designated region.

G

geomorphology: the science of land forms; the science which studies the natural origin and development of the land forms of the earth's surface.

geonomic: both geographic and economic, or relating to economic geography.

geophysics: the study of the physical or natural-science aspects of geography.

geopolitics: political geography.

geosociologic: pertaining to geosociology (*see* next item).

geosociology: social science as studied from the viewpoint of its earth's background.

H

hemisphere: the half of a divided sphere.

historico-institutional: both historical and institutional, *i.e.* from the double viewpoint of the historian or student of the past, and the sociologist and anthropologist who study the institutions or folkways of the present.

homogeneous: essentially the same throughout.
homolographic: the name applied to a type of map projection which portrays area with comparative exactness.
hydrographic: with reference to the charting of water areas.
hyperborean: Far Northern.

I

irruption: violent entry into.

L

lacustrine: pertaining to lakes.
littoral: as applied to a geographic region, on the shore or along the coast.

M

mandate: in political geography, an area placed under the supervisory control but not the sovereignty of a guardian nation under the Treaty of Versailles.
monadnock: isolated old worn-down mountain in an otherwise relatively level region; exceptional survival from a former mountain range or other type of elevated land form.
monosphere: single, undivided sphere.
mutation: relatively abrupt change; a change or divergence not resulting from evolutionary causes.

N

nemoriculture: exploitation of the tree life or tree resources; economic life based upon utilization or exploitation of natural vegetation other than grass.
nodal: having reference to a node. (*See* next item.)
node: meeting point, intersection point, or division point.

P

parkland: natural landscape consisting partly of grass and partly of trees.
pastoralism: economic life based upon use or exploitation of natural grassland through the medium of domestic animals.
paternalistic: of a government, "fathering" or "looking after" the citizenry.
pelagic: remotely insular or oceanic.

peneplained: almost reduced to a level plain by erosion.

peripheral: as applied to a geographic region, on the edge or rim, *i.e.* intermediate between adjacent and remote.

physiographic: with reference to physiography, or the study of earth features as they exist without consideration of or relationship to man.

politico-geographic: with reference to political geography; or both political and geographic.

provincialism: the tendency of the culture and institutions of a region or division of a region to become different from those of other areas.

R

reciprocal: operating in both directions at the same time.

repercussion: secondary result.

S

savanna: tropical grassland with relatively sparse arboreal vegetation.

selva: tropical forest.

socio-economic: both social and economic; from the viewpoint both of sociologists and of economists.

strategic: as applied to an area (usually relatively small), having a peculiar importance resulting from its position or relative location.

stratosphere: the upper atmosphere.

T

taïga: subarctic forest.

technological: with respect to technology or manufacturing processes of the more elaborate type.

tritisphere: a third part of a divided sphere.

tundra: arctic and subarctic vegetation consisting chiefly of mosses, lichens, grasses, and small shrubs; subpolar pastures.

U

ubiquitous: existing or operating everywhere.

Z

zonation: division into zones or horizontal strata.

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