CONTINENT FOOTING

NORTH AMERICA

SOUTHERN LIMIT, OREGONIAN COASTAL CONIFEROUS FOREST BIOTIC PROVINCE

A VIDEO CONVERSATION WITH ROBERT CURRY

We're sitting right now near the Golden Gate Bridge in San Francisco at the leading edge of the North American continent. We're looking out into the Pacific toward which everything is moving. We've often heard than mankind has migrated Pacificward, the Pacific migrations have been significant developmental steps in the history of mankind.

Interestingly enough, geologically the continents also move Pacificward.

We're now sitting here in northwestern North America and we're moving west at a rate of three or four centimeters per year out into the ocean. The ocean and the continents themselves are riding northwestward another two or three centimeters per year, making our net travel about seven centimeters northwest every year.

The rocks that we're sitting on here in western San Francisco are those which have been scraped off the leading edge of the continent as it cruises westward, as it drifts or slides westward. These rocks are very mixed up, churned up as the edge of the continent squishes along the floor of the ocean. Pieces of volcanic rocks and sedimentary rocks are falling off the edge of the continent and these things come together to make this great mass of very friable unstable rocks.

We really have to start a little earlier to get into the beginning of this story, we have to start about a hundred million years ago more or less. At the time North America was part of one great continent which we now call Pangea, which existed as a whole. North America, South America, Europe, Asia and Africa all being more or less a continuous continent. Animals able to walk from one place to another on the continental mass.

Approximately 60 million years ago this continental mass sitting over one edge of the globe became imbalanced, and for some reason we don't yet know, broke up and pieces started sliding apart at rather rapid rates, three or four centimeters a year, each piece of the continent moving away from the others; sliding into the great Pacific Ocean which was then many times the size of the Pacific Ocean today.

What's essentially happening is that the continents are redistributing themselves over the surface of the Earth in a way that is stable so that the spinning globe isn't off balance.

As the continents move Pacificward—north, east, south and west don't mean anything, you really have to think of them as moving Pacificward—as they move Pacificward, the continents run into various undulations on the crust. You have to think of the Earth's crust as comprising three separate kinds of layered materials. The stuff that we live on here on top is the first, the very lightest material, the very lightest kinds of rocks and minerals. Just beneath us, just right here under the ocean a very short distance, is a material that's about two-thirds again heavier or denser. That stuff is loosely connected to a more viscous partly molten mantle which comprises half or two-thirds of the total Earth.

We're living on this little light crust that is almost blowing around on the solid surficial portion of the Earth which is mostly covered by ocean.

The surficial portion of the Earth, the oceanic crust, has a lot of mountains and valleys and ridges, some very large mountains and mountain chains. As the continents began sliding around on this crust, the North American continent moving northwestward ran into a mountain range on the floor of the Pacific which we now call the East Pacific Rise. One piece of the North American continent ran right into the mountain and up the side and down the other side. It overrode the East Pacific Rise.

The East Pacific Rise is the location of a lot of heat flow from the Earth, some of that heat makes hot spots on the crust that slides over it, and it melts that crust. One manifestation of that melting today is Yellowstone National Park in Wyoming and Montana which now represents a hot spot on the peak of that rise over which the continent has slipped. Most of North America west of a north-south line running roughly through Yellowstone National Park has gone over the top of this mountain and is now sliding faster westward.

We're going west, here on the west coast, faster than the rest of North America because we're sliding down the backside of this great range which is now roughly under the Rocky Mountains.

These hot spots like Yellowstone National Park, and there's another hot spot to the west of us a couple of thousand miles which we see as the Hawaiian Islands, these hot spots are relatively stationary on the globe and the crustal plates slide over them. As North America moves west, the Yellowstone hot spot appears to move eastward. In fact, it's staying still and the continent is sliding over the top of it. There's a trail that's been left by this hot spot. Yellowstone right now represents the locus of the present hot spot and we have the Snake River basalts representing a trail of heat across the continent of North America, melting its way as the continent moves over the top of it. Yellowstone is destined to head further east ultimately to get out into Kansas and Nebraska.

The Hawaiian Islands are moving at the same rate, making new islands progressively southeastward of the older islands. The big island of Hawaii is the youngest of the islands and as you go further northwest you travel to progressively older islands.

In the last several tens of millions of years a peculiar thing happened and one piece of the west coast of North America comprising western California and Baja California became unhitched from the mass of North America and began to get coupled into the North Pacific plate, the base of the North Pacific Ocean. While North America comes forward and westward this piece is sliding northward. . . . This is manifest in the San Andreas fault. This piece of California that's just to the west of us here out in the Pacific Ocean is sliding off and sliding north.

At the same time Japan, Alaska and Asia are moving southward in the Pacific, southward and toward us, so that everything is sliding into the Pacific.

So the continents are sliding around and are really best likened to scum.

Outside of North America some very interesting things have been happening. India has crashed into Asia. Both of them are moving but Asia is moving slower, and India has crammed into Asia at such an incredible rate of speed that it's crumpled the bottom of Asia in a fantastic fashion and bent up the Himalaya. The Himalaya actually occur right where India crashes into Asia.

As the Pacific Ocean floor moves northeastward and Asia moves southeastward, something has to give. In that particular place the Pacific Ocean floor is diving beneath Asia making a great chain of volcanoes where it melts, which comprises the Aleutians, the Japanese Islands and the Kurile peninsula. These are the great island arcs where the Pacific Basin crashes beneath Asia.

Okay, well what's all this got to do with man and the people in North America, in this particular place?

One of the interesting manifestations of the fact that the western part of North America is sliding ahead of the eastern part of North America is that the continent west of the Rocky Mountains, west of the old ridge along the floor of the ocean which is now manifest as the Rocky Mountains, this part of the continent is much newer and it's also stretching because it's going downhill faster than the back part of the continent, the old, eastern part of the continent.

So the midwest and eastern North America are pushing their way slowly up this ridge on the floor of the old Pacific Ocean, and the westward part is sliding down, and cracking and spreading. Thus we have the basin and range provinces of Nevada and Utah and eastern Oregon and southern Idaho which is an extension, which is an area of the crust where it breaks up and new volcanic rocks well up to fill the cracks. So we get a whole series of mountains and valleys.

Further west, when we get to California, when we get to the Sierra Nevada, we're into an area that is moving forward and stubbing its toe on the floor of the Pacific so fast that it's melting. For the last 60 million or so years we've been having molten material injected into mountains which are upraised as the continent bends its toe forward, as it slides off into the Pacific. In the extreme western part of Oregon, Washington, British Columbia, and California we have very young rocks that are actively being uplifted, active tectonism.

What this means is that there is a very different kind of nutrient cycling, a very different kind of life-sustaining system west of the Rocky Mountains in comparison to that system east of the Rocky Mountains. East of the Rocky Mountains, the continent is stable. It is old. It is relatively flat. It has been worn down by long periods of geologic erosion. West of the Rockies the continent is breaking up. It is melting. It is cracking. It is sliding at different rates, and making holes in the crust, down through the crust where mantle materials may come up.

West of the Rocky Mountains, lots of nutrient-rich materials such as those that we see around us here, very nutrient-rich rocks with lots of ferro-magnesium minerals, lots of divalent cations that we use in fertilizers for plants, like calcium, are readily available at the surface of the Earth. These things are coming to the surface of the Earth today and they are weathering at the surface of the Earth today. When this happens we've got a large flux of nutrients on this young landscape which find their way into the rivers, into the soils and into the sea.

Here the sea has a shallow, very narrow continental shelf. In many places the continental shelf isn't defined very well at all, such as it is here near San Francisco. This continental shelf falls off rapidly into the deep sea and receives all these nutrients coming out of western rivers. These western rivers, these high gradient western rivers with their high nutrient flux, create an ideal situation for spawning salmon. The salmon spawn on the Pacific Rim, which is this area of high energy land sliding rapidly toward the Pacific. The continental shelves of the Pacific Ocean, although small, are highly productive. They have a high flux of nutrients both off the land and from the deep ocean meeting near to shore and are able to support fairly large fisheries—sardines, salmon, tuna.

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On land, the soils of western North America, west of the Rocky Mountains—which extend all the way from Alaska to the tip of South America, as a matter of fact, so we can really talk about both Americas here—the western parts of both Americas have young soils with open nutrient-cycling loops. More material is weathered than is taken up in the bio-mass. Much material enters the rivers. These soils are young, they are relatively unstable, they are forming today.

This is in marked contrast to the central and eastern parts of North America where the soils are old, and they cannot take much mishandling. If you once plow up the soils of the Great Plains or the Prairie States, you break down a long accumulation of nutrients. Once you lose these nutrients, you don't have many more places for these nutrients to come from.

Here on the west coast we have rich forests which are today making use of rapidly cycling nutrients. We've got open nutrient loops and lots of resiliency in the land. The soils may be thin and they may be immature, but there are lots of new sources of nutrients if these soils are destroyed. These new sources of nutrients are through volcanic ash or volcanic eruptions, through rapid erosion of new materials onto the land surface that can once again weather to form new soils.

We also have in the western part of North America high diversity. Lots of different kinds of sites, lots of change, lots of climatic change, lots of soil change.

Because we have high diversity, high nutrient flow, steep gradients therefore high energy, we can support a high diversity of people and a high diversity of biological organisms.

This high diversity of biological organisms has led to a variation in peopling in western North America that has resulted in many tribal groups. Here there are small tribal groups located in close proximity to one another, each one living on a relatively closed system of biologic support.

The west coast tribal groups were able to specialize in the use of resources so as to be able to efficiently use a wide variety of available biologic niches and were provided opportunities for support throughout all seasons within a relatively small geographic area. Each coastal mountain-valley provided upland areas or coastal plains for deer and elk browse and game birds; tidal areas for shellfish; a river for salmon and trout; forested lands for bear and small mammals; and beaches or estuaries for shore and migratory birds. All of these could support a moderate population with high substitutability.

Thus tribes were protected from need for aggressive interaction by their neighbors should one food supply source fail through overuse or natural variation, and probably had surpluses that could be traded with others. They did not need to travel much and developed individual tribal and linguistic identities that may serve us today to help define the sub-regional units that are capable of solar-energy-based life support.

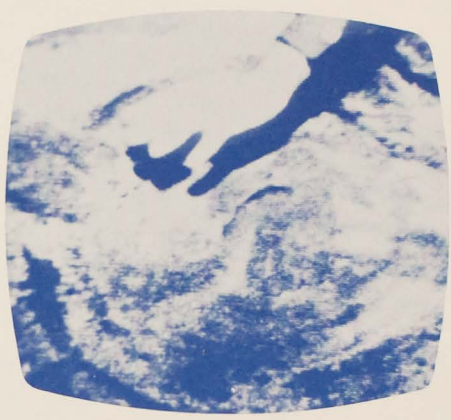
PETER BERG: When we talk about the effect that soil nutrition has on people, we're talking about culture.

ROBERT CURRY: On the west coast we've got a lot of different kinds of variation in age of the land surface, variation in fertility of the land surface, and as a result we get specialization of different groups of people to different economies. Shellfishing people along the coast, in American Indian culture, who will trade with hunting and gathering people or acorn collecting people inland. They intercommunicate. There's an ethno-linguistic bond between the hunting and gathering people inland and the shellfishing people on the coast that is a function of the ability of that particular region to support a certain diversity of people, a certain population of people and a stability of that area to continue to support them.

In order to have stability, ecologically, we need diversity.

So here on the west coast where we have high diversity of kinds of biotic types and man's dependence on those biotic types, we can have high stability of populations of man.

The American Indian cultures of western North America had relatively high stability and high diversity. If one particular shellfish failed for a number of years they could shift to another shellfish, or they could trade inland for something else, for deer. This contrasts with the Plains Indians who had to travel very large distances to keep a stable population, and still they would have very severe winters sometimes, or the buffalo wouldn't migrate in the same pattern (and they were highly dependent on the buffalo for at least part of the year) and the populations were unstable, they became large when game was plentiful and small when game wasn't plentiful. In the northern Plains region and other less biologically diverse lower nutrient flux regions, tribal boundaries were diffuse, poorly defined, and generally encompassed large areas of land.



Because there's the diversity, there's a wide variety of kinds of people who could exist on the west coast and a kind of human energy that is different from those found on the older parts of the continent.

LINN HOUSE: What would be the effect of monoculture on this stability-diversity relationship?

CURRY: Obviously, if we break down the diversity on the west coast, we break down the ability of the west coast to sustain populations under varying cultural and natural pressures.

If we go from a more stable-diverse forest ecosystem, for instance in Washington, Oregon, northern California and southern British Columbia, to a monocultural Douglas Fir ecosystem, we lose the ability of both that ecosystem to resist the various kinds of natural perturbations which occur and the ability of the people (and the economic interdependence of those people upon other peoples) to swing with the punches of nature.

BERG: We have to deal with the question of inhabiting North America now as the original inhabitants lived here. It seems that if we don't do that we're not going to have the same biospheric continuities here. How do we answer the criticism that it's unrealistic? We could say that it's ultimately realistic because if we don't start doing that we simply won't be able to be here any more.

CURRY: We have to face the fact that we are a world-culture, that we are comprised of people from all over the world and we interchange goods all over the world. But we still rely upon a relatively small geographic area for the bulk of what we get away with each day. The bulk of what we eat, the bulk of what we use, the bulk of our energy input is still energy that comes directly to us from the sun or from these trees which have grown in response to solar energy which has fallen here on the west coast.

If we want to maintain any stability in the sense of a world population, we've got to be able to be stable within a regional population.

BERG: What we've been calling shifting from "world" to "planet." From world-nation to planet-region.

CURRY: I concur. It seems that if we're going to be able to withstand the exigencies, the perturbations of world trade and the instability in one group contrasting with stability in another group, now at a time of burgeoning world population when the world ecosystem alone cannot support the world population that we presently have or are soon to gain. . . .

BERG: Without detriment.

CURRY: . . . without detriment, then we've got to be able to rely upon our own stuff where we live and near to us.

Only in the past two hundred years has it really been possible to think of ourselves as a world-culture. In the next two hundred years that will no longer be possible. We've now got to be regional cultures because the world can no longer support the number of people we've got. If you wish, we've got to go back to it. But it isn't a regression. We can go back to it now in a positive sense of knowing where we've been, what the total world offers and how to make do with what we've got here.

BERG: To bring it all back around, a social or cultural adaptation that would be political—to accomplish this—would probably have continental movement and soil nutrition as implicit bases.

CURRY: I would concur, because only if we look at the life-support system of the biosphere, or the biogeochemical surficial portion of the earth, can we talk about the ability of that system to sustain pressure and change.

We know that the mid-continental regions or eastern regions of North America outside the limits of glaciation, the southeast of the United States for instance, those regions cannot take high perturbation, they cannot take great change in biotic use of the land. But on the west coast of North America we can make use of such change only if we know exactly what it's going to do. We can't strip off the forest and expect to grow more trees when that forest is reliant upon a given nutrient cycle.

PETER COYOTE: Science has a perimeter around the known world of what's possible that is so rigid that you can go through phenomena that are outside this perimeter of understanding and you won't see them because your eyes can't see what your mind can't comprehend.

CURRY: I think maybe you're confusing manipulative science with interpretive science.

COYOTE: I don't want to put a value judgment on science. What I want to do is open up the door in mind and all of it so that you don't have to go through a university, you don't have to go through all that stuff, you can put yourself in a place and open yourself to it and the place will give you the same bona fide instructions that it gave to indigenous people all over the planet for all time.

CURRY: I think that's exactly right.

COYOTE: I would like to hear something from your perspective about how you translate that into . . . I mean is that vibration coming from the earth, is it coming from your feet into your brain . . . something that gives that a scientific postulation, because science does seem to be the avenue of objectifying things.

CURRY: So far science has just looked at pieces of things. It hasn't attempted to put the pieces together into a whole working unit.

Your reference to indigenous people as having put it together is close because a few scientists today are just beginning to have enough of the pieces to be able to put it together to see that those people indeed had it together all along. Very few scientists today are looking at the whole and trying to be taught by the whole. They're still trying to look at a piece and figure out what makes it work. It has taken many of those pieces to be able to prove that those people who understood the whole really knew what they were talking about, those people who were taught by nature.