

# A Forest Grows in Antarctica

Antarctica, for the most part, is a lifeless continent of rock and ice. Over the last 15 years, scientists have come to believe that the stark and frigid landscape we see today has existed for a very long time; the climatic message embedded in sea sediments is that once an ice sheet enveloped East Antarctica 15 million years ago, it never let go.

Now, however, scientists working on the continent itself have uncovered the wooden remains of what they believe was an extensive forest that flourished only 400 miles from the South Pole about 3 million years ago.

"This is sure evidence that the ice sheet went through a very major period of waning about that time," says Peter Webb, who discovered the wood with a team of researchers last November and December. "Antarctica workers have got to start to think in terms of more dramatic changes of the glacial record."

The idea of a permanently ice-clad Antarctica first began to melt a few years ago when Webb, a paleontologist at Ohio State University in Columbus, and his co-workers discovered marine microfossils in the Transantarctic Mountains (SN: 7/2/83, p. 6). Webb concluded that 4 million years ago, as well as at earlier times, the ice sheet had retreated and seaways stretched across East Antarctica. Then, when the sheet advanced, it carried the fossils from the ocean basin to the mountains.

The new find of roots and stems of wooden plants and of pollen in an area stretching about 1,300 kilometers along the Transantarctic Mountains means not only that the ice retreated but also that the climate was warm enough to support a shrublike beach forest. "The presence of the wood means that there was deglaciation on a major scale, with conditions radically different than they are today," says David Elliot, chief scientist of the recent National Science Foundation polar expedition, of which Webb's group was part. "This is a very significant find." Webb thinks the forest region a few million years ago must have resembled the present-day fjords of Chile and Norway.

According to Webb, before the forest developed, the region was covered by a considerable amount of ice. So an important question is where the forest and pollen came from. "Had the forest been living there all the time, and are we overestimating the severity of the earlier glacial record?" he wonders. Had life developed on its own in Antarctica? Or had the plants and pollen been carried to Antarctica from other continents?

Webb notes that 40 million years ago,



Wooden traces of Antarctic forest.

Antarctica was the middle link in a migration path for marsupials and other life traveling from South America to Australia, when both continents were much closer to Antarctica. By a few million years ago, Australia had moved very far away from Antarctica, so that "any migrations that took place along the same route would have come to a rather disastrous end," he says. "However, in my wilder moments I think that Antarctica may have received these migrations from lower latitudes." Just in case, Webb's group is on the lookout for remains of insects and other creatures that might have lived in the Antarctic forest.

Because the different scientific teams have only recently returned from the expedition, they have not had time to extensively compare their finds. One possible area of contention with the work of Webb's group is the dating of the wood, which so far has been estimated with the ages of microfossils found in the sediment with the wood. If the wood was much older than a few million years, its significance would lessen, since it would have little bearing on the more recent glacial history of Antarctica. Moreover, traces of life have been discovered in Antarctica dating back 200 million years or older. But Webb and Elliot say they are relatively certain that the wood is fairly young because it is not very fossilized: It still floats and can be burned.

In addition to finding evidence that the recent glacial history of Antarctica is more dynamic than was previously thought, Webb's group concluded that the continent may have been more tectonically active as well. The researchers discovered that the deposits containing the wood fossils are sliced by faults, which displaced sediment layers by as much as 1,000 meters. This indicates that the Transantarctic Mountains have risen very rapidly in the last few million years. Previously scientists had assumed that they had risen slowly, over a 40-million-year period.

"It seems that Antarctica is not the one or two plates that people have been thinking about," says Webb. "The big plates ... appear to be broken up in

smaller plates that are interacting against each other," resulting in rapid growth of the mountains.

This fast growth also makes it easier to accept the idea of retreating ice sheets. The faults show that a few million years ago, the mountains were lower than had been assumed. And the lower the mountains at that time, the less ice would be required to cover them and hence the less ice would have to be melted when the sheets retreated.

Scientists are interested in documenting the past growth and destruction of the world's ice sheets because, according to one line of thinking, these changes are key to the shifting sea levels during the earth's history: Sea level rises when the ice sheets melt and falls when they grow. The recent discoveries in Antarctica, says Webb, are some of the first real steps toward correlating ice sheet growth with sea level fluctuations. — S. Weisburd

## Government probes gene-splice test

"Greenhouse" experiments on genetically engineered bacteria injected into fruit and nut trees were among the tests reviewed by the Environmental Protection Agency (EPA) in making its decision last year to issue a permit to scientists at Advanced Genetic Sciences, Inc. (AGS) of Oakland, Calif., for the first field test of a genetically engineered organism (SN: 11/23/85, p. 324). But EPA did not know that these prior experiments on about 50 trees were not performed in a greenhouse, as the company had implied, but in the open air on the roof of the AGS building.

The company admits to the outdoor tests, which were disclosed last week in the Washington Post, but says its scientists acted in "good faith" because they did not consider the experiment to be an "environmental release" subject to EPA approval. EPA says the tests violated the federal requirement that the agency be notified before any field tests of genetically altered microbial pesticides. The U.S. House of Representatives' Committee on Science and Technology held a hearing March 4 to find out "how these events could have occurred."

"It's a scandal," says Jeremy Rifkin of the Washington, D.C.-based Foundation on Economic Trends. "It is a black day for the [biotechnology] industry."

Rifkin expects a court decision this week on his challenge to the AGS field-test permit. Meanwhile, the field tests — which were planned for early this spring