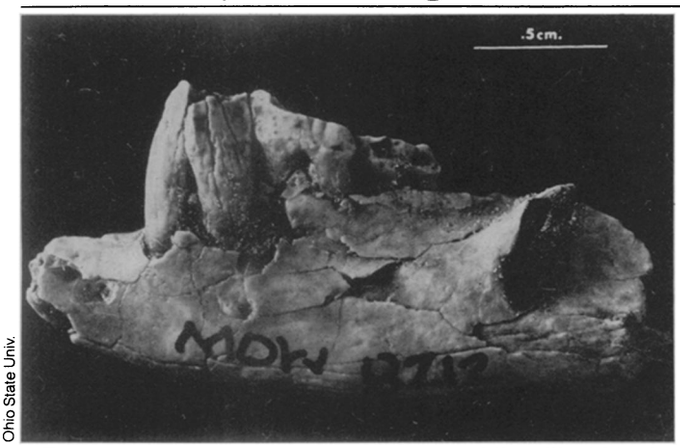
Fossilized jaw first sign of land mammals in Antarctica



Ohio State Univ.

The fossilized jaw, three inches long, belonged to a rodent-like marsupial. The discovery marks the first mammal found on the continent, and supports the idea that the marsupials crossed Antarctica millions of years ago on their way from South America to Australia.

Two days before the end of an already successful expedition, scientists working in Antarctica chanced upon fossilized remains of a small, rodent-like marsupial, the first mammal ever found on the continent. The 40- to 45-million-year-old jaw fragments discovered on Seymour Island provide compelling support for a long-standing argument: that the marsupials reached Australia from South America by crossing the Antarctic land mass.

Uncanny similarities between animals on the widely separated continents as well as the jigsaw puzzle fit of the continental margins suggested that the three southern continents once were united in a supercontinent named Gondwanaland. With proof in the last 20 years of the theory of plate tectonics, it became clear that the huge southern land mass had broken up, carrying the three continents aboard moving crustal plates.

William Zinsmeister of Ohio State University's Institute of Polar Studies and leader of the expedition says that the confirmed presence of land mammals in Antarctica shows that Antarctica and South America were attached during the late Cretaceous and early Tertiary periods, about 65 million years ago.

Lack of a critical bit of evidence — marsupial fossils from Alaska or Asia — had left little support for the route previously assumed for the marsupials. Rather than traveling up through North America, across Alaska and the Bering Straits, and down through Asia, it has been suspected that the marsupials took the southern route. Indeed, the rest of the fossil record upholds this view. The earliest known marsupial fossils are from North America, later ones from South America, and the most modern specimens from Australia. The Antarctic fossils constitute a middle step in the assumed evolutionary sequence.

For 40 million years the marsupials, which nurture their young in external abdominal pouches, dominated the mammalian world. Gradually, however, they were out-competed by the placental mammals, whose offspring reach greater maturity while still within the safe confines of the mother's womb. Today the opossum is the only marsupial in North America; Australia shelters most surviving species.

The specimen was found by Michael Woodburne of the University of California at Riverside. During a break he happened to pick up the rock that contained the jaw. A vertebrate paleontologist who specializes in marsupials, he immediately identified the specimen by its jaw structure and teeth. The animal, of the genus *Polydolops,* was nine or ten inches long, and probably lived on berries near its shoreline habitat. *Polydolops* has not been found in Australia but, Zinsmeister says, that may be because the fossil record there extends back only about 10 million years.

When Zinsmeister first visited Seymour Island in 1975, he suspected from the age and type of rocks and from their state of preservation that the island was the most likely site on which to find the "elusive marsupial." He refers affectionately to the island as the "Rosetta Stone to the southern Circum-Pacific." He believes the island provides the key to understanding the evolution of early marine and non-marine life forms in the Southern Hemisphere during the last 70 to 80 million years.

The research team also reported to its sponsor, the National Science Foundation, a wealth of other discoveries, many of which extend existing knowledge of what Antarctica was like before ice enclosed it. Plentiful specimens of petrified wood suggest that 70 million years ago, dense forests covered the now-frozen continent. Skeletons of plesiosaurs, large marine reptiles and lizard-like marine reptiles called mosasaurs indicate that at that time Antarctica was surrounded by warm, subtropical seas. By 40 to 45 million years ago, the environment was changing. There were still forests, as well as a rich aquatic community including whales, sharks and giant penguins. The scientists collected "buckets full" of bones from giant penguins that were as much as six feet tall. These specimens will be forwarded to specialists in bird fossils who hope to glean some information about the evolutionary origins of the penguin family.

—*C. Simon*

Mt. St. Helens: Ash and a bigger dome

Scientists monitoring Mt. St. Helens had fair warning that a new round of volcanic mischief was in the works. From the first seismic precursors Feb. 8, through the increasing incidence of deep and shallow focus quakes, through ground deformation similar to that which preceded previous events, all signs foretold some robust show of strength from the simmering cauldron on the mountain's summit.

What transpired — an explosive eruption at 7:28 p.m. March 19—exceeded even the expectations of most scientists at the United States Geological Survey Cascades Volcano Observatory in Vancouver and at the University of Washington Geophysics Center. While the degree of the eruption was greater than anticipated, Don Peterson, scientist-in-charge at the USGS facility, reports that the event was within the limits of the eruption alert issued by the observatory early that morning.

The first phase of the eruption sent a cloud of ash billowing to altitudes of 45,000 feet, as recorded by weather radar at the airport in Portland, Ore. After an estimated 20 to 25 minutes, the volcanic activity subsided for several hours. At 1:37 a.m. for two or three minutes the volcano erupted again, propelling ash to 18,000 feet. Seismicity then fell off sharply, and the mountain resumed the business of building its lava dome.

The eruption was far smaller, in volume of materials ejected and in duration, than the smallest explosive event in March 1980, when the youngest of the Cascade volcanoes erupted for the first time since 1857 (SN: 4/5/80, p. 213; 7/26/80, p. 58). While allowing for the unexpected, scientists predict no further explosive eruptions during this event. "We've found in all the previous events [at Mt. St. Helens] that there has been no significant explosive activity once the growth of the dome begins," Peterson says. By the night of Saturday, March 20, a new lobe of viscous lava was forming on the top of the dome cradled within the summit crater, and was oozing down the dome's southeast flank.

Other than destroying several USGS instrument stations on the mountainside, the eruption caused minimal damage. A mixed avalanche of melted snow, mud, rocks and ice careered down the north side of Mt. St. Helens, splitting into separate channels destined for Spirit Lake and the Toutle River.

—*C. Simon*

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