



Early hunters' disposable lance points.

Bonnichsen and Lahren/Science

Opening of the far northern seas

One of the best known and most widely accepted reconstructions from the ancient days of the supercontinents is the rending and gradual separation of Africa and South America, whose facing coastlines still fit like adjacent pieces in a global picture puzzle. Somewhat less obvious to the casual glance is the northern continuation of that great schism, when North America and Eurasia moved apart to form what is now the North Atlantic Ocean.

The research vessel *Glomar Challenger* has devoted Leg 38 of its deep-drilling mission to the final rifting in this northern split, the breakup of Norway and Greenland that produced the Norwegian and Greenland Seas as well as the mini-continent of Iceland. Led by Manik Talwani, director of Columbia University's Lamont-Doherty Geological Observatory, and Gleb Udintsev of the Institute of Oceanology of the Soviet Academy of Sciences, Leg 38 yielded core samples that indicate a complex history of shifting stresses and sinking landmasses covering as much as 40 million years. Seventeen holes were drilled, including one only 800 miles from the North Pole.

Beginning about 55 million years ago, the split began with the opening of what is now the Norwegian Basin,

a body of deep water off the Norwegian coast. For 25 million years the spreading continued, the core samples suggest, during which time the line along which the opening was taking place moved about 100 miles to the west. Then, as the widening continued, a huge strip of Greenland's coast broke off and also moved westward, finally sinking beneath the waves to form the Jan Mayen Ridge, a strangely linear submerged plateau that resembles a continuous mountain range hundreds of miles long. During this 15-million-year episode the line of opening moved again, so that it now passes through Iceland.

It was probably not until the final phase of this whole period, perhaps less than 20 million years ago, that the Norwegian Sea became truly open to the warmer waters of the Atlantic to the south. Core samples from the now-submerged Iceland-Faroe Ridge, descendant of the Norwegian Sea's ancient southern boundary, reveal lavas apparently extruded at or above sea level. These traces hint that it was not until these latter years that the ridge slipped below sea level, finally letting in the Atlantic water and easing the harsh climate of Scandinavia and the eastern Arctic. □

helps explain the mystery. They found beveled and cross-hatched pieces of bone along with the fluted projectile points that have become the mark of the Clovis hunters. (The primitive hunters are named after an archaeological dig near Clovis, N.M.)

Lahren and Bonnichsen made wooden replicas of the bone foreshafts in an attempt to understand their function. They lashed the two beveled pieces to a projectile point and a wooden lance (see diagram) and found that the foreshafts gave stability to the weapons. The two bone pieces "act like a pliers grasping the projectile point," Bonnichsen says, and prevent slippage. The weapon's narrow, resilient neck also would allow for deeper penetration into the mammoth's body than if it had a point attached directly to a thick lance, he says.

With this weapon model in mind, they propose that the early hunters could have carried many foreshaft-point units and just a few lances to the hunt. After stabbing a mammoth, a hunter could have pulled out the lance and left the detachable point unit buried deep within the wound. Then, within seconds, he could have replaced the unit and stabbed again. If the Clovis hunters had been aware of and aimed for the vulnerable nerve centers that may have existed in mammoths (and do exist in modern elephants) with their versatile weapons, they could, Lahren and Bonnichsen believe, have successfully slain their giant prey. □

EPA bans Dieldrin and Aldrin on crops

The Environmental Protection Agency has won an important legal step in the four-year-long dispute over the pesticides Aldrin and Dieldrin, and has suspended most of the production of the chemicals. But neither the Environmental Defense Fund (EDF), initiators of the campaign against the pesticides, nor Shell Oil Co., sole producer, is satisfied with the latest decree, and court battles will continue.

Attorneys for EDF, a Washington-based environmental law firm, have been trying for years to stop Shell's production of the two chlorinated hydrocarbons, used primarily on corn crops in the Midwest and citrus crops in the southern United States. Shell has been making about 10 million pounds per year for agricultural purposes. Environmental researchers have evidence that the pesticides are slow to degrade and are carcinogenic to mice and that their residues are found in almost all commercial foodstuffs and in 99.5 percent of the human tissues analyzed.

A cancellation hearing has been under way in EPA's administrative law court for several months on a joint move by EDF and EPA to ban all agricultural uses of the pesticides. In August, EPA Administrator Russell E. Train

issued a notice of the agency's intention to suspend further production of the pesticides until the full cancellation case is resolved next spring (SN: 8/10/74, p. 87). The administrative law court approved the suspension in September, and EPA last week ordered a ban on the production of Aldrin and Dieldrin for agricultural uses until the full case is decided. The ruling states that any stocks of the chemicals formulated into the products before Aug. 2 of this year may be sold for agricultural uses, but those formulated after Aug. 2 may be sold only for three specific, nonagricultural purposes: termite control, dipping the roots and tops of nonfood plants and moth-proofing in places with no waste water runoff. These uses were cleared by the EPA in 1972, and a spokesman says Shell will produce about one and a half to two million pounds per year for these purposes.

The cancellation case will continue in the administrative law court, but Shell and EDF have both filed petitions in U.S. district courts for review of the suspension order. EDF lawyers want to see a complete ban on production and sales of remaining stocks, and Shell wants the limited production ban overturned. □