Different depths for different fish

High-pressure situations are fine for some fish, but intolerable for others. The ability to withstand high water pressure appears to be an evolutionary prerequisite of those species successful in colonizing ocean depths, with adaptations for pressure resistance extending right down to the fish's biochemistry, Joseph Siebenaller and George N. Somero report in the July 21 SCIENCE.

Despite a lack of obvious physical barriers, marine species often display strict depth distribution patterns. To examine the role of hydrostatic pressure on maintaining separations, the researchers examined two species of rockfish that are closely related, have similar life histories and live at the same temperature, but at different depths. *Sebastolobus alascanus* commonly lives between 180 and 440 meters; *Sebastolobus altivelis* between 550 and 1,300 meters. The fish look very similar to an untrained eye, Siebenaller says. At first glance, and even after careful analysis with separation techniques, enzymes of the two species appear identical. Siebenaller and Somero examined the skeletal muscle enzyme lactate dehydrogenase and concluded that the two species could have only relatively minor differences in its composition. However, like the fish, the enzyme behaves differently under pressure.

The enzyme of the deeper-living species is less sensitive to changes in pressure. It is unperturbed in its binding of both substrate and cofactor and the rate of its reaction changes little with increasing pressure. The enzyme from the shallower species is more sensitive. The researchers suggest pressure changes the sensitive enzyme's structure. An important implication of the finding is that the relatively small difference in pressure, about 100 atmospheres, between the habitats of the two species is adequate to favor adaptive modifications of the enzymes. Siebenaller and Somero examined several other species in further experiments at the Scripps Institution of Oceanography and found pressure insensitivity to be characteristic of enzymes of the deep-living, but not shallow-living, fish.

The researchers see an opportunity to correlate the detailed structure of an enzyme with its function. They plan to analyze amino acid sequences of the active sites of the enzyme and look for the minor differences between shallow- and deep-living species responsible for the different behaviors.

If the deep-living species' enzymes are insensitive to pressure, why do they stay in the deep? "It's not enzymes alone that determine where they live," says Siebenaller, who is now at State University of New York at Stony Brook. Ecological interactions with other living species probably play an important role, but one that is more difficult to analyze in the laboratory. □

Big bone . . . Big bear

Utah State Historical Society

A heavy equipment operator in Kearns, Utah, spotted what he thought was a bone traveling along a conveyor belt at a sand and gravel pit. Subsequent investigation turned up this two-and-one-half-foot-long femur of a bear (shown in comparison with the femur bone of a present-day small black bear). Utah State paleontologist James H. Madsen Jr. estimates that the Pleistocene bear lived about 18,000 years ago and stood nearly 12 feet upright, three feet taller than the polar bear and five feet taller than the average grizzly. Madsen says it may be the largest bear for which remains have been found. "Chances are very good this is a new species, just because of its immense size," he says. "It may be a new genus, but right now that's just speculation." In addition to the femur, researchers dug up parts of both hip bones, both tibiae, a lumbar and a sacral vertebra. Some of the samples are being carbon dated at the Smithsonian Institution, according to Madsen.

Laetrile legalized for terminally ill

Proponents of legalization of the controversial cancer drug Laetrile have scored a major victory. Cancer patients certified "terminally ill" by a licensed medical practitioner can now receive Laetrile injections under a ruling by the U.S. Court of Appeals for the 10th Circuit.

The court ruled last week that "safety" and "effectiveness" as defined in the Federal Food, Drug and Cosmetic Act, and under which the U.S. Food and Drug Administration banned Laetrile, have no meaning when considered in the context of persons expected to die from cancer. The ruling came in a case appealed from Oklahoma in which a district court held that a FDA ban of Laetrile violated a terminally ill cancer patient's constitutional right to privacy. The appellate court asked: "What can 'generally recognized' as 'safe' and 'effective' mean to such persons who are so fatally stricken with a disease for which there is no known cure? Under this record," it concluded, "Laetrile is as effective as anything else."

But is it? Some cancer scientists and clinicians are sure to argue that it is not, as X-rays, surgery and an ever-expanding arsenal of carefully tested drugs extend the lives of patients with many kinds of cancer and even cure some of these patients. Also, as there are documented cases of occasional spontaneous cancer remissions, it may frequently be difficult for physicians to decide whether a patient is truly terminal or not. Yet it is up to individual physicians under the court ruling to define "terminally ill." Finally, there is the question of whether this ruling will weaken the FDA's legal jurisdiction over the safety and effectiveness of other kinds of drugs. □

Weather mod plan

A cohesive, 20-year program of "weather resources management" could produce 10 to 30 percent increases in mountain snowpack and rainfall in the High Plains and Midwest by the 1980s, a 10 to 20 percent reduction in hurricane winds and a 50 percent reduction in hail by the 1990s, says the Weather Modification Advisory Board. This 17-member panel, created by the 1976 National Weather Modification Policy Act, proposed last week that a National Weather Resources Management Board be associated with the National Oceanic and Atmospheric Administration. Research funding of $37 million in 1980 and $90 million by 1985 would support studies on cloud seeding and other methods of weather modification. The environmental, social and economic impacts of weather modification would be studied as well as possibilities of federal, state and local cooperation. □