

Pain relief in brain and blood

Some months ago investigators identified a molecule in the brain that has the same affinity for nerve receptors in the brain that morphine has and that is blocked by the same agents. This discovery excited pain researchers throughout the world. They hoped hard that the molecule would prove to be the first natural pain-relieving chemical to be culled from the brain.

Their hope has now been met, according to reports in the June 3 *NATURE*. A natural pain-relieving chemical has also been isolated from the blood for the first time, a National Institutes of Health meeting has recently revealed.

The pain-relieving molecule in the brain goes by the exotic name of "enkephalin" (SN: 5/15/76, p. 309). Actually enkephalin is not one molecule but two closely related ones. Each is a pentapeptide (a protein chain containing five amino acids) with a hydroxyl group at the end. They differ from each other by only one amino acid. Heinz H. Büscher and his colleagues at Sandoz Ltd. in Basle, Switzerland, synthesized both enkephalins and made an analog of each. They compared the analgesic activity of the two enkephalins and that of the two analogs in mice. As they report in *NATURE*, the two natural molecules indeed showed pain-killing activity. In contrast, the analogs produce no analgesia, showing that the original molecules indeed possessed pain-relieving characteristics.

Two other reports in the issue of *NATURE* further support a physiological role for the enkephalins in the central nervous system. One by P.B. Bradley and his co-workers at the University of Birmingham, England, shows that the enkephalins exert a depressant action on nerves in the brainstem. The other, by J.P. Gent and J.H. Wolstencroft, also of the University of Birmingham, shows that the two enkephalins exert depressant actions on brainstem neurons that are similar to those of morphine.

The search for a natural pain-relieving molecule in the brain encouraged Candace and Agu Pert and John Tallman of the National Institute of Mental Health to look for a similar kind of molecule in blood. They broke blood plasma down into chemical fractions and tested each one to determine whether it would attach to the morphine nerve receptors in the brain. Only one of the scores of such fractions fit the receptors. The researchers injected the substance into the brains of rats. It suppressed pain, becoming the first known natural pain-relieving molecule in blood.

The NIMH scientists described this discovery at the recent Inter-Assembly of Scientists at NIH. They have named the chemical "anodynin" from the word

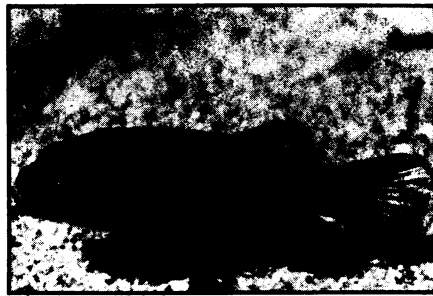
"anodyne," meaning a medicine to relieve pain. Although its chemical composition and structure have not been worked out, the substance appears to be distinct from the enkephalins because it is not broken down by the enzymes in the body that attack the enkephalins.

The enkephalins are maximally active at 2 minutes after injection and barely active by 5 minutes, compared to morphine's peak action at 15 minutes. However, the blood chemical's pain-suppressing action appeared as strong as morphine's and lasted several hours. □

Species protected by recent actions

The Devil's Hole pupfish, more than 1,700 plants and 159 animals will be given some protection from the habitat destruction, hunting and commercial trade that has brought them close to extinction, following recent actions by the Department of Interior and the U.S. Supreme Court.

The Supreme Court decided unanimously that the water in a deep pool on public lands in Death Valley, Nevada—and the 200 one-inch-long pupfish in that pool—could not be disturbed by the irrigation activities of a nearby 12,000-acre ranch. The owners of that ranch pumped so much water from the water table below Devil's Hole that algae could not grow normally on a rock ledge in the pool and thus could not support the small colony of pupfish that remain. The pupfish is listed by the U.S. Fish and Wildlife Service as an endangered species, and its habitat is protected on a piece of federal land. The Court's decision establishes that the water on public lands should be used for the land's intended purpose—in this



Inch-long pupfish gets favorable verdict.

case, the preservation of a nearly extinct fish—and not private interests.

More than 1,700 native U.S. plants were proposed for inclusion on the endangered species list and will be the first plants to receive federal protection under the Endangered Species Act of 1973. About 900 of the plants are found in Hawaii where an astonishing 50 percent of all plant species are now endangered by the rapid urbanization of the islands. The list of 1,700 includes wildflowers, cacti, shrubs, grasses, ferns and trees from 46 states and is taken from a longer list prepared by the Smithsonian Institution.

In another action, the U.S. Fish and Wildlife Service added 159 animals representing every continent to the endangered list. The group includes 61 mammals, 38 birds, 2 fish, 24 mollusks, 28 reptiles and 6 amphibians and such admired animals as the clouded leopard, the Asian elephant and the gibbon. They were named as some of the world's most endangered animals by an international convention in 1973. Inclusion on the U.S. endangered list protects them from importation and exportation without special permits. This latest action came after the Fund for Animals conservation group threatened to sue the Fish and Wildlife Service for its failure to protect these critically endangered species. □

Reconsidering early human evolution



*The contemporaneity of Homo erectus (b) and a robust Australopithecus (a) is now clearly established, says Richard E. Leakey in the June 17 *NATURE*. This finally throws out the single-species hypothesis which said Homo erectus evolved directly from Australopithecus. The decisive evidence comes in the form of a Homo erectus skull whose discovery was announced earlier this year (SN: 3/13/76, p.165). The skull, about 1.5 million years old, came from a site that had also yielded Australopithecus.*