Biology

Ron Cowen reports from Irvine, Calif., at a National Research Council conference on declining amphibian populations.

Tales from the Froglog and others

What's a Froglog? David B. Wake, a biologist at the University of California, Berkeley, and conference chairman, gathered information from around the world on amphibian declines in a digest given that whimsical title. Highlights from the Froglog and meeting include:

Canada: Richard Wassersug of Dalhousie University in Halifax, Nova Scotia, who has studied frogs in that province for eight years, says several species are on the wane or have not been sighted recently, including leopard frogs and an albino form of the North American species *Rana clamitans.*

Japan: Masafumi Matsui of Kyoto University notes that several species have declined, but attributes most losses to direct environmental change – notably the conversion of rice paddies to housing and golf courses.

Norway: Since 1966, biologists have documented losses of the common European toad, *Bufo bufo,* on islands in the outer regions of Oslo's fjord.

Puerto Rico: Since the mid- to late 1970s, three species of miniature frogs – *Eleutherodactylus japseri, E. karlschmidti* and *E. enidae* – have apparently disappeared, and one species, *E. unicolor,* has become rare. In addition, the once common *E. coqui, E. richmondi* and *E. wightmanae* have experienced dramatic declines in the last three years, says Margaret Stewart of the State University of New York at Albany.

Southeastern United States: This region shows little evidence of a general population decrease except for areas with obvious habitat destruction. Researchers note several declines, including the population of the large, stream-dwelling salamander *Cryptobranchus;* the chorus frog, *Pseudacris triseriata,* is either rare or has vanished in southern coastal areas where it once thrived.

Western United States: This section has suffered serious population losses, particularly in the Rocky Mountains, several areas of California and the Pacific Northwest. The first edition of RIBBIT, a research newsletter on frog, toad and salamander declines in the west, lists several endangered populations, ranging from inhabitants of forests to those that dwell in lowlands and mountains. Threatened mountain-dwelling species include the boreal and Yosemite toads, the cascade frog and the tiger salamander. Waning forest frogs include *Ascaphus truei* and several types of the leaf-breeding *Plethodon.* Three lowland frog species may now be extinct – *Rana fisheri, R. onca* and *R. tarahumarae.*

R. Bruce Bury and P. Stephen Corn of the U.S. Fish and Wildlife Service in Fort Collins, Colorado, prepared RIBBIT, relying on data from their own work and several other studies. In their survey of 105 locations in the central Rocky Mountains previously known to contain amphibians, the researchers note that the leopard frog inhabits only four of 33 sites where it once abounded, and the boreal toad is now seen in just 10 of 59 areas it had frequented. Acid rain does not appear to play a major role in the declines, Bury and Corn add. Three other species – tiger salamanders, wood frogs and chorus frogs – did not experience major regional losses during their three-year study, which ended in 1988. The scientists recently established Frog Net, an electronic communications system, to gather further information on amphibian declines in the West.

The California red-legged frog and the foothill yellow-legged frog, which live in California lowlands, have both suffered severe declines, in part due to the practice of stocking lakes with fish that eat tadpoles, notes Mark R. Jennings of the California Academy of Sciences in San Francisco. And in some areas of southern Oregon and Washington, the cascade, western spotted and red-legged frogs have virtually vanished, says Andrew R. Blaustein of Oregon State University in Corvallis.

Earth Sciences

Ancient whale smiled like a sieve

The modern blue whale, the largest animal on Earth, is a toothless giant of the deep that feeds by filtering sea-water through a comb-like structure called baleen. Scientists have long thought that Blues and other baleen whales, which belong to a suborder called Mysticetes, evolved millions of years ago from ancestral toothed whales, but they have lacked detailed fossil evidence to chronicle the transition from teeth to baleen. A Canadian paleontologist has now identified a previously unknown type of ancient whale from Antarctica with a gap-toothed smile that helps fill in the dental story.

Edward D. Mitchell of the Arctic Biological Station in Ste-Anne-de-Bellevue, Quebec, described a new genus and species of extinct whale called *Llanocetus denticrenatus* from remains found on Seymour Island along the Antarctic Peninsula. The animal, which lived about 40 million years ago, had an unusual set of notched teeth arranged in a widely spaced row along its cheek, Mitchell reports in the December 1989 CANADIAN JOURNAL OF FISHERIES AND AQUATIC SCIENCES.

Judging from the shallow roots to the teeth and the shape of the notches, Mitchell says the whale could not have eaten by gripping, piercing or tearing its prey. Instead, he proposes the animal used the notches in its teeth as a filter to catch fish or shrimp-sized invertebrates. While no modern whales use their teeth to feed this way, Mitchell notes that the Crabeater seal, which does not eat crabs, has notched teeth that it uses to filter krill and other invertebrates.

L. denticrenatus represents a "missing link" that fits somewhere between ancient toothed whales and the first known fossils of the toothless Mysticetes, says Mitchell, who suggests filter feeding in whales first developed in forms with notched teeth. These animals may also have had baleen, which is made of fingernail-like keratin that does not fossilize.

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Geomagnetic switch: Not impact caused

A close examination of sediment cores from the deep sea is challenging the theory that comet or meteorite impacts have caused the Earth's magnetic field to reverse itself several times during geologic history. Scientists proposed this theory 20 years ago when they noted that a turnover in the geomagnetic field 730,000 years ago coincided in timing with an impact, marked in the geologic record by tiny, glassy grains called microtektites. Since then researchers have found two other close timings between impacts and reversals 15 million years ago and 900,000 years ago, seemingly bolstering the original theory. But a study of the event 900,000 years ago suggests the impact followed the reversal and could not have caused it, report David A. Schneider and Dennis V. Kent of the Lamont-Doherty Geological Observatory in Palisades, N.Y., in the February GEOPHYSICAL RESEARCH LETTERS.

The researchers studied a layer of microtektites buried in sediments near the Ivory Coast. They discovered the microtektite layer above the sediment layer that recorded the reversal and estimated the impact occurred 30,000 years after the beginning of the reversal.

Kent concedes that recent work suggests a reversal 730,000 years ago did directly follow an impact, but he notes neither the K-T impact 65 million years ago nor one 15 million years ago are clearly linked to a reversal. With only one of four cases supporting the theory that impacts cause reversals, Kent says that coincidence could well explain the one exception.