Discoveries

The Dallas Morning News

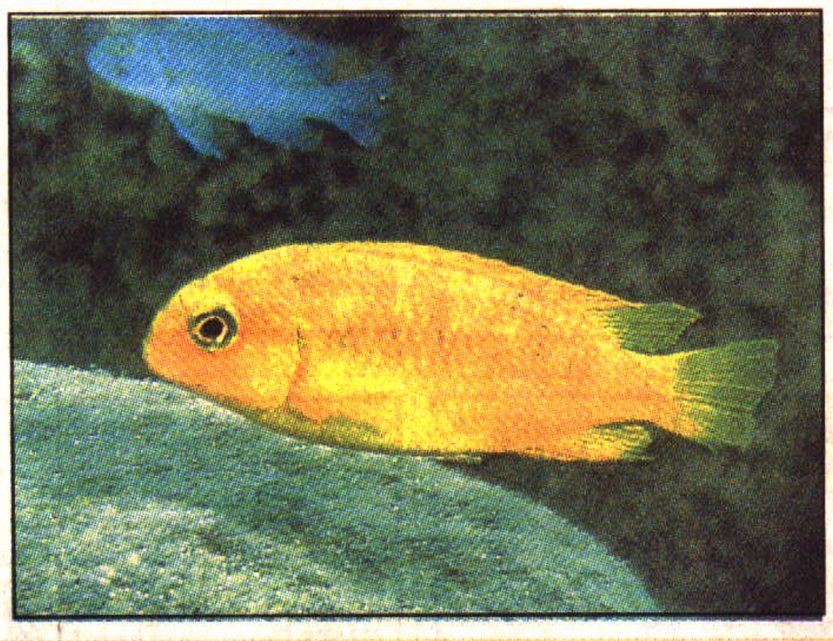
AN EVOLVING FIELD

DIVERSITY ON DISPLAY

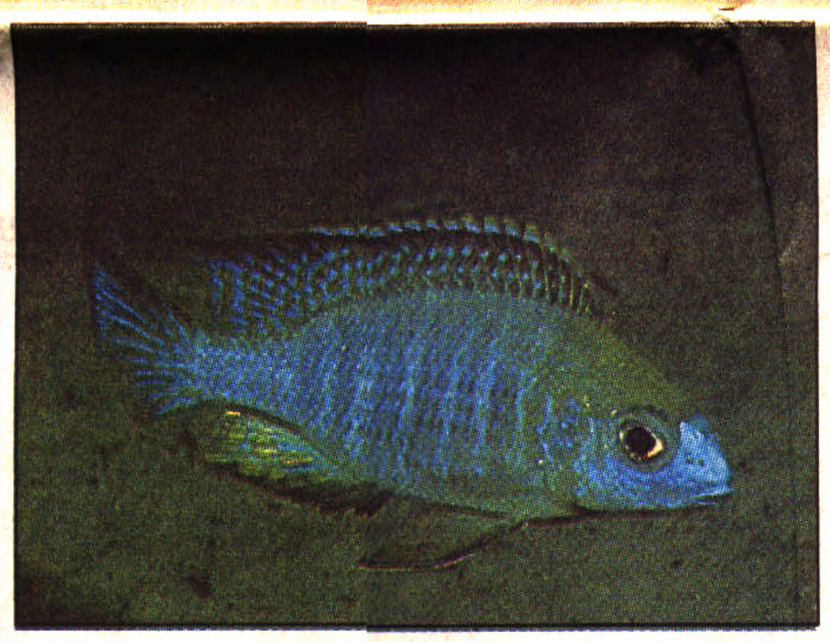
In East Africa, lakes Victoria, Malawi and Tanganyika harbor more than 1,000 separate species of cichlids. These wildly diverse fish are a prime subject for scientists studying how and why species evolve.
At right is a species from Lake Malawi, which eats the eyes of other cichlids. Shown at bottom right is a cichlid from Lake Tanganyika; the others are from Lake Malawi.

Dimidiochromis compressiceps

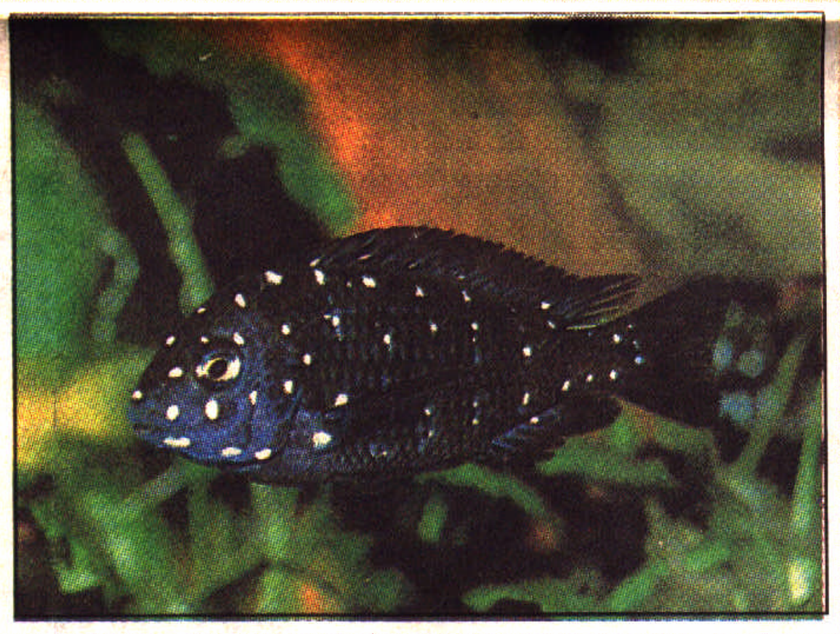
Pseudotropheus zebra



Pseudotropheus tropheops



Lethrinops (species unknown)



Tropheus duboisi

Photos by Dr. Andreas Spreinat

DNA gives clues about species' past

By Alexandra Witze
Staff Writer of The Dallas Morning News

EVOLUTION

Traditionally, studying evolution meant digging for fossils. Scientists compared pieces of bone, feathers and flesh to figure out how life changed over time.

Today the digging is more high-tech. Instead of fossils, researchers investigate the history of life using tiny fragments of DNA.

Studies of DNA are revealing surprises about how species evolved and how they are related, providing data to help conserve endangered species and even offering clues to fighting certain diseases.

"In the next 10 years, we should be able to get a very good picture of the evolution of life that we haven't been able to do in the 120 years since Darwin," said S. Blair Hedges, a researcher at the Institute of Molecular Evolutionary Genetics at Pennsylvania State University.

Using new molecular tools to delve into the evolutionary past, scientists are redrawing the branches on the family tree of life. One recent study, for example, challenges the accepted notion that the kinds of bees that share highly advanced social behavior must be related to each other. Another paper has traced the ancestry of a wildly diverse family of African fish to a single founding population in an old lake.

Other studies of evolution at the molecular level may help resolve arguments about life in the distant past. New studies are fueling the debate about what kind of fish crawled out of the ocean 400 million years ago and evolved into the first land-walking vertebrate.

Some molecular research aims toward planning for the future. Recent studies may help scientists decide whether conserving endangered species, such as the humpback whale and the red wolf, is worthwhile, genetically speaking. By figuring out how closely related the living animals are, scientists can tell whether a species is already doomed to extinction through inbreeding because of its small gene pool.

Research has even focused on the evolution of bacteria and viruses. A new study traces the lineage of the bacterium that causes the venereal disease chlamydia. Understanding how *Chlamydia trachomatis* develops may lead to a vaccine that can counter the bacterium's future changes.

All this work has prompted the number of scientific journals devoted solely to molecular evolution to jump from one to three in the past few years.

Molecular studies are becoming popular because looking at fossils doesn't always show everything about the relationships between organisms, biologists say. Fossils reveal only the morphology, or form and structure, of an animal or plant. Molecular research doesn't divulge everything either, but it can be an important puzzle piece in the jigsaw of determining the history of life.

"It is almost impossible to study the evolutionary derivations of bac-

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Scientists get a line on lineage of fish family

By Alexandra Witze
Staff Writer of The Dallas Morning News

If Charles Darwin had gone snorkeling in some East African lakes instead of tripping off to the Galapagos Islands, scientists might be talking today about Darwin's cichlids instead of Darwin's finches.

After all, biologists are now learning as much about the process of evolution from the cichlid family of fishes as Darwin did from his songbirds.

The finches helped prompt Darwin to formulate his theory of evolution by natural selection, years after his 1835 visit to the Galapagos. Darwin had noticed that finches on different islands evolved into highly adapted forms, each with a specially shaped beak to eat only insects, seeds or leaves.

The cichlids (pronounced SICK-lids) of Africa are at least as specialized. In three particular lakes, more than 1,000 separate species of cichlids dwell — an astonishing example of an evolutionary explosion.

Biologists have been fascinated ever since they discovered the explosive radiations of the African cichlids almost a hundred years ago. The wildly diverse fish are a prime subject for scientists studying how and why species evolve.

These bony, perchlike fish also live in the waters of Central and South America, Madagascar and Asia. But in East Africa, lakes Victoria, Malawi and Tanganyika harbor the greatest variety of cichlid species anywhere. Axel Meyer, an evolutionary biologist at the State University of New York at Stony Brook, described the cichlids' diversification in the August issue of *Trends in Ecology and Evolution.*

Lake Malawi alone is home to more cichlid species (at least 400 and possibly as many as 1,000) than any other lake in the world. There are more cichlid species in Lake Malawi than there are fish species in the freshwaters of North America. And Lake Tanganyika, only 200 miles away, harbors about 170 different species; another 200 miles farther, Lake Victoria contains more than 300 species.

One reason the cichlids have been so successful in diversifying is that the different species have squeezed into almost every possible ecological niche. Different cichlids have specialized to a point that seems ridiculous.

Cichlids have two sets of jaws that have helped them develop bizarre hunting strategies. Their front jaws operate separately from the set of jaws in the back of their throat. The front jaws can capture prey in any manner of

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