



Aquatic Highway Signs

THERE IS nothing superhuman or miraculous about the alleged "homing instinct" of salmon, that takes them back to the ancestral spawning grounds for generation after generation. The fish, indeed, respond almost like robots to certain guiding stimuli, that serve as aquatic highway signs in the rivers up which they travel from the sea when the time comes for them to lay their eggs and die. So says Dr. Henry B. Ward, professor emeritus of zoology at the University of Illinois and permanent secretary of the American Association for the Advancement of Science.

Temperature seems to be one of the most potent of these directing stimuli that control salmon traffic. When the silver horde comes to a fork in the river, one branch with warm water and one with cold, they will most frequently reject the warm creek and swim up the cold one. Swiftness of current has some effect in guiding them, too; though of course there are limits: some creeks are so swift and full of rapids that not even a big salmon has strength to fight its way up them. Salmon do not seem to care whether the water is roily or not, nor does the relative acidity of the water bother them, except where chemicals are present in poisonous amounts.

Prof. Ward stressed the fact that it is impossible to make dogmatic statements that "salmon like this" or that "they don't like that." There are five species of salmon, each with its own set of reactions. Furthermore, even within a given species, reactions seem to differ with latitude. For example, he found red salmon in southern British Columbia preferring water temperatures that red salmon in Alaska rejected.

Salmon breed in lakes and wide places along the courses of their favorite rivers, being attracted always to

loose gravel beds where the water is kept gently stirred by springs welling up from the bottom. This upwelling cold water seems to be as definite a stimulus to spawning as temperature is to choice of migration routes.

The parent fish die after the eggs have been deposited and fertilized, but the water is so cold that their bodies do not decay. When winter comes, they are frozen fast in the ice, and in spring they constitute the first solid food eaten by the young fish.

Dr. Ward emphasized that present knowledge of salmon and their ways is

exceedingly fragmentary. They live for the first season in the waters where they are spawned, then migrate downstream to the sea, not to be seen again until they are four years old, ready to go upstream again, breed, and die. It is as though students of the human race were permitted to watch children until they were about eight years old, and then should lose track of them completely until they were mature men and women of forty-five who all died at about fifty. A great deal, he warned, remains to be learned about that wide unfiled gap in the salmon's life history.

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GEOLOGY

Life on Earth Traced Back More Than a Billion Years

LIFE on the earth was traced back a billion and a quarter years, at the Geological Society of America's annual meeting, in Cincinnati, Ohio, by Dr. Alfred C. Lane of Tufts College and Dr. William D. Urry of the Massachusetts Institute of Technology.

The strange remote vista included a time which Dr. Lane called the Collozoic, or era of oozy or jelly-like animals, and back of that an even longer time which he called Eophytic, or era of dawn-plants, when the atmosphere consisted mainly of carbon dioxide.

Dates, correct within a few tens of millions of years, have been supplied for these ages by a study of elements left in the rocks by the decay of the primal supply of radium that was in them. One method is to measure the final end-product of that decay, the very heavy element lead. Another, largely developed through Dr. Urry's researches, depends on the amount of helium.

By checking readings of both these geological clocks against each other, Drs. Lane and Urry have arrived at an age of between 500 and 560 million years for the very earliest animals that had skeletons, shells or other hard, fossil-forming parts. From the bottom of this Paleozoic Era they measure backward through the long Collozoic, or Era of Jelly-Animals, to a beginning possibly 900 million years back, and thence through the Eophytic, or Dawn-Plant Era, to its beginning about 1,250 million years ago. Before that time was the Abiotic or Lifeless Era, with oldest rocks of ages estimated between 1,650 and 1,850 million years.

Radioactivity Cooks Mountains

Mountains come into existence because radioactivity within the earth produces great doming-up blisters of semi-molten stuff, more or less steam-filled "blobs" appear on the surface of a pot of boiling mush. This, roughly, was the hypothesis put forward by Dr. John L. Rich of the University of Cincinnati.

The boiled-up domes themselves do not form the mountain ranges, Dr. Rich explained; they are much vaster than any mountain ranges. What happens is that the harder surface layers coast off the slopes of the domes and are thrown into wrinkles around their bases. These wrinkles are the mountain ranges. The liquid contents of the domes find a partial escape through cracks in their thinned-out roofs, as vast field-flows of lava. The stretched harder matter on top cracks into what are known as block faults, whose tilted edges form mountain systems of a different type.

Mountains Under Massachusetts

Vast buried foldings of massive crustal layers, veritable subterranean mountain ranges that have never seen the light of day, quite probably underlie Massachusetts and Connecticut, Dr. Chester R. Longwell of Yale University suggested. He was led to this hypothesis by a study of what are called gravity anomalies, or differences in the pull of gravity in different places. Areas of stronger pull indicate the nearness of the tops of these stationary billows of dense rock; areas of weaker pull are presumably over their valleys or troughs.

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