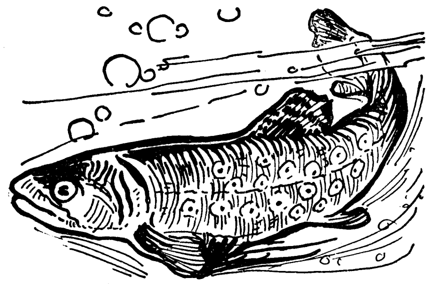
NATURE RAMBLINGS
by Frank Thone

ICHTHYOLOGY



The Breath of a Fish

FISH, we are prone to imagine, get along without air. They live in a medium that would quickly strangle us if we were immersed in it—for drowning is primarily death by oxygen starvation. Yet they must have air just as we must, and without it they too will drown.

The fish's secret is that he can get the air (or rather, the oxygen) he needs out of the water itself. Not from the "0" in the H_2O: in the water the oxygen is bound firmly to the hydrogen, and useless for respiration purposes. But dissolved in almost all water as it occurs in nature is a certain amount of the all-necessary gaseous element, and if one is properly equipped to get it out, why, one can live perfectly well in water and never miss the air.

The fish's equipment for getting this oxygen is his outfit of gills—the red fringes, row on row, that lie under those slits that are where the sides of his neck would be if he had any neck. Gills are filled with blood inside, and present a very large surface to the water outside, so that the water as it flows past comes into close contact with oxygen-greedy blood, that pulls in the dissolved element through the thin gill walls. The fish's circulatory system is so arranged that the blood from the heart is pumped first through the gills, then around through the body and back to the heart again, just as the cooling water in an automobile is pumped first through the radiator and then through the engine jacket and back to the pump.

The more active a fish, the livelier the water it likes to live in; for swift currents in streams and waves on lakes or seas help to mix oxygen in the water and thus become more charged with it than are sluggish streams and stagnant pools. Thus we find trout in swift mountain brooks, and catfish on the muddy beds of slow rivers; nervous, active sharks at the surface of the seas, and almost sedentary flounders lying on the bottom. The less oxygen, the less chance to be vigorous.

Among the slowest and least active of all the fish in the world are the tropical lungfishes, some of which do not have functional gills at all, but depend entirely on air breathed by means of a primitive sac-like lung they have. To fill this they must come to the surface once in a while, just as a whale must come up to "blow."

Lungfishes live in the muddiest, most stagnant pools that anything can stay alive in, and when these uninviting dwelling-places become nearly dried up in summer they "aestivate" just as ground-squirrels and turtles hibernate retreat into a burrow, lapse into so deep a sleep you would think them dead, and live on their stored food until better times come again. Only the lungfish must store oxygen as well as food: the last lungful of air they take in before they retreat into their burrows has to last them for weeks, even months. No wonder a lungfish is not lively!

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PHYSIOLOGY

New Theory Explains How Cells Develop Resistance

A NEW THEORY of how certain cells of the body develop resistance to injury was described by Dr. William deB. MacNider of the University of North Carolina before the Southern Medical Association. For the scientific studies leading to the development of this new theory, Dr. MacNider was awarded the research medal of the Association.

The theory may explain what happens to some patients suffering from chronic Bright's disease and to mothers who develop kidney trouble just before the birth of a child.

Certain cells of the kidneys and liver, known to scientists as fixed tissue cells, can be injured by such poisons as bichloride of mercury, uranium and chloroform, Dr. MacNider explained. He investigated the results of such injuries in animals and found two types of reaction.

In one type the injured cells may regenerate or "come back" in a form similar to their original cell form. These cells, he found, had no resistance to future injury by the same chemicals. On the other hand, the cells may regenerate or come back in a changed form which is not the normal type of cell but which is capable of doing some work. This type of cell is resistant to many times the amount of the same injurious chemical that produced the change.

Dr. MacNider observed dogs that developed acute Bright's disease from bichloride of mercury or uranium poisoning. When the animals were slightly ill and then recovered, with no change in the type of cells in the kidneys, they had no resistance to further poisoning with the chemicals. But when animals became very ill and recovered, their kidneys having been repaired with an abnormal type of fixed cells, they developed a very great deal of resistance to the chemicals.

From these studies, Dr. MacNider concluded that the mother who is very ill of kidney disease before her child is born, but who recovers, can generally have more children without any further trouble, because the cells in her kidneys have come back in this abnormal, highly resistant form. On the other hand, the patient who is only slightly ill will probably have trouble before the birth of subsequent children.

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