

PRELIMINARY NOTICE OF THE MORE IMPORTANT SCIENTIFIC RESULTS OBTAINED FROM A STUDY OF THE EMBRYOLOGY OF FISHES.

By J. A. RYDER.

At the last meeting of the Academy of Natural Sciences of Philadelphia (April 19), Mr. Ryder remarked that, as a result of his studies with the United States Fish Commission on the development of the bony or Teleostean fishes, he had learned that they differ in their mode of development from all other groups of vertebrates and fish-like animals, except the sturgeons, in having a cavity, the segmentation cavity, which persists and ultimately extends around the entire yolk as a paravitelline space between the epiblast and hypoblast layers of the embryo; this cavity in these fishes not being evanescent, as it appears to be in the embryos of the other sub-classes. The paravitelline space does not wholly disappear in the young fish until as much as two weeks after it leaves the egg. The segmentation cavity probably does not persist as long in fish embryos with a vitelline system of vessels as in the pike and stickleback for example.

An annulus or thickened ring of cells all round the edge of the blastoderm, continuous at one point with the tail of the embryo, limits the cavity alluded to above; the ring of cells the speaker called the periblastodermic annulus, and is characteristic of the embryos of true fishes and sturgeons. This feature characterizes these types, as far as is now known, as sharply from their relatives as does the anatomy of the adults.

The cleavage of the germ disk in bony fishes and sturgeons is regular, which further distinguishes them from other types, but they resemble the sharks in that the germ of the young fish is developed at the edge of the disk, and not in its center as in birds and reptiles.

A vesicle appears at the tail of the embryo when the blastoderm has covered rather more than half of the vitellus. This structure, which has been called Kupffer's vesicle, has not yet been proved to be an allantois, as was at first supposed, but is almost certainly a result of the invagination of the gastrula mouth or blastopore at the tail. The canal passing from it may be called Kupffer's canal, and opens on the dorsal face of the embryo. It may be continuous with the medullary canal.

The true nature of the gastrula was pointed out on homological grounds. The true gastrula of Teleosts appears to originate as an invagination at the tail of the embryo, represented by Kupffer's canal, essentially the same as in *Amphioxus*, and is not homologous with the gastrula regarded as such by Haeckel.

The paired fins originate from lateral folds, and the first skeletal elements of the breast fins in the cod are a pair of curved cartilaginous

arcs or rods which are not disposed radially, but concentrically to the base of the fin. These folds appear so far back on the embryo that their genetic relation to the gill arches appears improbable. The fin is displaced forwards with the growth of the young fish, and its base rotates through an angle of ninety degrees in acquiring the upright position.

PHILADELPHIA, *April 20, 1881.*

REARING OF CALIFORNIA MOUNTAIN TROUT (*SALMO IRIDEUS*).

By SETH GREEN.

(Extract from a letter to Prof. S. F. Baird, May 3, 1881.)

I have 220 six-year old California mountain trout, some of them weighing 3 pounds, and 10,000 three-year old that we are taking the spawn from now. One day last week we took 88,000 spawn. We shall have next year 30,000 more three years old. We have orders for all we shall take this year. But next year we shall have many millions. They are a hardy game fish. They spawn in the spring, and hatch in streams a much larger percentage than our trout. They will live in any streams that our trout will, and in many warmer streams that our trout will not live in. This is the fourth season that we have taken the spawn, and every year a good many have hatched in our spawning-races. We never saw one of our trout or salmon-trout hatched in the races. Seven years ago I got 300 of their eggs; we hatched and raised 275; when they were three years old we took 64,000 eggs and raised 10,000 for breeders. The next year we had 260 of the old stock, and took 90,000, and raised 30,000 for breeders and distributed the rest. Last year we had 220 of the old stock; we took 80,000 eggs and are raising 12,000.

SALMON CAUGHT IN GENESEE RIVER, NEW YORK.

By SETH GREEN.

NEW YORK STATE FISHERY COMMISSION,
OFFICE OF THE SUPERINTENDENT,
Rochester, N. Y., May 3, 1881.

* * *: Last week five salmon were caught in the Genesee River, weighing from 3 to 10 pounds. They were caught in small scoop-nets. The falls are seven miles from Lake Ontario. They are 87 feet in perpendicular height. Eighty rods above is another fall of 90 feet. Then the river, 90 miles to its head in the Allegheny Mountains, is a clear stream for 40 miles. Then it comes on large flats with clay banks, and becomes very roily during floods. The young salmon were put in the tributaries above the falls. They have gone over the falls and