BRANCHIOPOD CRUSTACEANS.

Unquestionably the most interesting group of all crustaceans (crabs, lobsters, shrimps, etc.) are the branchiopods or branchipeds. They occur in salt and fresh water, and usually in great numbers. When taken out of the pool with a common dipper and dropped into a glass jar with some water, their most graceful motions can be observed at leisure. They swim slowly backward, incessantly paddling with their branchial feet, of which there are usually eleven pairs on either side of the upper body. Each of the leaf-like feet has a sort of a gill attached for breathing, in the shape of an oval fleshy lobe. The head is rounded, and has two large stalked eyes at the sides. A little above the eyes there is on either side a thin delicate antenna, or organ for feeling. The tips of the feelers are beset with microscopically small touch-globules and bristles. A little below the eye stalks there are a pair of claspers, often with hooks, large in the male, and small and simple in the female. The male claspers are sometimes flat and curiously branched, as in the genus *Streptocephalus*, Fig. 6.

Between the male claspers there are often two fleshy lobe-like tongues, which are usually found coiled spirally beneath the head. These fleshy processes are curiously branched in the genus *Chirocephalus*, Figs. 5 and 7. The mouth is closed by a pair of minute jaws, which, when viewed under the microscope, look like two currycombs. Below these there are two more pairs of very minute jaws.

All members pertaining to this family take their food from the soil of the ponds or pools in which they occur. They occasionally strike against the mud, whirling it up, thus getting a quantity into the external channel between their feet. The motion of the latter is such as to gradually drive the mud toward the head, and microscopic organic matter (algæ, etc.) contained therein enters the mouth and stomach. F. Spangenberg, Ph.D., first mentioned this fact in 1875, and I have frequently observed the same in *Eubranchipus, Streptocephalus watsonii P.*, etc. Under no circumstances will they ever partake of chopped meat or bread placed in the aquarium; for as soon as the decomposition of the meat begins, all the individuals will die.

Just below the last pair of branchial feet the external sexual organs may be seen, contained in two united segments. Below the sexual organs is a cylindrical prolongation of the body, the so-called post-abdomen, to which the two united sexual segments also belong. The post-abdomen ends usually with a furca or terminal fork. The latter consists of two more or less long, flat, and stiff bristles fringed with finer bristles (setæ).

The furca undergoes great changes in salt water species according to the density of the water; the furca is therefore of but little value in the determination of species. In *Thamnocephalus*, Fig. 20, we find a rudder-like, flat, broad appendage instead of a terminal fork, the latter being but faintly indicated by a median notch. Some branchiopods occur in the hot season only; others, like *Eubranchipus vernalis*, Verrill, Fig. 1, only in winter. In midwinter, when mild weather sets in, and the thin coat of ice gradually melts away, *Eubranchipus* can be seen by the thousands near Maspeth, L. I., in ponds along the railroad track. They are of various hues of red, more or less transparent, and measure about one inch in length when full grown. The female drops her eggs every few days; the latter are dark brown, spherical, and finely granulated. The eggs of other genera form perfect mathematical figures, and are very peculiar. The smaller pools nearly all dry up in the hot season, being occasionally filled by rains. *Eubranchipus* are supposed to be a relic of the ice age, and are never seen in summer.

The eggs of branchiopod crustaceans show the singular phenomenon of hatching only after having once been dried up. Perfectly dry mud from the pools in which they occur will develop the eggs contained therein, after adding water, in a tumbler or jar, within two or three days. The young at first look entirely different from the adult, and swim about very actively. They shed their skin a number of times, and every time reappear with an additional growth of feet and increased body, until mature.

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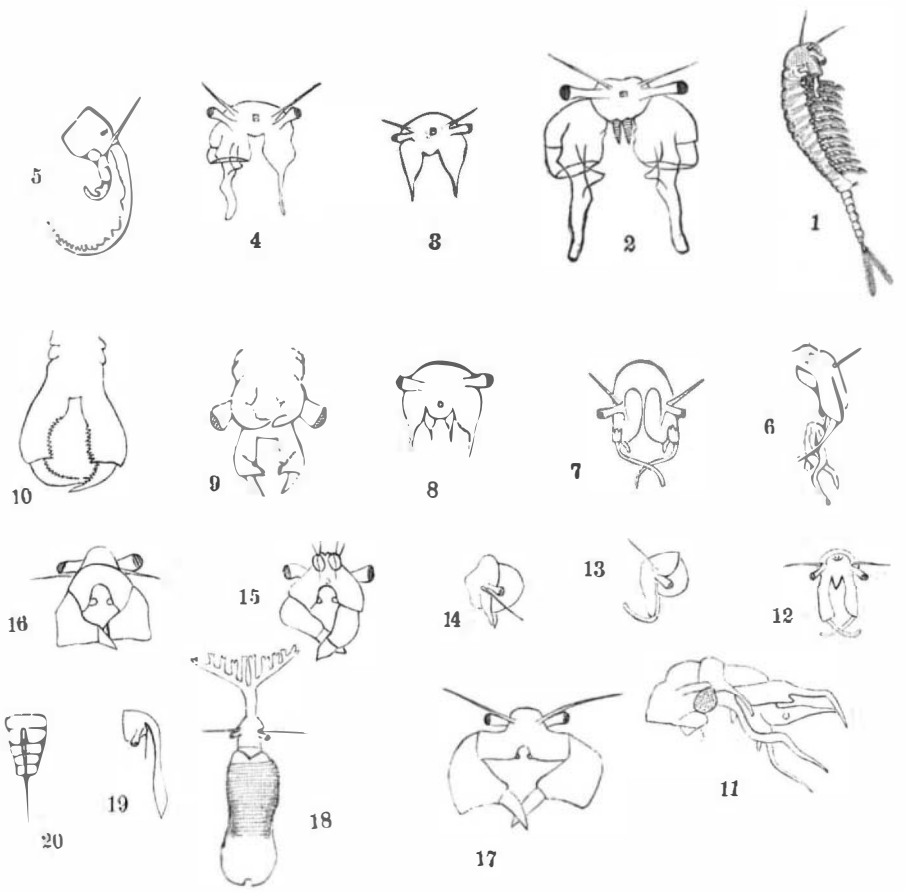


1. *Eubranchipus vernalis*, Verrill. Male, about twice natural size. Author's drawing.—2. Head of *Eubranchipus*. Male, much enlarged. front view. After Verrill.—3. Head of *Eubranchipus*. Female, slightly enlarged. Author's drawing.—4. Head of a hermaphrodite of *Eubranchipus*. Male and female claspers on one and the same animal. Sexual organs accordingly. Author's drawing.—5. Head of *Chirocephalus*, Holmani. After Ryder. Lateral view of male. From Woodbury, N. J.—6. Head of *Streptocephalus sealii*. After Ryder. Side view of male. From same locality.—7. Same as Fig. 5. Front view.—8. Same as 5. Female, front view.—9. Head of *Branchinecta arctica*, Verrill. Male. From Labrador. 10. Head of *Branchinecta groenlandica*, Verrill. Male. From Greenland.—11. Head of *Streptocephalus texanus*, Packard. Male. From Texas.—12. Head of *Branchinecta coloradensis*, Packard. Male. From Colorado.—13. Head of 12. Side view.—14. Head of female of 12. Side view.—15. Head of *Artemia gracilis*, Verrill. Male. Connecticut and Massachusetts. In salt water. 16. Head of *Artemia monica*, Verrill. Male. Mono Lake, Cal.—17. Head of *Artemia fertilis*, Verrill. Male. Great Salt Lake, Utah.—18. *Thamnocephalus platyurus*, Packard. Entire male. Half of natural size. Seen from above. Kansas.—19. Head of female of the same. Side view.—20. Side view of the last few segments of abdomen with telson of 18.

BRANCHIOPOD CRUSTACEANS.

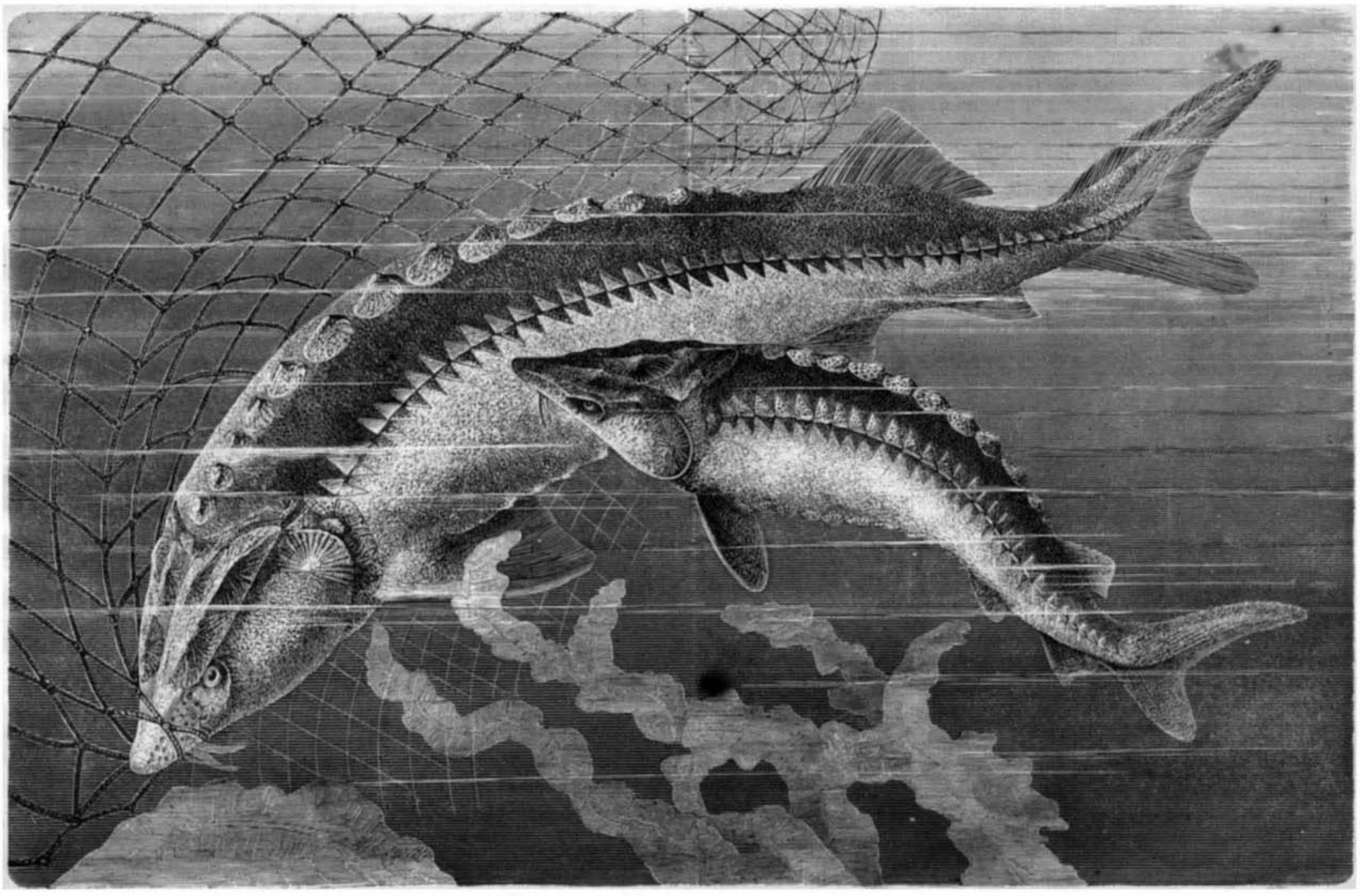
THE STURGEON FAMILY.

This family of fish have no bones like the cod, salmon, herring, etc., but, instead, have soft flexible gristle. The sturgeon is for some countries as important as the salmon, and is most common in Eastern Europe, living both in the sea and the large lakes, and at certain seasons of the year ascends the rivers in large schools.

In Russia a large proportion of the population is supported by the sturgeon fisheries, where it is salted, smoked, sundried. From it is obtained the Russian isinglass and caviare. All attempts to hatch sturgeon eggs and raise the fish artificially have so far been failures.

The finest kind of sturgeon (of Europe), whose flesh is almost as high-priced as that of the salmon, is the sterlet (*Acipenser ruthenus*), which seldom measures more than two feet, and averages eight and a half pounds, is found in the Danube, Salzach, the Drau, and Dniester. From its air bladder the finest isinglass is made, and from its roe the finest caviare.

The Prussian Ministry of Agriculture, in 1872, accepted an offer from De Koch, of St. Petersburgh, to plant 100,000 young sterlets from the Volga in the rivers of Germany, especially in the piscicultural establishments. With our American sturgeon great confusion has resulted in determining the different species, from basing them on cha-



THE STURGEON FAMILY—(*Acipenserini.*)