

# Culture of the Stonefly Nymphs

## *(Isoperla confusa)*

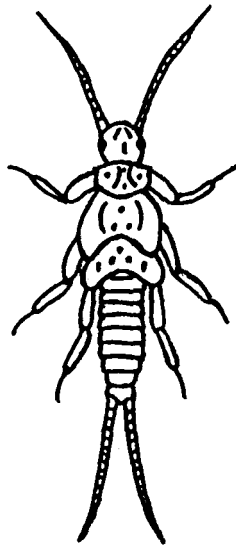
By Joseph Boucher

Stonefly Nymphs have not been cultured in captivity, except as experiments in some laboratories, and they offer a great challenge to adventurous culturists to compete with nature in their artificial propagation. They are an important natural food for the fishes in unpolluted fresh water streams, and they also make an excellent live food for aquarium fishes.

There is several known predaceous and harmless herbivorous species of Stoneflies, and most common and best known herbivorous specie in the Great Lakes region, seems to be *Isoperla confusa*, the Nymph of this specie is recognized especially by its two shield-like dorsal wing pads, the long pair of antennae, and the long pair of segmented terminal tails (cerci). The three pairs of jointed legs, and ten abdominal segments are also characteristic identifications of the specie. They are brownish to greenish in color, and decorated with contrasting yellow and black markings on their back. They grow from 10 to 15 mm. in body length, excluding the antennae and terminal cerci appendage.

The natural habitats of the Stonefly Nymphs is in clean unpolluted flowing streams and rivers, especially in cool areas. the non-eating adult Stoneflies are terrestrial and spend their short adult life span among the shore vegetation, but the long living Nymphs are aquatic and live and develop in the shallow water near the shores and hide under stones and among the bottom debris. Their natural food consist mostly of green clinging Algae, and golden brown clinging Diatom Algae, and also on decomposed organic matter presumable incrusted with unicellular green Algae and free Diatom Algae. The Nymphs are also found among bunched Filamentous Algae, which incidentally provides the best method to collect a starting culture of the Nymphs, by netting them out with the Filamentous Algae.

*Isoperla confusa* reproduce sexually, and their life cycles are completed in four developmental stages comprising of the Eggs, Nymphs, Imagoes, and adult Stoneflies. The small oval Eggs which are produced in large numbers, are supposed to hatch in a few days, but it is not known exactly how long it takes, and at what temperature it occurs. The Nymphs remain in the Nymphal stage for about one year, and when fully developed in the spring or fall, they climb on floating vegetation or debris, where they transform into Imagoes. The Imagoes manage to reach the shore vegetation where they transform into adults in 1 to 2 days. The adult Stoneflies mate without swarming, and the females drop their fertilized eggs in large batches on the water near the shores where they sink to the substrate and adhere to the aquatic vegetation or bottom debris until they hatch. It is presumed that fall laid eggs may remain dormant until the next spring. The adult females only live a week or so, but produces about a thousand eggs during their short adult life stage. The emergence of most aquatic adult insects is accelerated by warm



**Stonefly Nymph**  
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temperature, but with the Stoneflies it is the opposite, and their emergence is accelerated by the colder temperature instead, which occurs in the spring and fall, which may be altered in temperature controlled cultures.

The artificial culture of Stoneflies is more or less an experiment at this time, which may require modification according to results. It could be done in a cool basement in large aquariums with an open bottom screen cage fitted with shelves on one side for the adults to rest on, the cage is placed on the aquariums to retain the adult Stoneflies. The size of the cage depends on whether they mate while at rest or in flight, which will have to be determined. Provide an abundant supply of oxygen with under gravel aeration, and about  $\frac{3}{4}$ " of fine aquarium gravel as a substrate. Provide hiding places such as with broken pieces of clay pots placed on the gravel for the Nymphs. And provide floating pieces of wood for the transforming Nymphs and Imagoes to rest on while transforming. Fill the aquariums preferably with rain water or aged tap water, and provide sufficient illumination for a healthy Algae growth. And feed the Nymphs alternately with clinging green Algae and clinging golden Diatom Algae. The Nymphs can also be fed alternately with supplemental dietary food products such as Spinach, Alfalfa, and Desiccated Liver tablets, which are dropped on the culture substrate where they separate into fine eatable particles.

The Algae can be cultured in separate containers, and can be started with small Algae covered stones collected from clean ponds and flowing streams, and feed the Algae daily with a few drops of commercial liquid fertilizer such as the kind used for leafy garden and potted house plants, or preferably with the ALGA-GROW concentrates now on the market.

And provide the essential illumination, aeration, and temperature, for a healthy growth, and add broken pieces of concrete for them to grow on. The Algae is fed to the Nymphs by transferring the Algae covered stones or added broken pieces of concrete to the Nymphs culture.

Only the Nymphs are used as fish food and they are best collected with a roast baster or large asepto syringe and strained through a tea strainer. We are depending mostly on the Nymphs to maintain the continuance of the population, and we must make sure that enough of them remain in the culture at all times. When the minimum time, and exact temperature required for the completion of each life cycles is known, it may be possible to force them to produce several generations per year, which would make their culture more profitable.

There is another known herbivorous specie *Peltoperla arcuata* which possibly may be better qualified for artificial propagation, and worth investigating. It is recognized by its wider flatish thorax and wider and shorter legs, and its shorter abdomen with only seven showing segments, and its shorter terminal cerci. They are supposed to be common in Eastern and Western areas near the Southern Canadian border.