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Editorial Article

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The Importance of Artificial Rearing of Chironomidae Insect (Blood Worm) as Fish and Shrimp Food

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Abstract
The chironomidae family is related to Order of Diptera. They are called non biting midges. Females will lay egg masses in water. The larva feed on organic material such as organic debris and algae. Due to having hemoglobin in their larval blood, they are called bloodworm. They are able to live in a complete absence of oxygen for several hours. Hemoglobin molecules in the blood bind and hold a reserve supply of oxygen. Chironomus as indicators of organic pollution in aquatic environment. Chironomids were important in the diets of all fish species as well as shrimps. Bloodworms are harvested from mud flats and sold to fisherman or as a food source for domestic pets. In the world there are several centers for artificial rearing of this insect. There are different formulations of blood form which is prepared by different companies in the world. Rearing and artificial culturing this insect is important resource for fishes and shrimps which are the mina important food of human being.

Keywords: Bloodworm, Rearing, Hemoglobin, Fish, Shrimp Food

Introduction
The Chrinomidae family is from order of Diptera, suborder Nematocera. Utilization The Chironomidae is a large and diverse family of insects. They are commonly known as “non-biting midges”. There are over 20,000 species known world-wide. Adult midges are relatively small (1-20 mm long), with narrow bodies and long legs. They resemble, and are often confused with, mosquitoes (Culicidae), but unlike mosquitoes, they do not bite, and have no scales on their wings. In most species, adult males have plumose antennae that are much larger than the females (these are probably used to locate females). During the spring and summer males will create mating swarms which people can find quite a nuisance even though adults do not bite, or feed. Females will lay egg masses in water. The larva feed on organic material such as organic debris and algae. The larvae with fourth instars often being longer than earlier instars. Inhabit diverse freshwater ecosystem. They may serve as good indicators of aquatic pollution. They have been used over the decades in fresh water bio-monitoring. Aquatic macro invertebrates are an important food source for fish. There are several ways to assess water quality in water bodies such as methods that focus on physical and chemical properties, dissolved oxygen, mercury, and water clarity, and biological measures. In sufficient situation we can produce 2 kg larva in m2 per day. They have hemoglobin. Substrates as physically complex as leaves, wood, weeds and mosses generally have greater biodiversity than simpler substrates such as sand and rock bed. Compared with other substrates, the accumulations of litter in streams of forested areas appear to be preferentially occupied by chironomid larvae. Chironomid larvae are usually found where there is organic matter, an almost total absence of oxygen, and in many lentic and lotic environments. Climatic factors also influence the amount of Chironomidae larval found. Tropical regions are considered favorable for the growth of the larvae, which usually takes around 15 days, ranging from a temperature from 0° to 32°C with the enabling factors it can be predicted that a high number of generations occur each year. Substrates as physically complex as leaves, wood, weeds and mosses generally have greater biodiversity than simpler substrates such as sand and rock bed. Compared with other substrates, the accumulations of litter in streams of forested areas appear to be preferentially occupied by chironomid larvae. Chironomid larvae are usually found where there is organic matter, an almost total absence of oxygen, and in many lentic and lotic environments.

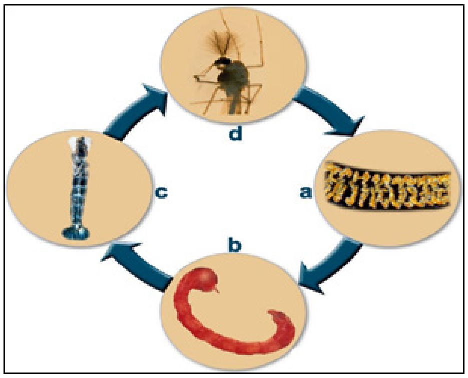

Figure 1: Life cycle of chironomidae: a) egg, b) larvae, c) pupae, d) adult

Very fine detritus, probably tripton, was the sole food item of planktonic first instar larvae. Fine detritus was the most important food item in the diets of most larval chironomid species and was even a major food item of the predacious Tanupodinae. Diatoms were the next most important food item; filamentous green algae, coarse detritus and animal remains, although present in the gut, were not important numerically. Chironomids were important in the diets of all fish species studied; peak numbers were ingested in June. During the winter, fish ingested chironomids from the Acorus and flint zones. In the spring and summer, when large populations of chironomids were available. Chironomids are abundant insects in freshwater habitats. They undergo a complete metamorphosis of four life stages: eggs, larvae, and pupae in water, and a terrestrial adult stage. Chironomids are known to be pollution-tolerant, but little is known about their resistance mechanisms to toxic substances. V. cholerae, other chironomid endogenous bacteria, and their chironomid host exhibit complex mutualistic relationships. Chironomus is commonly associated with the presence of decomposing organic matter and aquatic macrophytes. The increase in the density of larvae of the Chironomus in environments with eutrophic features has been registered in several types of ecosystems. The quality of surface waters is a very sensitive issue because anthropogenic actions degrade surface waters and impair their use for drinking, industrial, agricultural, recreation, public health or other purposes. The concern that fresh water will be a scarce resource in the future. They have forced countries into the evaluation of river water qualities in recent years. Chironomus as indicators of organic pollution. Chironomus mean density varying from 23999.69 to 30253.96 individuals/m2 in polluted sites while 24.13 individuals/m2 in the best water quality site. The numerical abundance of this genus is greatly influenced by food availability independently of the size of the substrate particles. The genus Chironomus is tolerant to organic and industrial pollutants, which means its occurrence and dominance are an effective biological indicator of stream pollution. The Chironomus larvae was the only recorded group of acroinvertebrates. They are able to live in a complete absence of oxygen for several hours. Chironomid larvae are opportunistically omnivorous, ingesting a wide variety of food items Figure 2

Figure 2: Larvae of Bloodworm

Hemoglobin in Chironomidae

Hemoglobin is a respiratory pigment that facilitates the capture of oxygen molecules. It is an essential component of all human red blood cells, but it occurs only rarely in insects-most notably in the larvae of certain midges (family Chironomidae) known as bloodworms. These distinctive red "worms" usually live in the muddy depths of ponds or streams where dissolved oxygen may be in short supply. Under normal (aerobic) conditions, hemoglobin molecules in the blood bind and hold a reserve supply of oxygen. Whenever conditions become anaerobic, the oxygen is slowly released by the hemoglobin for use by the cells and tissues of the body. This back-up supply may only last a few minutes, but it's usually long enough for the insect to move into more oxygenated water. Apneustic insects (those with closed tracheal systems) rely solely on dissolved oxygen and show the least oxygen dependence. Midges (Diptera: Chironomidae) are common and widespread apneustic aquatic insects and are often the only insects to occur in low oxygen habitats such as profundal sediments in highly productive lakes. The midge Chironomus plumosus typifies least oxygen dependence and is declared champion. Insects, like other multicellular animals, require oxygen for efficient cellular metabolism. Insects obtain oxygen from their environments and convey it to cells in many ways, and hence have adapted to nearly all terrestrial and aquatic habitats. The red pigment so visible through the larval integument was identified as hemoglobin by E. R. Lankester in 1872. In 1932, T. Svedberg et al. used their then-new technique of sedimentation velocity ultracentrifugation to estimate the molecular weight of hemoglobin from Chironomus (and other invertebrates); chironomid hemoglobins "weighed in" at 32 kDa. Physiological studies focused on the unusually high oxygen affinity of the hemoglobin (compared to its vertebrate counterparts) and on how it facilitated oxygen supply to larval tissues in a relatively hypoxic benthic habitat. Chironomus hemoglobin is actually a mixture of many hemoglobin proteins synthesized and secreted by larval fat body.

Why does they are good choice for feeding fishes?

They have Increasing growth and fecundity. They rapidly growth and have sufficient fry, alive bate high tolerance and have a good quality of fish's meat.

Nutrient food: Protein, Amino acid phenyl alanine, Lusin, Lysine, Ca, P, Fe, B carotene.
In Chironomus plumosus (Bloodworm), there are: Lipid, vitamin, Mineral, Fatty acid, phenyl alanine, lusyn and lysine. In 100 gr of larvae body there are: 23 gr calcium, 0.17 gr phosphor, 7.63 gr Iran and Beta carotene.

Pool for rearing of Chrinomus larvae: PH: 7.8, DO: 4.2 mg/liter, temperature for larve: 17.5 and 23 degrees centigrade.

Larval food: wheat flour, Shrimp flour, Soy flour (45 percent), Different fish species grow better, Yeast

Temperature for eggs: 21-25 in 72 h, Larvae 1: without any color after 9 day go to red, 94000 larvae m2. Each larve 0.00041 gr. Chironumid larvae could be exploited for 23 days. However, in winter exhibit after 29 days. Chironomus xanthus embryonic developmental period in 15 c about 4 days. embryonic developmental period: 0.5 to 6 day. Pupa developmental period: in 9-11 day. Organic materials and N is vital for larvae.

Chironomus spp. (midge larvae) live in the anoxic sediments and hypolimnia of freshwater lakes and reservoirs during the day and migrate to the surface waters at night to feed on plankton. It has recently been proposed that Chaoborus take up methane (CH4) from the sediments in their tracheal gas sacs, use this acquired buoyancy to ascend into the surface waters, and then release the CH4 thereby serving as a CH4 "pump" to the atmosphere. We tested this hypothesis using diel surveys and seasonal monitoring, as well as incubations of Chaoborus to measure CH4 transport in their gas sacs at different depths and times in a eutrophic reservoir (Figure 3).

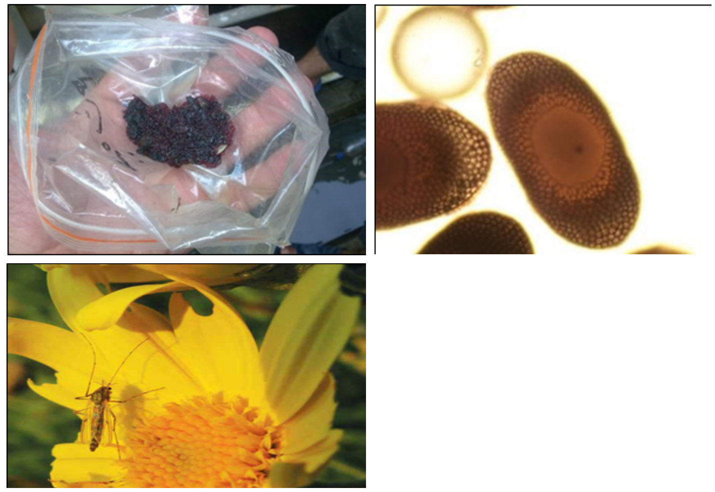

Figure 3: Adults and Eggs of Bloodworm

Traditionally, bloodworms are harvested from mud flats and sold to fisherman or as a food source for domestic pets. The red worms are renowned as bait, and fisherman will pay fair prices for a fresh specimen. Making a successful worm farm depends on raising the worms and getting them to market in a fresh state. Declines in worm numbers on the mud flats have increased demand from farmers, creating a healthy market for farm-raised specimens Figure 4.

Figure 4: Reared bloodworms

Bloodworms are a common food that is given to lots of different types of fish and shrimps Figure 5.

Figure 5: Bloodworms are a common food that is given to lots of different types of fish and shrimps

Different formulations of bloodworm: There are different formulations of blood form which is prepared by different companies in the world. The main important types are:

Frozen bloodworms: Frozen bloodworms, usually cubes in blister packs, are not as entertaining to feed as live bloodworms but they make a convenient option that can be kept in the freezer for a long time.

Freeze dried bloodworms: Freeze dried bloodworms are dried and usually come in tubs. They are not as nutritional as live bloodworms or frozen bloodworms, but can still be used to add some variety to the diet of surface feeding fish.

Bloodworm gel food: Gel food for fish is available in many 'flavors', including bloodworm. It is a great option for carnivorous fish, inverts and amphibians because the gel contains extra vitamins Figure 6 [1-14].

Figure 6: Different types of bloodworms preparation

Conclusion

The aquatic insects of bloodworm play an important role in the food chain of aquatic environment. Rearing and artificial culturing this insect is important resource for fishes and shrimps which are the mina important food of human being.

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