

Ecological and Economic Importance of Chironomids (Diptera)

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Abstract: Chironomids are holometabolous insects having egg, larval, pupal and sexual dimorphic adult stages in their life cycle. Egg, larval and pupal stages are aquatic while adults are aerial cum terrestrial. As an abundant and omnipresent group of organism in aquatic bodies, they are major food source for aquatic invertebrates, amphibians, fishes and birds. Larval Chironomids plays as major link between producers and consumers as benthos in aquatic food webs. As benthos they feed on sediment and push carbon and energy to higher trophic level. In other words, we can say that they are acting as earthworms at aquatic shorelines. They also release ammonia, nitrogen and phosphorus in aquatic bodies. Recently their use in aquaculture industry is increased as their larval forms are cultured and utilized as fish food and fish bait. The mouthparts and head capsule deformities indicate pollution of heavy metals and pesticides. Adult Chironomids having short life span have feeble mouthparts, so unable to bite. Sometimes Chironomids swarms causes nuisance and economic loss to the Lake front residents by clogging air conditioners and automobile radiators. Larval hemoglobin and epidermis of adults cause asthma, rhinitis, and conjunctivitis to sensitive peoples. Sometimes they act as pests for field crops including wheat, rice, maize, tomato, potato, lettuce and some horticultural crops.

IndexTerms: Chironomids, benthos, bioindicator, hemoglobin, polytene chromosome.

INTRODUCTION: Chironomids usually called non biting midges and blind mosquitoes. They resemble mosquitoes morphologically but they differ in their mouthparts and wing scales. Chironomids are cosmopolitan insects inhabits various niches like sea, lake, river, snowfields, mountains, wood, dung *etc* (Armitage *et al*, 1995). Approximately 5000 species of Chironomids reported worldwide (Ferrington *et al*, 2008). Chironomids are holometabolous insects having egg, larval, pupal and sexual dimorphic adult stages in their life cycle. Egg, larval and pupal stages are aquatic while adults are aerial cum terrestrial. They spent most of their life in the larval form. High species diversity of Chironomids is associated with their adaptive capabilities to survive in extreme environmental conditions (Armitage *et al*, 1995). Many larval Chironomids are red because of hemoglobin analog in their hemolymph. Chironomids generally used as model organism for the study of polytene chromosomes. They are infamous because of their small size, they

are not vector of any disease, they are taxonomically difficult to identify and they do not have any aesthetic value (Singh and Rawal, 2016).

RESEARCH METHODOLOGY: As a Zoologist, Chironomids amazed me and a detailed review of information and literature available was analyzed. With focusing on their ecological and economic importance, this report is prepared.

RESULTS AND DISCUSSION: As an abundant and omnipresent group of organism in aquatic bodies, they are major food source for aquatic invertebrates, amphibians, fishes and birds (Hudson *et al*, 1990). Larval Chironomids plays as major link between producers and consumers as benthos in aquatic food webs (Tokeshi, 1991). As benthos they feed on sediment and push carbon and energy to higher trophic level (Oliver, 1971). In other words, we can say that they are acting as earthworms at aquatic shorelines. They also release ammonia, nitrogen and phosphorus in aquatic bodies (Henry and Santos, 2008). Recently their use in aquaculture industry is increased as their larval forms are cultured and utilized as fish food and fish bait. Like all other organisms, temperature is the major limiting factor for their population density (Eggermont and Heiri, 2012). Chironomids egg masses are sometimes used as reservoirs of *Vibrio cholerae*, which is a pathogen of disease Cholera. Most Chironomids can cope with low oxygen concentration, wide range of salinity, wide range of pH and heavy organic and inorganic pollution. This attributes to their genetic adaptability during evolution. However exposure to such environmental stress causes deformity in their genomic and anatomical structure. So we can use them as bioindicators for assessment of environmental health of water body in which they resides. The mouthparts and head capsule deformities indicate pollution of heavy metals and pesticides. Deformity of mentum, mandibles, antennae and epipharyngis is clearly visible in fourth instars larvae (Nazarova *et al*, 2004). Along with this heavy metal pollution also cause chromosomal aberration and polymorphism in polytene chromosomes (Bhaduri *et al*, 2011). Adult Chironomids having short life span and have feeble mouthparts, so unable to bite. Sometimes Chironomids swarms causes nuisance and economic loss to the Lake front residents by clogging air conditioners and automobile radiators. Larval hemoglobin and epidermis of adults cause asthma, rhinitis, and conjunctivitis to sensitive peoples (Sublette, 1985). Sometimes they act as pests for field crops including wheat, rice, maize, tomato, potato, lettuce and some horticultural crops (Cranston, 1987). Chironomid fossils are used by paleontologists as indicators of past climate changes.

CONCLUSION: However these dipterans insects are not ecologically and economically important like mosquitoes and honey bees but as an organism, we cannot deny their importance. They are less ecologically important on land because of the fact that they are not pollinators but we cannot deny their importance in water. However only nature knows what the keystone species is and we all are aware of the butterfly effect in Chaos theory.

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