



ULTRASTRUCTURE OF ADHESIVE ORGANS OF TWO AQUATIC INSECTS INHABITING HIGHLAND HILLSTREAMS

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Primarily to understand the exact mechanism of attachment in the fast flowing torrential water of hillstreams, investigations were carried out to understand the process/mechanism of adhesion in aquatic insects to the wide variety of substrates present in the hillstream Tirthan, in Kullu district of Himachal Pradesh. Two insects i.e. *Bibliocephala spp.* and *Isoperla spp.* belonging to order Diptera and Plecoptera, respectively were sampled from the Tirthan stream during summer months (April and May). The SEM investigations of the ventral surface of *Bibliocephala spp.* revealed the presence of a central row of half-a-dozen distinct suckers having mucous pores in center and surrounded by chitinous pad at posterior end of body. In addition to this, distinct papillae occur on the peripheral region, the tip of which contains long and short hairy pads. In the other aquatic insect *Isoperla spp.* the ventral surface revealed the presence of numerous inverted bell like structures, which acts as suckers. The action of adhesion is further aided by the presence of spines and hairy fibrils. It is opined that though both insects are living in the same kind of habitat yet both *Bibliocephala spp.* and *Isoperla spp.* have different mechanism of adhesion to the substrate.

As the hillstreams are usually situated in upland parts of a river, having steep water currents, which in turn impact on its inhabitants. Various adhesive structures are used by organisms of hill streams for the attachment of organism to the substratum in order to cope with these particular conditions of hillstreams. In response to this organisms developed adhesive discs, attachment pad and other adhesive apparatus, in order to stay in these habitat. The aquatic insects inhabiting the highland hillstreams have special devices like adhesive discs and attachment pads. The *Bibliocephala spp.* and *Isoperla spp.* are chosen for present investigation, as these are readily available in these streams and have peculiar structures on their body. The mechanism of adhesion in the other organisms of hillstreams with the SEM investigation have been discussed in past among fishes¹⁻⁶. The detailed attachment structure with the help SEM investigations in case of terrestrial insects have been worked out by several authors⁷⁻¹¹. As far as process of adhesion in aquatic insects are concern light microscopic investigations have been reported¹². Underwater attachment in current with setose pads of *Epeorus assimilis* have been suggested¹³, but exact mechanism of adhesion and detailed structure of adhesion on other aquatic insects have not been studied so far. Therefore the present investigations were undertaken on the two common insects of Tirthan hillstream of upper Himalaya region of Himachal Pradesh.