Evolution of the Proboscis Armature in Schizorhynchia: What we presently know

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Schizorhynchia includes approximately 193 species of meiofaunal predators that use anterior proboscis to capture prey. The proboscis comprises dorsoventrally paired muscular “tongues”; either unarmed, or bearing hooks or teeth. The proboscis itself has two basic parts in each tongue – a medially located tongue proper, in which the muscle-units run across the width of each tongue, combined with laterally-located divaricator muscles, in which the muscle-units run along the outside of the tongue. Taxonomy in this group has historically relied on the light-microscopic structure of the proboscis, with the taxa bearing unarmed proboscides regarded as basal. Molecular phylogenies do not support this view – the speciose Cheliplanidae, all with armed proboscides, are basal in the taxon, with the genus *Carcharodorhynchus* lying immediately above them, also with an armed proboscis. Other Schizorhynchia possessing armed proboscides are scattered throughout the tree, suggesting that proboscis has lost and/or evolved armature repeatedly. In order to understand how the proboscis functions, we have examined proboscides in both the armed and unarmed condition, using confocal-laser-scanning microscopy, transmission electron microscopy, and/or serial block-face SEM. Comparisons between the unarmed and armed proboscides show clearly that proboscis construction is similar in both, with collagen-like fiber bundles serving to restrict and direct motion in the proboscis (and accompanying hooks, if so armed). However, from the standpoint of biomechanics, the principal remaining question is “where are the nuclei of the proboscis muscles located?” They are clearly NOT located in the proboscis sensu-stricto, as studies of the proboscis proper shows no nuclei in the tongues of proboscides with numbers of radial muscles ranging from a few, located in two rows on each tongue, to proboscides with hundreds of individual muscle units..

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