

Short Communication

THE OLDEST BDELLOID ROTIFERA FROM EARLY PERMIAN SEDIMENTS OF CHAMBA VALLEY: A NEW DISCOVERY

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ABSTRACT

The fossil Rotifer of the genus *Rotaria* has been recovered from the Early Permian sediments of Chamba Valley, Himachal Pradesh, India by maceration technique. The finding of this oldest fossil rotifer is unique because it is the first record from Permian sediments of India and is oldest record of fossil rotifer. The present fossilized specimen of *Rotaria rotaria* is complete, well preserved, microscopic, 497.35µm in length and 358.13µm in breadth.

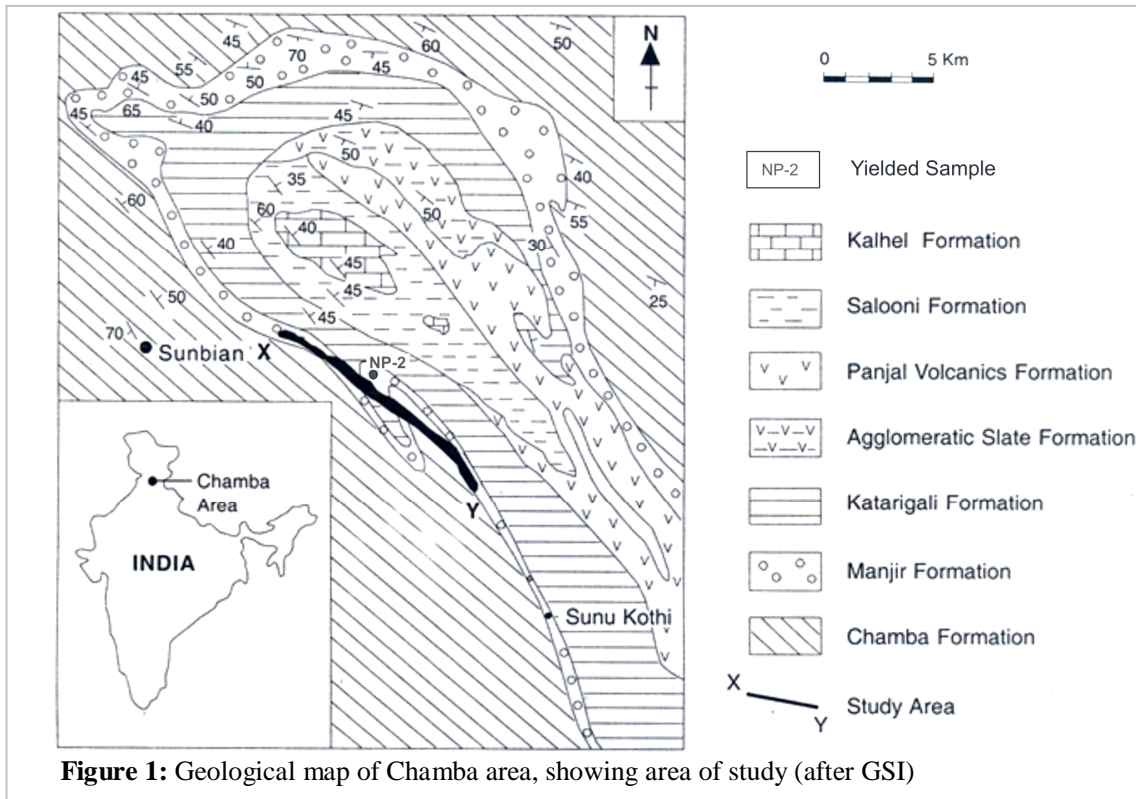
INTRODUCTION

Bdelloid rotifers are asexual organisms i.e. they reproduce without males. Most of the asexual organisms are known to become extinct after relatively short time periods because of the inability to adapt. How bdelloid rotifers have survived for millions of years has been a mystery to scientists (<http://www.admin.cam.ac.uk/news/dp/2007101201>). Fossil records show that many of the animals living today were already in existence at the beginning of Palaeozoic era about 500my ago (Kumar *et al.*, 2011). As a group, the rotifers display amazing variety in structure and habitat suggesting that they have a long geologic history but unfortunately due to very small size and mostly soft bodies they are not commonly favoured for fossilization. Only hard parts, jaws can be preserved in the fossil record, but their tiny size makes detection a serious challenge (Orstan, 1999). The present fossilized specimen of *Rotaria rotaria* is complete well preserved, microscopic, slender, 497.35µm in length and 358.13 µm in breadth has been recorded from Early Permian sediments of Chamba valley, Himachal Pradesh, India. *Rotaria* is a genus of asexual microorganism known as bdelloid rotifer. Fossils of *Habrotricha angusticollis* rotifer have been found in 6000 years old Pleistocene peat deposits of Ontario, Canada (Warner and Chengalath 1988). Till now the oldest reported fossil rotifers have been found in Dominican amber dating to Eocene (Waggoner and Poinar, 1993). Hence, it's occurrence in sediments of Manjir Formation of Chamba Valley is significant record because it is the oldest one and reported for the first time from India. Chamba basin (Himachal Pradesh) represents the Tethyan realm of North-West Himalaya and the Manjir formation is the major stratigraphic unit of this basin. Earlier, on the basis of lithological attributes Manjir Formation was considered to be of Upper Proterozoic age. Later, well preserved stratigraphically significant palynomorphs comprising chiefly monosaccates viz., *Parasaccites*, *Plicatipollenites*, nonstriate disaccates viz., *Scheuringipollenites*, *Platysaccus* and striate disaccates viz., *Striatopodocarpites*, *Faunipollenites* and *Striatites* were reported giving a definite Early Permian age to Manjir Formation (Pandey *et al.*,). The present study is based on the samples collected along the Bhalsu-Sunu Kothi-Khundi Marl section (figure-1) along Siul River. Lithologically, the rocks of Manjir Formation are represented by heterogenous poorly sorted pebbly beds separated by non-pebbly horizons. The specimen of Rotifer for the present study has been recovered from non-pebbly unit (NP-2).

Systematic Palaeontology

Kingdom	Animalia
Phylum	Rotifera
Class	Digononta
Order	Bdelloidea
Sub Order	Bdelloida
Family	Philodinidae
Genus	<i>Rotaria</i>

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The specimen has elongated body and is divisible into an anterior head region bearing ciliary apparatus known as Corona, middle trunk and posterior region- tail or foot (fig.1). The transparency of body clearly reveals the internal organs which can be seen functioning in extant forms. It is actually a tiny metazoan with bilateral symmetry and complex internal organisation. It is known as “wheel animalcule” or “wheel bearer organism” that makes reference to the crown of cilia around mouth at the anterior end and not elsewhere on the body surface, hence the name rotifer. The rapid movement of cilia makes it appear to whirl like a wheel. The wheel organ that pulls water towards the animal in feeding is equally suitable for locomotion. Corona at blunt anterior end of head is subdivided into two retractile trochal discs. The eye spot is traceable. The mouth leads through a short pharynx (throat) which is a muscular organ and contain a pair of internal jaws (trophy). This muscular organ is found only in rotifers and is known as mastax which is clearly visible in specimen. There is mid dorsal projection in head called rostrum that carries two rostral cartilages which are clearly visible in the specimen. Cilia of corona that draws a vortex of water into the mouth which rotifer sifts for food. The animal is furnished with typical flame bulbs, protonephridia for excretion. Most of the body including trunk and narrow foot is covered by a thin semiflexible extendable, transparent multicellular cuticle. The cuticle of trunk forms a rigid shell called lorica. The anterior end of the body is withdrawable within the lorica.

Pseudocoelomatic rotifers are the smallest multicellular microscopic creatures who make their living at the scale of unicellular protists and are said to be cell constant because the number of cells in the adult individual remains fixed and surprisingly constant, except in the gonads. Since cells of adult do not divide, therefore rotifers have no power of regeneration (Manter and Miller, 1959). Rotifers are characteristically free living, fresh water forms. The transparent cuticle of the rotifers suggests that they are close relative of round worms and arthropods.

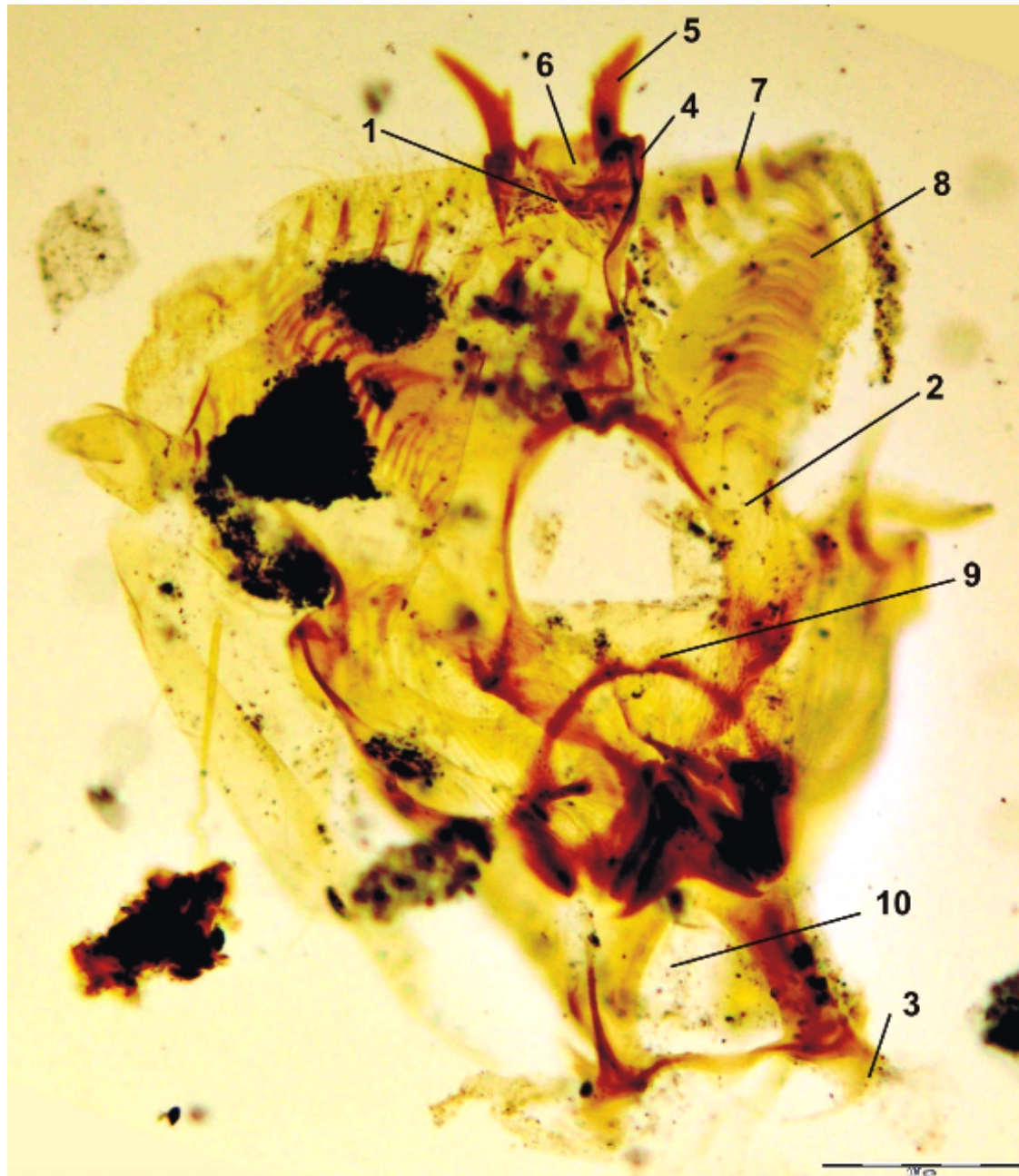


Figure 2: Rotifera complete specimen. 1. Head, 2. Trunk, 3. Foot, 4. Rostrum, 5. Rostral cartilage, 6. Corona, 7. Trochal disc, 8. Mastax, 9. Eye spot, 10. Urinary bladder.

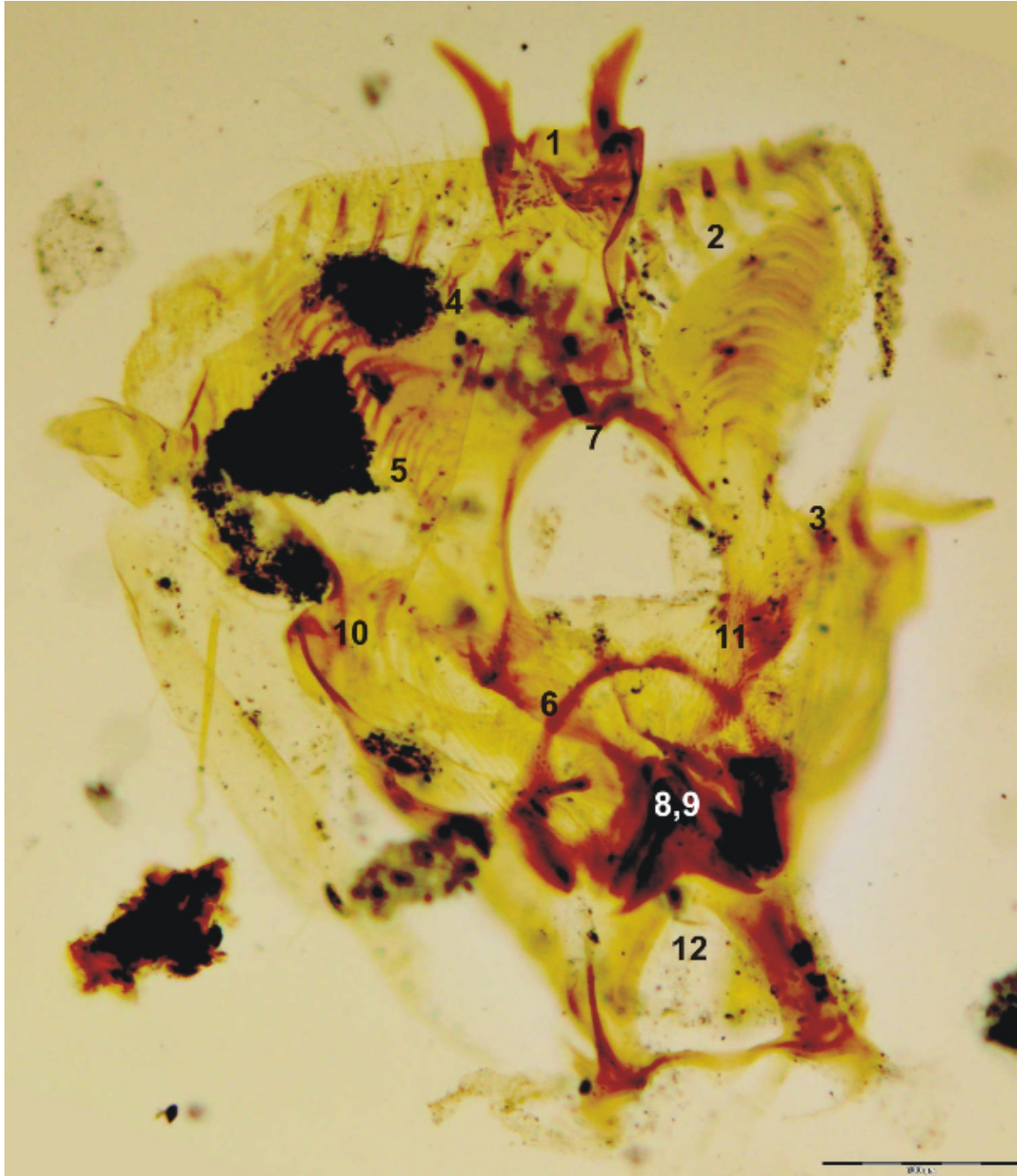


Figure 3: Complete specimen with number 1-12 indicating the enlarged portion for showing details in figure-4.1 to 4.12

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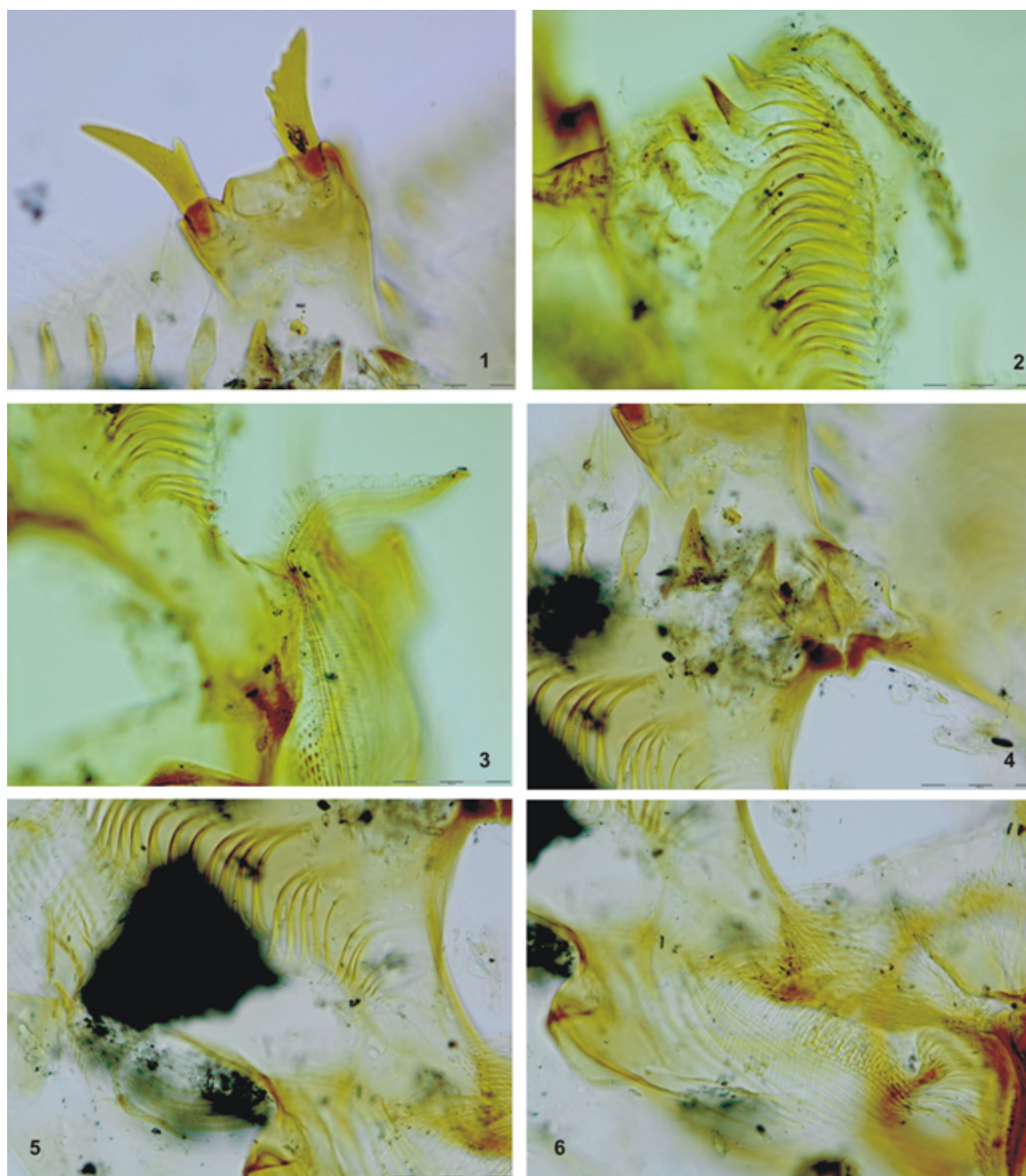
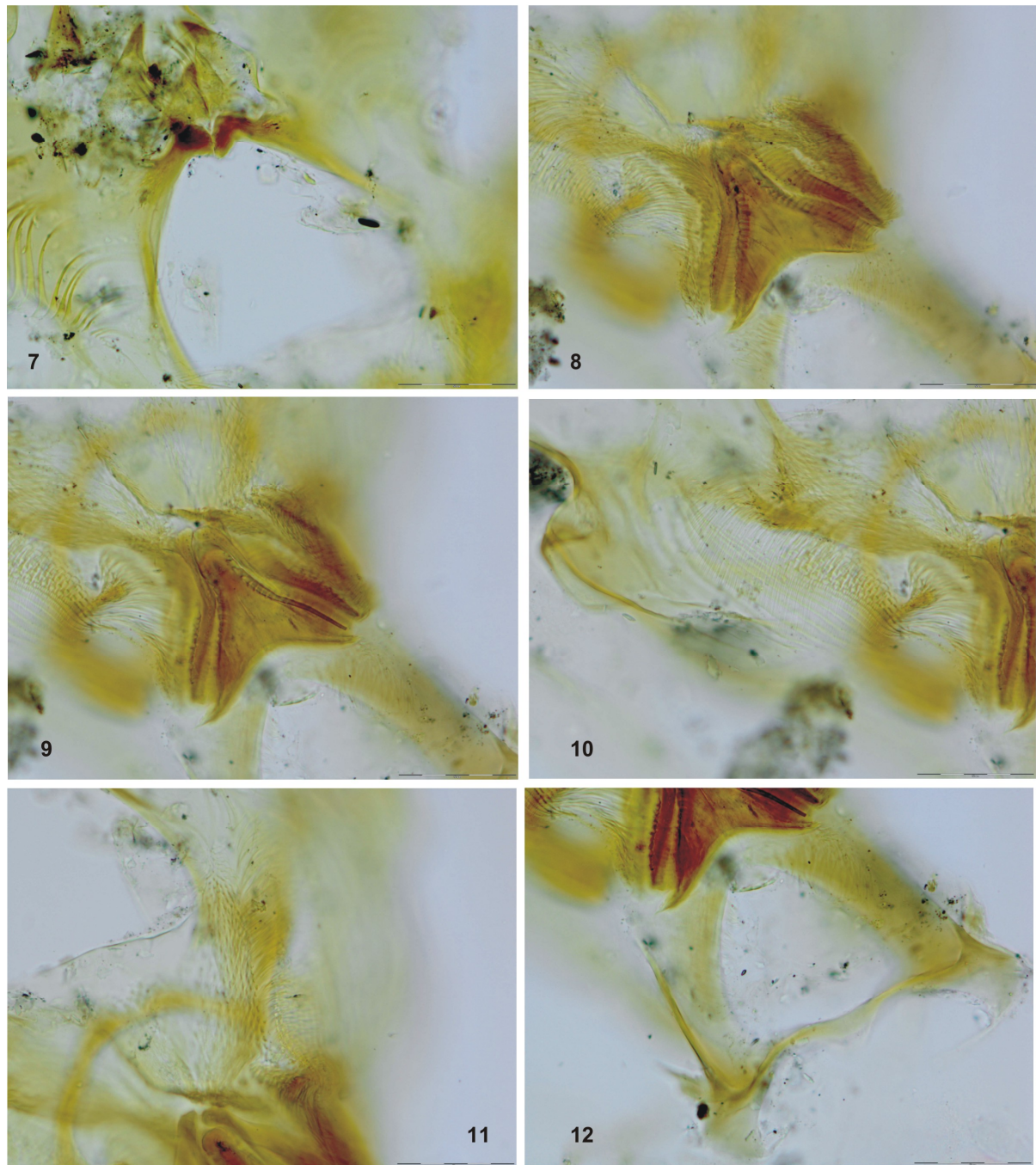


Figure 4.1: Head portion enlarged showing corona and a part of trochal disc, 4.2 Anterior right half enlarged showing trochal disc and mastax, 4.3 right half of the trunk portion enlarged, 4.4 Middle part of the trunk region enlarged, 4.5 Left half of middle part of specimen enlarged showing mastax, 4.6 left half of trunk portion enlarged.

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Figure-4



Contd... Figure 4.7 Middle part of trunk region enlarged, 4.8 & 4.9 posterior portion of trunk region enlarged, 4.11 posterior right half of the trunk region, 4.12 posterior portion of specimen enlarged showing urinary bladder.

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