Chapter IV

MORPHOLOGICAL CHARACTERS OF ORIBATID MITES

Oribatid mites are characterised by heavily sclerotized body. The body of an oribatid mite, dorsally can be divided into an anterior proterosoma and a posterior hysterosoma. The proterosoma represents the anterior part of the original prosoma and the hysterosoma consists of the posterior part of the prosoma bearing legs III and IV as well as the original opisthosoma. The podosoma is the region carrying legs I and II. Metapodosoma represents the region between legs III and IV. The propodosoma and metapodosoma together constitute the podosoma. The large dorsal sclerite of the body is the prodorsum. The gnathosoma is located in the antero-ventral region of proterosoma.

1. Dorsal Region (Plate-3, Fig.1)

a. Prodorsum

The anterior tip of the prodorsum is the rostrum. The flat, lath or plate like outgrowths extended from the base of the bothridium towards the rostrum is called lamella. If these outgrowths are rib like or protruding like a bar from the plane of the prodorsum, they are called costulae. Lamellae may be separate or connected by a transverse ridge or translamella. Prodorsum bears 5 pairs of setae viz.
1. Rostral setae (ro)
2. Lamellar setae (le)
3. Interlamellar setae (in)
4. Anterior exobothridial setae (exa)
5. Posterior exobothridial setae (exp)

A sensillus (ss) (Plate-3, Fig.2) arises from each bothridium (bo) and shows variation in size and shape in various genera and species.

**b. Notogaster**

The prodorsum is separated from the notogaster by a dorsosejugal suture. The notogaster is undivided or rarely separated into 2-4 parts by transverse sutures. In primitive oribatids, there are usually 16 pairs of notogastral setae which will be 10 or 14 pairs in higher oribatids. Grandjean (1949) applied different terminology to define various setal types. Thus, when the setal number is 16 pairs the notation is as follows:

First row : $c_1, c_2, c_3$
Second row : $d_1, d_2, d_3$
Third row : $e_1, e_2$
Fourth row : $f_1, f_2$
Fifth row : $h_1, h_2, h_3$ and
Sixth row : $ps_1, ps_2, ps_3$

When the setal number is 14 or 15 pairs the notation changes as:

First row : $c_1, c_2, c_3$
Second row : $da, la$
Third row : $dm, lm$

Fourth row : $dp, lp$

Fifth row : $h_1, h_2, h_3$ and

Sixth row : $ps_1, ps_2, ps_3$

Here ‘$d$’ indicates dorsal, ‘$l$’ lateral, ‘$a$’ anterior, ‘$m$’ medial and ‘$p$’ posterior positions. When the number of notogastral seta is 10 pairs, the notation changes to

First row : $ta, te, ti$

Second row : $ms$

Third row : $r_1, r_2, r_3$

Fourth row : $ps_1, ps_2, ps_3$

Here the letter ‘$a$’ stands for anterior ‘$e$’ for exterior and ‘$i$’ for interior. Some primitive oribatids have more than 16 pairs of notogastral setae. These setae which in most cases differ from normal setae are called neotrichial setae and the condition is called neotrichy.

Certain groups of oribatids have wing-like anterolateral projections called pteromorphs ($ptm$) which sometimes extend beyond the body and may curve ventrally over the legs. Pteromorphs may be movable or immovable.

Most of the oribatid mites are characterised by special respiratory organs of the notogaster viz., area porosae or sacculi or pori. The area porosae are portions thinner than the cuticle of the notogaster and are
supplied with fine pores. They vary in number and shape. Higher oribatids usually carry four pairs of area porosae viz., $Aa, A_1, A_2$ and $A_3$. In addition to these, $Ad$ and $Apa$ two other area porosae, were also detected in few types.

If the area porosae sink bag like into the cuticle, with only a slit or dot-like opening on the surface, they are called sacculi. They are named $s_0, s_1, s_2$ and $s_3$. If area porsae disappear with only a point like pore in their place, we have the pori ($pa, p_1, p_2$ and $p_3$). They may also take the form of slits on the notogaster, called fissures and are denoted by $ia, im, ih, ips$ and $ip$.

2. **Lateral Region**

A chitinous, longitudinal ridge called tutorium ($tu$) with a free apex may be present on each side laterally in higher oribatids. Pedotecta ($pd_1, pd_2$ and $pd_3$) are structures which partly cover or protect the bases of legs. The ventral plate laterally produced into projections of various shapes called discidia ($dis$) which protect the base of $IV^{th}$ leg. In some oribatids, a wedge shaped structure arises from leg IV, called the custodium ($cus$).

3. **Ventral Region** (Plate-3, Figs. 3-5)

a. **Gnathosoma** (Plate-3, Fig.4)

It is the region bearing the oral organs or the mouth parts and is situated in an anterior cavity or the camerostome. The basal part of the gnathosoma is called subcapitulum or infracapitulum, which consists of an unpaired mentum, a dorsal neck or cervix, the paired genae and their
continuation in the rutellum (ru). The articulation between the mentum and genae is called the labiogenal articulation which is of 4 types.

1. Anarthric type - Without special articulation
2. Stenarthric type - Labiogenal articulation directed posteriorad so that the mentum appears triangular.
3. Diarthric type - Labiogenal suture transverse with a large quadrangular mentum. Genae and rutelli are large.
4. Suctorial type - Mentum and genae are fused and no suture is present. Rutelli are modified into tubes.

The infracapitular region bears setae, the number of which varies. Usually mentum and genae bear one pair of setae each (\(h\) and \(a\) respectively). In addition to this, genae also bear 1-2 pairs of minute setae (\(m_1\) and \(m_2\)). In higher oribatids, usually only a single pair of minute seta (\(m\)) present. The chelicerae (Plate-3, Fig. 5) of oribatid mites are of five types. 1) a wide or chewing type and 2) an elongated picking or peloptoid type. Chewing type of chelicerae possess two setae (\(cha\) and \(chb\)), and a fixed digit (digitus fixus) and a movable digit (digitus mobilis). Both the digits bear teeth. Peloptoid chelicerae have only one seta. The pedipalps are formed by 2-5 segments. The setation of each segment is related to that of the ambulatory legs.

b) Epimeral Region

The epimeral or coxisternal region is the area between the infracpitolium and genital plate. This region is covered over by four
epimeral plates viz. $ep_1$, $ep_2$, $ep_3$ and $ep_4$. The epimeral plates are bordered by chitinious thickenings called the apodemata. A total of 5 apodemata $apo_1$, $apo_2$, $apo_3$ $apo_4$ and $aposj$ (apodemata sjugalis) are distinguished. The epimeres carry varying number of setae which are denoted by a formula of four figures, i.e., the epimeral setal formula. The number of setae is denoted by a letter of alphabet from middle to margin.

**c) Ano-genital Region**

The ventral region of the body behind the area of epimeres is occupied by the genital and anal plates, called the ano-gential region. In primitive groups, the genital and anal plates touch each other and occupy the entire length of genito-anal region. However, in higher oribatids the genital and anal plates do not meet each other and are situated on a distinct ventral plate. A pair of genital plates, an unpaired preanal plate, a pair of anal plates and a pair of laterally located adanal plates are seen on the ventral plate. Except preanal plate, all the above mentioned plates carry setae of varying number and nature. Genital plates in primitive forms are divided by a transverse suture. The genital and anal areas may also have porous fields, area porosae postanalis ($Apa$) and slit organs or fissures ($iad$, $ian$). The ventral plates may be ornamented variously.

**4. Legs** (Plate-3, Fig.6)

Adult oribatid mites possess 4 pairs of legs, each with 5 segments viz., trochanter, femur, genu, tibia and tarsus. Chaetotaxy of legs vary from
species to species as well as from legs I to IV. The chaetotaxy of different segments is indicated by a formula. The leg setae are of 4 major types.

1. Normal setae: They are the most abundant setiform organs on the legs and are homogeneous with a median cavity and contain actinochitin.

2. Solenidia: Solenidia are hollow, thin walled and can be easily distinguished from other setiform organs by the lack of actinochitin. They are of the following 4 types.
   a. Baculiform - When they have the same diameter throughout
   b. Ceratiform - When they taper towards the tip
   c. Tactile - When they are very long and flagellate
   d. Piliform - When they are elongated and with fine tip

   The solenidial notation varies with segments and accordingly they are denoted as sigma (σ) when they are on genu, phi (φ) when they are on tibia and omega (ω) when they are on tarsus.

3. Eupathidic setae: Eupathidic setae are usually present on the tarsus of leg I and they represent modified setae having a hollow canal, penetrating the small root and a large alveolus. They are formed as a result of regressive evolution.

4. Famuli: They are seen only on the tarsal segments and can be distinguished by their unique shape. They are like solenidia or eupathidia but stand separate by the presence of actinochitin. Their internal surface is rugose and are also formed by regressive evolution.