

## A Study of Antennae Receptor Organ of Some Hypogastruridae (Order: Collembolan) in Agra Region

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### ABSTRACT

The member of this family (Hypogastruridae Börner, 1913). are small, broad, heavily pigmented which are with or without jumping organs. Under this family the receptor organs of three genera and five species have been studied. In the present study, we examined the structure and function of antennae receptors organs in Collembola species (*Hypogastrura kubertpurensis* and *Hypogastrura communis principalis* Yosii, *Xenylla obscura*, *Xenylla funicta* sp. nov. and *Protanura granulata* sp. nov), which belongs to the family Hypogastruridae.

Keywords: Hypogastruridae, Antennal Receptor Organs

Received 11/07/2017

Revised 10/08/2017

Accepted 26/08/2017

### Citation of this article

Deepmala Verma, Rajesh K. Yadav . A Study of Antennae Receptor Organ of Some Hypogastruridae (Order: Collembolan) in Agra Region. Int. Arch. App. Sci. Technol; Vol 8 [3] September 2017. 107-109.

### INTRODUCTION

Member of these family (Hypogastruridae Börner, 1913) Collembola are generally found near the water or among mosses. Insects of this family are small, broad, heavily pigmented which are with or without jumping organs. The size and shape of receptor organs are highly variable in different insects, but within of some Indian apterygotes a certain degree of uniformity becomes apparent. The visual organs of Collembola are very simple and they are meant for perceiving the light. Barra [1] described an ultrastructure study of photoreceptors in Collembola. Post antennal organs (PAO) are of variable shape, made up of transparent cuticle behind the base of antennae, Beeker [2] described the postantennal organs of Collembola, Lewis [3] reported on the structure and function in some external receptor organs in Collembola while Bajjal [4] reported a new species of *Lepidocyrtinus* from India, while Dallai [5] observed first data on the ultra structure of the postantennal organs of Collembola. Ocelli are simple with elevated cuticle and are dome shaped. They are situated in the form of group of each side of the head. The number of ocelli in collembola being variable but never more than eight. Bagnall [6] again used the ocelli and postantennal organs on the morphological modification for separation of certain genera of Collembola. Pseudo-ocelli are found all over the body of some collembolan, which are generally of different shape and sized. These are made up of elevated transparent cuticle. In some collembola the body is heavily pigmented and is meant for perceiving the light. Some collembola the post antennal organs, ocelli and the pseudo- ocelli are totally absent.

### MATERIAL AND METHODS:

The material for the present study was largely obtained various rice field of Kuberpur, District Agra (U.P) and wheat field of Etdmadpur, District Agra (U.P). The specimens were mostly procured from under heaps of cry fallen leaves, among mosses, edges of stream and rivers. Large number of specimens was collected from different localities and wheat and rice crop fields during monsoon near Agra region. The specimens were collected with the help of camel hair brush mounted with 90% alcohol. The microscopically study of the structure of

the receptor organs, specimens were first put into dil. KOH and then mounted on slide under a binocular microscope and mounted in salmon's polyvinyl alcohol-lactophenol medium and photo plate prepared with the help of holotype and used Celestion digital microscope with 5MP camera.

## RESULT AND DISCUSSION

### **Species 1: *Hypogastrura kubertpurensis* sp. nov.**

Collembola collected from the rice field of Kuberpur, District agra. Body Colour deep blue dorsally, with black pigmentation and gray ventrally. Ocellar field black. Antennal with blue pigmentation, leg and furca without pigmentation.

**Trichoid Sensilla** - Clothed micro and macrosetae on the antennae and the body of the Collembola specially ground the last abdominal segment and appendages. These receptors are mechanoreceptor and meant for finding out the direction of air and also for the reception of sound vibrations. These sensory receptors enable the Collembola to orient against the air current, while on the ground or with in soil stimulation of these receptors on furca and body initiate a jumping reflex or change of position just to avoid air current.

**Sensilla Basiconica** - They are generally in grouped on the antennae. These receptors are in the form of bulb, cones and pegs. They are meant for receiving mechanical stimuli, therefore mostly tactile in function.

**Sensilla Chaetica** - Absent

**Temperature Receptors** - They are present on the antennae and forelegs in the form of small setae, they are meant for finding out temperature fluctuations.

**Tenent Hairs** - They are small in size and present at each foot and these hairs are used on smooth surface for adhesion during locomotion.

### **Species 2: *Hypogastrura communis principalis* Yosii**

Collembola collected from the wheat field of Ethadmadpur, Agra region . Body dorsally purple with blackish blue psmentation and grey ventrally. Ocellar field black legs and furca without any pigmentation. Body clothed by simple setae, which mn longer and somewhat numerous around the last abdominal

**Trichoid Sensilla (Tr. S.)** - These are small setae present on .he body and antennae of Collembola. These receptors are meant for finding out the movement of air and also for the reception of sound, and help the Collembola in orientation of air current.

**Sensilla Basiconica (Sn.B.)** - They are very common on the antennal segment and are in the form of bulb, pegs and cones. These receptors generally meant for mechanical stimuli.

**Sensilla Chaetica (Sn.Ch.)** - They arc well developed and are found on the dorsal side of segment which are strong spine like they are different from body setae because they are made up of thick wall and are purely tactile receptors.

**Temperature Receptors (T.Rp.)** - They are in the form of small setae on the antennae and thoracic appendages. They help in finding out the environmental temperature.

**Tenent Hairs (Ten.H)** - Each leg of the body provided white short, clavate tenent hairs, which are meant for skating on the surface of smooth moist soil.

### **Species 3: *Xenylla obscura*, Imms**

Collembola collected from the rice field of Ganeshpur, Agra Region. They body colour is purple deep dorsally, with black assentation and yellow white ventrally. Ocellar field black. Leg and furca without any pigmentation. Body covered by micro setae, antennal, leg and furca are also clothed with setae. Large number of these setae are present on the last abdominal segment. These setae's are mostly mechano-receptors.

**Trichoid Sensilla (Tr. S.)** - These are elongated setae present on body, antennae, leg and furca, also numerous around the last abdominal segment. These are machano-receptors which are for finding out the air current and manipulate the body of Collembola to change the position to avoid air current.

**Sensilla Basiconica (Sn. B.)** - Absent

**Sensilla Chaetica (Sn. Ch.)** - They are two in number, elongated with spine, which are separated. These arc tactile receptors and have the Collembola to orient its body in its media.

**Temperature Receptors (T.Rp.)** - These are present in the form of small setae on the antennae and legs, for finding out the fluctuation of temperature.

**Tenent Hairs (Ten. H.)** - They are well developed to each foot, which manipulate the body of Collembola on smooth surface by adhesion of surface by molecular forces.

**Species 4: *Xenylla funicta* sp. nov.**

Collembola collected from moist grasses of Sikandra fort Agra . Body grayish purple dorsally and yellowish white ventrally. field black. Leg and furca grow without any pigmentation, tuberculate, sparsely clothed by numerous setae specially d the last abdominal segment. Antennal, leg and furca by simple setae.

**Trichoid Sensilla (Tr. S.)** - These are found over the antennae and body, especially on the last abdominal segment and also on furca. These are mechanoreceptors for finding out the air current and orient the body of Collembola just to avoid the air current.

**Sensilla Basiconica (Sn.B.)** – Absent

**Sensilla Chaetica (Sn.Ch.)** - They are minute, two sensilla chaetica are present on the last abdominal segment, purely tactile receptor and helps to orient the body of Collembola within the muddy grass.

**Temperature Receptors (T.Rp.)** - Scattered small setae present on the antennae and legs which are temperature receptors and are very sensitive to fluctuation of temperature.

**Tenent Hairs (Ten. H.)** - Absent.

**Species 5: *Protanura granulata* sp. nov.**

Collembola collected under dry leaves near Sikandra fort Agra. Body deep orange dorsally and yellowish orange ventrally. ocellar field black. Leg and furca yellow without any pigmentation, feily covered by setae, with dorsal and lateral bosses.

**Trichoid Sensilla (Tr.S.)** - These are elongated setae like projection on the antennae and also on the body. On the body, especially on dorsal and lateral region trichoid sensilla are peculiar.. They also having a single bosses on these regions with central setae. These are mechanoreceptors. The Trichoid sensilla on dorsal and lateral regions are provided with bosses, and these setae bend for receiving the air current in effective areas.

**Sensilla Basiconica (Sn.B.)** - A bladder like sensilla basiconica is present between third & fourth antennae. This is meant for chemical stimuli for receiving the taste and odour. Bladder like outgrowth of sensilla basiconica is present on the apex of antennae and is an important chemoreceptor organ.

**Sensilla Chaetica (Sn.Ch.)** – Absent

**Temperature Receptors (T.Rp.)** - The thoracic appendages and antennae are provided with numerous micro setae which are functioning as a temperature receptors for finding out the temperature,

**Tenent Hairs (Ten.H)** - Absent

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