

Antennal Cleaner of the Workers and Reproductives of *Solenopsis invicta*, Red Imported Fire Ant (Hymenoptera Formicidae)

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Red imported fire ant (RIFA), *Solenopsis invicta*, is an invasive species that has caused great economic, veterinary and medical loss over the decades since its introduction. This ant uses its antennae for several important functions such as nest mate recognition and food location [1] and therefore the antennal surface which is covered with sensilla must be kept clean in order to get rid of debris that could interfere with the sensilla functioning properly. We are providing a description of the antennal cleaner of the minor and major workers of RIFA plus the reproductives.

Specimens were fixed in Karnovsky fixative, post-fixed in 2% O₃O₄, dehydrated in acetone. The material for SEM was air dried from HMDS platinum coated and examined with a JEOL- JSM-6500F at 5kV and TEM specimens were embedded in Spurr's resin. Sections were stained and examined with a JEOL-JEM-100CX II at 80kV.

Antennal cleaner or strigil of *S. invicta* workers and reproductives consists of two distinct parts located at the junction of tibia I and tarsus I (Fig. 1). First portion of the cleaner is on the distal end of the tibia and is known as the spur (Figs. 1, 2). The spur is slightly concave and twisted. On the outer surface of the spur, fine pointed spines of various lengths cover about three quarters of the outer surface, whereas on the inner surface of the spur, the spines are concentrated along the outer edge and are flattened and come to an abrupt point (Figs. 2, 3). A comb is located on the edge of the spur that faces the leg and the tines that make-up the spur comb are about the same length, rounded apices, smooth dorsal surface and a slightly concaved ventral surface with angular ridges running the length of the tine (Figs. 4, 5).

The second part of the cleaner that is located in the apical portion of the metatarsus, consists of an elongated depression that is flanked by a comb along the inner margin of the depression and a cluster of specialized setae on the outer margin (Fig. 2). Tines that make-up the tarsal comb are morphologically the same as those tines on the spur comb. On the side opposite to the comb is an area of specialized setae that are long, spatulate, flat and ridged (Fig. 6). These setae form a dense elongated zone that runs the length of the ventral surface of the metatarsus.

Between the metatarsal comb and band of setae there is an elongate depression and its surface is covered with irregular shaped cracks or fissures, this is known as the 'bande poreuse' (Figs. 6, 7) [2]. Below this cuticular region is a layer of epidermal cells which are about 20µm long, slender, irregularly shaped and are situated on a basal lamina (Fig. 8). The nuclei of the cells are in the basal portion and the cells have a high concentration of mitochondria, rough and smooth endoplasmic reticula, Golgi Bodies, glycogen and lysosomes (Fig.9). There are no specialized canal cells.

Antennal cleaner on the workers and reproductives are the same even though the workers and female reproductive have a clubbed antennae whereas the male reproductive has a filiform antenna. The external morphology of the antennal cleaner is similar to other species of *Solenopsis* [3] but nothing is

known about the external fine structure of the tines in the two combs and the band of setae along the ‘bande poreuse’ in other formicid species.

The antennal cleaner gland which lacks canal cells, is a class I epidermal gland [4]. Antennal cleaner gland has been found in other ants in several different genera and there is a very wide variety in the length of the ‘band poreuse’ and some ants do not have fissures but only pores [5, 6, 7]. Ultra structurally, the red imported fire ant antennal cleaner gland is very similar to the one in *Messor rufitarsis* [7]. The gland may be producing cleaning compounds and/or lubricants for the antennal surface.

References:

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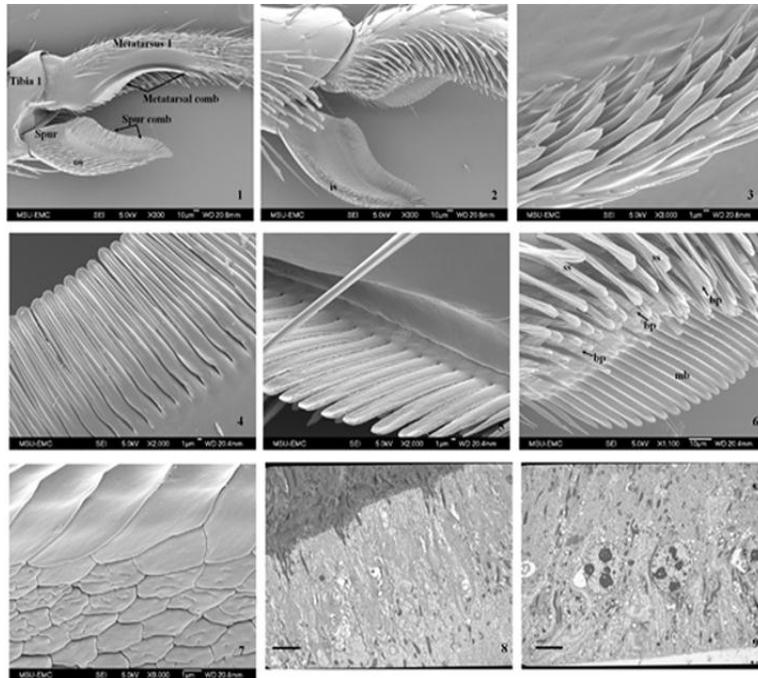


Fig. 1. Male antennal cleaner, outer surface of spur with setae (os). Fig. 2. Female antennal cleaner, inner surface (is). Fig. 3. Setae on the inner surface of a major worker spur. Fig. 4. Dorsal surface of the comb tines. Fig. 5. Ventral surface of comb tines. Fig. 6. ‘Bande poreuse’ between metatarsal comb (mb) and spatulate setae (ss). Fig. 7. Fissures or cracks in the ‘bande poreuse’ of a minor worker. Fig. 8. Longitudinal section of the ‘bande poreuse’ showing the fissures in the cuticle and underlying epidermal cells, bar = 2µm. Fig. 9. Basal portion of the epidermal cells on the basal lamina, bar = 2.5µm.