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Stator huautlae, a New Species from Mexico Feeding in Fruits of Sage (Lamiaceae), a New Host Family from the New World for Bruchidae (Coleoptera)

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Abstract

The **new species**, *Stator huautlae*, is described. It was reared from nutlets of its host plant *Salvia sessei* Bentham (Lamiaceae), from Morelos, Mexico. This is the first record for the genus *Stator* and for a bruchid from the New World feeding in the fruits of this family. The relationships of *S. huautlae* to other species groups of *Stator* are discussed. Figures of the dorsal and lateral surfaces, the male genitalia, and eggs and exit holes of *S. huautlae* in the nutlets of *S. sessei* are included.

Species of *Stator* are native to the New World and their distribution extends from the United States to Argentina and the West Indies. According to Johnson and Kingsolver (1976) species of *Stator* are most abundant in tropical areas.

Johnson *et al.* (1989) revised the *Stator* of South America, and Johnson and Kingsolver (1976) wrote the only taxonomic revision concerned with Mexican and Central American *Stator*. The data presented by Johnson and Kingsolver indicated that the following species occur in Mexico: *S. aegrotus* (Sharp), *S. beali* Johnson, *S. chihuahua* Johnson and Kingsolver, *S. dissimilis* Johnson and Kingsolver, *S. limbatus* (Horn), *S. mexicanus* Bottimer, *S. monachus* (Sharp), *S. pruininus* (Horn), *S. pygidialis* (Schaeffer), *S. sordidus* (Horn), *S. subaeneus* (Schaeffer), *S. vachelliae* Bottimer and *S. vittatithorax* (Pic). Including the new species described here, of the 30 species of *Stator* known from the New World, 14 species (46%) are recorded from Mexico. Johnson and Kingsolver (1976) included *S. bottimeri* Kingsolver, *S. coconino* Johnson and Kingsolver, *S. generalis* Johnson and Kingsolver, and *S. trisignatus* (Sharp) in their paper, but these species have not been found in Mexico.

Decelle (1982) was the first scientist to publish that bruchids feed in the fruits of the genus *Salvia* L. and the family Lamiaceae after he discovered that *Bruchidius retusus* (Baudi) fed in the fruits of *Salvia acetabulosa* L. and *S. triloba* L. from the Near East (*e.g.*, Iraq, Israel, Lebanon, Palestine, and Turkey. The holotype of *B. retusus* is from Syria.) Decelle placed *B. retusus* in his new genus *Salviabruchus*. *Salviabruchus retusus* has subsequently been reported feeding in fruits of *S. fruticosa* Bentham from Israel (Anton *et al.* 1997).

Even though bruchids feed in Lamiaceae in the Old World and, as will be explained below, it was a surprise when Jesús Romero discovered that a new species of *Stator*

Fig. 1. Dorsal aspect of *Stator huautlae*.

feeds in the fruits of this family in Mexico. According to Romero and Johnson (2002), species in the genus *Stator* feed mainly in the Fabaceae, and perhaps two species in the Bixaceae, but a report from the seeds of the Myrtaceae is very doubtful. At present, although some species of *Stator* feed voraciously in seeds of non-economic legumes, none are considered to be pest species.

Methods

We used the terminology for the male genitalia of Kingsolver (1970) and of the external morphology that of Johnson and Kingsolver (1976). According to botanical morphological terminology, fruits and nutlets are synonymous terms for *Salvia sessei*.

Stator huautlae Romero and Johnson, **new species**

Description. Male.

Integument Color. Body black (Fig. 1) except basal four antennal segments, and mentum and prementum usually red orange to light brown.

Vestiture. Eye usually with medial fringe of sparse, white hairs; postocular lobe with short white hairs (Fig. 2); usually without postocular patch of white hairs, remainder of head with sparse white hairs; scutellum covered with dense white hairs, basal corners of pronotum with dense white hairs, remainder of pronotum, elytra, and legs with uniform, moderately dense white hairs; mesepisternum, metepisternum, apical portions of the first three and the last abdominal segments with dense white hairs, remainder of mesothorax, metathorax, and abdomen with moderately dense white hairs; pygidium with sparse white hairs, base usually with three small white patches of hair, one medial and two lateral (Fig. 1).

Structure.

Head. Short and broad, densely punctulate; frons with a weak median glabrous carina extending from frontoclypeal suture to vertex; with vague transverse sulcus between upper limits of eyes;

Fig. 2. Lateral aspect of *Stator huautlae*.

posterior margin of eye protruding laterally, well separated from vertex; width of eye 1.2–1.5 times width of frons; ocular sinus 0.5–0.6 as long as width of eye; distance from base of antennae to apex of labrum about 0.42–0.54 as long as distance from upper limits of eyes to apex of labrum; antennal segments 1, 3, and 4 usually filiform, 2 moniliform, 5–10 eccentric, 11 subacute apically, 5–11 slightly broader than long; antenna reaching to humerus or slightly longer, 0.50–0.62 as long as length of elytra.

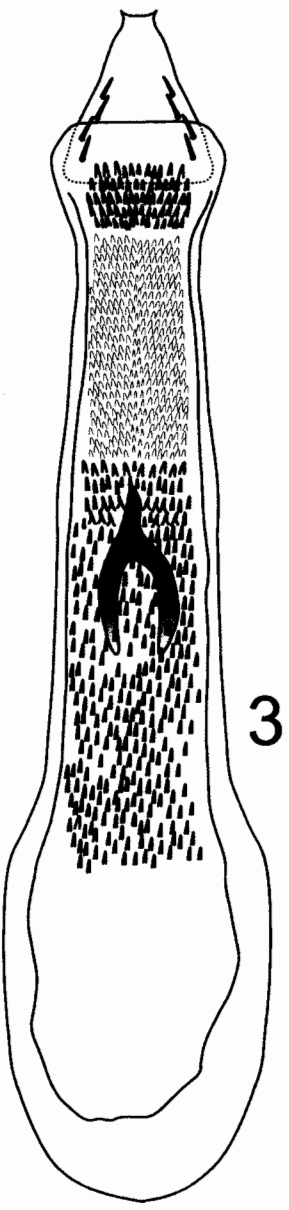
Prothorax. Disk campanulate (Fig. 1); finely punctate; lateral prothoracic carina not reaching coxal cavity; short median impressed line on median basal lobe; prosternum separating procoxae for about 0.66–0.73 their length.

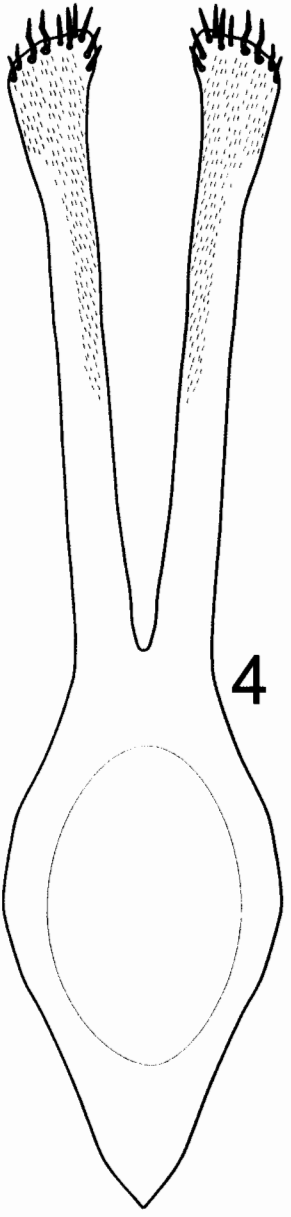
Mesothorax and Metathorax. Scutellum small, quadrate, with lateral posterior small teeth (Fig. 1); elytron about twice as long as broad, dorsal surface flattened between humerus and medial margin; striae deep, punctate, strial intervals punctulate finely; striae 3, 4, 5 and 6 equidistant at base; striae 5 and 6 not abbreviated at base, humerus impunctate, usually glabrous; undersurfaces punctate; entire face of hind coxa finely, shallowly foveolate; hind femur constricted basally and apically, expanded medially to slightly less than width of coxa; without scattered spinules on inner ventral longitudinal carina; femur armed with inner subapical acuminate spine 0.5–0.6 as long as width of tibial base; lateral ventral carina sinuately emarginate apically, with blunt angulation; tibia robust, with weak lateroventral, lateral, and dorsomesal carinae, ventral carina absent; dorsal surface of tibia somewhat roughened, with fossa indistinct; dorsal carina indistinct; tibial corona with three to four spinules, mucro 0.11–0.20 as long as first tarsomere; without sinus at base of mucro; first tarsomere with indistinct ventral, lateral, and mesal carinae.

Abdomen. First sternum slightly flattened medially, about 1.10–1.35 times longer than remaining sterna, posterior margin straight; sterna 2–4 unmodified, fifth emarginate; pygidium punctate, convex in lateral view.

Measurements. Length (pronotum-elytra) 1.37–1.87 mm. Width 0.87–1.2 mm. Maximum thoracic depth 0.67–1.0 mm.

Genitalia. Median lobe moderate in length; in ventral view, ventral valve slightly sinuate on lateral margins, arcuate in lateral view, gonopore trumpet shaped; without hinge sclerites; armature





Figs. 3–4. *Stator huautlae* male genitalia. **3)** Median lobe, ventral view; **4)** lateral lobes, basal piece and tegminal strut, ventral view.

of internal sac consisting of one large medial forked spine, cleft of fork about 0.5 in length of spine, apex of sac with a cluster of small denticles, apical 0.30 of sac covered with many fine denticles, and the other 0.55 with small spines (Fig. 3). Lateral lobes slightly expanded apically, cleft to about 0.86 their length (Fig. 4).

Female.

Similar to male but apical margin of last visible abdominal sternum straight.

Length (pronotum-elytra) 1.62–1.92 mm. Width 1.05–1.22 mm. Maximum thoracic depth 0.87–1.0 mm.

Host Plants. *Salvia sessei* Bentham: Estación de Microondas El Salto, Tilzapotla, Reserva de la Biosfera Sierra de Huautla, Morelos, 2/II/2000, J. Romero Nápoles, 1,650 msnm, 18°27′54″N and 99°16′37″W. *S. sessei*: Same locality data but 30/XI/2001, J. Romero Nápoles, 1,650 msnm, 18°27′54″N and 99°16′37″W.

Types. Holotype ♂, allotype ♀, and paratypes ♂♀: Estación de Microondas El Salto, Tilzapotla, Reserva de la Biosfera Sierra de Huautla, Morelos, 2/II/2000, J. Romero Nápoles, 1,650 msnm, 18°27′54″N and 99°16′37″W, reared seed JRN #252/2000 of *Salvia sessei* Benth. Paratypes ♂♀: same locality data but 30/XI/2001, reared seed JRN #257/2000 of *Salvia sessei* Benth.

Holotype, allotype, and paratypes deposited in Colección Entomológica del Instituto de Fitosanidad, Colegio de Postgraduados, Mexico. Paratypes also deposited in the following collections: U.S. National Museum of Natural History, Washington, D.C.; C. D. Johnson collection, Northern Arizona University, Flagstaff, Arizona, USA; Colección Entomológica del Instituto de Ecología A. C. Xalapa, Mexico; Colección Nacional de Insectos, UNAM, Mexico, Colección Nacional de Insectos, INIFAP, Mexico.

Etymology. The specific epithet *huautlae* refers to the name of the locality, Huautla, Morelos, in which *Stator huautlae* was collected.

Discussion

Stator huautlae is most similar to *S. dissimilis* in most of it characteristics. The two are distinct because *S. huautlae* has an internal sac of the male genitalia with a large, median spine that is more flattened and smaller and it has a trumpet-shaped rather than a rounded gonopore sclerite (Fig. 3). Externally *S. huautlae* is larger in size (length 1.4–1.9 mm vs. 1.3–1.6 mm).

According to Johnson *et al.* (1989) there are six phylogenetic groups of *Stator*: *Subaeneus* group (5 species), *Aegrotus* group (6 species), *Limbatus* group (10 species), *Sordidus* group (4 species), *Dissimilis* group (3 species), and *Championi* group (2 species).

Stator dissimilis was named because it was somewhat dissimilar to most other species of *Stator*. *Stator huautlae* belongs to the *Dissimilis* group because it shares with *S. dissimilis* the following characters: uniform white vestiture on the dorsal surface (Fig. 1), one large spine in the internal sac of the male genitalia, without a dorsal fossa on the hind tibia, the hind coxa is punctulate, and it has an incomplete lateral carina on the prothorax. Johnson *et al.* (1989) indicated that *S. postumus* Johnson, Kingsolver, and Terán should be included in this group. *Stator huautlae* is distinct from *S. postumus* because their morphological differences, their distributions are different as *S. dissimilis* is known only from Mexico and *S. postumus* is from Venezuela. Only females are known for *S. postumus* and we believe, because of the differences listed above, that the two species are distinct from one another. Therefore, until more information is available for males of *S. postumus*, this species along with *S. dissimilis* and *S. huautlae* are placed in the *Dissimilis* group.

As mentioned above, Decelle (1982) was the first to publish a record of a bruchid feeding in fruits of a member of the family Lamiaceae (Labiatae). He reported the

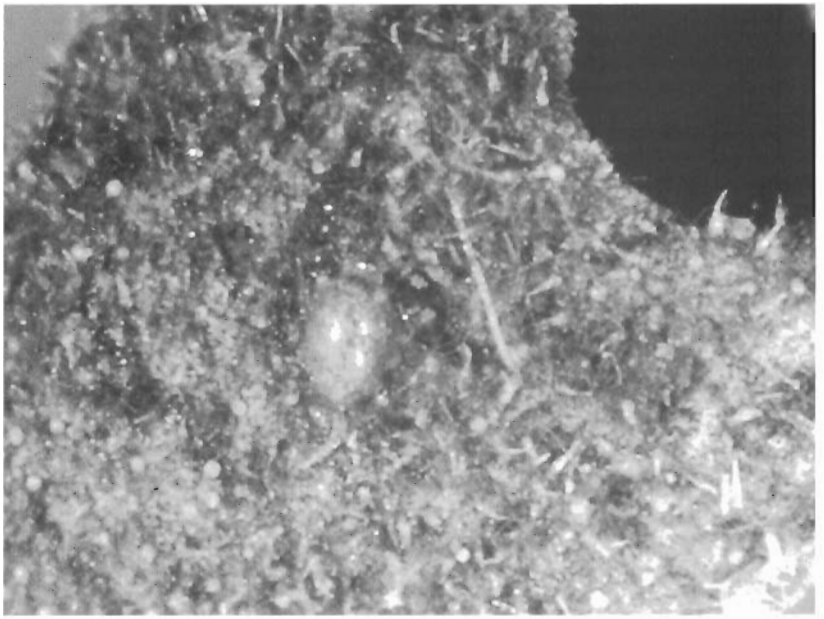


Fig. 5. Egg of *Stator huautlae* glued to the surface of a nutlet of *Salvia sessei*.

species *Salviabruchus retusus* to feed in fruits of *Salvia acetabulosa* and *Salvia triloba* in the Near East. Anton *et al.* (1997) published *Salvia fruticosa* as a host by for *S. retusus*.

This is the first report for a bruchid to feed in the fruits of *Salvia* in the New World and, of especial importance, the first documented report of a bruchid actually feeding in the fruits of *Salvia*. *Stator huautlae* eggs (Fig. 5) and exit holes (Fig. 6) are very noticeable on the nutlets of *Salvia sessei*, thus corroborating that the insect actually feeds in the fruits of this plant. That the egg is glued to the surface of the fruit places the species *S. huautlae* in the Mature Pod Guild of Johnson (1981). This ovipositional behavior is unusual for a species of *Stator* because most species oviposit on the smooth surfaces of seeds.

In general, when the flower of *Salvia sessei* has dried and the fruits are mature, the average number of nutlets in each ovary was two but the number varied from one to three and occasionally four. The nutlets varied in length from 4.15–5.0 mm and in width from 2.65–3.5 mm. We sampled 120 nutlets of *S. sessei*. Of the 120 nutlets, 26 of them had a single egg glued to them and 94 were without eggs of *Stator huautlae*, thus about 22% of the nutlets had eggs on them. Of the 26 nutlets with an egg on them, 16 nutlets had an exit hole and ten did not. Therefore, there was a 61.5% success rate for complete development in these nutlets once the adult females found an oviposition site. In this brief study, then, of the 120 nutlets sampled, only 16 adults completed their development in the nutlets. Thus, there was a 13.3% overall success rate of finding a nutlet to oviposit upon and for development to occur of this bruchid in nutlets of this plant.

Because of the small size of the nutlets, we hypothesize that only one bruchid develops per nutlet. From this and previous observations on the size of adult bruchids and the size of the nutlets in which they develop, it is probable that the size of the adult bruchids depends upon the size of the seed and certainly the nutritional value of the

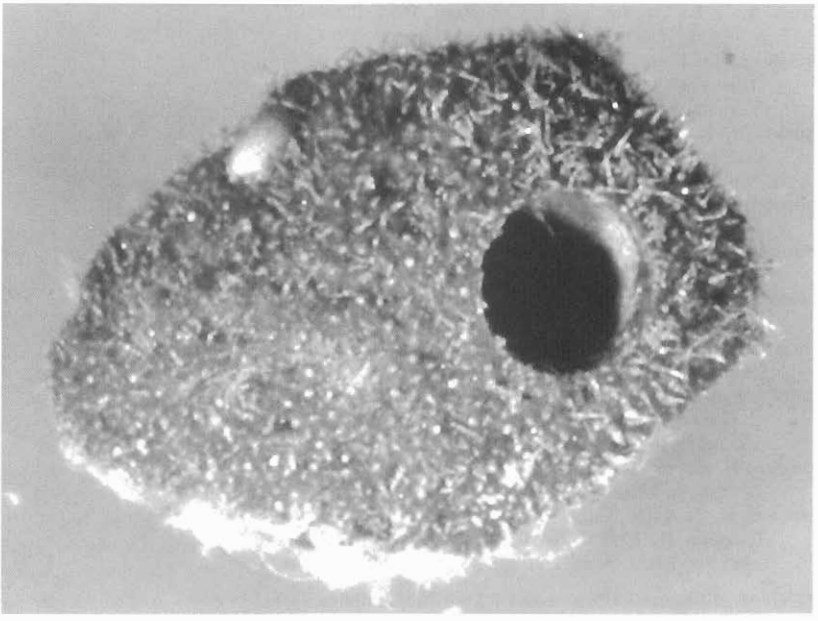


Fig. 6. Exit hole of *Stator huautlae* in nutlet of *Salvia sessei*. C = empty egg chorion of *S. huautlae*.

seeds or fruits. When possible, some bruchids feed in several seeds in the course of their development and are able to achieve a larger size by consuming several small seeds, but there is no evidence of this in this species and its host.

There appear to be two possibilities for *Stator huautlae* females to select a fruit to oviposit upon. They may elect to oviposit only on nutlets without eggs on them or in situations where there are few females and thus few eggs have been oviposited; there is little chance that two eggs may be laid on one fruit.

A search of the literature revealed that Mexico is the only country where *S. sessei* grows. We collected fruits and specimens of this species of plant in the state of Morelos, but it also grows in the states of Durango, Guerrero, Jalisco, and Michoacan. Usually the plant grows in pine and oak forests at 1,240 to 2,450 m of altitude (Casas *et al.* 1994; Guizar *et al.* 1992; Rodríguez and Espinoza 1996; Vázquez *et al.* 1995).

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