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Observations on the fauna directly connected with sedges of the genus Cyperus in Costa Rica, Central America

I. Sibariops confusus (Boh) (Col., Curculionidae) on Cyperus ferax L. Rich

by

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Sedges of the genus *Cyperus* are extremely abundant in the tropics and are well represented in Costa Rica by more than forty species. The object of this study was to locate the more abundant species in Costa Rica, to inspect these for insect damage and to isolate any insect species that might appear to be of importance in controlling the abundance of these plants. This paper deals with the incidence of the weevil *Sibariops confusus* (Boh) on the relatively large sedge *Cyperus ferax* L. Rich.

Cyperus ferax is a large sedge (3 to 3½ ft. high) which grows in swampy areas close to running water. It was found in many locations in Costa Rica but in all of these areas, except for one, the plant appeared to be relatively free from insect attack. In an area between the capital city of San José and the Caribbean port of Limón, close to the Río Amarillo, about 10 kilometers outside the small town of Los Diamantes, this species abounded and was found to be infested with the adults, eggs, larvae and pupae of the weevil *Sibariops confusus*. The area around the sedge swamp consisted of Tropical Wet forest and the whole atmosphere was hot and humid. In the swampy area, growing together with *C. ferax* was a smaller sedge, *C. luzulae* (L) Retz. This species was searched for signs of weevil damage but no plants were found to be infected.

The genus *Sibariops* was first described by CASEY (2) and he included *Limnobaris confusus* (Boh) —mis-read as *L. confusa* (Boh)— in it. Adult specimens of *S. confusus* in the U.S. National Museum have been collected from

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many habitats, including *Cassia tora* leaves, crowder peas, corn foliage, corn buds, *Malachra capitata,* sugar cane leaf whorl, brome grass roots, *Vigna repens* stems and blossoms, and *Cyperus esculentus.* SATTERTHWAIT (5) records the eggs, larvae, pupae and adults of this weevil as occurring commonly in chufa. Larvae were isolated from *Cyperus esculentus* stems in West Lafayette, Indiana on October 30, 1915 by the same author, who bred them out, obtaining pupae on November 2 and adults on November 18 of the same year.

It appears that this is the first time this weevil has been recorded from Costa Rica and it is possible that the distribution of the insect is widespread in Central America as well as in North America.

I would like to express my gratitude to Miss Rose Ella Warner of the Insect Identification and Parasite Introduction Research Branch, of the U.S. Department of Agriculture for identifying the weevil and supplying the information concerning the specimens in the U.S. National Museum. This work was carried out whilst I was in Costa Rica in 1964 as a member of the Organization for Tropical Studies (OTS). This organization was supported by National Science Foundation Grant No. GE 4705.

LIFE HISTORY OF *SIBARIOPS CONFUSUS*

Cyperus ferax is a sedge in which there are many large leaves subtending each of the many spikelets which make up one flowering head. When young, the plant sends up a flowering shoot on top of which the flowers are at first completely encased in the leaves that subtend them. Small black weevils were found on young plants at this stage, rather than on older plants where the flowers had emerged. The weevils occurred in the leaf axils of the flowering head and they were observed feeding on the juices from the young succulent leaves. Copulation was also observed to be occurring in these leaf axils. The beetles were active in bright sunlight and would fly quite readily but they returned to the leaf axils during rain.

Weevils also occurred on plants where the flowers had newly emerged and some adults were found in the axils of the leaves towards the base of the flowering stem. These beetles were inserting eggs just under the epidermis of the flowering stem in the region of the leaf axil. The female bores into the plant with her rostrum and then turns around and inserts an egg into the hole. A small brown scar develops on the outside of the stem where the egg is inserted and it is thus possible to detect the number of eggs laid into any one stem by counting these marks. Between 15 and 20 eggs had been inserted into many of the stems that were investigated.

Larvae hatch from the eggs and bore down the stem in one of the vascular bundles. The vascular bundle is destroyed by the presence of the larvae and turns brown in colour. This vascular destruction can be detected on the outside of the stem as a thin brown discolouration running towards the base of the plant. A heavy infestation of the larvae kills off many of the vascular

bundles and the flowering head then shows signs of drying up and dying as the nutrient supply is cut off.

As they bore downwards and feed on the plant tissues, the larvae increase in size and do more and more damage to the plant. If there are only a few larvae in the plant, all boring down one side of the stem, then the flowering head begins to bend over away from the side in which the larvae occur. If there are many larvae boring down all around the stem, then the stem collapses and the flowering head falls to the ground.

When they reach the base of the stem, the larvae are usually mature and they pupate in small cavities in the stem which they construct from grass mixed with salivary products. Adult beetles emerge from these cavities and cut their way out of the now decaying remains of the stem to start the cycle once again.

The length of the life history is unkown as all stages were collected at the same time from many plants in various stages of infection and decay.

MORPHOLOGY OF THE IMMATURE STAGES

Measurements are given in millimeters, the figures in brackets being the means of the measurements.

(a) Egg

Length 0.59 — 0.65(0.62) (n=5) Oval shape, both ends bluntly rounded. Chorion smooth, colourless at first, becoming cream as development proceeds.

(b) Larvae (Figs. 1 — 6)

The exact number of larval instars is unknown as not enough material was collected. The distance (D) between the centres of the antennal sockets across the epistoma and the length (L) of the head capsule from the top of the epicranium to the epistomal suture were measured in 15 larvae, and the last instar and the penultimate instar were distinguished. (See also PARNELL, 4 for similar measurements of other Curculionid larvae).

Penultimate Instar	D = 0.26 — 0.31	(0.28);(n = 6).
	L = 0.40 — 0.46	(0.43);(n = 6).
Last Instar	D = 0.37 — 0.43	(0.40);(n = 9).
	L = 0.56 — 0.62	(0.60);(n = 9).

Only the last instar is described as it is morphologically similar to the preceding instar. Both instars are creamy-white in colour.

THIRD INSTAR LARVA (Figs. 1 — 6): Head capsule somewhat retracted into the thorax, not fully prognathous; epicranium well sclerotised, coronal suture well developed, frontal sutures indistinct, represented by thin area of chitin only, vertex with extra thickened regions running from top of head to meet frontal sutures just above the antennae (fig. 1b). Antennae with a single conical segment set on a basal membrane in which are situated six small sensory cones and a seta, setation and distribution

of sensory pores on head capsule as shown in Figs. 1a, 1b and 2., little variation found. Epistoma strongly sclerotised with enlarged area at either end for mandibular articulation. Clypeus moderately sclerotised laterally, bearing two pairs setae and one pair sensory pores; membranous region somewhat divided by labrum medially. Labrum trilobed apically with one pair long setae and two pairs short setae. Epipharynx bears three pairs anterolateral setae, three pairs anteromedian setae and two pairs epipharyngeal spines, all sword shaped, together with a pair of epipharyngeal rods as described in curculionid larvae by VAN EMDEN (3); a pair of three-lobed sensory pores anteriorly and a pair of two-lobed sensory pores on the posterior margin. Posterior region of head capsule with large occipital foramen and a well developed tentorial bar, hipostomal region well sclerotised for posterior mandibular articulation.

Mouthparts: Mandibles strongly sclerotised with three sharply pointed and one blunt set of apical teeth; one sharp and one blunt tooth directly below the dorsal row; setae and pores scattered over body of mandible as indicated in Fig. 4. Maxilla well developed, sclerotised cardo, stipes and two segmented palpi bearing an apical patch of small structures probably with a sensory function; long and short setae and sensory pores arranged as in Fig. 5; mala fused with stipes, bearing on its inner margin a comb-like structure composed of a dorsal row of four small sword shaped setae and a ventral row of seven large sword shaped flattened setae. Labium composed of a Y-shaped sclerotised pre-mentum bearing two pairs sensory pores (1); a pair of two segmented labial palpi on membrane between the premental arms; labial palpi with two sensory pores on each segment and an apical set of sensory structures similar to those on the maxillary palpi; membrane between premental arms bears one pair long setae and one pair sensory pores as illustrated in Fig. 5; ligula membranous with two pairs short setae and one pair sensory pores; mentum and submentum membranous, bearing three pairs setae, the middle pair being very long.

Thorax: All segments completely membranous, two tergal folds, pedal lobes not greatly pronounced; one pair bicameral spiracles open laterally on prothoracic segment. Setation complex as indicated in Fig. 6.

Abdomen: Consists of ten segments; bicameral spiracles open on the lateral regions of segments 1 — 7; setation regular on first seven segments as illustrated in Fig. 6. Eighth and ninth abdominal segments with two pairs of long setae raised on tubercles dorsally and dorsolaterally. One pair bicameral spiracles between the tubercles on segment 8. Setation otherwise indicated on Fig. 6. Segment 10 small and circular, devoid of setae, terminal anus.

SUMMARY

Sibariops confusus adults oviposit in the stems of the sedge *Cyperus ferax* in Costa Rica. The resulting larvae feed on the stem tissues of this plant and bore downwards as they increase in size. The presence of large numbers of larvae within a stem often causes the death of the upper regions of the plant.

The larvae pupate at the base of the stem and adult weevils emerge from the decaying remains of the plant.

The morphology of the eggs and of the last instar larvae is included, together with measurements distinguishing the last instar larvae from the penultimate instar.

RESUMEN

En Costa Rica los adultos de *Sibariops confusus* ponen sus huevos en los tallos de *Cyperus ferax.* Las larvas resultantes se alimentan de los tejidos del tallo y perforan hacia abajo conforme aumentan de tamaño. La presencia de grandes cantidades de larvas dentro del tallo con frecuencia causa la muerte de las partes superiores de la planta. Las larvas migran a la base del tallo en donde se convierten en pupas y los adultos emergen de los restos en descomposición de la planta.

Se incluye la morfología de los huevos y de las larvas en su último estadío, así como las medidas que diferencian las larvas en el último estadío de aquellas en el penúltimo.

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Figs. 1-4. Last instar larva of *Sibariops confusus:* (1a) Head capsule showing setation; (1b) Head capsule showing sclerotisation; (2) Antenna (left); (3) Epipharynx; (4) Right mandible.

Figs. 5-6. Last instar larva of *Sibariops confusus:* (5) Left maxilla and labium: ventral view; (6) Lateral view of complete larva to show setation.

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ams anteromedian setae
c cardo
cl clypeus
cs coronal suture
e epistoma
er epipharyngeal rods
es epipharyngeal spines
fs frontal suture
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lb labrum
lp labial palp
mas mentum and submentum
ml mala
mp maxillary palp
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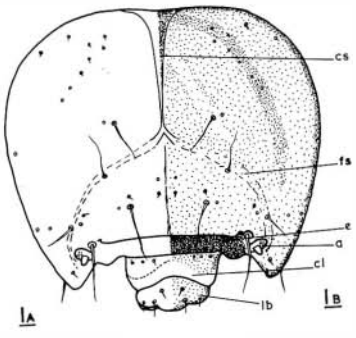
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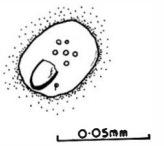
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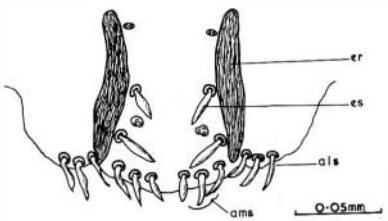
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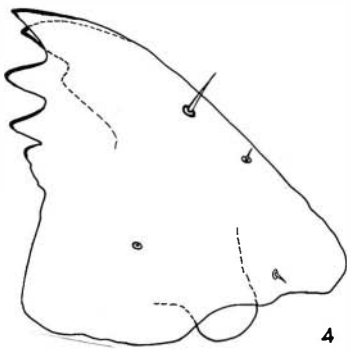

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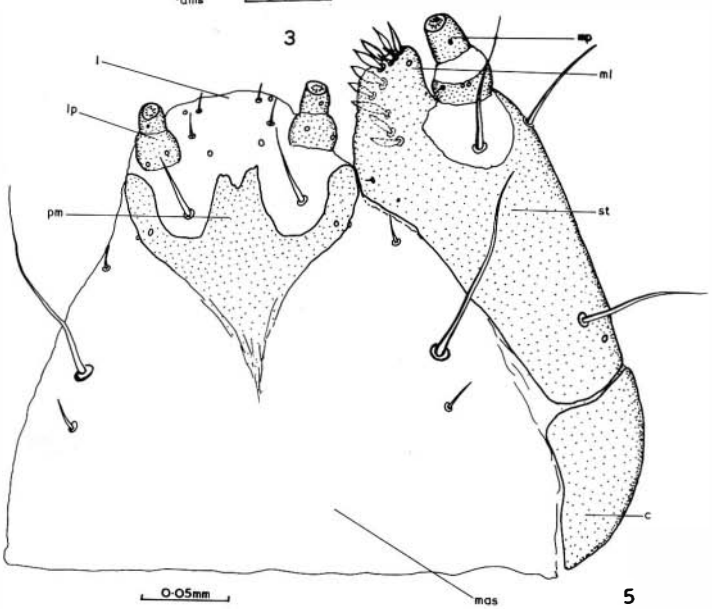
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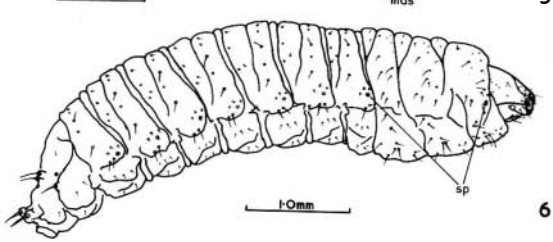
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