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BIOLOGY AND TAXONOMY OF *TUTHILLIA COGNATA* (HOMOPTERA : PSYLLOIDEA), A PEST ON *MYRCIARIA DUBIA* (MYRTACEAE)

Daniel BURCKHARDT (*) & Guy COUTURIER (**)

(*) Muséum d'Histoire naturelle, Case postale 434, CH-1211 Genève 6, Switzerland

(**) ORSTOM, Centre de Bondy, Institut Français de Recherche Scientifique
pour le Développement en Coopération, 70-74, Route d'Aulnay, F-93140 Bondy, France.

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Résumé. — Biologie et taxonomie de *Tuthillia cognata* (Homoptera : Psylloidea), un ravageur de *Myrciaria dubia* (Myrtaceae). — *Tuthillia cognata* est découverte comme ravageur de *Myrciaria dubia* (Myrtaceae) au Pérou et Brésil. Tenant compte de la morphologie de la larve, le genre est transféré des Ciriacreminae dans les Anomoneurinae.

Summary. — *Tuthillia cognata* is discovered as a pest of *Myrciaria dubia* (Myrtaceae) in Peru and Brazil. The 5th instar larva is described. Based on larval morphology, the genus is transferred from the Ciriacreminae to the Anomoneurinae.

Myrciaria dubia (H.B.K.) McVaugh (Myrtaceae) grows naturally in the Amazon Basin and is known locally as camu-camu. It is a shrub, 2 to 3 meters high, with slender branches and thin opposite elliptical leaves, 5 to 8 cm in long and 1.5 to 3 cm in wide. The fruits are globular, 2 to 2.5 cm in diameter. In natural environments, *M. dubia* occurs by lakes and rivers and may form dense stands, sometimes with the lower part of the plant submerged for several months.

Experimental cultivation of the fruit is underway at the Instituto de Investigaciones en Amazonia Peruviana (IIAP) in Jenaro Herrera and by the Instituto Nacional de Pesquisas da Amazonia (INPA) in Manaus, Brazil. *Myrciaria* Berg. comprises 65 tropical American species (Willis, 1980) several others of which have edible fruits, including *Myrciaria cauliflora* Berg., *M. jaboticaba* Berg., *M. tenella* Berg. and *M. trunciflora* Berg. (Uphof, 1968).

M. dubia is attacked by *Tuthillia cognata* Hodkinson *et al.* 1986, previously known only from the 3 type specimens from Manaus. The psyllid induces curling of the apical leaves, which then turn yellow and wither (fig. 10 & 11). Larvae develop on the inner surface of leaf-curls and produce copious flocculent waxy secretions.

Tuthillia was erected by Hodkinson *et al.* (1986) for four tropical American species. One (*T. latipennis* Hodkinson *et al.*, 1986) was collected from an unidentified Myrtaceae having conspicuous but unoccupied roll leaf galls. *Tuthillia* was included in the Ciri-

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creminae as the sister-group to *Ciriacremum* Enderlein, *Kleiniella* Aulmann and *Palmapenna* Hollis. Based on the adult male terminalia, Hodkinson *et al.* (1986) suggested the Diaphorininae as the possible sister-group of the Ciriacreminae but concluded that larval morphology may better indicate phylogeny. They also contrasted the myrtaceous hosts of *Tuthillia* and of some *Notophorina* (Diaphorininae) with the fabaceous hosts of *Ciriacremum* and *Palmapenna*.

In general, little is known about larvae of tropical American psyllids. Burckhardt & Brown (1988) provided keys to 28 Panamanian species in 15 genera (compared to the 137 Panamanian species in 33 genera recorded by Brown (1985)). This paper presents the first description of the larvae of a *Tuthillia* species.

Material and Methods

Morphological terminology follows mainly White & Hodkinson (1982, 1985). Illustrations and measurements, based on 8 specimens, were made from slide mounted material. Material was examined from Peru: 25 males, 28 females (dry mounted), 2 males, 2 females, 8 larvae (slide mounted), several larvae (in 70% ethanol), Jenaro Herrera, 4°55'S, 73°40'W, 7. and 15.IX.1987, on *Myrciaria dubia* (G. Couturier & M. Inga) and Brazil: 13 males, 7 females (dry mounted), Manaus, km 60 I.N.P.A., XII.1987, on *Myrciaria dubia* (G. Couturier). Material is deposited in ORSTOM; Muséum d'Histoire naturelle, Genève; Muséum National d'Histoire Naturelle, Paris; British Museum (Natural History), London; Museo Javier Prado, Lima; Instituto Nacional de Pesquisas da Amazonia, Manaus.

Description of fifth instar larva of *Tuthillia*

Coloration. Yellowish, generally little sclerotized, sclerites slightly darker. Compound eyes red. Tips of antennae, claws and spiracles brown.

Structure. Body (fig. 1) elongate, slender, 2.2-2.8 mm long. Surface densely covered with minute slender, truncate sectasetae (fig. 2-4), and with sparse long, slender setae. Small sectasetae evenly distributed over the whole surface of body but absent from antennae, legs, ventral surface of wing-pads, and parts of ventral surface of head, dorsal surface of hindwing-pads and caudal plate. Maximum body width including wing-pads 0.5-0.6 times body length, and maximum abdominal breadth 0.3-0.4 times body length. Fore-margin of head weakly indented in the middle. A dorsal group of 5-6 large truncate sectasetae present behind eyes (fig. 2). Ventral surface of head, particularly sclerite at antennal base, with long setae. Antennae 3-segmented, 1.3-1.5 mm long, 1.4-1.6 times as long as forewing-pads; flagellum bearing 4 rhinaria, each with a nearby seta, the basal 3 being about 3 times as long as flagellar diameter, the apical one is slightly longer; in addition there are a few setae shorter than diameter of flagellum. Terminal setae of antennae robust, the longer one about twice as long as the shorter one, which is itself subequal to the flagellar diameter. Clypeus (fig. 8) pear-shaped, bearing 2 long setae near anterior margin, partially covered in small sectasetae. Forewing-pads slender, truncate apically, inner and outer margin subparallel, without humeral lobes. Outer margin bearing 11-14 large truncate sectasetae (fig. 4). Abdominal margin, excluding caudal plate, with 3 groups of 6-12 large, truncate sectasetae on either side (fig. 5); ventral surface with a double row of long setae in the middle as well as some scattered shorter setae. Abdomen slightly widened in the middle; apex truncate, indented medially. Caudal plate (fig. 6) with numerous large sectasetae along hind-margin; 1.7-2.1 times as wide as length along the middle; anterior ventral margin straight in the middle in male (fig. 1), and v-shaped in female larvae (fig. 6). Anus terminal, circumanal rings broad; pores of outer ring (fig. 7) large, oval, irregularly spaced dorsally, more evenly spaced ventrally; pores of inner ring smaller, similarly spaced as pores of outer ring. Additional pore-fields absent. Legs covered in setae of various length, modified setae absent. Tarsal arolium (fig. 9) petiolate longer than claws; unguitactor developed, petiole about as wide as arolium.

Taxonomic remarks

Larvae of Diaphorininae are characterized by the presence of lanceolate setae and large triangular tarsal arolia with a short or rudimentary petiole. Those of Ciriacreminae have capitate setae (particularly on the meso- and metatibia), up to 4+4 sectasetae on the margin of caudal plate, and broadly triangular tarsal arolia, with relatively long narrow petiole. *Tuthillia cognata* lacks most of these characters. However, some characters, such

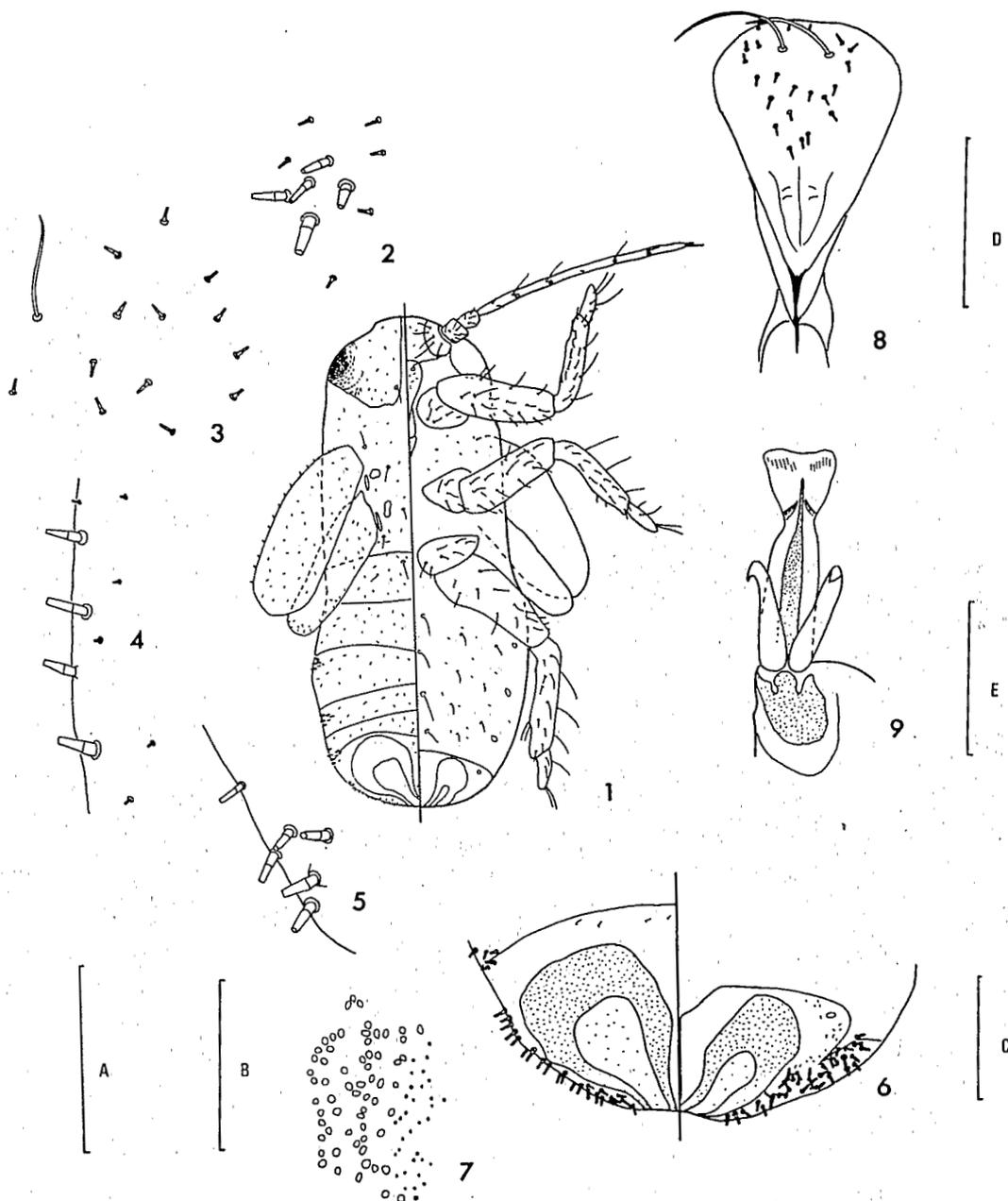


Fig. 1 to 9, *Tuthillia cognata*, 5th instar larva. — 1, Habitus, male, dorsal surface left, ventral surface right. — 2, Group of large sectasetae behind eye. — 3, Dorsal surface of thorax. — 4, Outer margin of forewing-pad. — 5, Group of lateral, large sectasetae on abdomen. — 6, Caudal plate, female, dorsal surface left, ventral surface right. — 7, Detail of outer and inner pore rings. — 8, Clypeus. — 9, Tarsal arolium. Scale lines: A = 1.0 mm (fig. 1); B = 0.1 mm (fig. 2, 3, 4, 5, 7); C = 0.3 mm (fig. 6); D = 0.2 mm (fig. 8); E = 0.05 mm (fig. 9)



Fig. 10, Plantation of *Myrciaria dubia* in Jenaro Herrera, showing deformations caused by psyllids (arrows).
Fig. 11, Deformation by *Tuthillia cognata* affecting the apical portion of a branch of *Myrciaria dubia* in Jenaro Herrera.

as the terminal anus, the broad circumanal ring, the lateral sectasetae on the abdomen, the absence of capitate setae on the legs, and the weakly sclerotized body are shared with some species of *Epipsylla* Kuwayama. This is also supported by some adult characters present in both genera, such as the metatibiae bearing a crown of apical spurs. *Tuthillia* should therefore be transferred from the Ciriacreminae to the Anomoneurinae *sensu* White & Hodkinson (1985).

Notes on the biology

Tuthillia cognata occurs frequently in plantations of *Myrciaria dubia* where individual shrubs are infested with between 1-15 colonies (fig. 10). Each colony comprises about 10-20 larvae (fig. 11). On some plants, the apices of up to 20 per cent of the branches may be infested. *T. cognata* is less common in natural stands of *M. dubia*.

Myrciaria dubia is cultivated alongside other Myrtaceae such as *Eugenia stipitata* McVaugh and *Psidium acutangulum* D. C. in Manaus, and *E. stipitata* and *E. uniflora* L. in Jenaro Herrera. In addition *Myrciaria jaboticaba* Berg., *Eugenia malaccensis* L. and *Psidium guajava* L. are grown in adjacent areas. None of these species support *T. cognata* suggesting that the psyllid is monophagous on *Myrciaria dubia*.

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