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Ctenarytaina fomenae sp.n. (Hemiptera: Aphalaridae), a new species of psyllid, pest of *Syzygium guineense* (Myrtaceae) from Western Cameroon

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Abstract

A new species of psyllid, *Ctenarytaina fomenae* sp.n., is described from Bamendjou, Western Region of Cameroon. This psyllid develops on *Syzygium guineense* Willd (Myrtaceae), a medically and ecologically important plant. *Ctenarytaina fomenae* sp.n. is morphological different from other psyllids species of the same genus by the following characters: female proctiger showed a bottle-shape circumanal ring; apical ends of the distal portion of the aedeagus shorted and spherical; paramere showed in its basal portion 3 rows of dark short setae and 1 row of dark setae in its apical portion; male proctiger is biarticulated, with its distal portion short and cylindrical and the proximal segment having an invagination with a Y shape. This paper describes all developmental stages of the newly described psyllids species, *Ctenarytaina fomenae* sp.n.

Keywords: taxonomy, *Ctenarytaina fomenae* sp.n., aphalaridae, Cameroon, *Syzygium guineense*, psyllid

1. Introduction

Jumping plant-lice or psyllids (Hemiptera: Sternorhyncha) are among the insects that feeding and development are responsible for serious damages to their host plants. Nymphal stages caused more damages than the adult stage since larvae feed directly on phloem of the young actively growing host plant shoots and foliage. The psyllid classification was based on cladistic and phenetic studies of larval and adult morphological characters of the world psyllids fauna [1]. The new classification of psyllids is currently based on morphological and molecular characters, reflecting phylogenetic relationships [2]. This classification showed eight families (Aphalaridae, Carsidaridae, Calophyidae, Homotomidae, Liviidae, Phacopteronidae, Psyllidae and Triozidae) and twenty subfamilies [2]. The Aphalaridae, Liviidae and Psyllidae are redefined in this classification [2]. Burckhardt associates the psyllids families with host plants [3]. The subfamily of Spondyliaspidae of Psyllidae family included 24 genera, with various species which breed almost exclusively on Myrtaceae plant family and which are restricted to the Australian region [4]. The genus *Ctenarytaina* has 12 described species which have an even wider distribution [4, 5]. This genus originated from Austro-oriental and pacific [6-9]. It colonizes several families of plants such as Myrtaceae (*Eucalyptus*, *Leptospermum*, *Lophostermon*, *Syzygium*), Rutaceae (*Boronia*), Theaceae and Onagraceae [8, 10]. The common known species, *Ctenarytaina spatulata*, *C. eucalypti*, *C. longicauda*, *C. thysanura* and *C. peregrina* affect *Eucalyptus* spp. and cause important damages [5, 8, 9, 11-14] and it is found in several countries including New Zealand, USA, Uruguay, Taiwan, Pacific and mainly the Australian continent (New South Wales, Tasmania, Victoria) [4, 8, 9, 14]. In Africa, todate, this genus has been reported on eucalypt host plants in Kenya and South Africa [4]. In Cameroon, during investigation, 37 species of Psyllidae family were recorded in the Western Region, where *Ctenarytaina* sp. was collected for the first time [15]. This genus was absent in the Psyllidae fauna of the Centre [15], South [16] and Adamawa [17] Regions of Cameroon.

Syzygium guineense (Myrtaceae) is a small tree, with edible fruits [18]. It has a wide distribution in Subsaharan Africa particularly in wooded savannahs and tropical forests [19]. It is found in Benin, Uganda, Swaziland, Gabon and Cameroon [19-21]. In Cameroon, it grows in the Western region and more precisely in Bamendjou [22]. The barks of this plant as well as essential oil are used in traditional medicine to treat gastro-intestinal upsets and diarrhea [20, 21, 23-25].

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It is used as antibacterial and acts actively on *Escherichia coli*, *Bacillus subtilis*, *Shigella sonnei* and *Enterobacter* [19, 26]. *Syzygium guineense* is the host plant of *Ctenarytaina* sp. Collected in the Western region of Cameroon. This genus and this species are described for the first time from Cameroon. Developmental stages are described and illustrated.

2. Materials and Methods

The following abbreviations are used: LZUY= Laboratory of Zoology, University of Yaoundé I, Cameroon; NHMB= Naturhistorisches Museum Basel, Switzerland; MRAC= Royal Museum for Central Africa, Belgium; Psyllids were collected at Bamendjou, Western region of Cameroon, latitude: 05°23'N, longitude: 10°20'E, altitude: 1615 m. The adults were captured with an entomological sweep net and with a mouth aspirator. Larvae and eggs were sampled directly from the buds and leaves of the host plant. All specimens were preserved in 70% ethanol or dry and slide-mounted. They are deposited in (LZUY), NHMB and MRAC. The widths of the thorax of all larval stages were measured including wing pads. Identification keys were used for species identification [8, 9, 27, 28,]. The host plant species was determined at the National Herbarium of Cameroon and deposited in LZUY.

Material examined

From March 2006 to June 2010, *Ctenarytaina fomenae* sp.n. was collected at Mboum-Bamendjou, Tagoumdja's wooded area, Western region of Cameroon 4 times on *Syzygium guineense* (Fig. 1a): 15 iii 2006 (Dzokou V.J. and Tamesse J.L.), 1 holotype male, slide-mounted (MRAC); Paratypes: 4 males, 5 females, 6 larvae, same data as holotype (LZUY); 2 males, 2 females, 3 larvae, same data as holotype (NHMB); 26 males, 28 females, 80 larvae, 19 iii 2006 (Dzokou V.J. and Tamesse J.L.) (LZUY); 8 VI 2006 (Dzokou V.J. and Tamesse J.L.) (LZUY), 1 male, 3 females, 30 larvae; 14 VI 2010 (Dzokou V.J. and Soufo L.), 39 males, 40 females, 122 larvae.

Specimens included eggs, five larval stages and adults. 50 eggs, 60 individuals of first larval stage, 50 individuals of second larval stage, 31 individuals of third larval stage, 43 individuals of fourth larval stage, 42 individuals of fifth larval stage, 29 females and 20 males were measured, using a stereomicroscope. *Ctenarytaina fomenae* sp.n. causes shoot dieback, leaf curl and leaf discoloration, sooty mould growing on the honeydew, which is secreted in large amounts (Fig. 1b).



Fig 1: Leafy twigs (a) and damage caused by *Ctenarytaina fomenae* sp.n. on *Syzygium guineense* (location: Bamendjou, western region)

3. Results

Taxonomy description of *Ctenarytaina fomenae* Tamesse sp.n., psyllid of *Syzygium guineense*.

3.1 Eggs and larval stages

Eggs are yellowish and newly emerged larvae are yellowish and mature ones are brownish. Last segment of antennae is dark. Eggs are oval in form and there is a peduncle at the apical portion (Fig. 2a).

Larvae for first to fourth larval stages: thorax with 3 pairs of legs, but tarsus without arolium. Last segment of antennae bears long setae at their apical end. Antennae divided into three segments; thorax lacks wing pad and abdomen not segmented with four dorsal maculations (first larval stage) (Fig. 2b). Antennae with 5 segments; forewing pad and hindwing pad present but less developed; abdomen with an apparent segmentation and with one dorsal maculation (second larval stage) (Fig. 2c). Antennae with 6 segments, fourth and fifth segments carrying a rhinarium; thorax with two dorsal maculations; wing pad more developed than that of second larval stage; abdomen more segmented than (third larval stage) (Fig. 2d). Antennae subdivided into 7 segments with a rhinarium at the subapical ends on segments 3, 5 and 6; wing pads more developed than that of the three first larval stages; thorax with three important dorsal maculation; abdomen with a distinct segmentation (fourth larval stage)

(Fig. 2e). Eggs, first, second, third and fourth larval measurements are as follows: eggs: 0.24–0.35 mm long and 0.12–0.18 mm width; 2.1 times longer than wide; 1st larval stage: 0.29–0.59 mm long and 0.12–0.23 mm width, 2.3 times longer than wide; 2nd larval stage: 0.59–0.74 mm long and 0.25–0.29 mm width, 2.7 times longer than wide and 1.3 times longer than first larval stage; 3rd larval stage: 0.71–0.94 mm long and 0.24–0.34 mm width, 2.6 times longer than wide and 1.7 times longer than the 2nd larval stage; 4th larval stage: 0.82–1.18 mm long and 0.24–0.37 mm width, 2.7 times longer than wide and 1.1 times longer than the 3rd larval stage.

3.2 Fifth larval stage

Newly emerged larvae are yellowish and mature ones are brownish; the last segment of antennae is brown. Antennae subdivided into 9 segments with a rhinarium at the apical ends of segments 3, 4, 7 and 8. Segment 9 possesses a concave seta; head with a large dorsal maculation (Fig. 2f). Legs made up of 4 more-developed segments bearing numerous setae on tibia and tarsus; alike and devoid of arolium (Fig. 2g). Forewing pads and hind wing pads developed, with lanceolated setae. Abdomen with a distinct dorsal segmentation, bearing nine lanceolated setae and, ventrally, anus, in terminal end, bearing a circumanal ring (Fig. 2h). Fifth larval stage measurements are as follows: 1.06–1.65 mm long and 0.41–0.59 mm width, then 2.9 times as long as wide.

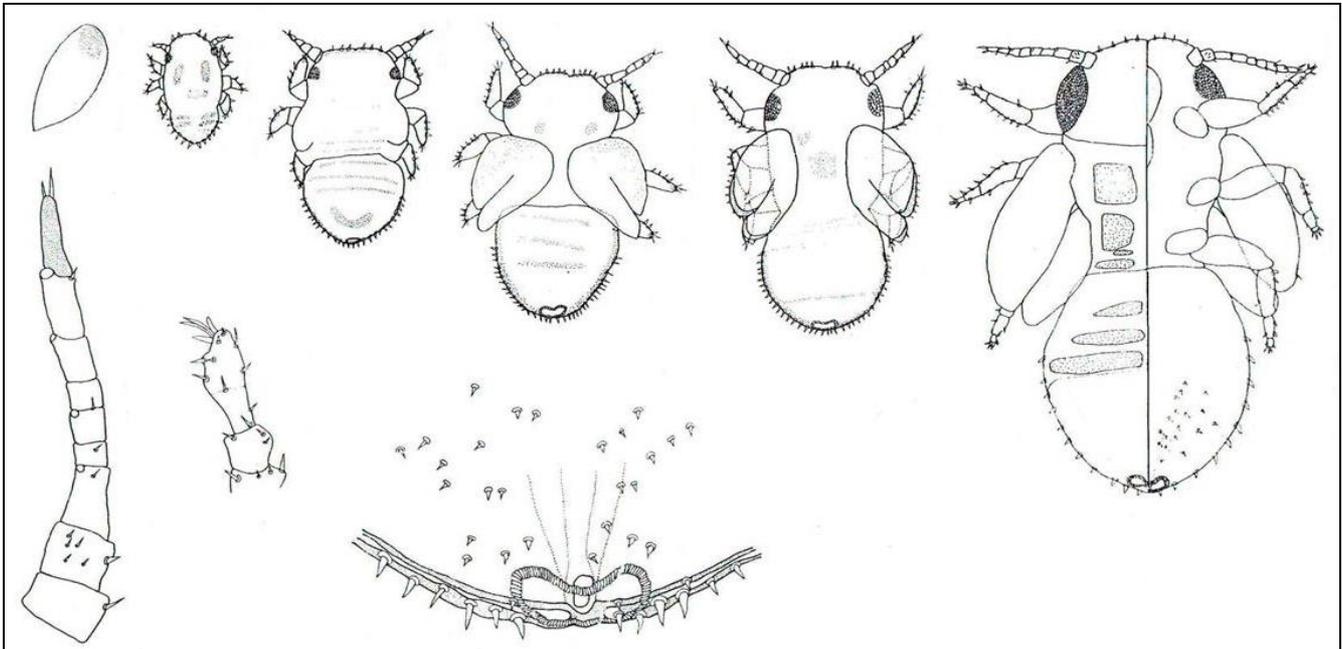


Fig 2: Developmental stages of *Ctenarytaina fomenae* sp.n, psyllid of *Syzygium guineense* from Cameroon. (a) egg; (b) first larval stage; (c) second larval stage; (d) third larval stage; (e) fourth larval stage; (f) fifth larva stage; (g) antennae of the fifth larval stage; (h) metatarsus apex of the fifth larval stage; (i) abdominal end. Scales α_1 0.16 mm, α_3 0.04 mm.

3.3 Adults

Coloration

After the last moult of larvae, adults emerge with orange color, head and thorax become brown; adults become darker when mature. Females are darker than males. Genal cones brown, eyes purplish, antennae brown–grayish with the last two segments darker, dorsal sclerites with longitudinal dark bands; forewings translucent with dark cells in the fore posterior margin; hind wings with grayish wing cells and brown veins. Male genitalia yellow whereas in females, the sub genital plate and the proctiger are dark.

Structure

Females (Fig. 3a) differ from the males (Fig. 3b) by the size and the structure of their genitalia. Females measurements are as follows: 1.43–2 mm long and 0.43–0.66 mm width; male measurements are as follows: 1.17–2.71 mm long and 0.34–0.57 mm width. Adults are 3.1 times as long as wide. Females are longer and larger than the males. Psyllid body is covered with short lanceolated setae in both males and females. Distal end of the genitalia pointed in females and conical in males. Head prolonged by two genal cones; with visual sensorial organs, mouth appendices and antenna; longitudinal head axis on the same median plan with the rest of the body; genal cones short and flat bearing lanceolated setae (Fig. 3c). Genal cone measurements are as follows: 0.09–0.14 mm long in females and 0.06–0.11 mm long in males. Vertex divided into two parts by the median line; with setae at the apical region; ocellus and antennal fossi structure of the head present. Head width measurements are as follows: 0.4–0.63 mm in females and 0.34–0.57 mm in males. Eyes purplish and globulous; compound eyes present at the lateral position on the head. Antennae, divided into 10 segments with variable length; each segment with at least a short seta (Fig. 3d). The third antennal segment measurements are as follows: 0.09–0.1 mm long in females and 0.06–0.1 mm long in males. Scape and pedicel larger, fifth segments shorter; tenth segment bearing a long and short setae apically. Antenna with a rhinarium at the sub apical end on the segments 4, 6, 8 and 9; antennae measurements are as follows: 0.40–0.63 mm long in females

and 0.31–0.54 mm long in males; then female antennae 1.1 times longer than male antenna. Dimorphism is pronounced by the length of the antennae.

Metacoxa and trochanter without setae; metafemur with an internal lobe measures 0.20–0.29 mm long in females and 0.17–0.29 mm long in males; female metafemur is 1.18 times longer than male metafemur. Metatibia with 3 internal spurs and 2 external spurs at its distal ends (Fig. 3e); metatarsus bears two spurs (Fig. 3f); same length as the metafemur in male; metatibia is 0.6 and 0.5 times longer than the head width in female and male respectively. Female's metatibia is 1.2 times longer than male metatibia.

Forewings and hind wings are hyaline. Forewings wider and rounded at their apical end, veins brown and wing cells grayish, with dark stains on the front of the hind margin (Fig. 3g). Forewings measurements are as follows: 1.43–1.83 mm long and 0.57–0.74 mm width in females against 1.14–1.37 mm long and 0.4–0.57 mm width in males. Then, forewings are 2.9 and 2.6 times longer than head width respectively in females and males, veins with short setae.

Hind wings transparent and shorter than forewing, venation weaker (Fig. 3h). Costal and sub costal veins of hind wing bear eleven lanceolated setae. Hind wings measurements are as follows: 1.14–1.57 mm long, 0.31–0.63 mm width in females and 0.85–1.14 mm long, 0.29–0.42 mm width in males, then hind wings are 2.7 and 2.6 times longer than wide in females in males respectively.

Female genitalia greatly sclerotized, proctiger and the subgenital plate bear lanceolated setae (Fig. 3i). The proctiger with longer setae in its apical portion; anal orifice formed by two cordiform series of waxy glands which together form a bottle-like circumanal ring; the latter is sinuous, surrounding the anal pore. Subgenital plate lightly curved with lanceolated setae at its apical portion. The ventral valvula lightly sinuous and smooth, internal valvula larger and dorsal valvula more reduced. Proctiger measurements are as follows: 0.37–0.6 mm long, 0.9 times longer than head width and 1.2 times longer than the subgenital plate. Subgenital plate measurements are as follows: 0.26–0.46 mm long.

Segments 9 and 10 fused and carrying male genitalia,

proctiger (Fig. 3j). Proctiger bisegmented; distal segment more or less cylindrical, short and carrying at its apex, an anal orifice. The proximal segment broad, in the form of Y carrying an invagination (Fig. 3m). Proctiger carrying lanceolated setae and measurements are as follows: 0.14–0.26 mm long, then 0.4 times longer than head width. Two parameres (Fig. 3k) in number, lamellar and curved, bearing strong, dark and simple light setae; 3 lines of short silks in the basal area and one line in the apical area; parameres bear

lanceolated setae. Parameres measurements are as follows: 0.14–0.23 mm long and then 0.4 times longest than head width. Aedeagus divided in two portions: the proximal portion, which is the longer, and distal portion the shorter. Distal portion straight, ended by a shorter and spherical portion with an external ejaculator canal. Aedeagus (Fig. 3l) measurements are as follows: 0.11–0.17 mm long, then 0.3 times longer than head width.

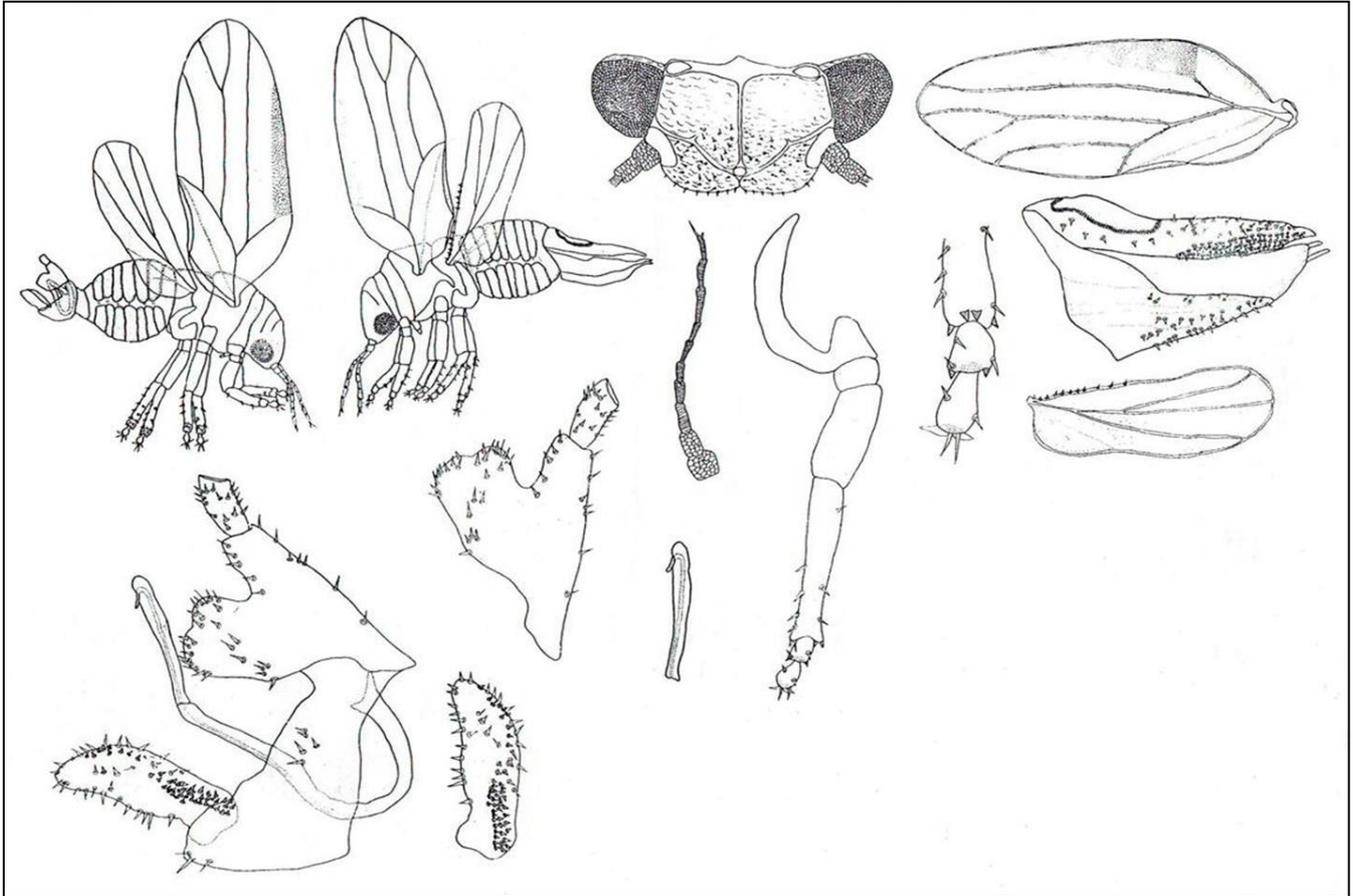


Fig 3: Adult organs of *Ctenarytaina fomenae* sp.n, psyllid of *Syzygium guineense* from Cameroon. (a) male; (b) female; (c) head; (d) antenna; (e) metaleg; (f) metatibia apical end; (g) forewing; (h) hindwing; (i) female genitalia; (j) male genitalia; (k) proctiger; (l) paramere; (m) aedeagus. Scales: α_1 0.16 mm; α_2 0.08 mm; α_3 0.04 mm.

4. Discussion

Ctenarytaina fomenae sp.n. differs from the other *Ctenarytaina* species by several characters. In the larvae of the fifth stage, the brown color of the last segments of antenna differs from that of other species. The lack of arolium corroborates the description of Taylor and Hodkinson [8, 28]. Genal cone is short, flat and differs from those of other species. They are of small size compared to that of others species [8].

The genitalia of *Ctenarytaina fomenae* sp.n. differs from that of other species of the same genera by the structure of organs and setae arrangement. The basal part of the male proctiger possess an invagination of Y form. The arrangement as well as the form of *Ctenarytaina fomenae* sp.n. paramere allow the easy differentiation from others species. The parameres resemble those of *C. spatulata* [8, 9, 29], but differ from the arrangement of setae. The female proctiger shows a bottle-like circumanal and is made of two rows of waxy glands, so differs from others described species [8, 12, 30]. The structure of the distal portion of the aedeagus is similar to that of *C. eucalypti* described by Olivares, Hollis, Santana and Burckhardt [5, 12, 31, 32].

5. Conclusion

The psyllid of *Syzygium guineense* collected in the western region of Cameroon and belonging to the family Aphalaridae, the subfamily Spondylaspidinae, the genus *Ctenarytaina* (Ferris and Klyver, 1932) and the species *Ctenarytaina fomenae* sp.n is new. This species is described for the first time from Cameroon.

6. Etymology

This species is dedicated to eminent Professor Abraham Fomena, Faculty of Science, University of Yaoundé I for its valuable contribution to the taxonomy of psyllids in Cameroon.

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