



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2020; 8(2): 137-141

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Received: 13-01-2020

Accepted: 15-02-2020

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Pseudoeriopsylla mpoamei sp. n., a new pest of jumping plant-louse (Hemiptera: Psylloidea: Homotomidae) from western Cameroon associated with *Ficus platyphylla* Del. (Moraceae)

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Abstract

A new species of *Pseudoeriopsylla* is described from the Western Region of Cameroon, *Pseudoeriopsylla mpoamei* sp. n.. The described species of *Pseudoeriopsylla* genus are exclusively African and are characterised by the presence of a pterostigma and the absence of the costal break on the forewing. The prospection carried out since 2005 in the Western Region of Cameroon have permitted the collecting of this new species. Previously, *Pseudoeriopsylla laingi*, *P. etoundii* and *P. bitomi* were described from Cameroon. The new species is diagnosed and illustrated; compared with the known species; information is given on its distribution, host plant and biology. The new species was collected on *Ficus platyphylla* in Nkop village, Foto grouping, Menoua Sub Division. It feeds on the leaves and young buds of *Ficus platyphylla* (Moraceae).

Keywords: biodiversity, taxonomy, psyllids, *Ficus platyphylla*, Cameroon

Introduction

Psyllids are sap-sucking insects responsible of damages caused on their host plants. Both larva and adult psylloids feed on the soluble contents of tissues of their host plants, mainly vascular tissues^[1]. Homotomidae is a family of 80 species belonging to 11 genera with pan-tropical^[1]. According^[2], more detailed studies are needed to solve phylogenetic relationships problem among Carsidaridae, Homotomidae and Aphalaridae (Pachypsyllinae). Homotomidae family is characterised by a pair of tubercles present on the metapostnotum; ventral sense organs of metafemur in basal position, proximal organ offset from distal pair; male proctiger bipartite (not *Synoza*); male subgenital plate without latero-dorsal appendages; rs-m crossvein absent on forewing. This family has three subfamilies: Dynopsyllinae with 5 genera (*Diceraopsylla*, *Dynopsylla*, *Austrodynopsylla*, *Triozamia* and *Afrodynopsylla*); Homotominae with 2 genera (*Homotoma*, *Synoza*); Macrohomotominae with 5 genera (*Mycopsylla*, *Macrohomotoma*, *Phytolyma*, *Pseudoeriopsylla* and *Moriphila*)^[3-4]. The new *Moriphila* genus is probable sister group of the afrotropical *Phytolyma* whose species develop on *Milicia an Morus* (Moraceae)^[4].

In Cameroon, the subfamily Dynopsyllinae is represented by *Triozamia lamborni* Newstead^[3]; Homotominae by *Homotoma* genus with *Homotoma chlamydodora*, *H. eastopi*, *H. bamendae*^[3]; Macrohomotominae by 2 genera: *Phytolyma* genus with 2 species, *Phytolyma fusca*^[5] and *Phytolyma tchuentei*^[6]; *Pseudoeriopsylla* genus with 3 species, *Pseudoeriopsylla laingi*^[3], *Pseudoeriopsylla etoundii*^[7] and *Pseudoeriopsylla bitomi*^[8]. The species of *Pseudoeriopsylla* genus are exclusively African and are characterized by the presence of a pterostigma on the forewing and the absence or not of the costal break. The investigations undertaken since 2005 in the West-Cameroon have permitted to collect another new species of *Pseudoeriopsylla* on *Ficus platyphylla* (Moraceae). This work, thus, describes the new species, compares with the described cameroonians' species *P. laingi*^[3], *P. etoundii*^[7], *P. bitomi*^[8], and the five others african *Pseudoeriopsylla* genus: *P. nyasae* Newstead; *P. medleri*, *P. carvalhoi*, *P. kenya*, *P. etiennei*^[3].

Moraceae is a family of Dicotyledonous Angiosperms pantropical made with more than 1400 species belonging to 53 genera^[3].

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About two thirds of the psyllid species recorded on Moraceae belong to the family Homotomidae, and the remainder number belong to the Liviidae, Psyllidae and Triozidae; about 90% of the species are associated with *Ficus* [4]. According to [9], the families of Moraceae and Urticaceae are much closed. Moraceae constitutes the fifth most important host family of the Sternorrhynchous jumping plant-lice, a group of highly host specific insects comprising around 4000 described species worldwide [10]. The *Ficus* genus is one of the significant genera in the Plantae kingdom with more than 700 species described [11]. *Pseudoeriopsylla etoundii* and *Pseudoeriopsylla bitomi* are living on *Ficus*, an important medicinal plant genus in Cameroon. The leaves of *Ficus* spp. are used in several localities in the North of Ivory Coast to cure rheumatism [12], the organic extracts of the leaves also have a significant antimicrobial activity on *Streptococcus faecalis*, *Candida albicans*, *Microsporum audouinii* [13].

Material and methods

Field survey

The psyllids were captured on *Ficus platyphylla* (Moraceae) at Nkop, Dschang Sub Division, Menoua Division, in the Western highland of Cameroon. Adults were captured with the entomological sweep net of 0.5 mm mesh size and mouth aspirator or soft hair brush. The larvae were sampled using a mouth aspirator. These insects were preserved in 70% ethanol.

Specimens' treatments, measurements and drawings

The specimens were mounted on slides in Canada balsam and conserved in 70% ethanol in the Laboratory of Zoology of the University of Yaoundé I (LZUY) and in Laboratory of Agricultural Zoology of the University of Dschang (LAZUDs). The morphological terminology follows Hollis and Broomfield (1989). The illustrations were achieved under a microscope LEICA DM. 1000 which is incorporated by a drawing tube. Measurements (mm) were made from specimens preserved in 70% ethanol using Leica stereomicroscope. The host plant was identified at the National Herbarium of Yaoundé (Cameroon) and was deposited in LZUY.

Deposit and conservation of the specimens

The specimens were also deposited in the Museum of Natural History of Basle (NHMB) in Switzerland and in the Royal Museum for Central Africa (RMCA) in Belgium.

Material examined: Holotype : ♂, Cameroon: West Region, Nkop, 10°04'N, 5°26'E, 1385 m, 27 March 2006, *Ficus platyphylla* (Dzokou and Tamesse). Slides mounted (LZUY). Paratypes: Cameroon: 3 ♂, 7 ♀, 12 larvae, same data as holotype; 1 ♂, 1 ♀, 2 larvae. Dry- and slide-mounted or preserved in 70% ethanol (NHMB); 1 ♂, 1 ♀, 1 larva, preserved in 70% ethanol (RMCA); 7 ♂, 5 ♀, 4 larvae, same data as holotype, 14 October 2012 (Dzokou), preserved in 70% ethanol in the Laboratory of Agricultural Zoology, University of Dschang (LAZUDs).

Results

Taxonomy

Pseudoeriopsylla Newstead

Pseudoeriopsylla [14]: p 105; [15]: p 370 (as a synonym of *Macrohomentoma*); [16]: p 242. Type species: *Pseudoeriopsylla nyasae* Newstead, by monotypy.

Pseudoeriopsylla Newstead; [17]: p 62 (as a synonym of *Macrohomentoma*). [Misspelling.]

Pseudoeriopsylla Newstead; [3]: p 153, 154.

Key to *Pseudoeriopsylla* from Cameroon

1. Forewing with a pterostigma partially sub-rounded or entirely mottled.....3
2. Forewing with a pterostigma lengthened entirely mottled..... 6
3. Opaque band along the cubital vein Cu₁ and Cu_{1b} of the forewing..... 4
4. Opaque band absent along the cubital vein Cu₁ and opaque spot only at the apex of the Cu_{1b}.....*Pseudoeriopsylla etoundii* Dzokou *et al.*
5. Presence of a dark spot in the cell Cu₂.....*Pseudoeriopsylla laingi* Hollis and Broomfield
6. Absence of dark spot at the base of the anal cell.....5
7. Presence of many rhinaria on first flagellomere and more than 2 rhinaria on second flagellomere.....*Pseudoeriopsylla mpoamei* sp.n.
8. Presence of an apical rhinarium on the first flagellomere and 2 rhinaria on second flagellomere, basal portion of the forewing entirely mottled.....*Pseudoeriopsylla bitomi* Dzokou *et al.*

Description

Adult.

Colouration: The overall body of male blackish (Fig. 1). Cephalo-thorax generally dark in the both sexes. Mesoscutellum dark beside metascutum. Pterostigma dark with a central clear band; central flattened band. A dark band spreads out along the vein Cu₁ and Cu_{1b} and reaching the anal margin.



Fig 1: ♂ adult of *Pseudoeriopsylla mpoamei* sp. n.

Morphology: Head in dorsal view, semicircular; eyes externally in the continuation of the vertex, frontal cones absent (Fig. 3A). Pronotum rounded on the vertex side; mesopraescutum roughly rectangular with lateral shape margins; dorsulum well defined. Metascutellum with a process in form of two spines dorsally; metapostnotum strongly fixed on metascutellum and its auxiliary cord, its apex, drowned in the first abdominal segments. Parapteron oviform in profile view and well defined as well as tegula; a bottleneck exists between thorax and abdomen; clypeus slightly developed. Quadrate vertex with two sides rounded, lodged lateral ocelli at the limit of the eyes. Median suture not visible; below each ocellus, median suture reaches neither the limit of the front, nor the base of the head. The two lateral ocelli in low position, form a triangle-like with the median ocellus.

The antennal flagellomeres 7 and 8 thick and shorter than the

other segments of the flagellum. Flagellomere 8th bearing 2 subequal setae apically; rhinaria present all over the surface of 1st flagellomere and also many short setae, 5-6 subapically rhinaria on 2nd, 6-7 rhinaria on 3rd, 4-5 rhinaria on 4th, 2-3 rhinaria on 5th and 2 rhinaria on 8th (Fig. 3B).

Forewing 2.42-2.55 (male) and 2.08-2.68 (female) times longer than wide. Pterostigma not completely rounded, vein R+M+Cu₁ very short and almost the same length as M+Cu₁; R item twice longer than R+M+Cu₁; R₁ item curved at the proximal portion; it closer to Rs item towards its base. M+Cu₁ and R+M+Cu₁ veins with the same length approximately, identical for M and M₁₊₂. M₁₊₂ item bent towards r₂ cell, pointing the anal item just below the apex of the wing. Cu_{1a} occurs and curved at the point of touching M item before going down gradually towards the anal. Cells m₁, m₂ and cu₁ each with a radular area. M, M₁₊₂ and M₃₊₄ veins with the same approximate length. Anal item delimits a small cell just at its' distal portion; r₂ cell longer, and crosses more than 2/3 of the length of the wing (Fig. 3C).

Hind leg meracanthus relatively long, trochanter bearing 3

spines, 2 external and one internal. Metafemur bearing spinules, metatibia bearing 5 big spurs apically and 2 crowns of very small spurs in a comb's shape. Metabasisarsus bearing 2 apical spurs and setae towards its apical half; the last tarsus classically bearing 2 claws and one pulvillus (Fig. 3D).

Male terminalia as in Figure 3E. Proctiger made of 2 segments; the 1st segment being larger, dorsally rounded, ventrally depressed; its bases spotted with some setae towards its apical half and on the dorsal face; the 2nd segment more covered by setae. Paramere (Fig. 3F) elongate, with narrowed proximal half, apical portion with 2 small sclerotized areas; paramere is covered with setae, especially on two thirds of distal portion. Aedeagus divided into two segments; and distal segment (Fig. 3G) with a thickly dorsal depression and a weak ventral depression.

Female terminalia as in Figure 3H; proctiger relatively long, apically dense setae. Circumanal ring with 2 rows of pores in complex convolutions. Dorsal valvula covers the inner and ventral valvula. Subgenital plate also with dense setae apically. Measurements and ratios found in tables 1 and 2.

Table 1: Measurements (in mm) of adults *Pseudoeriopsylla* species (N= number of measured specimens)

Measured parameters	<i>Pseudoeriopsylla mpoamei</i> sp. n.		<i>Pseudoeriopsylla bitomi</i>		<i>Pseudoeriopsylla etoundii</i>	
	♂ (N=4)	♀ (N=7)	♂ (N=5)	♀ (N=6)	♂ (N=7)	♀ (N=17)
body length	6.25-6.44	5.75-6.25	7.12-8.19	7-8.06	4.31-6.25	5-6.5
body width	1.65-1.69	2-2.12	2-2.37	2-2.62	1.62-1.87	2
head width	1.25-1.37	1.44-1.5	1.5-1.75	1.5-1.75	1.5	1.3-1.6
antenna length	2-2.06	1.5-1.75	2.12-2.62	1.75-1.87	1.5-1.87	1.4-1.7
flagellomere 1 length	0.31-0.37	0.25-0.31	0.37-0.5	0.37-0.44	0.25-0.37	0.19-0.31
forewing length	6.75-6.94	8.06-8.31	8.62-9.37	9-10	6.62-7.5	7-9.81
forewing width	2.65-2.87	3-4	3.37-3.81	3.87-4.12	3.12-3.37	3.12-3.62
hindwing length	3.4-3.5	3.25-3.75	3.12-4.12	4-5	2.87-4.25	3.4-3.9
hindwing width	1.6-1.75	1.5-1.75	1.19-1.87	2	1.5-2.37	1.5-2.12
length of distal segment of aedeagus	0.3-0.31		0.5-0.62		0.56-0.62	
paramere length	0.35-0.37		0.37-0.62		0.4-0.5	
male proctiger length	1.4-1.5		0.37-0.56		0.25-0.62	
metafemur length	1.25-1.26	0.87-1.12	0.87-1.25	1.12-1.25	0.81-1	0.5-1.13
metatibia length	1.35-1.37	0.56-1.37	1.25	1.12-1.25	1.12-1.25	0.69-1.37
female proctiger length		1.25-1.87		1.94-2.37		1.37-1.94
female subgenital plate length		1.12-1.37		1.15-1.62		1-2
pterostigma length	1.25	1.25-1.5	2.12-2.25	2.19-2.62	1.12-1.25	1.19-1.37
Rs vein length	2.65-2.75	2.63-3.37	3.56-3.87	4-5	2.5	2.31-2.87
length margin of cells r ₂ , m ₁ and m ₂	2.06-2.56	2.87-3.25	3.12-3.31	3.3-3.5	-	3
M ₁₊₂ vein length	2.65-2.75	3-3.31	3.12-3.87	3.5-3.7	2.31-2.75	2.44-2.87
M ₃₊₄ vein length	2	2.3-2.5	2.5-2.94	2.94-3.12	1.94-2.19	2-2.37
length margin of m ₁ cell	1.25-1.37	1.37-1.62	1.37-1.81	1.62-1.81	1.19-1.25	1.25-1.37
length margin of cu ₁ cell	1.6-1.62	1.87-1.9	2.1-2.5	2.37-2.75	1.4-1.5	1.37-1.62
cu ₁ cell width	1.65-1.69	1.75-2.06	1.94-2.37	2.37	2	1.87-2.37

Table 2: Ratios (in mm) of adults *Pseudoeriopsylla* species from Cameroon

Measured parameters	<i>Pseudoeriopsylla mpoamei</i> sp. n.		<i>P. bitomi</i>		<i>P. etoundii</i>	
	♂ (N=4)	♀ (N=7)	♂ (N=5)	♀ (N=6)	♂ (N=7)	♀ (N=17)
forewing length/ forewing width	2.42-2.55	2.08-2.68	2.46-2.56	2.32-2.43	2.12-2.22	2.24-2.71
forewing length/paramere length	1.98-1.99	2.22-2.48	2.27-2.76	2-2.25	1.76-2.31	2.06-2.51
paramere length/ hindwing width	2-2.12	2.14-2.17	2.2-2.62	2-2.5	1.79-1.91	1.84-2.27
Antenna length/ flagellomere 1 length	5.57-6.45	5.64-6	5.24-5.73	4.25-4.73	5.05-6	5.48-7.37
male proctiger length/ head width	1.09-1.12	-	0.25-0.32	-	0.17-0.41	-
metatibia length/ head width	1-1.08	0.39-0.91	0.71-0.83	0.71-0.75	0.75-0.83	0.53-0.85
antenna length/ head width	1.5-1.6	1.04-1.17	1.41-1.49	1.07-1.17	1-1.25	1.06-1.08
flagellomere 1 length/ head width	0.25-0.27	0.17-0.21	0.25-0.28	0.25	0.16-0.25	0.15-1.19
female proctiger length/ female subgenital plate length	-	1.1-1.36	-	1.29-1.46	-	0.97-1.37

Fifth instar larva

Colouration: The overall body of the fifth instar larva blackish (Fig. 2).

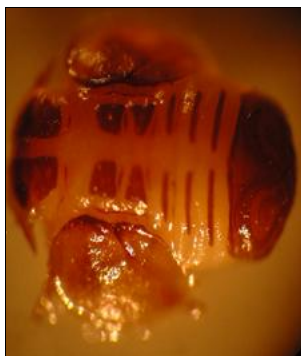


Fig 2: Fifth instar larva of *Pseudoeripsylla mpoamei* sp. n.

Morphology: Body divided into head, thorax and abdomen. Antenna with 3 segments. Abdominal sclerites dorsally visible, 2 ventral sclerites visible. External margin of the abdomen, lined up by setae as well as the ventral side. Circumanal pore ring widely extending to dorsal surface of

caudal plate (Fig. 3I). Forewing pads almost rounded with a central area, thickly pigmented; hindwing pads reduced and frayed. Hind legs with 5 segments and tibiotarsus apex as in Figure 3J. Measurements and ratios found in table 3.

Table 3: Measurements (in mm) of fifth instar larvae *Pseudoeripsylla* species from Cameroon

Measured parameters	<i>Pseudoeripsylla mpoamei</i> sp. n. (N=12)	<i>P. bitomi</i> (N=26)	<i>P. etoundii</i> (N=30)
body length	3-4	3.37-4.69	3-4
body width	3.4-3.5	3.8-4.5	3-4
antenna length	0.81-1	0.62-1.12	0.56-0.94
forewing-pad length	1.87-2.25	2.25-2.62	1.87-2.37
caudal plate length	1	0.8-1.5	0.5-1
caudal plate width	2	2.37-2.81	1.75-2.12

Host plant: *Ficus platyphylla* (Moraceae)

Biology: Larvae develop and feed between bracts of the young buds of the host plant. This development is at the origin of the drying of the young buds.

Distribution: Cameroon

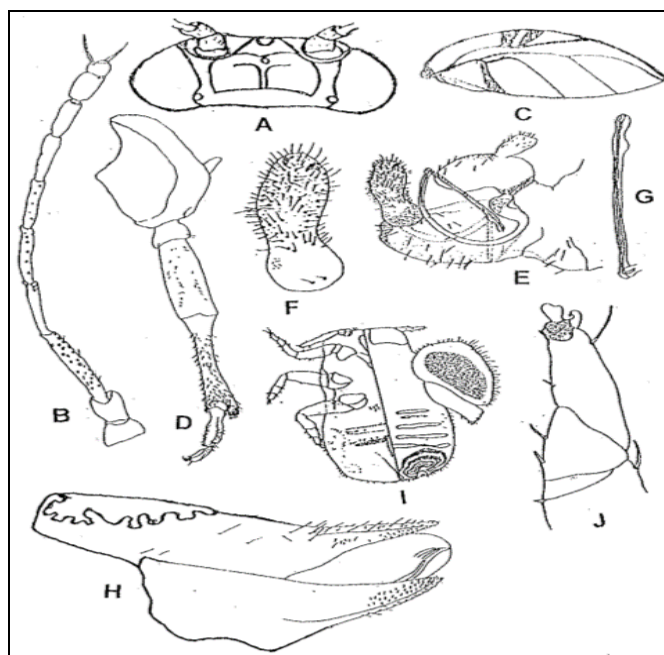


Fig 3: *Pseudoeripsylla mpoamei* sp. n., A: head (dorsal view), B: antenna, C: forewing, D: hind leg (in profile), E: ♂ terminalia (in profile), F: paramere (in profile, inner surface), G: distal segment of aedeagus (in profile), H: ♀ terminalia (in profile), I: fifth instar larvae (left ventral and right dorsal surfaces), J: tibiotarsus apex of fifth instar larvae. Scale bars: a=4 mm (C, I); b=1.6 mm (A, B, D, E, F, G, H); c=0.4 mm (J).

Etymology: Dedicated to Professor MPOAME MBIDA, Parasitologist and former Dean of the Faculty of Agronomy and Agricultural Sciences (FAAS), University of Dschang for its scientific rigour.

Discussion

The specific morphological characters and measurements show that *P. mpoamei* sp. n. is different for the all known species.

Among Hemiptera-Psyloidea, the species of Homotomidae family, subfamily of Macrohomotominae comprise the specimens with large size. The 1st flagellomere of the antenna of *Pseudoeripsylla mpoamei* sp. n. carries several rhinaria,

contrary to *P. carvaihoi* [3] in which the 2nd flagellomere carries several rhinaria whereas *Pseudoeripsylla mpoamei* sp. n. have only 5 to 6 rhinaria apically. For *P. bitomi* and *P. etoundii*, the 1st flagellomere carries a single apical rhinarium. The 2nd flagellomere of *P. bitomi* carries 2 rhinaria and *P. etoundii* carries a single rhinarium. For *P. laingi* also described in Cameroon, the 1st flagellomere carries approximately 20 rhinaria and the 2nd, two rhinaria. *Pseudoeripsylla medleri*, carries around 20 rhinaria on the 1st flagellomere and 6 on the 2nd flagellomere while *P. nyasae* carries 3 and 4 rhinaria on the 1st and the 2nd flagellomeres respectively. *Pseudoeripsylla kenyae* and *P. etiennei* carry each a single rhinarium on the 1st and the 2nd flagellomeres. In

Pseudoeripsylla mpoamei sp. n., the pterostigma of the forewing is less rounded with a triangular clear band on the centre while in *P. etoundii* the pterostigma is rounded with a circular clear central zone. The pterostigma of *P. laingi* is also rounded, but with a clear zone which touches the C+Sc vein while in *P. bitomi* the pterostigma is lengthened and dark. In *Pseudoeripsylla mpoamei* sp. n., the Cu1a vein is curved at the junction point with the median vein M, this is specific for *P. mpoamei* and makes this species different to all the described species of *Pseudoeripsylla* genus. This incurvation is observed on *Macrohomotoma gladiata* [3], but not also near to the median vein M as in *Pseudoeripsylla mpoamei* sp. n. A dark band skirts the Cu1b vein on the side of *cu*₂ cell in *Pseudoeripsylla mpoamei* sp. n., similar band is observed on *P. laingi*; while in *P. bitomi*, the base of the forewing is dark, except a triangular clear band observed on the *cu*₂ cell and in *P. etoundii*, a dark zone with the rounded end is observed at the base of the *cu*₂ cell. The distal part of metatibia in *Pseudoeripsylla mpoamei* sp. n. carries 5 spurs against 4 in *P. bitomi* and *P. etoundii*. The male terminalia are morphologically different for the cameroonians' species, specifically the bisegmented proctigeres, the parameres and the aedeagus. The female terminalia are also morphologically different. In *Pseudoeripsylla mpoamei* sp. n. and *P. etoundii*, the dorsal valve covers the internal and ventral valves; the female proctiger of the 2 species with a dorsal circumanal formed of two rows of pores forming complex convolutions. In *P. bitomi*, the internal valve is longer than the dorsal and ventral valves; the dorsal circumanal formed of a single row of pores forming complex convolutions. The forewing pads of *Pseudoeripsylla mpoamei* sp. n. fifth larva carry a central zone strongly pigmented, that is contrary to *P. bitomi* and *P. etoundii* larvae. The distal part of the fifth instar larval posterior legs is morphologically different in the three species.

Conclusion

Pseudoeripsylla mpoamei sp. n. described in this work comparatively to the previous described species is different. The morphometric and morphological data show that the species is new for the science and increases the number of described species of *Pseudoeripsylla* genus from eight to nine and brings up to four the number of described species from Cameroon.

Acknowledgements

We are thanking Dr. Daniel Burckhardt, Naturhistorisches Museum, Basel, Switzerland for the preliminary identification of this psyllid.

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