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JUMPING PLANT-LOUSE EURYCONUS DIALIA SP. NOV. (HEMIPTERA: PSYLLIDAE), ASSOCIATED WITH DIALIUM SP. (FABACEAE) IN CAMEROON

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ABSTRACT

Jumping plant lice are phytophagous insects which induce damages to their host plants. The biodiversity of Cameroonian psyllid fauna is important but many species remain unknown. Euryconus dialia sp. nov. is associated with Dialium sp. a valuable timber tree in which the psyllid induces necrosis of leaves especially young plants. The aim of this work is the describe and identify the psyllid associated with Dialium sp. in Cameroon, a contribution of the psyllid biodiversity study in Cameroonian fauna. From the description E. dialia sp. nov. is characterized by forewing pattern in which the surface is covered by large brown band which is darker on the distal portion of the wing and on c+sc cell, a light white area covered the third surface of c+sc cell on the proximal portion and another light white area is surrounding half of the Rs vein; internal veins carrying dark patches except M2+3 and R+M+Cu veins. Genal processes well developed and broad anteriorly slightly incised forming two tubercles on the apex. Terminal abdominal margin with 4+4 truncate sectasetae; anus oval, in terminal position; circumanal ring consisting of a single row of pores; additional pore fields developed, convulted, extending much onto abdominal dorsum and consisting of a single row of wax pores. Comparing E. dialia with the specimens recorded previously elsewhere it is morphologically different from them and can be reported as new species in the Euryconus genus.

Keywords: Taxonomy, Euryconus, psyllid, Baphiopsis parvifolia, Cameroon.

1. INTRODUCTION

The plants are associated with good number of insect species to provide to them nutritive elements for their surviving; among those insects psyllids are included. Psyllids generally called jumping plant-lice, are plant sap sucking insects belonging to Hemiptera order principally associated to perennial dicotyledone plants [1,2,3,4,5]. Psyllids induce several types of damages to their host plants: necrosis of some parts of the host plant, formation of galls, stunting of buds and leaves; some species are vectors and transmit pathogens to their host plant when they are feeding. The diseases transmitted by the psyllids induced the degeneration of the host plants.

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According to [6], the larvae induce severe damages to the host plants while adults transmitted disease to host plants. They attack mostly soft tissues of the host plants, young plants, and shoots of host plants. Psyllid developmental cycle consist of: egg, five larval stages and adult. The psyllid life span depends of host plant phenology, climatic factors, and natural enemies [7,8]. To control the psyllids pest of plants is necessary to identify them and many psyllid species remain unknown in the world. Nowadays there are around 4000 described psyllid species in the world and most of them were recorded in temperate and sub-tropical regions of the world [9]. Afrotropical psyllid fauna is less known when it considered having important diversity of those insects because the plants biodiversity in afrotropical region is very important. So far, psyllid species have been recorded in Cameroon and few of them have been described by some authors such as [10,11,12,13] described 3 species: *Pseudoeriopsylla* genus and *Trioza messii*; [14] described *Diclidophlebia andjigae*; [15,16,17,18] described 2 species in *Trioza* genus, 2 species in *Paurocephala* genus and 6 species in Carsidaridae family; [19,20,21] described 3 species: *Pseudophacopteron burckhardti*, *Phytolyma tchuentei*, and *Blastopsylla occidentalis*; [22] described 9 species in *Pseudophacopteron* genus; [23] described 5 species in *Diclidophlebia* genus; [24] described 14 species in Triozidae family. Many psyllid species remain not described and for now there is no described species in *Eryconus* genus in Cameroon. The main objective of this work is to describe and identify the psyllid of *Dialium* sp. a contribution for the study of biodiversity of psyllids in Cameroonian fauna.

2. MATERIALS AND METHODS

The specimens described in this work were collected in Kala and Nkomilong localities of in Mbankomo Sub-division, Mefou Akono Division, Centre Region of Cameroon. The geogra phical coordinates were specimens were sampled are: mountain Kala; latitude: 03°50’121’’N, longitude: 11°26’004’’E, altitude: 1122 m and mountain Nkomilong; latitude: 03°49’954’’N, longitude: 11°20’504’’E, altitude: 1161 m. On the field adult psyllids were captured with entomological sweep net of 0.5 mm mesh size and mouth aspirator. Larvae were sampled directly from buds and leaves of the host plant with soft brush. The specimens were preserved in 70% ethanol and were deposited in Laboratory of Zoology, Higher Teacher’s Training College, University of Yaounde I (LZUY), and Naturhistorisches Museum Basel, Switzerland (NHMB). The host plant was identified by Professor Bonaventure Sonké of the University of Yaounde I. The measurements of adults were done with the use of a stereomicroscope (mark LEICA L2) having an ocular micrometer graduated from 0 to 10 micrometric units. Measurements done on the adults were body length; body width; head width; antenna length; first flagellomere length; genal process length; forewing length; forewing width; hindwing length; hindwing width; metatibia length; metafemur length; male proctiger length; paramere length; distal segment of aedeagus length; female proctiger length; female subgenital plate length. Measurements of the 5^{th} instar immature, were: body length; body width; antenna length; forewing-pad length; metatibia length. The adult specimens were maintained in a solution of sodium hydroxide (KOH) at 10% for about 4 hours. This solution dissolved the internal organs and softened the chitinous cuticle. The different organs to describe in adults were detached with the help of two fine needles mounted on wooden handles. The mounting was done under the stereomicroscope. The dissected organs were mounted on an objective slide in polyvinyl drop and covered with an objective slide cover. The mounted slides are dried using light bulb. The illustrations were realized under a

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microscope equipped with a drawing tube mark LEICA DM. 1000. SPSS version 16.0 program was used for statistical analysis. The morphological terminology follows mostly [25,26,27].

3. RESULTS

Fifth instar immature

Colouration: overall body yellowish, half of the distal portion of abdomen completely yellow brown, anterior part of abdomen with four brown bands; dorsal face of thorax with 4 brown spots dorsal part of head covered totally by brown patch; wing pads brown and eyes redish.

Structure: fifth instar immature dorsoventrally flattened (fig.1); head with 3+3 simple setae. Antenna relatively long with ten segments, flagellum with a single rhinarium on the flagellomere 2, 4, 6 and 8. Wing pads sparse of short setae. The mesotibia with single capitate seta; metabasitarsus also with single capitate seta, metatibia with 3 regularly spaced apical spurs on external face and 2 on internal face, metabasitarsus with 2 single apical spur (fig.2). Terminal abdominal margin with 4+4 truncate sectasetae; anus oval, in terminal position; circumanal ring consisting of a single row of pores; additional pore fields developed, convulted, extending much onto abdominal dorsum and consisting of a single row of wax pores (fig.3). Measurements found in table 1.

Adult

Colouration: the overall body brown in male; and yellowish in female but the thorax is slightly darker than abdomen; in male abdominal sclerites brown separated by yellowish intersegmental membrane. Eyes dark reddish grey, ocelli lighter whitish. Antenna brownish but flagellomeres 5 and 6 with dark tip; fagellomeres 9 and 10 completely dark. Forewing surface covered by large brown band which is darker on the distal portion of the wing and on *c+sc* cell, a light white area covered the third surface of *c+sc* cell on the proximal portion and another light white area surrounding half of the Rs vein. All the internal veins of the forewing carrying dark patches except M_{2+3} and R+M+Cu veins; black pteriostigma. Hindwing hyaline with brown veins. Metatibia and metabasitarsus with black spurs.

Structure: head strongly inclined from longitudinal body axis resulting in an arched dorsal outline of the thorax and wider than pronotum; vertex trapezoidal, 1.8 times as wide as long, covered by inconspicuous short setae; genal processes well developed and broad anteriorly slightly incised forming two tubercles on the apex, genal process 1.2 times as wide as long, each genal process carrying 7 long simple setae and inconspicuous short setae (fig.4). Antenna relatively long 1.04-1.15 times as long as head width, fifth flagellomere the longest, single simple subapical rhinarium on flagellomeres 2, 4, 6 and 7, terminal setae long and flagellomere 2, 5, and 6 each with two setae while flagellomere 3, 4, and 7 each with single seta (fig.5). The pronotum of the prothorax and mesonotum of mesothorax less large than the head wide; mesonotum slightly arched while metanotum relatively large. The hind leg with long coxa carrying short and pointed meracanthus; metatibia without conspicuous genual spine, metatibia with 4 regularly spaced apical spurs on internal face and 3 on external face; metabasitarsus with 2 regularly spaced apical spurs; and hind leg ending by an arolium composed of two lobes (fig.6,7). Forewing (fig.8) elongate rounded apically, 2.0-2.1 times as long as wide, 2.5-2.6 times as long as head width; pterostigma long and triangular with broad base and narrow end; covered the 3/4 of Rs vein length; M_{1+2} vein 1.3 times longer than M_{3+4} vein while Cu_{1a} vein 2.3 times

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longer than Cu_{1b} vein; dorsal surface of veins with short hairs; cu_1 cell 0.8 times higher than wide. Hindwing (fig.9) with 2 setae before the costal break and 5 evenly spaced setae after the costal break; vein R+M+Cu splitting into R and M+Cu, vein M+Cu splitting into M and Cu, vein Cu splitting into Cu_{1a} and Cu_{1b}.. Male terminalia (fig.10) proctiger unipartite and tubular; male subgenital plate trapezoidal. Paramere (fig.11) relatively long with broad proximal part and incurved internal margin ending by a sclerotinised hooked pointed apex, paramere sparsely covered with long simple setae. Distal segment of aedeagus relatively long, strongly inflated apically or distal dilatation irregularly oval with truncate apex and sclerotised end tube of ductus ejaculatorius relatively long and thick (fig.12). Female terminalia (fig.13) relatively long with broad proximal part and tapering apical half ending by rounded apex; circumanal ring elongate narrow and incurved consisting of two rows of elongate wax pores; subgenital plate triangular with broad proximal part and rounded apex; ovipositor well developed; valvula lateralis bluntly rounded apically; valvulae dorsalis and ventralis long and straight. Measurements found on table 2.

Etymology: the species name refers to its host plant name *Dialium* sp.

Material examined: Holotype ♂, Cameroon, Centre Region; mountain Kala, latitude: 03°50'121''N; longitude: 11°26'004''E; altitude: 1122 m; 27 iv 2006, *Dialium*sp. (W. Yana and J.L. Tamesse); mounted slides (LZUY).
Paratypes. Cameroon: mountain Kala: 8♂, 14♀, 3 larvae, 27 iv 2006 same collection with holotype (LZUY, NHMB, 70% ethanol); 1♂, 1♀, 2 larvae, 26 v 2006; 19♂, 38♀, 15 larvae, 28 vii 2006; 15♂, 25♀, 28 viii 2006; 3♂, 2♀, 12 larvae, 27 xi 2006; 8♂, 9♀, 2 larvae, 16 ii 2007; 2♂, 6♀, 27 iv 2007. Mountain Nkomilong: 6♀, 5 larvae, 22 iii 2006; 8♂, 9♀, 29 xii 2006; 24♂, 21♀, 1 larva, 29 i 2007; 9♂, 10♀, 19 ii 2007; 2♂, 1♀, 1 larva, 29 iii 2007.

Bio-ecology and damage: the adults and larvae of *Euryconus dialia* (fig.14,a,b,c) are sucking sap of the host. Adults feed on the veins of the leaves while the immature stages feed on the host plant buds and produce white wax filaments. The highest number of adults and larvae was observed from June to September when there is moderated rainfall and from December to March during dry season. Numerical variation of *E. dialia* individuals in the year depends of the phenology of the host plant. The remarkable damage the psyllid induces to its host plant is the necrosis of the leaves especially when the host plant is young (fig.14d).

4. DISCUSSION

According to [28], the genus *Euryconus* is more related with the genera such as *Brinckitia* [29] with type-species *Brinckitia annosa* [29]; *Colophorina* [26] with type-species *Colophorina cassiae* [26]; *Epiacizzia* [30] with type-species *Epiacizzia edentalis* [30]; *Euphaleropsis* [31] with type-species: *Euphaleropsis drypetis* [31]; *Euphalerus* [32] with type-species *Euphalerus nidifex* [32]; *Euryconus* [33] with type-species *Euryconus enderleini* [33]; *Macrocorsa* [34] with type-species: *Macrocorsa congensis* [34]; *Paraphyllura* [35] with type-species *Paraphyllura micheliae* [35]; *Peregrinivena* [36] with type-species *Peregrinivena liangheana* [36]; *Pugionipsylla* [37] with type-species: *Pugionipsylla lysidice* [37]; *Retroacizzia* [29] with type-species *Arytaina mopani* [38]; *Tridencopsylla* [30] with type-species: *Psylla hungtouensis* [39].

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According to [40] *Macrocorsa* genus resemble more to *Colophorina* and *Euryconus* genera. The forewing of the three genera is rhomboidal, pattern consisting of dark spots or patches, absence of genual spine on metatibia. *Euryconus* genus differs from *Colophorina* and *Macrocorsa* genera in that the head in profile, inclined from longitudinal body axis in an angle of about 0-45°; number of apical metatibia spurs 6-8; fifth instar immature with Capitate setae and anus is ventral.

Euryconus dialia differs from *Euryconus* sp. recorded by [25] in Brazil the fact that the forewing pattern is composed of surface covered by large brown band darker on the distal portion of the wing and on *c+sc* cell, a light white area covered the third surface of *c+sc* cell on the proximal portion and another light white area surrounding half of the Rs vein. All the internal veins of the forewing carrying dark patches except M_{2+3} and R+M+Cu veins while in *Euryconus* sp. the forewing pattern without large brown band and bearing several brown spots on the veins and cells. In *Euryconus dialia* genal processes well developed and broad anteriorly slightly incised forming two tubercles on the apex, while in *Euryconus* sp. genal processes well developed and deeply incised forming two tubercles.

5. CONCLUSION

Euryconus dialia **sp. nov**. described in this work is morphologically different from the other species recorded previously elsewhere. The morphological characters specific for *E. dialia* are based on the forewing pattern, genal processes, and the circumanal of the fifth instar immature. Considering the economic importance of the host pant *Dialium* sp. (Fabaceae), is urgent put in place appropriate control method to fight against the pest insect described in this work.

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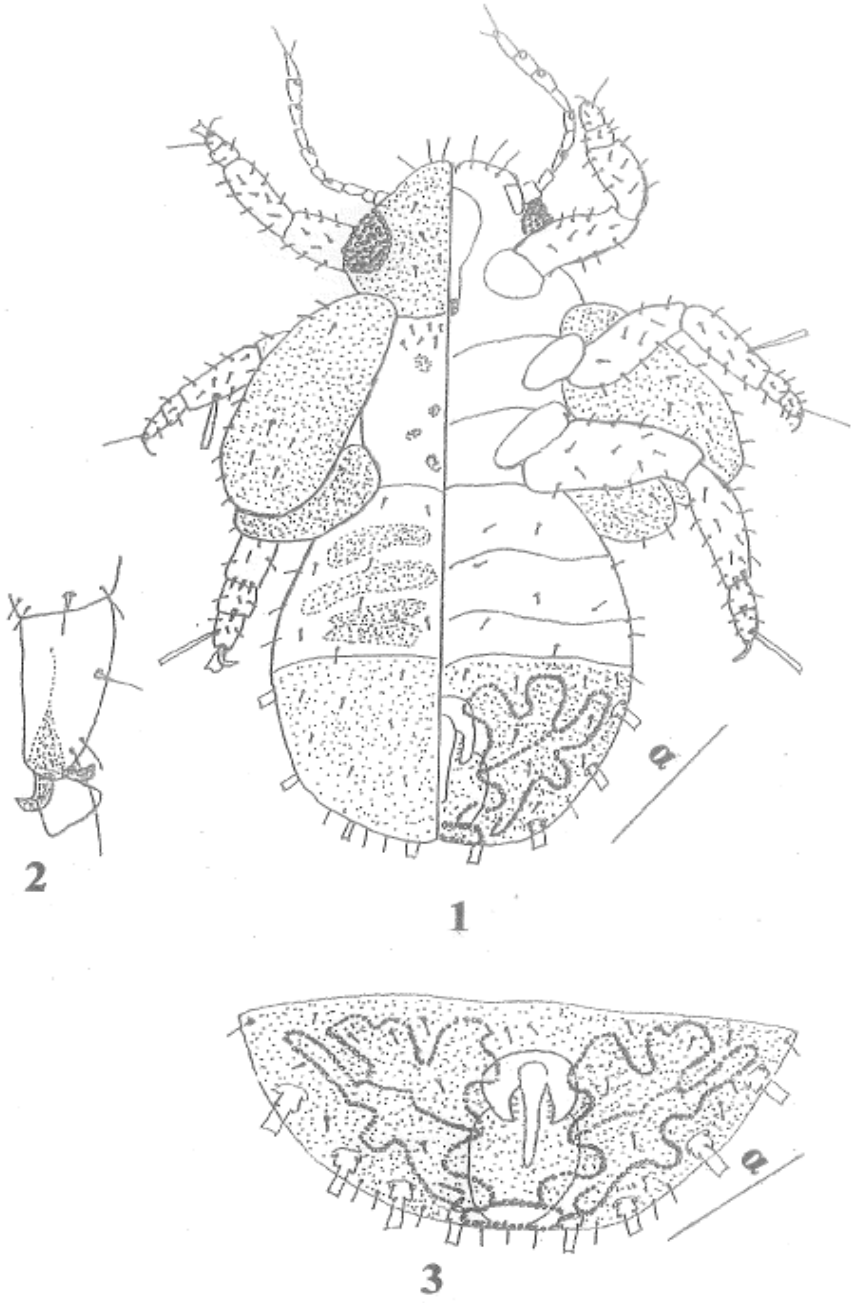

Figures 1-3: *Euryconus dialia* **sp. nov**.: **1**, fifth instar larva, dorsal view (right), ventral view (left); **2**, tarsal apex with claws and arolium; **3**, ventral view of larval apical abdomen. Scale bars: α= 0.24 mm.

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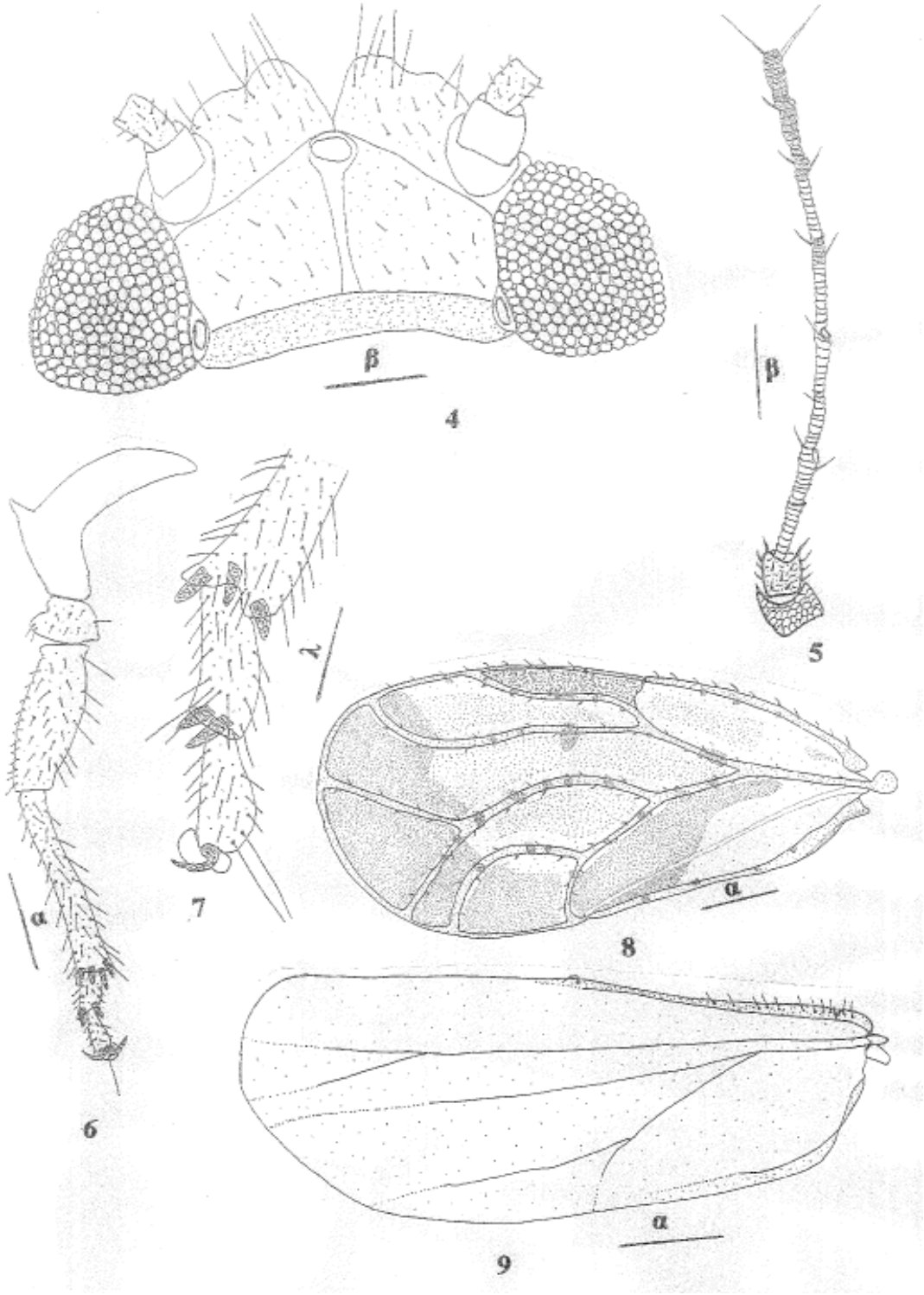

Figures 4-9: *Euryconus dialia* **sp. nov**.: **4**, adult head dorsal view; **5**, adult antenna; **6, 7**, hind leg; **8**, forewing; **9**, hindwing. Scale bars: λ= 0.06 mm; α= 0.24 mm; β = 0.12 mm.

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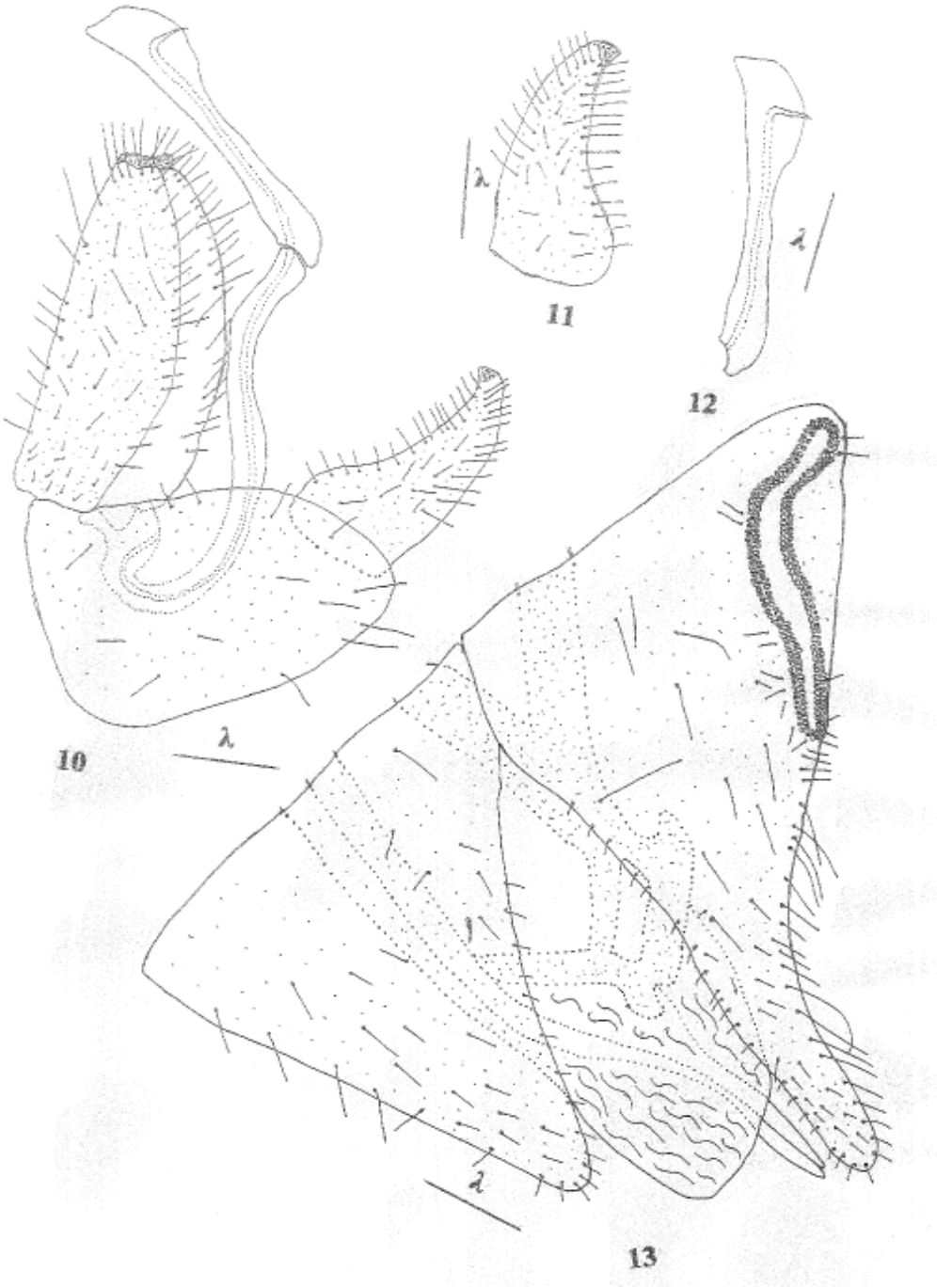

Figures 9-13: *Euryconus dialia* **sp. nov : 10**, male terminalia in profile; **11**, paramere internal face; **12**, distal segment of aedeagus; **13**, female terminalia in profile. Scale bars: λ= 0.06 mm.

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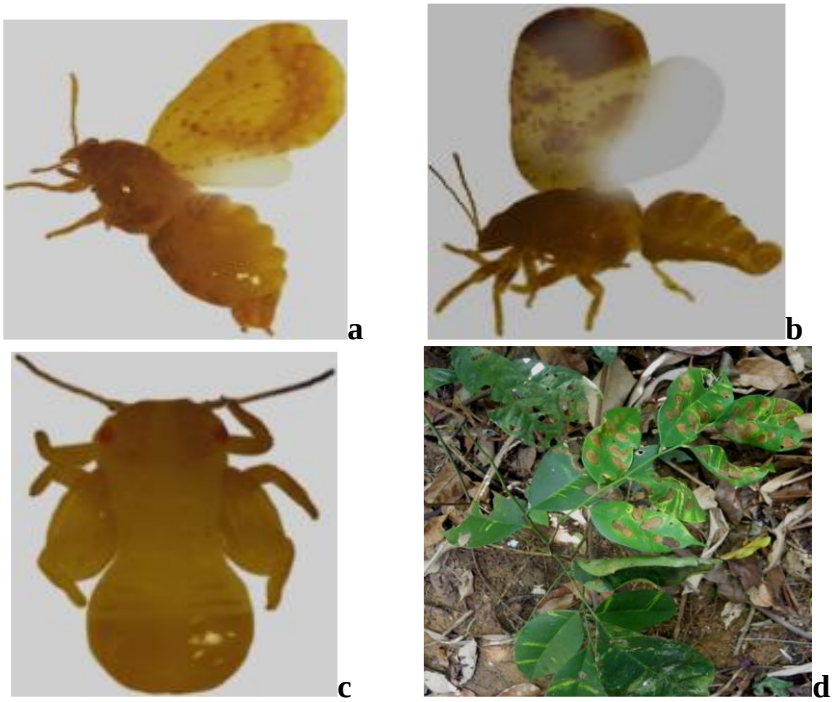

Figure 14: **a**, female of Euryconus dialia; **b**) male of Euryconus dialia; **c**) fifth instar immature of Euryconus dialia; **d**) type of demage.

Table 1: Measurements (mm) of *Eryconus dialia* sp. nov. fifth intar immature (N= number of measured specimens)

Parameters	N	Min	Max	Mean	S.D
BL	35	1.20	1.91	1.56	0.18
BW	35	0.43	0.66	0.59	0.06
AL	35	0.46	0.63	0.56	0.03
MTL	35	0.23	0.31	0.25	0.02
WL	35	0.43	0.63	0.53	0.05

Abbreviations: **BL**= body length; **BW**= body width; **AL**= antenna length; **WL**= forewing-pad length; **MTL**= metatibial length; **Min**= minimum; **Max**= maximum; **S.D**= standard deviation.

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Table 2: Measurements (mm) of *Eryconus dialia* sp. nov adults (N= number of measured specimens)

	Males					Females				
parameters	**N**	**Min**	**Max**	**Mean**	**S.D**	**N**	**Min**	**Max**	**Mean**	**S.D**
BL	35	2.11	3.70	3.27	0.33	52	2.94	4.41	3.95	0.29
BW	35	0.64	1.00	0.77	0.08	52	0.58	1.00	0.85	0.08
HW	35	0.94	1.17	1.06	0.07	52	1.05	1.29	1.19	0.06
AL	35	1.00	1.35	1.22	0.09	52	1.11	1.35	1.24	0.05
F1L	35	0.05	0.12	0.11	0.01	52	0.11	0.11	0.11	0.00
GPL	35	0.05	0.12	0.11	0.01	52	0.05	0.12	0.11	0.01
WL	35	2.17	2.94	2.65	0.16	52	2.82	3.52	3.15	0.17
WW	35	1.05	1.35	1.23	0.07	52	1.17	1.76	1.54	0.11
wL	35	1.76	2.70	2.29	0.20	52	2.35	3.23	2.74	0.17
wW	35	0.58	1.11	0.86	0.10	52	0.82	1.17	1.03	0.09
MTL	35	0.52	0.76	0.69	0.05	52	0.64	0.82	0.74	0.05
MFL	35	0.41	0.58	0.50	0.04	52	0.41	0.64	0.54	0.05
MPL	35	0.17	0.29	0.24	0.03	52				
PL	35	0.29	0.41	0.35	0.37	52				
DAEL	35	0.11	0.23	0.18	0.32	52				
FPL						52	0.47	0.70	0.61	0.04
FSPL						52	0.35	0.52	0.42	0.04

Abbreviations: **BL**= body length; **BW**= body width; **HW**= head width; **AL**= antenna length; **F_1L**= length of first antennal flagellomere; **GPL**= frontal cone length; **WL**= forewing length; **WW**= forewing width; **wL**= hindwing length; **wW**= hindwing width; **MTL**= metatibial length; **MFL**= metafemur length; **MPL**= male proctiger length; **PL**= paramere length; **DAEL**= distal segment of aedeagus length; **FPL**= female proctiger length; **FSPL**= female subgenital plate length; **Min**= minimum; **Max**= maximum; **S.D**= standard deviation..

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