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The new jumping plant-louse especies: *Diaphorina dangoensis* sp. nov. (Hemiptera, Psyllidae) associated with *Strychnos spinosa* (Loganiaceae) in Cameroon

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Key words: Taxonomy, Psyllid, *Diaphorina*, *Strychnos spinosa*, Cameroon

Abstract

Diaphorina is a species-rich genus, native to the tropics and subtropics of the Old World, particularly of more arid regions including Cameroon. The aim of this study was to describe a new species of *Diaphorina* genus associated to traditional medicinal plant in Africa, *Strychnos spinosa* (Loganiaceae). Adult psyllids were captured with a sweep net of 0.5 mm mesh size and a mouth aspirator then preserved dry and slide mounted or in 70% ethanol. The species was identified under stereomicroscope, drawing and measurements were made from slide mounted material. Adult forewing coloration with yellowish hyaline membrane densely covered with irregular dark brown markings maculated; six clear spaces present at the apical margin, one yellowish lunate area at apical margin in each cell, r_1, r_2 and m_1, two small yellowish lunate area in cell Cu_1; one longitudinal yellowish stripe in cell m_2 in the apical part. Inner face of paramere with a small tooth, just below, a cluster of stout setae present, pointed downwards, bearing a other cluster of long setae pointing outward. Subgenital plate of female with basal margin broad and truncated obliquely, tip of ovipositor blunt. Fifth instar larvae with wing-pads bearing small simple setae along the margin; tarsal arolium triangular more wide than long with sligth depression into median part; third segment antenna, bearing three lanceolate setae and five simples setae. Taxonomic studies comparing with species previously described indicated that, *Diaphorina dangoensis* sp. nov. is a new psyllids species of Psyllidae family described from Cameroon.

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Introduction

Diaphorina genus according Burckhardt *et al*., 2021 include in the Diaphorininae, Vondráček, 1951 subfamily based on the morphology of head, forewings and male terminalia, belonging to Psylloidea Superfamily, Latreille, 1807 and Psyllidae Latreille, 1807 Family. It is a species-rich genus, native to the tropics and subtropics of the Old World, particularly of more arid regions with some 80 species described (Capener, 1970; Hollis, 1987; Burckhardt and Mifsud, 1998; Burckhardt *et al*., 2015; Aléné *et al*., 2021; Mveyo Ndankeu *et al*., 2023). *Diaphorina citri* is known to be the most serious pest of citrus ; it is very well known for transmitting the greening disease of citrus (huanglongbing), in the presence of disease pathogens such as *Candidatus* spp. (Bonani *et al*., 2009; de Léon *et al*., 2011). Psyllids are generally very host specific, and related psyllid species tend to develop on related host species (Burckhardt *et al.,* 2014). The species belonging of *Diaphorina* genus are related and developped on at least 18 families of plants, mainly on Anacardiaceae, Asteraceae, Loganiaceae and Apocynaceae in Afrotropical and Madagascan (Hollis, 1987).

Species-groups within *Diaphorina* are difficult to recognize, however, Hollis, 1987 has defined the *amoena* species-group based on presence of the hexagonal cellullar arrangement of the forewing membrane spinules. Aléné *et al*., 2021 has also defined a second putatively monophyletic species-group, the *albomaculata* species-group, based on forewing predominantly light with dark pattern consisting of dots that are partly confluent, cell r_1 with large light area or forewing predominantly dark with a few light areas, cell r_1 entirely dark, at most with a few small light dots.

In Cameroon, the more and more, a few studies have been undertaken on the taxonomy of psyllids, however the number of species described is very weak in comparison to studies leading by Dzokou, 2010; Yana, 2012; Mveyo Ndankeu, 2017; Dayang, 2020 in four geographical zones component our country. Adamawa region is one of the ten administrative regions of Cameroon. It is situated between 6°49'59N latitude and 13°15'0E longitude, altitude level is situated between 1000-2000 m. The climate of this region is tropical soudanian type with two main seasons: dry and rainy season. The temperature is rather fresh at the average of 22°C, rainfall is between 900-1500 mm water/year (Suchel, 1988). The type of vegetation of Adamawa Plateau is Savanna Guinean constituted of shrub and herbaceous (Letouzey, 1986). These shrubs are found in the Guinean and Soudanian Savanna.

To date, three specie has known in Cameroon, one have been redescribed by Aléné *et al*., 2011, like *Diaphorina enderleini* associated with *Vernonia amygdalina* (Asteraceae); *D. pfanderae* by Aléné *et al*., 2021 associated with *Ozoroa pulcherrima* (Anacardiaceae) and *D. strychnos* by Mveyo Ndankeu *et al*., 2023 associated with *Strychnos innocua* (Loganiaceae).

The psyllid species to describe is associated to *Strychnos spinosa* which belonging of Loganiaceae family like several host plants of *Diaphorina* genus. This study will permit to enrich psyllids biodiversity by the identified species in Cameroon and in the world.

Materials and methods

Type locality

Dang, 7°24'42,4"N; 13°32'42,4"E ; 1077 m.

Type material

Holotype: ♂, Dang, 28 June 2011. Paratype: Beka-Hosseré : 2♂, 4♀, 7°20'19,9"N ; 13°33'31,4"E ; 1111 m, 10 July 2015. Bini : 2♀, 28 May 2011; 34♂, 45♀, 5larva, 5-14-24 May 2011; 11♂, 13♀, 11-12-23 June 2011; 7♂, 4♀, 12-21 July 2011 ; 2♀, 9-12 August 2012; 3♂, 2♀, 1 larva, 3 April 2012; 1♀, 4 January 2013; 1♂, 1♀, 20 March 2013.

University campus of Ngaoundere

8♂, 4♀, 26 April 2011; 20♂, 28♀, 23larvae, 3-12-21-31 May 2011; 5♂, 10♀, 9-28 June 2011; 2♂, 2♀, 2

larvae, 2 April 2012. Dang : 21♂, 23♀, 8larvae, 7-17-26 May 2011; 15♂, 20♀ 4-14-25 June 2011; 2♂, 8♀, 5-14-23-30 July 2011; 6♂, 12♀, 12 larvae, 11 August 2011; 1♀, 31 December 2011; 9♂, 13♀ 31 March 2012; 1♂, 1♀, 12larvae, 5 April 2012 ; 6♂, 6♀, 44 larvae, 30 March 2013; 11♂, 14♀, 4-8 April 2013; 3♂, 1♀, 29 July 2013; 7°24'42,4"N ; 13°32'42,4"E ; 1077 m. Mbizoro: 14♂, 13♀, 19-28 May 2011; 8♂, 14♀, 1larva, 7-16-30 June 2011; 3♂, 6♀, 7-19-28 July 2011; 2♀, 6 August 2011; 17♂, 13♀, 2larvae, 29 March 2012; 38♂, 34♀, 7larvae, 4 April 2012 ; 7♂, 5♀, 9-18-28 August 2012; 2 larvae, 30 March 2013; 8♂, 10♀, 1 larva, 4 April 2013, 7°24'25,7"N ; 13°32'55,4"E ; 1069 m

Type series deposit

The type series of *Diaphorina dangoensis* sp. nov. were deposited in the collections of the Laboratory of Zoology, Higher Teacher's Training College, University of Yaounde I, Cameroon (LZUY).

Field survey

The observations and survey took place in various localities of the Adamawa Region, Cameroon, from May 2011 to July 2013. During each survey, host plants were inspected. Adults of psyllid were captured with a mouth aspirator. Nymphs were sampled directly from buds and leaves of the host plant. The host plant was identified at the National Herbarium at Yaoundé (Cameroon) and is deposited in LZUY.

Observations and illustrations

The specimens are preserved dry and slide-mounted or in 70% ethanol and are deposited in Laboratory of Zoology, University of Yaoundé I. The measurements were made from slide-mounted using Leica stereomicroscope. The dissected organs were mounted on an objective slide in polyvinyl drop and covered with an objective slide cover. The drawings were realized under a Leica microscope equipped with a drawing tube.

Terminologies

The terminologies used for the description follow the identification keys of Capener, 1970; Hollis, 1987 and Ossiannilsson, 1992.

Head

Vertex, median suture, genal cones, ocellus, compound eyes; Antenna: Rhinaria, flagellomere; Wing: costal break, pterostigma, vein, spinules, cells; Leg: metacoxa, meracanthus, metatibia, spurs, arolium; Male genitalia: proctiger, paramere, aedeagus, ductus ejaculatorius; Female genitalia: proctiger, subgenital plate, dorsal and ventral valvulae, circumanal ring.

Results

Description of Diaphorina dangoensis sp. nov.

Adults

Coloration (Figs 1a, 1b)

General colour dark brown with yellowish tinge. Head dark brown, genae yellowish brown in second half posterior ; antennae yellowish with segments 1 and 2 brown, tip of segment 8 dark brown, segments 9 and 10 entirely dark brown, terminal bristles whitish. Compound eyes dark orange, ocelli whitish. Thorax dark brown, legs basally dark brown, tibiae yellowish and terminal segment of tarsi brownish. Forewing with yellowish hyaline membrane densely covered except at basal sixth with irregular dark brown markings maculated ; six clear spaces present at the apical margin, one yellowish lunate area at apical margin in each cell, r_1, r_2 and m_1, two small yellowish lunate area in cell Cu_1 ; one longitudinal yellowish stripe on cell m_2 in the apical part. Veins yellowish ; basal portions of $M+Cu_1$, M, R_1, R_S and Cu_{1a} dark brown. Abdomen with broad dark brown transverse bands on tergites, yellowish brown on membrane between segments and on sides, ventrally yellowish brown; terminalia dark brown.

Fig. 1. Species of *Diaphorina dangoensis* sp.n. and host plant, **a:** female adult (x25), **b:** male adult (x25), **c:** *Strychnos spinosa* (Loganiaceae)

Structure

Head (Fig. 2) horizontal, less wider than body or slightly smaller than thorax. Vertex flat, about twice

as broad as long, with a small whitish fovea in each half near posterior margin and closer to each other than to the eyes; sparsely covered with long simple setae; median suture distinct. Genae on the same level as the vertex, contiguous near the base, about as long as wide, diverging slightly outwards, laterally and apically rounded, enough covered with long simple setae on the margins. All three ocelli visible from above, lateral ocelli small, elevated, situated at inner margin of eye; anterior ocelli distinctly larger than the posterior pair at the extreme front.

Antennae (Fig. 3) small and enough thick, little shorter than width of head, antennal flagellum 0.89 times in male and 0.85 times in female as long as head width, ten-segmented, with subapical rhinaria on segments 4, 6, 8 and 9 ; basal segments robust; third longest.

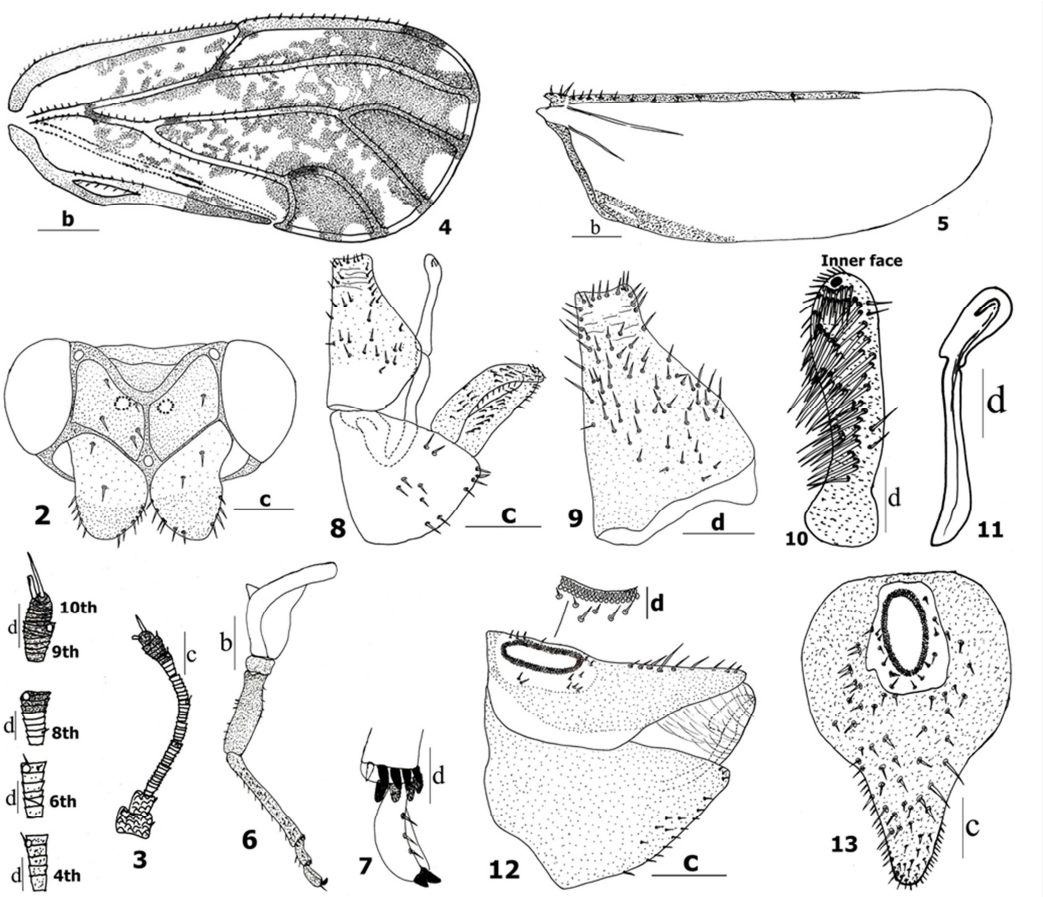

Fig. 2-13. Adult organs of *Diaphorina dangoensis* (2) head ; (3) antenna ; (4) forewing ; (5) hindwing ; (6) metathoracic leg, (7) metatibia apical end ; (8) male genitalia ; (9) male proctiger ; (10) paramere ; (11) aedeagus ; (12) female genitalia ; (13) female proctiger. Scales: a: 2 mm; b: 0.8 mm; c: 0.4 mm; d: 0.2 mm

Antennae bearing a few setae, terminal segment smallest with two unequal apical spine, a small seta present near each rhinaria. Antenna is 8.5 times longer than the length of the first flagellomere in both sexe.

Forewings (Fig. 4) about 1.83-2.16 times longer than wide, large, widest subapically, narrowly rounded at apex, gradually narrowing towards the base; pterostigma long and narrow ; stem R_S straight in the first proximal half and slightly sinuous in the second apical half ; joining above the fork M_{1+2} at apex; marginal cells subequal, first marginal cell smaller and narrower than second; distance between Cu_1 and fork M_{3+4} shorter than between fork M_{1+2} and M_{3+4} long as cubital petiole; stem R more than twice as long as cubital petiole $M+Cu_1$; all veins armed with a

double row of minute setae. Forewing measurements are 2.2-2.8 mm long, 1.0-1.2 mm width in males and 2.2-2.8 mm long and 1.08-1.2 mm width in females.

Hindwing (Fig. 5) long, 0.84-0.85 times as long as forewing, transparent with apical margin rounded; costal margin with three setae before the costal break and nine setae and hamelus after the costal break; subcosta brown, other veins indistinct, except stem $R+M+Cu_1$ without apparent setae. Hindwing measurements are 1.8-2.5 mm long, 0.6-0.8 mm width in males and 2.0-2.4 mm long and 0.68-0.8 mm width in females.

Hindleg (Fig. 6) coxa with meracanthus well-developped, apex pointed ; metatibia (Fig. 7) with a open crown of eight dark sclerotised spurs apically, shared out 4+4, additional a stout non sclerotised pointed setae; basal tarsal segment with two black spines at apex. Metatibia measurements are 0.64-0.8 mm long in males and 0.68-0.8 mm long in females.

Genitalia male (Fig. 8) smaller than abdomen, pubescent with moderately long long setea.

Male proctiger (Fig. 9) 1.5-1.37 times as long as paramere, almost triangular or pyriform, anterior margin straight, broadly rounded in the basal half, broadest in middle; lateral margins narrow towards apex and towards base from middle; apical margin narrow, slightly curved bearing a row of moderately long simple setae; curved on posterior margin in apical part. Male subgenital plate with rounded dorsal margin and few sparse moderately long setae postero-ventrally. Male proctiger measure is 0.40 mm long in the average. Parameres (Fig. 10) about 0.26 mm long, simple and spatulate or lamellar; in lateral view, broadly rounded at apex; on inner face, with a small tooth, just below, a cluster of stout setae present, pointed downwards, bearing a other cluster of long setae pointing outward ; anterior margin straight and posterior margin curved in the third basal part. Distal segment of aedeagus (Fig. 11) slender with its base part slightly expanded, apical dilatation of apical segment elongate with a waist in its basal part, ductus ejaculatorius short and straight. Distal segment of aedeagus measurements are 0.2-0.28 mm long, it is 0.30 times longer than head width.

Female genitalia (Fig. 12) short and conical, broad basally and narrow caudally, smaller than abdomen ; female proctiger (Fig. 13) longer than subgenital plate, female proctiger measurements are 0.52-0.8 mm; it is 0.92 times longer than head width and 0.85 times longer than the subgenital plate ; female proctiger triangular or piriform, basal margin broadly rounded, apical margin roundly pointed with row of long simple setae intermixed with short scattered setae. Circumanal pore ring elongated oval consisting of two rows of pores surrounded by minute setae, the outer row rounded and the inter one oblongate pores. The subgenital plate with basal margin broad and truncated obliquely, apical margin rounded and bordered by row of scattered short simple setae. Subgenital plate measurements are 0.4-0.6 mm long. Dorsal and ventral valvulae slightly curved ventrally, tip of ovipositor blunt, lateral valve with a rounded swelling. Measurements and ratios are found in Table 1.

Fifth instar larva

Colouration

The fifth instar larva is overall brown to dark brown with reddish to orange compound eyes. The outer margins of wing-pads, the third segment of antenna, the spots on dorsal side of head and thorax, dorsal sclerites and also caudal plate brown to dark brown. The spaces among the spots and dorsal sclerites, the first two segments of antenna and also the rest of wing-pads whitish to yellowish. There are seven pairs of dark spots on the dorsal side of the thorax and four pairs of dark sclerites on the dorsal side of the abdomen.

Structure

The average measures of fifth instar larva (Table 2) is 1.80 mm long and 0.91 mm wide; it is 1.97 times longer than wide. Body (Fig. 14) flattened dorso-ventrally, quite large, broadly oval, the continuity is broken near the head and the base of abdomen.

Table 1. Measurements (mm) and ratios of *Diaphorina dangoensis* sp.n adults species (N= number of measured specimens)

Parameters	Males				Females			
	N	Min	Max	Average	N	Min	Max	Average
BL	40	2.4	3.6	3.07	40	2.8	4.0	3.42
BW	40	0.84	1.0	0.94	40	0.88	1.08	0.98
HW	40	0.68	0.80	0.76	40	0.8	0.8	0.8
AL	40	0.64	0.80	0.68	40	0.64	0.72	0.68
F_1L	40	0.08	0.08	0.08	40	0.08	0.08	0.08
WL	40	2.2	2.8	2.44	40	2.2	2.8	2.53
WW	40	1.0	1.2	1.13	40	1.08	1.2	1.17
wL	40	1.8	2.52	2.08	40	2.0	2.4	2.14
wW	40	0.6	0.8	0.76	40	0.68	0.8	0.78
MTL	40	0.64	0.8	0.73	40	0.68	0.8	0.74
MFL	40	0.36	0.52	0,44	40	0.4	0.8	0.50
MPL	40	0.36	0.44	0.40	/	/	/	/
PL	40	0.24	0.32	0.26	/	/	/	/
FPL	/	/	/	/	40	0.52	0.8	0.66
PSPL	/	/	/	/	40	0.4	0.6	0.47
DAL	40	0.2	0.28	0.23	/	/	/	/
BL/HW	40	3.52	4.5	4.04	40	3.5	5.0	4.27
BL/BW	40	2.85	3.6	3.26	40	3.18	3.7	3.48
AL/HW	40	0.94	1.0	0.89	40	0.8	0.9	0.85
F_1/HW	40	0.12	0.1	0.11	40	0.1	0.1	0.1
AL/F_1	40	8.0	10.0	8.5	40	8.0	9.0	8.5
WL/HW	40	3.23	3.5	3.21	40	2.75	3.5	3.16
WL/WW	40	2.2	2.33	2.11	40	2.03	2.33	2.16
WL/wL	40	1.22	1.11	1.17	40	1.1	1.16	1.18
MTL/HW	40	0.94	1.0	0.96	40	0.85	1.0	0.92
PL/HW	40	0.35	0.4	0.34	/	/	/	/
FPL/FSPL	/	/	/	/	40	1.3	1.33	1.4
LR	40	1,0	1,6	1,24	40	1,08	1,4	1,34
LM+Cu_1	40	0,48	0,68	0,58	40	0,52	0,8	0,61
LM_{1+2}	40	1,0	1,4	1,19	40	1,08	1,4	1,26
LM_{3+4}	40	0,72	1,2	1,06	40	1,0	1,2	1,14
LPt	40	0,71	0,85	0,78	40	0,71	0,85	0,78
m_1	40	0,6	0,8	0,72	40	0,68	0,80	0,74

Adult legend: BL, body length; BW, body width; HW, head width; AL, antenna length; F1L, length of first antennal flagellomere; 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; DAL, length of distal segment of aedeagus; FPL, female proctiger length; FSPL, female subgenital plate length; LR, R vein length of forewing; LM1+2, M1+2 vein length of forewing; LM3+4, M3+4 vein length of forewing; LPt; pterostigma length; m1, m1 cell length of forewing.

Table 2. Measurements (mm) and ratio of *Diaphorina dangoensis* sp.n fifth instar larva (N= number of measured specimens)

Parameters	N	Minimum	Maximum	Average
BL	14	1.54	2.09	1.80
BW	14	0.76	1.0	0.91
AL	14	0.36	0.45	0.39
MTL	14	0.18	0.27	0.20
WL	14	0.81	1.09	0.93
BL/BW	14	2.02	2.09	1.97

Fifth instar larva legend: BL, body length; BW, body width; AL, antenna length; WL, forewing-pad length; MTL, metatibial length.

Antenna (Fig. 15) small, about 0,39 mm long, three-segmented, the first two basal segments distinct, quite short ; third segment longest, not differenciated into segments, bearing three lanceolate setae, bearing also five simples setae and four rhinaria, the three first basal rhinaria guarded by three tick lanceolate

setae ; apex with two unequal thick setae, a long subapical seta and short apical seta.

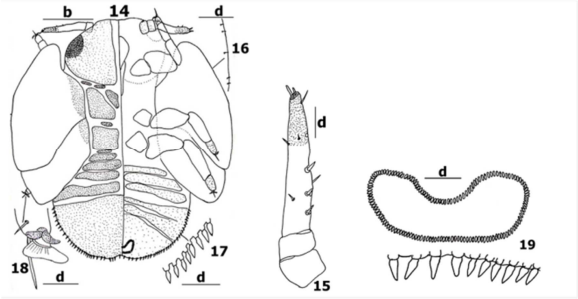

Fig. 14-19. Fifth larval stage organs of *Diaphorina dangoensis*. (14) Fifth larval stage, left dorsal view, right ventral view; (15) antenna; (16) forewing pad; (17) margin of caudal plate; (18) tarsal arolium; (19) circumanal pore ring. Scales: b: 0.8 mm; d: 0.2 mm

Wing-pads large, the humeral angle extending forward up to the anterior margin of eyes. Wing-pads (Fig. 16) bears small, simple setae along the margin. The posterior abdominal plate (Fig. 17) or caudal plate black near the border and bearing a marginal row of lanceolate setae.

Tarsal arolium (Fig. 18) triangular or like fish-tail with sligth depression into anterior median part. Anus (Fig. 19) ventral, with a great depression into anterior part, surrounding by the outer circumanal pore ring consisting of a single row of elongated pores.

Etymology

Derived from the University city of Dang in the Adamawa region of Cameroon, referring to the type locality in which this described species of psyllids has been the most collected.

Host plant

Strychnos spinosa Del. (Loganiaceae) (Fig. 1c).

Strychnos spinosa named “Monkey ball tree” have some uses according to Bonnet *et al.*, 2008: food with the pulp of edible fruits; in traditional pharmacopoeia, the roots used against gastritis, colic, fever and sexual asthenia; the leaves used like analgesic; the pulp of fruits used against convulsion and it also used like emetic (Adjanohoun *et al.*, 1986, 1989; Burkill, 1995; Nacoulma-Ouédraogo, 1996; Ouaba *et al.*, 2006).

Distribution

Strychnos spinosa is distributed in the Sudano-Guinean and Guinean savannas from Senegal to Cameroon, in tropical Africa.

Biology

Diaphorina dangoensis sp.n. provokes on its host plant distorsion of the buds and yellowing of the leaves. The larvae live on the underside of the young leaves of the buds and the adults feed on both sides of the leaves.

Discussion

Diaphorina dangoensis sp. nov. newly described shares the same host plant genus, *Strychnos* belonging to Loganiaceae family like some species collected by some authors : *D. amoena* Capener, in 1970 (Capener, 1970) from South Africa on *Strychnos innocua*; *D. nigripennis* on *S. usambarensis*, in 1974 (Hollis, 1987) from Kenya; *D. flavipennis* in 1974 (Hollis, 1987) from Tanzania on *S. usambarensis*; *D. fabulosa* in 1965 (Hollis, 1987) from South Africa on *S. innocua*; *D. truncata* in 1935 (Mathur, 1975) from India on *S. nux-vomica* and *D. strychnos* in 2023 (Mveyo Ndankeu *et al.*, 2023) from Cameroon on *S. innocua*. Of all the above species mentioned, none is close to *D. dangoensis* sp. nov. in forewing maculation and membrane spinules arrangement, except *D. strychnos* (Mveyo Ndankeu *et al.*, 2023).

Diaphorina dangoensis sp. nov. is rather close in forewing shape and maculation to *D. petteyi*, Capener, 1970 on *Polygala myrtifolia* (Polygalaceae) ; *D. loranthi*, Capener, 1973 on *Loranthus zeyheri* (Lorantidaea) ; *D. clutiae*, Capener, 1970 on *Clutia natalensis* (Euphorbiaceae) ; *D. communis*, Mathur, 1975 on *Murraya koenigii* and *M. paniculata* (Rutaceae) ; *D. caliginosa*, Malenevosky & Burckhardt, 2014 on *Carissa spinarum* (Apocynaceae) and *D. strychnos*, Mveyo Ndankeu *et al.*, 2023 on *Strychnos innocua* (Loganiaceae).

In adults of *Diaphorina dangoensis* sp. nov., forewing coloration with yellowish hyaline membrane densely covered except at basal sixth with irregular dark brown markings maculated; six clear spaces present at the apical margin, one yellowish lunate area at apical margin in each cell, r_1, r_2 and m_1, two small yellowish lunate area in cell Cu_1; one longitudinal yellowish stripe in cell m_2 in the apical part. Veins yellowish; basal portions of M+Cu_1, M, R_1, Rs and Cu_{1a} dark brown. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with forewing membrane opaque, off-white, covered from base to apex with many sharply contrasting dark brown irregular patches, leaving small light semioval patches medially in cells r_2, m_1, m_2 and cu_1 at wing margin. It also differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with forewing with six clear spaces present at the apical margin, without longitudinal yellowish stripe in cell m_2 in the apical part. In *D. petteyi* (Capener, 1970), forewing is rather whitishly opaque with a dense pattern of dark bistre markings; maculation of the rest of the wing is more dense and there is a small clear area at the tip above the termination of Rs. It equally differs from *D. loranthi* (Capener, 1973) with forewing without longitudinal yellowish stripe in cell m_2 in the apical part, rather a clear small lunate area at apical margin in cell m_2 and without basal portions Cu_{1a} dark brown. It also differs from *D. clutiae* (Capener, 1970) with maculation sparse, usually sepia but occasionally very pale; five clear spaces present at the apical margin, just three lunate area at apical margin in each cell Cu_1, m_1 and m_2, one transverse clear stripe in both cell r_1 and r_2 in the apical part; and also differs from *D. communis* (Mathur, 1975) with forewing sub-opaque densely maculated with smoky black maculae and irregular clear space; seven clear spaces present at the margin of the wing: 4 spots, one in each of the four cells, 2 spots between Cu_1 and Cu_2 and 1 spot near clavus.

Forewing in *Diaphorina dangoensis* sp. nov., large, widest subapically, not elongate, about 1.83-2.16 times longer than wide, rounded at apex, gradually narrowing towards the base; whereas in *D. caliginosa* (Malenevosky and Burckhardt, 2014), it elongate, relatively narrow, about 2.47-2.60 times longer than wide, broadest in apical quarter, broadly and almost symmetrically rounded apically. It differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with forewing oval, constricted at the proximal part, enlarged and rounded at the apex, 2.4 times longer than wide; it also differs from *D. petteyi* (Capener, 1970), narrowing to base, about 2.6 times longer than wide; it equaly differs from *D. loranthi* (Capener, 1973) with forewing narrow at base and slightly obliquely rounded apically, about 2,5 times longer than wide. It is closed to *D. communis* (Mathur, 1975) with forewing evenly widest subapically, narrow at base and two and a half times as long as wide.

Hindwing in *Diaphorina dangoensis* sp. nov., transparent with apical margin rounded; costal margin with three setae before the costal break and nine setae (3+9) and hamelus after the costal break; subcosta brown, other veins indistinct, except stem R+M+Cu_1 without apparent setae; whereas in *D. caliginosa* (Malenevosky & Burckhardt, 2014), costal margin with 2 + 8 ungrouped setae basally and 1 seta apically, presence of apical veins basally dark brown. It differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023), in which hingwing bearing four setae before the costal break and six plus five setae and hamelus after the costal break (4+6+5+1), other veins distinct; it also differs from *D. loranthi* (Capener, 1973) with other veins distinct and it also differs from *D. communis* (Mathur, 1975), costal margin armed with 7 or 8 simple and 4 to 6 hooked setae, all veins distinct.

Metatibia in *Diaphorina dangoensis* sp. nov. with a open crown of 8 dark sclerotised spurs apically, shared out 4+4, additional a stout non sclerotised pointed setae; basal tarsal segment with two black spines at apex. It differs from other species with absence of additional stout non sclerotised pointed setae; it also from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) and *D. communis* (Mathur, 1975) with metatibia bearing apically 7 spurs (3 external and 4 internal). It is closed to *D. caliginosa*, *D. loranthi* (Capener, 1973) and *D. clutiae* (Capener, 1970) with 8 black apical spines.

Male proctiger in *Diaphorina dangoensis* sp. nov., 1.5-1.37 times as long as paramere, almost triangular or pyriform, anterior margin straight, broadly rounded in the basal half, broadest in middle; apical margin narrow, slightly curved bearing a row of moderately long simple setae; curved on posterior margin in apical part. Male subgenital plate with rounded dorsal margin and few sparse moderately long setae postero-ventrally. It is closed to *D. caliginosa* (Malenevosky and Burckhardt, 2014) and *D. strychnos* (Mveyo Ndankeu *et al.*, 2023), with proctiger large, apically broadly rounded posterior lobes ; but it differs to *D. caliginosa*, with male subgenital plate with slightly sinuate dorsal margin. It differs from *D. loranthi* (Capener, 1973) with proctiger with apical margin truncated. It also differs from *D. clutiae* (Capener, 1970) with proctiger saddle-shaped, tip blunt, lateral margins posteriorly curved with short upwardly directed hairs; ventral plate rather somewhat abruptly upwardly curved at extremity. And it also differs from *D. communis* (Mathur, 1975) with proctiger with lateral lobes small, broadly rounded in the basal half.

Male paramere in *Diaphorina dangoensis* sp. nov., simple and spatulate or lamellar, on inner face, with a small tooth, just below, a cluster of stout setae present, pointed downwards, bearing a other cluster of long setae pointing outward ; anterior margin straight and posterior margin curved in the third basal part. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with paramere, in lateral view, nearly parallel-sided, straight; inner face covered with numerous long unsclerotised setae non pointing outward. It also differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) generally tubular with an apical end narrowed and curved in its apical third, its medial part is enlarged and there is a small depression in its proximal part on the external margin. It also differs from *D. clutiae* (Capener, 1970) with paramere flat and finger-like, slightly wider in middle, inner and outer surfaces covered with downwardly directed hairs. It is closed to *D. communis* (Mathur, 1975) with a small, strong, black point at apex, setae on the mesal surface longer and thicker than others and directed downwards, basal region with a strong projection pointing anteriorly ; however it differs with presence of a cluster of stout setae pointed rather outward.

Distal segment of aedeagus in *Diaphorina dangoensis* sp. nov., is slender with its base part slightly expanded, apical dilatation of apical segment elongate with a waist in its basal part, ductus ejaculatorius short and straight. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with obovate apical dilatation, ductus ejaculatorius short and sinuate. It also differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with distal portion curved in apex part and inner margin is slightly sinusoidal ; in *D. loranthi* (Capener, 1973), aedeagus with rather shaft somewhat sinuate. It is closed to *D. clutiae* (Capener, 1970) and *D. communis* (Mathur, 1975) with aedeagus with club-like termination.

Female proctiger in *Diaphorina dangoensis* sp. nov., is triangular or piriform, basal margin broadly rounded, apical margin roundly pointed with row of long simple setae intermixed with short scattered setae. Circumanal pore ring elongated oval consisting of two rows of pores surrounded by minute setae, the outer row rounded and the inter one oblongate pores. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with proctiger, in lateral view, with dorsal margin slightly concave, apex narrowly rounded; circumanal pore ring elliptic; it also differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with circumanal with two rows of rounded pores and bearing densely long simples and short lanceolate setae; it also differs from *D. petteyi* (Capener, 1970) with proctiger with a shallow medial swelling caudad of anal ring, with scattered short and some rather long hairs on apical half. And it also differs from *D. clutiae* (Capener, 1970) with proctiger with tip blunt and rounded, with scattered long hairs and densely covered with micro-setae on apical third; anal ring oval and rather large.

Female subgenital plate in *Diaphorina dangoensis* sp. nov., with basal margin broad and truncated

obliquely, apical margin rounded and bordered by row of scattered short simple setae. Dorsal and ventral valvulae slightly curved ventrally, tip of ovipositor blunt, lateral valve with a rounded swelling. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) which with distinct ventral hump medially, in apical half straight and narrowing to pointed apex. It differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with subgenital plate with a transverse groove consisting of two lobes, a proximal large lobe and a distal pointed lobe. It also differs from *D. petteyi* (Capener, 1970) with subgenital plate almost horizontal and only very slightly swollen in middle ; whereas in *D. loranthi* (Capener, 1973), presence of conspicuous rounded swelling in the middle. It also differs from *D. clutiae* (Capener, 1970) with subgenital plate very slightly swollen beyond base and gently upwardly curved to tip ; and it also differs from *D. communis* (Mathur, 1975) with subgenital plate with the posterior half bent upward and acutely pointed at apex; ovipositor acutely pointed.

For the fifth instar larvae. In *Diaphorina dangoensis* sp. nov., body flattened dorso-ventrally, quite large, broadly oval, the continuity is broken near the head and the base of abdomen ; it is 1.97 times longer than wide. Wing-pads bears small, simple setae along the margin. It differs from *D. caliginosa* (Malenevosky & Burckhardt, 2014), *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) and *D. petteyi* (Capener, 1970) with margins of wing pads lacking any visible setae ; and it also differs from *D. communis* (Mathur, 1975) with derm of wing pads with minute points.

The margin of caudal plate in *Diaphorina dangoensis* sp. nov. bearing a marginal row of lanceolate setae (61 to 63). It differs from others species with number of lanceolate setae : 120 relatively long in *D. caliginosa* (Malenevosky and Burckhardt, 2014), 70 to 72 in *D. strychnos* (Mveyo Ndankeu *et al.*, 2023), continuous series to 45 to 50 lanceolate setae in *D. communis* (Mathur, 1975).

In *Diaphorina dangoensis* sp. nov., antenna three-segmented, with third segment longest, not differenciated into segments, bearing three lanceolate setae, bearing also five simples setae and four rhinaria, the three first basal rhinaria guarded by three tick lanceolate setae; apex with two unequal thick setae, a long subapical seta and short apical seta. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with apical segment posteriorly with only three pointed lanceolate setae; it also differs from *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with apical segment posteriorly with five pointed lanceolate setae. It is closed to *D. communis* (Mathur, 1975) with third segment bearing three lanceolate setae and a few simple setae.

Tarsal arolium in *Diaphorina dangoensis* sp. nov., is triangular more wide than long with sligth depression into anterior median part. It differs slightly from *D. caliginosa* (Malenevosky and Burckhardt, 2014), *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) and *D. communis* (Mathur, 1975) with broadly triangular. Anus ventral in *Diaphorina dangoensis* sp. nov., with a great depression into anterior part, surrounding by the outer circumanal pore ring consisting of a single row of elongated pores. It differs from *D. caliginosa* (Malenevosky and Burckhardt, 2014) with outer circumanal ring also elongate with lateral sides slightly bent forwards, consisting of single row of pores, the inner pore ring consisting of two rows of minute pores; it also differs from *D. petteyi* (Capener, 1970) with circumanal ring rather broad, composed of four rows of minute pores ; it equally differs from *D. clutiae* (Capener, 1970) with circumanal ring somewhat banana-shaped and it also differs from *D. communis* (Mathur, 1975) with the outer circumanal pore ring consisting of a sing row of slit-like pores, the inner ring with an irregular row of small faint pores. It is closed to *D. strychnos* (Mveyo Ndankeu *et al.*, 2023) with a single row of elongate pores, and the anterior margin with a deep depression.

Conclusion

Diaphorina dangoensis sp. nov. newley described is associated with *Strychnos spinosa* belonging do

Loganiaceae host plant family. It is morphological different from others species of *Diaphorina* genus. Forewing with yellowish hyaline membrane densely covered except at basal sixth with irregular brown markings maculated with fine dark brown spots, one yellowish lunate area at apical margin in each cell, r_1, r_2 and m_1, two small yellowish lunate area in cell Cu_1 ; one longitudinal yellowish stripe on cell m_2 in the apical part. Male proctiger pyriform, broadly rounded in the basal half, broadest in middle; lateral margins narrow towards apex and towards base from middle; apical margin narrow, slightly curved bearing a row of moderately long simple setae. Parameres in lateral view, broadly rounded at apex; on inner face, with a small tooth, just below, a cluster of stout setae present, pointed downwards, bearing a other cluster of long setae pointing outward. The subgenital plate with basal margin broad and truncated obliquely, apical margin rounded and bordered by row of scattered short simple setae ; tip of ovipositor blunt, lateral valve with a rounded swelling.

Fifth instar larvae of *Diaphorina dangoensis*. Wing-pads bears small, simple setae along the margin ; the caudal plate bearing a marginal row of lanceolate setae ; antenna small, three-segmented, third segment longest, not differenciated into segments, bearing five simples setae and four rhinaria, the three first basal rhinaria guarded by three tick lanceolate setae ; apex with two unequal thick setae, a long subapical seta and short apical seta. Tarsal arolium triangular with sligth depression into anterior median part. Anus ventral, with a great depression into anterior part, surrounding by the outer circumanal pore ring consisting of a single row of elongated pores.

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