

New taxonomic data for *Phanocloidea lobulatipes*, the largest stick insect from French Guiana (Phasmatodea, Occidophasmata, Diapheromeridae)

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- Abstract. The egg and the adult female of *Phanocloidea lobulatipes* Conle, Hennemann, Bellanger, Lelong, Jourdan & Valero, 2020, from French Guiana, are described and illustrated for the first time. The size difference between wild and culture specimens is discussed.
- Résumé. Nouvelles données taxonomiques pour *Phanocloidea lobulatipes*, le plus grand phasme de Guyane française (Phasmatodea, Occidophasmata, Diapheromeridae). L'œuf et la femelle de *Phanocloidea lobulatipes* Conle, Hennemann, Bellanger, Lelong, Jourdan & Valero, 2020, de Guyane française, sont décrits et illustrés pour la première fois. La différence de taille entre les spécimens d'élevage et sauvages est discutée.

Keywords. - Taxonomy, egg, behaviour, breeding.

Despite their large body size (200.0-236.6 mm), which should make them relatively easy to spot in nature, stick insects of the genus Phanocloidea Zompro, 2001, from French Guiana remained poorly known until recently. However, Phanocloidea muricata (Burmeister, 1838) is well-known and one of the most abundant Phasmatodea in the region. This species was described several times throughout the 19th and 20th centuries under various names, many of which were recently synonymized (HENNEMANN & CONLE, 2024: 238). A second species, originally named Bacteria crassipes Chopard, 1911, was later found to be conspecific with *Phanocloidea pallidenotata* (Redtenbacher, 1908) (CONLE et al., 2020: 12), with its previously unknown female and egg described even more recently (HENNEMANN & CONLE, 2024: 255). Two additional species were described in 2020: Phanocloidea procera (Conle, Hennemann, Bellanger, Lelong, Jourdan & Valero, 2020), initially placed in the genus *Phanocles* Stål, 1875, before being transferred to Phanocloidea by HENNEMANN & CONLE (2024: 239), and Phanocloidea lobulatipes Conle, Hennemann, Bellanger, Lelong, Jourdan & Valero, 2020. In summary, most known species – P. muricata, P. procera and P. pallidenotata – have been fully described, i.e. females, males and eggs. However, the female and egg of P. lobulatipes remained undescribed until now.

In November 2022, during several sampling campaigns and Phasmatodea inventory surveys in French Guiana (including one night in the municipality of Saint-Élie) the first author along with colleagues Emma Loeb and Nicolas Hausherr collected an adult female tentatively identified to *Phanocloidea lobulatipes*, found approximately 2.5 meters above ground on an unidentified plant. To confirm its identity, the specimen was subsequently bred in situ by Toni Jourdan to obtain eggs and then by Yannick Bellanger, Maxime Ortiz and Mehdi Bouhlal, for the second generation, to obtain males. Following confirmation of the species, we proceeded with the first formal description of the adult female and egg of *Phanocloidea lobulatipes*.

#### **M**ATERIAL AND METHODS

The specimen was collected at night using a LED flashlight and was kept alive in a mosquito net cage to observe behaviour and obtain eggs. It was then killed with ethyl acetate, eviscerated and cleaned of thoracic and abdominal contents, which were replaced with a mixture of boric acid and talc (50/50) and cigar-shaped cotton before being dried for transport.

Yannick Bellanger stored eggs in a small plastic box on wet peat at a temperature of 20°C. Freshly hatched nymphs were kept in a small cage with one side of mosquito net and provided with a mix of plants until a suitable substitute food plant was identified. Once juveniles began growing, they were moved into a larger cage, where they were maintained at temperatures ranging from 18 to 25°C. Preserving and collecting methods follow JOURDAN *et al.* (2014: 488). The dates written on the specimen labels correspond to the dates when specimens were killed and naturalised. Colours are mostly described from live specimens, as drying can significantly alter coloration.

Measurements (in millimetres) were taken with a precision of  $\pm$  0.1 mm for the insects, and  $\pm$  0.01 mm for the eggs using a caliper. Adults and eggs were examined under Novex AP-8 and Wild Heerbrugg MB binoculars. Photographs of adult specimens were taken with a Nikon D5200 equipped with a AF Micro Nikkor 40 mm lens, 1:2.8G, while the eggs were photographed with a Sony A7RIII, extension tubes, Raynox DCR 150 and a Mitutoyo M-Plan APO 10× lens, as well as a DIY diffuser and three Godox flashes V350. Focus stacking was performed with an automatic rail (cool rail from MIKZZ) and Helicon Focus 8 software.

The classification follows the recent framework proposed by SIMON *et al.* (2019). The terminology of the egg capsule follows the seminal work of CLARK-SELLICK (1997).

Abbreviations used. – MNHN, Muséum national d'Histoire naturelle, Paris, France; ASPER, collection of ASPER members (PL: housed in Philippe Lelong's collection, Sainte-Foy-d'Aigrefeuille, France; TJ: housed in Toni Jourdan's collection, Crêts-en-Belledonne, France; YB: housed in Yannick Bellanger's collection, Trédias, France; PAO: housed in Paul-Antoine Ouvry's collection, Vibeuf, France); coll. OC, Oskar Conle's collection, Duisburg, Germany; coll. TR, Thibault Rosant's collection, Saint-Laurent-du-Maroni, Guyane, France.

#### RESULTS

Order **Phasmatodea** Jacobson & Bianchi, 1902 Clade **Neophasmatodea** Engel *et al.*, 2016 Clade **Occidophasmata** Simon *et al.*, 2019 Family **Diapheromeridae** Kirby, 1904 Subfamily **Diapheromerinae** Kirby, 1904

#### Genus Phanocloidea Zompro, 2001

*Type-species. – Bacteria nodulosa* Redtenbacher, 1908 (syn. *Phasma muricata* Burmeister, 1838), by original designation.

Phanocloidea lobulatipes Conle, Hennemann, Bellanger, Lelong, Jourdan & Valero, 2020 (fig. 1-15, table I-II)

Phanocloidea lobulatipes Conle et al., 2020: 13 ; HENNEMANN & CONLE, 2024: 237.

*Type material.* – HOLOTYPE: *S*, "MNHN-EO-PHAS563; 15; PK37, 22.VII.93, A3S4 N°3, P.E. Roubaud det.; proche de *Phanocloidea pallidenotata S*, det. E. Delfosse 10/05; *Phanocloidea lobulatipes*, Conle *et al.* n. sp., holotype, det. Hennemann *et al.* II.2017" [MNHN].

PARATYPES : 1 ♀ (nymph), "Guyane, montagne de Kaw, 5–12.VIII.92, Roubaud, Auvray, Rarchaert rec." [MNHN]; 1 ♂, "Französisch Guyana: commune de Roura, montagne des Chevaux, RN2 PK22, 4°44′56″N–52°26′28″W, 75 m, S.E.A.G., leg. Stéphane Brûlé 13.09.2014″ [coll. OC, No. 0342-1]; 1 ♂, "Französisch Guyana: commune de Roura, montagne des Chevaux, RN2 PK22, 4°44′56″N–52°26′28″W, 75 m, S.E.A.G., leg. Stéphane Brûlé 21.08.2014″ [coll. OC, No. 0342-2]; 1 ♂, "Août 2005 à vue, Vige Esperance, St Laurent du Maroni, Th. Rosant (Guy. Fr.)″ [coll. TR, No. 3960]; 1 ♂ (nymph), "GUYKAW16-066, rec. & det. P. Lelong & Y. Bellanger" [coll. ASPER]; 1 nymph, "GUYKAW16-066, 12.XI.2016, Guyane fr., route de Kaw, Camp Caïman, PK22 depuis Roura" [MNHN].

*Studied material.* – 1  $\bigcirc$ , GUY22-020, Guyane, Saint-Elie, 5.2883354 , -53.05519, 3.XII.2022, rec. Jourdan T., Hausherr N. & Loeb E. [MNHN]; 10 eggs [ASPER-YB] and 3 eggs [ASPER-TJ] from wild female GUY22-020, Saint-Élie, 3.XII.2022, rec. Jourdan T., Hausherr N. & Loeb E; 1  $\bigcirc$ , GUY22-021, Guyane, Saint Elie, élevage F1 Y. Bellanger, 22.VII.2024 [ASPER-YB]; 2  $\bigcirc$ , GUY22-022 and -023 *idem*, 6.IX.2024 [ASPER-YB]; 1  $\bigcirc$ , GUY22-025, *idem*, 15.IX.2024 [ASPER-PL]; 1  $\bigcirc$ , GUY22-029, *idem*, 22.X.2024 [coll. TR, No. 22856]; 1  $\bigcirc$ , GUY22-030, *idem*, 24.VIII.2024 [ASPER-PAO]; 15 eggs, Guyane, Saint-Élie, élevage F1 Y. Bellanger, VIII.2024 [ASPER-YB]; 3  $\bigcirc$ , GUY22-026, -27 & -28, Guyane, Saint-Élie, élevage F1 M. Ortiz, 12.VI.2024 [ASPER-TJ].

**Diagnosis.** – The female of *Phanocloidea lobulatipes* is easily distinguished from all other stick insects known from French Guiana by its very large size, with a body length exceeding 200.0 mm and reaching an overall length of almost 330.0 mm with the anterior legs included. It is easily separated from other large Guianese stick insects and from all known species of the genus *Phanocloidea*, by its numerous lobes on the legs associated with the presence of hypertrophied praeopercular organ as a pair of very large, flattened and lobed excrescences on the abdominal sternum 7. This is the largest known praeopercular structure of all *Phanocloidea* species and perhaps of the whole of Phasmatodea (Frank Hennemann, pers. comm.). The egg is similar to that of *Phanocloidea pallidenotata* but is distinguished by a much wider micropylar plate with a fluffy appearance (thin and with a medio-longitudinal row of hairy structures in *P. pallidenotata*).

**Description of the female.** – Fig. 1-10, table I. Large (body length 200.0-236.6 mm) and stocky for the genus with flattened head and very thick and lobate legs. Colour of body and legs greyish brown with darker mottling, eyes orangey, some black tubercles on all the thoracic parts. Abdomen of the same colour as rest of body except for pleurae of abdominal segments III-VI which are whitish laterally.

*Head.* Long and flat, about 1.5-1.6× longer than wide. Vertex flattened and entirely smooth. Coronal suture inconspicuous ending in a V-shaped depression between eyes and a pair of small bumps between the bases of antennas. Eyes moderately large, moderately projecting, their diameter contained about 2.5× in length of genae. Antennae filiform, not reaching the apex of the forelegs, and reaching from half of metanotum to the anterior half of tergum II. Scapus

almost rectangular, compressed dorsoventrally and about 1.5× longer than wide. Pedicellus sub-cylindrical and about 0.5-0.7× the length of scapus.

*Thorax.* Pronotum slightly shorter and slightly narrower than head, rectangular and about 1.6-1.7× longer than wide; transverse median sulcus distinct, gently curved and not reaching lateral margins; posterior margin darker and elevated. Mesonotum about 5.0-5.8×



**Fig. 1-10**. – *Phanocloides lobulatipes* (Conle *et al.*), ♀ GUY22-020. – **1-3**, Habitus: **1**, dorsal view; **2**, lateral view; **3**, ventral view; **- 4-6**, Abdominal extremity: **4**, lateral view; **5**, ventral view; **6**, dorsal view. – **7**, Left median leg. – **8**, Left posterior leg. – **9**, Detail of mesonotum. – **10**, Abdominal extremity in presumed defensive display.

	♀, GUY22-020♀, F1 culture (nine specimens): mean (range)		
Body (inc. subgenital plate)	200.0	<b>227.2</b> (211.57-236.6)	
Antennae	75.0	<b>94.8</b> (85.23-103.8)	
Head	8.4	<b>9.5</b> (8.49-10)	
Pronotum	7.1	8.7 (7.65-9.9)	
Mesonotum	41.1	<b>45.6</b> (42.95-48.37)	
Metanotum	13.9	<b>15.5</b> (13.9-16.5)	
Median segment	19.4	<b>22.0</b> (20.53-23.5)	
Profemora	38.1	45.6 (42.3-48.9)	
Mesofemora	31.0	37.3 (35.42-38.47)	
Metafemora	33.8	44.7 (41.32-47.42)	
Protibiae	40.3	49.0 (46.49-52.3)	
Mesotibiae	30.5	37.9 (35.2-39.5)	
Metatibiae	33.5	47.2 (43.28-50.7)	

Table I. - Measurements of the females of *Phanocloidea lobulatipes* (Conle et al.) [mm].

longer than pronotum, with a distinct dorso-longitudinal carina and two latero-longitudinal carinae; surface slightly wrinkled anteriorly; anterior half with tubercles of various sizes and shapes, between the carinae, and on the latero-longitudinal carinae. Mesopleurae with six to eight tubercles irregularly aligned, of various shapes and sometimes darker than the body. Mesosternum with several scattered blackish tubercles of various sizes. Metanotum with the same dorso-longitudinal and latero-longitudinal carinae as mesonotum, and bearing several very tiny tubercles on its surface, not visible to the naked eye; about 0.7× the length of median segment; junction with the median segment slightly swollen. Metasternum with several scattered blackish tubercles of various sizes.

*Legs.* Very stocky with characteristic lobes. Profemora slightly shorter than protibiae, compressed and curved basally; mesofemora roughly of same length as mesotibiae; metafemora slightly shorter than metatibiae. All carinae of femora and tibiae bearing plenty small sharp spines aligned and generally blackish, and numerous setae among them, only visible under magnifying glass.

In profemora: dorso-anterior carina strikingly elevated and fringed, especially basally; dorso-posterior carina simple; ventro-posterior carina elevated and straight, ending with a large sharp spine; ventro-anterior slightly elevated, basally upright and almost perpendicular to the dorso-anterior carina; medio-ventral carina elevated basally, parallel to ventro-anterior carina, forming a gutter. In protibiae: dorso-anterior and -posterior carinae very close to each other, both elevated, fringed and slightly diverging apically, the dorso-anterior being more elevated and the dorso-posterior with lobes of various sizes and length; ventro-anterior, ventro-posterior elevated; medio-ventral carina parallel and almost perpendicular to ventroanterior carina, ending with a sharp spine. In mesofemora: dorso-posterior carina elevated and slightly undulate; ventro-posterior carina strikingly elevated, with a very developed lobe on its basal third which is more elevated anteriorly; dorso-anterior and medio-ventral carinae simple; ventro-anterior carina elevated, with a single lobe on the anterior of its basal third. In mesotibiae: dorso-anterior and -posterior carinae very close to each other; dorso-anterior carina slightly elevated and with small lobes at mid-length and on apical third; dorso-posterior carina strikingly elevated, with two larges undulates lobes on the apical two-thirds; ventroposterior carina very elevated and slightly more on its apical third; ventro-anterior carina just slightly elevated and regular; medio-ventral carina just slightly elevated on its basal quarter. In metafemora: dorso-posterior carina elevated, with a large semi-circular lobe on its anterior apex; dorso-anterior and medio-ventral carinae simple; ventro-anterior and -posterior carinae elevated, much more on their basal third which are lobulate. In metatibiae: dorso-posterior carina slightly elevated on its basal third, then distinctly elevating toward posterior, with

a distinct lobe at mid-length and another on its apical quarter; dorso-anterior less elevated, only slightly lobate at mid-length; medio-ventral carina only elevated on its basal part, and with a sharp blackish spine at its apical extremity; ventro-posterior carina strikingly elevated, particularly on its basal apex, and slightly less on its apical part; ventro-anterior carina similar but less elevated. All basi-tarsi shorter than other associated tarsi, and with a distinct lobe dorsally on all their length.

Abdomen. Median segment inconspicuous, 1.4-1.5× longer than metanotum and 1.3× longer than tergite II. Tergites IV-VI the longest, somewhat of same length and almost 3× longer than wide on the posterior part; III slightly shorter than IV-VI, and slightly longer than II; VII shorter than II; IX-X the shortest, of similar length and almost quadrate. Posterior part of tergites II-V swollen, V with a prominent scale-like lobulate posteromedial excrescence, VI with a similar but smaller excrescence. Tergite VIII with lateral margins enlarged, forming small fringes posteriorly. Sternite 7 with a hypertrophied praeopercular organ as a pair of very large, flattened and lobed excrescences, each projecting ventro-laterally and extending up to half the length of tergite VIII. Anal segment with posterior margin almost straight and very slightly indented medially; medio-longitudinal carina distinct. Epiproct very small and almost entirely hidden under anal segment. Cerci small, conical and hairy, roughly reaching to posterior margin of anal segment and slightly exceeding from its posterior angles. Paraprocts hardly visible from above but visible in lateral view, cream-coloured with a few short hairs, ending sharp and directed inward. Gonapophyses creamish or orangey, very elongated, canaliculate interiorly, bow-shaped, widely projecting over apex of abdomen by at least the length of anal segment but sometimes the length of tergites IX-X combined, and even reaching the tip of subgenital plate. Subgenital plate wide and concave, projecting beyond tip of abdomen by about twice the length of anal segment; apical third of ventral side with a medio-longitudinal carina; rounded apex.

*Description of the egg.* – Fig. 12-15, table II. Medium-sized and strongly resembling to that of *Phanocloidea pallidenotata*, remarkable for its chromatic contrast between beige capsule and large brown operculum, and the large size of operculum.

*Capsule* slightly compressed laterally and slightly wider in the anterior part; height and width almost similar, capsule rounded in cross-section. Surface entirely covered with six to eight rows of long and flattened beige fringes, formed by wide hairs stuck together, oriented toward the anterior and hiding the capsule. Straightened fringes on some eggs show a dark brown capsule, as well as the operculum.

*Operculum* rounded in cross-section, outer margin forming a very prominent, cylindric and hollow structure, of 0.75-0.85× the length of the capsule and about the same diameter. Basal part



Fig. 11-14. – Phanocloides lobulatipes (Conle et al.), egg. – 11, Dorsal view. – 12, Lateral view. – 13, View of polar area. – 14, Apical view of operculum. (Photos: Tine Herman).

Capsule total length (incl. operculum)	Capsule length	Capsule height	Capsule width	Operculum length	Operculum diameter	Micropylar plate length	Micropylar plate width
<b>6.43</b> (6.36-6.50)	<b>3.45</b> (3.20-3.57)	<b>2.95</b> (2.57-3.57)	<b>2.9</b> (2.50-3.21)	<b>2.67</b> (2.50-2.79)	<b>2.38</b> (2.14-2.50)	<b>2.38</b> (2.29-2.57)	<b>0.79</b> (0.71-0.86)

 Table II. – Measurements of the egg of Phanocloidea lobulatipes (Conle et al.): mean (range) [mm], from three eggs (in coll. ASPER-TJ).

with a crown of fringes plastered to the operculum surface, of same colour, texture, and length as the capsule's fringes. Operculum dark brown on the basal two thirds with orangey streaks joining together to form a last apical third entirely orangey. Apical part slightly tightened but not closed, forming a hollow only recovered by three arms, thin and amber colour, merged in the centre.

*Micropylar plate* oval, slightly elongate, almost parallel-sided and about 0.6-0.7× the length of the capsule; 2.6-3.3× longer than wide, with fluffy appearance; outer margin formed by flattened and wide hairs, amber brown with golden tips; connected to the polar area. Micropylar cup depressed and topped with a lamellar structure on the posterior of micropylar plate. Polar area almost flat with a crown of fringes in its centre. Median line creamish and short between the micropylar plate and the crown of fringes of the polar area, and surrounded by a lamellar structure.

*Description of newly hatched nymph.* – Freshly hatched nymphs with body lengths between 24.8-26.8 mm (fig. 15). Llight brown with legs and abdomen annulated with yellowish. Antennae also annulated with yellowish, their apex white. Head distinctly wider than body.

**Behaviour**. – During the day, the nymphs stay hidden in the vegetation and have very characteristic positions: the body can show various angles, the mid-legs are often folded and directed backward. In this case, the insect stands on leaves only with its fore- and hind-legs. The wild female demonstrated a surprising defensive behaviour



Fig. 15. - Phanocloides lobulatipes (Conle et al.), post-hatch nymph in Yannick Bellanger's culture.

when handled, curving its abdomen upward while displacing its internal terminalia to exhibit both pairs of gonapophyses-like stings (fig. 10), and hectically moved with this threatening posture. Interestingly, this behaviour was not observed in the F1 generation reared in captivity.

*Biology.* – The wild female was kept in a large and ventilated cage and fed only on pigeon pea, *Cajanus cajan* (L.) Huth. Successfully breeding this species in Europe was achieved in a large (1 meter high) and well-ventilated cage with one full side with mosquito net and with a daily spray of water. Nymphs and adults of the F1 generation were feeding on bramble (*Rubus* spp., Rosaceae), raspberry (*Rubus idaeus* L., 1753, Rosaceae) and salal (*Gaultheria shallon* Pursh, 1814, Ericaceae) as alternative foodplants. Incubation time for the eggs was 185-275 days at a temperature of 20°C, with a hatching success rate of 76%. Males reached adulthood in about 10 months, while females took 11-12 months to mature.

#### DISCUSSION

Despite its large size, *Phanocloidea lobulatipes* was known from only six specimens collected in French Guiana between 1993 and 2016: five from Montagne de Kaw and one from Saint-Laurent-du-Maroni. Among these, four were adult males, while the other two were nymphs (one male and one female). This species may be more widely distributed throughout the territory but appears to be either rare or inaccessible using collecting methods employed in the last 30 years (nighttime sight hunting, light trap). Males, which are more mobile and fly well, are generally easier to collect. However, the small number of encountered specimens also suggests that *P. lobulatipes* is genuinely rare. The first male was collected in 1993 during the GEP (Groupe d'Étude des Phasmes, 1993) missions using insecticide canopy fogging – a method that is no longer used for ethical reasons. Alternatively, the very small number of specimens collected could also be explained by a canopy-dwelling lifestyle. The recent discovery of an adult female may have been a matter of chance. When collected, the specimen appeared to have recently lost its right median leg, possibly due to a predation attempt in the canopy, which could explain its fall to the lower vegetation strata.

About the size difference between wild and culture specimens. – Culture specimens often grow larger than their wild counterparts, a trend observed over several years by the second author. The present case is consistent with this observation, as nine specimens reared by Yannick Bellanger and Maxime Ortiz were noticeably larger (20-30 mm) than the wild-collected specimens. Multiple reasons could contribute to this size disparity, including food abundance, the absence of predators and environmental stresses (e.g. wind, hard rain), or use of substitute plants.

For taxonomic description, particular caution should be exercised when using captive bread specimens. Ideally, bred specimens should not be designated as type specimens when possible, and measurements of wild and captive individuals should not be mixed to avoid misrepresenting the natural size range of the species.

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### References

- CLARK-SELLICK J. T., 1997. Descriptive terminology of the phasmid egg capsule, with an extended key to the phasmid genera based on egg structure. *Systematic Entomology*, **22**: 97-122. https://doi.org/10.1046/j.1365-3113.1997.d01-30.x
- CONLE O. V., HENNEMANN F. H., BELLANGER Y., LELONG P., JOURDAN T. & VALERO P., 2020. Studies on neotropical Phasmatodea XX: a new genus and 16 new species from French Guiana. *Zootaxa*, 4814 : 1-136. https://doi.org/10.11646/zootaxa.4814.1.1
- GROUPE D'ÉTUDE DES PHASMES, 1993. Le kit S.P.C. (Système de Prospection de la Canopée). *Le monde des phasmes,* Hors-série n° 1 Spécial Guyane : 43-44.
- HENNEMANN F. H. & CONLE O. V., 2024. Studies on neotropical Phasmatodea XXVI: Taxonomic review of Cladomorformia tax. n., a lineage of Diapheromeridae stick insects, with the description of seven new genera and 41 new species (Phasmatodea: Occidophasmata: Diapheromeridae). *Zootaxa*, **5444** : 1-454. https://doi.org/10.11646/zootaxa.5444.1.1
- JOURDAN T., LELONG P. & BELLANGER Y., 2014. Contribution à l'inventaire des Phasmatodea de Saül, Guyane. Bulletin de la Société entomologique de France, 119 (4): 487-498. https://doi.org/10.3406/bsef.2014.2431
- SIMON S., LETSCH H., BANK S., BUCKLEY T. R., DONATH A., LIU S., MACHIDA R., MEUSEMANN K., MISOF B., PODSIADLOWSKI L., ZHOU X., WIPFLER B. & BRADLER S., 2019. – Old World and New World Phasmatodea: Phylogenomics resolve the evolutionary history of stick and leaf insects. Frontiers in Ecology and Evolution, 7: 345. https://doi.org/10.3389/fevo.2019.00345