

## A new stick insect from Costa Rica (Phasmatodea, Pseudophasmatidae, Xerosomatinae)

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**Abstract.** – Both sexes and the egg of a new species of Phasmatodea from Costa Rica, *Planudes asperus* n. sp., are described and illustrated.

**Résumé.** – Un nouveau Phasme du Costa Rica (Phasmatodea, Pseudophasmatidae, Xerosomatinae). Les deux sexes et l'œuf d'une nouvelle espèce de Phasmatodea du Costa Rica, *Planudes asperus* n. sp., sont décrits et illustrés.

**Zusammenfassung.** – Eine neue Stabheuschrecke aus Costa Rica (Phasmatodea, Pseudophasmatidae, Xerosomatinae). Eine neue Stabheuschreckenart aus Costa Rica, *Planudes asperus* n. sp., wird in beiden Geschlechtern und den Eiern beschrieben und abgebildet.

**Keywords.** – *Planudes*, Costa Rica, new species, taxonomy.

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Specimens belonging to the species described hereafter were repeatedly collected during the past 60 years and are known from various different localities in Costa Rica. In 2005, Oskar Conle found several specimens of both sexes in the area around Monteverde. Six years later, in 2011, Yannick Bellanger collected a single female about 2000 meters above sea level, while staying in the research station of “El Cerro Dantas”. He obtained some eggs from this specimen. This species was successfully bred in captivity for about one year, before it disappeared again from European stocks.

Detailed comparison with the types of the species of the genera *Planudes* Stål, 1875, and *Isagoras* Stål, 1875, which are both very closely related to each other, showed that the examined specimens belong to a new and still undescribed species.

Measurements are given in millimeters with a precision of  $\pm 0.1$  mm.

**Abbreviations used.** – ANSP, Academy of Natural Sciences, Philadelphia, USA; ZMHB, Museum für Naturkunde der Humboldt-Universität, Berlin, Germany; coll. OC, private collection of Oskar V. Conle, Bolsterlang, Germany; coll. YB, private collection of Yannick Bellanger, Trédias, France.

Verophasmatodea, Pseudophasmatoidea, Pseudophasmatidae, Xerosomatinae, Prexaspini

Genus *Planudes* Stål, 1875

*Planudes asperus* n. sp.

HOLOTYPE: ♂, Heyne 12.21, Turrialba, Costa Rica (ZMHB).

PARATYPES: 13 ♀ and 17 ♂: 1 ♂, Costa Rica, Turrialba, 19.X.1950, leg. C. S. Carbonell (ZMHB); 1 ♂, Costa Rica, Puntarenas, Prov. San Vito, 12.III.1968, H. Hespeneheide (ANSP); 1 ♂, El Volcan Chir., Pan., 4100 ft., 16.VI-29.VII.1937, D. W. Bishop, Rio Gariche (ANSP); 1 ♂, Costa Rica, Quebrada Gonzáles, Station, Braulio Carrillo National Park, Limón Province, 10°9'42.16"N - 83°56'15.85"W, 483 m, leg. O. Conle, F. Hennemann & K. Nishida, 20.XI.2012 (coll. OC); 11 ♂ and 10 ♀, Costa Rica, Monteverde, Trail from Hotel Belmar to Cerro Amigos, 1400-1700 m, 10°18'91"N - 84°48'65"W, 26.IX-3.X.2005, leg. O. Conle & M. Friede (coll. OC); 1 ♀, Costa Rica, Cerro Dantas, 30.VIII.2011 (coll. YB); 2 ♀, Ex Zucht 2006, F1 Generation, Zuchtstamm aus Costa Rica, Monteverde, Trail from Hotel

Belmar to Cerro Amigos, 1400-1700 m, 10°18'91"N - 84°48'65"W, 26.IX-3.X.2005, *leg. O. Conle & M. Friede* (coll. OC); 2 ♂, Costa Rica, Alajuela, Reserva Biológica A.MI. Brenes, 840 m, 26.V.2006, collected at light trap (coll. OC).

**Measurements (millimeters).** – *Holotype*. Body: 50.4; antennae: >48.0; head: 3.4; pronotum: 2.5; mesonotum: 8.6; tegmina: 7.5; alae: 36.7; profemora: 13.2; mesofemora: 9.1; metafemora: 12.0; protibiae: 13.0; mesotibiae: 8.7; metatibiae: 11.0.

**Males** (minimum-maximum). Body: 48.0-64.0; antennae: 50.0-58.0; head: 3.3-3.5; pronotum: 2.5-3.1; mesonotum: 8.4-9.9; metanotum: 3.4-3.8; median segment: 3.7-4.2; tegmina: 7.2-8.0; alae: 28.0-39.0; profemora: 12.0-13.6; mesofemora: 8.0-9.7; metafemora: 11.0-12.2; protibiae: 12.4-13.3; mesotibiae: 8.1-9.5; metatibiae: 11.3-13.2.

**Females** (minimum-maximum). Body: 53.0-68.5; antennae: 40.0-45.0; head: 3.8-4.6; pronotum: 3.9-4.2; mesonotum: 9.5-11.6; metanotum: 4.1-4.4; median segment: 4.0-4.5; tegmina: 5.3-6.5; alae: 7.5-10.2; profemora: 12.9-13.9; mesofemora: 9.0-11.1; metafemora: 12.4-13.3; protibiae: 12.3-13.1; mesotibiae: 8.7-9.2; metatibiae: 11.2-12.5.

**Eggs** [average (minimum-maximum)]. Capsule length: 2.8 (2.7-2.8); capsule height: 2.1 (2.0-2.2); capsule width: 1.3 (1.2-1.4); operculum: small diameter: 0.6 (0.6-0.7); large diameter: 1.5 (1.5-1.6).

**Description of the female.** – Fig. 6-8. Medium-sized and robust for the genus, with very short alae. General coloration of body and legs very variable, ranging from pale to dark brown, sometimes furnished with paler or darker speckles. Body surface strongly wrinkled and bearing small granules and tubercles.

**Head** 1.3 to 1.4× longer than wide, roughly rectangular in dorsal view, dorsoventrally compressed; surface wrinkled and granulated, covered with small tubercles; cheeks bearing some small tubercles; eyes slightly oval, hardly projecting, hemispherical, marbled with yellow and dark brown; ocelli reduced. Antennae slender, reaching tergum V or even VI, covered with fine setae, brown in basal half and drab yellowish in apical half. Scapus rectangular and flattened dorsally, about 1.3× longer than the cylindrical pedicellus.

**Thorax.** Surface of pro- and mesonotum wrinkled and covered with small granules; pronotum longer than wide, as wide as or slightly wider and roughly longer than head, bearing a visible longitudinal dorsomedian furrow and a distinct transverse dorsomedian furrow. Mesonotum about 2.5× longer than pronotum, roughly parallel-sided with only the very posterior portion very slightly widened; a distinct longitudinal dorsomedian furrow at least in its anterior half, posterior half dorsally flattened. Metanotum and median segment combined, slightly shorter than mesonotum. Tegmina suboval, about 2× longer than wide, projecting over posterior margin of metanotum, apically rounded and bearing slightly elevated shoulders in the center; alae short, 1.5 to 1.8× longer than tegmina, slightly projecting over anterior margin of tergum II, costal area brown to pale brown, spotted with dark markings; anal area brownish translucent with darker veins.

**Abdomen.** Surface wrinkled and granulated, a little longer than head and complete thorax combined (excluding median segment); segments II to V of equal length, segment VII the longest, segment IX the shortest; anal segment slightly longer than IX, with an indented apex. Sternites distinctly granulated and covered with tubercles of irregular size and position; preopercular organ well developed and rounded on the posterior part of the sternum VII. Subgenital plate short, anterior half flattened and constricted; posterior half bulgy with pointed apex; slightly projecting over posterior margin of tergum VIII. Gonapophyses very prominent and distinctly projecting over the apex of subgenital plate, reaching towards center of anal segment. Cerci very short and stout, with rounded apex, not reaching posterior margin of anal segment.

**Legs.** Profemora compressed and curved basally, anterodorsal carina distinctly raised and slightly undulate, posterodorsal carina distinctly raised and with tubercles on its external side; mesofemora the shortest and slightly longer than their associated tibiae; pro- and mesotibiae roughly straight, their antero- and posterodorsal carinae with small tubercles and lobes; metafemora roughly of the same length as their associated tibiae; carinae of the metatibiae bearing granules; hind legs usually not projecting over apex of abdomen. Tarsi short and more than half the length of corresponding tibiae, basitarsus 1.5× longer than second tarsomere.

**Description of the male.** – Fig. 1-5. Medium-sized and more slender than the female, with fully developed and long alae. General coloration of body even more variable than in female; pale to dark brown; legs, tegmina and costal area of alae often furnished with bold whitish or pale cream patches and markings. Body surface strongly wrinkled and covered with small granules and tubercles.

**Head** 1.4 to 1.8× longer than wide, roughly rectangular in dorsal view, dorsoventrally compressed; surface wrinkled and slightly granulated; eyes slightly oval, bright beige to drab yellowish, hardly projecting, hemispherical, light brown, sometimes with a postocular line; ocelli reduced; antennae as in female, but at least reaching tergum VIII, sometimes even reaching the posterior margin of anal segment.

**Thorax.** Surface of pro- and mesonotum wrinkled and covered with small granules; pronotum rectangular and longer than wide, roughly as wide as and slightly longer than head, bearing a visible longitudinal median furrow and a marked transversal median furrow. Mesonotum dorsally flattened, 2.6-2.8× longer than pronotum, roughly parallel-sided with the posterior part slightly widened; a distinct longitudinal dorsomedian furrow at least in its anterior half. Metanotum and median segment combined, slightly shorter than mesonotum. Tegmina suboval, about 2× longer than wide, apically rounded and bearing elevated shoulders in the center; alae long, projecting over anterior margin of tergum IX or even reaching center of anal segment; costal area uniformly beige to dark brown or sometimes furnished with bold whitish or pale cream patches and markings; anal area brownish translucent with darker veins.

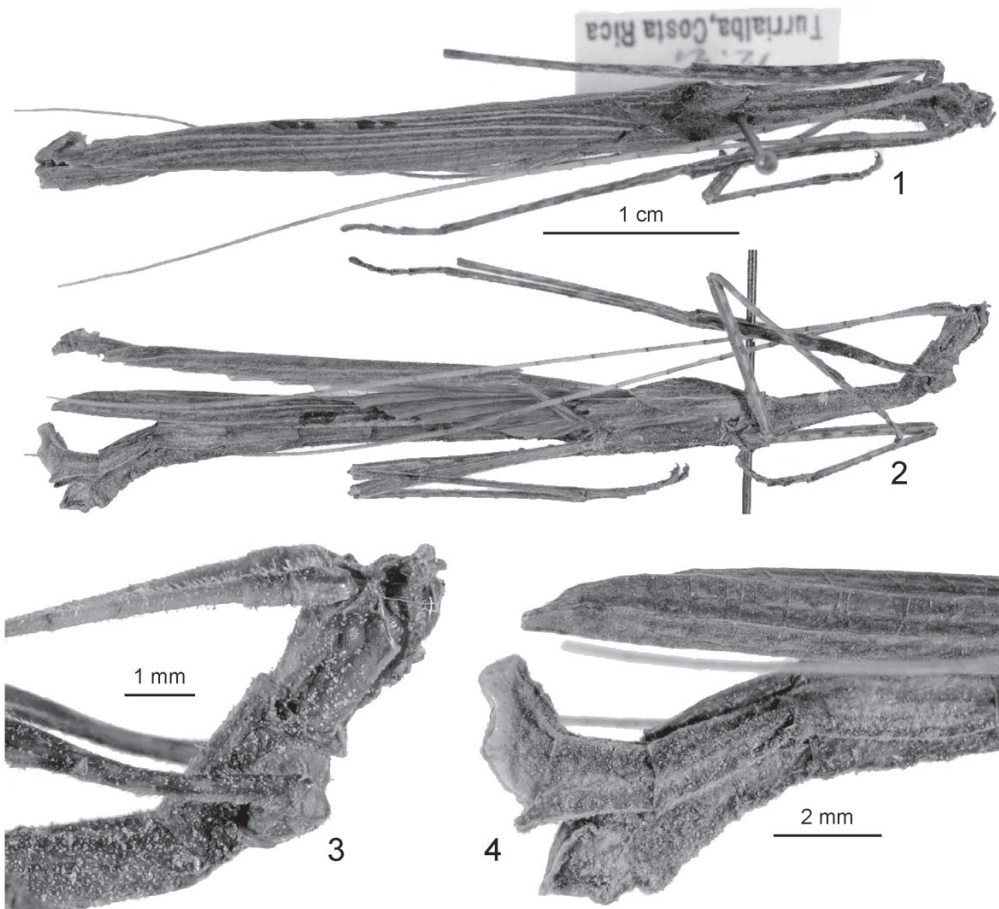


Fig. 1-4. – *Planudes asperus* n. sp., holotype ♂ (ZMHB). – 1, Habitus in dorsal view. – 2, Habitus in lateral view. – 3, Head in lateral view. – 4, Terminal segments of abdomen in lateral view.

*Abdomen.* Surface granulated, distinctly longer than head and thorax combined (excluding median segment); segments II to VII roughly of equal length. Tergum VIII slightly shorter and very gently gradually widened towards the posterior, IX 0.66× as long as VIII; both with a rugose longitudinal lateral carina. Anal segment slightly shorter than IX, broad basally but increasingly tectinate and narrowed

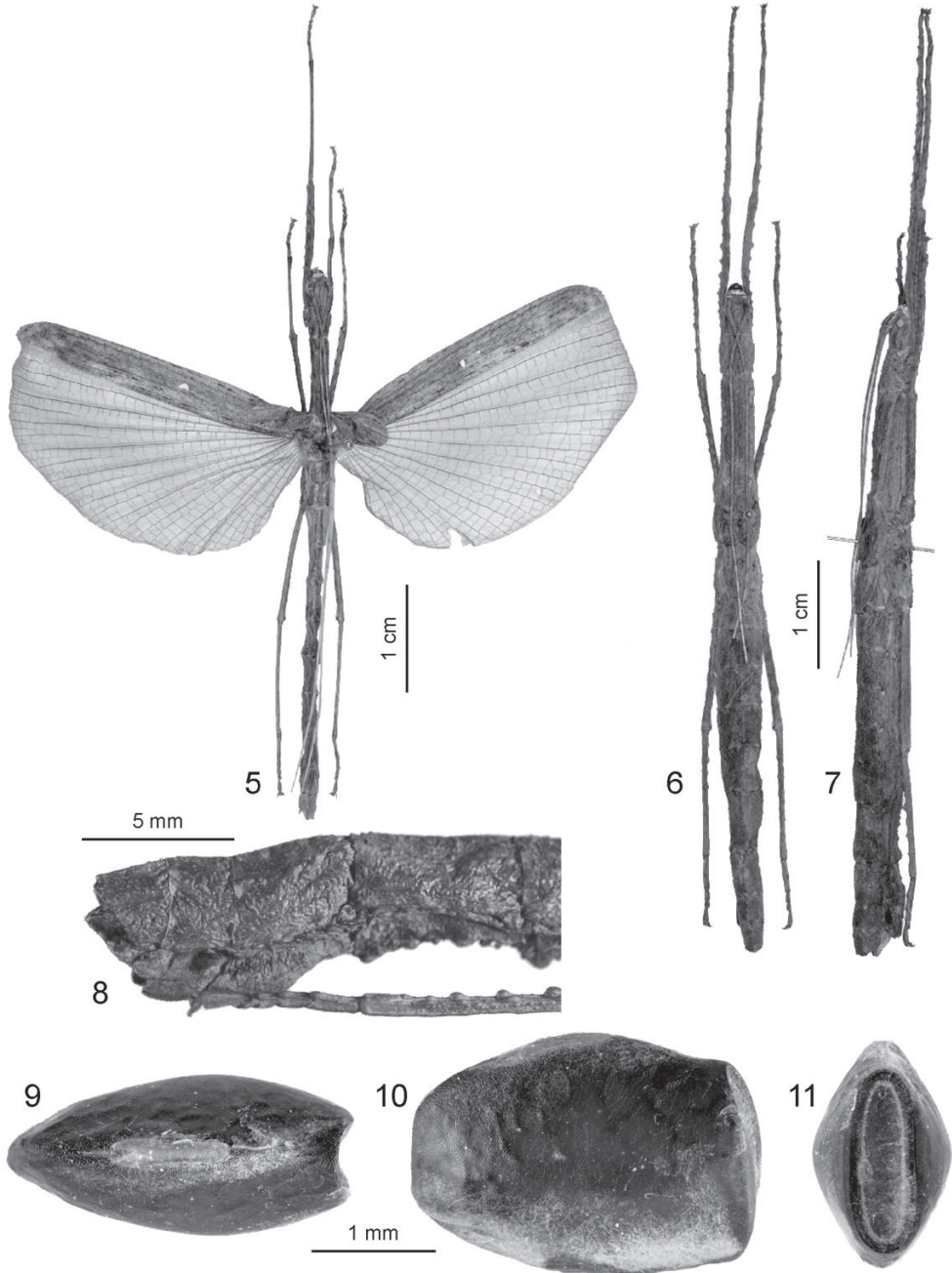


Fig. 5-11. – *Planudes asperus* n. sp. – 5, Paratype ♂, coll. OC, habitus with opened wings. – 6-8, Paratype ♀, coll. OC: 6, habitus in dorsal view; 7, habitus in lateral view; 8, terminal segments of abdomen in lateral view. – 9-11, Egg: 9, dorsal view; 10, lateral view; 11, apical view of operculum.

towards the apex; the latter strongly tectinate with the lateral margins distinctly facing each other, gently incised medially and the posterior margin rounded in lateral aspect; interior surfaces of posterior margin densely set with minute teeth; sternites densely granulated and covered with small tubercles of irregular size and position; cerci slender, elongate and slightly broadened in the basal half, the apex narrow and rounded, at best reaching the posterior margin of anal segment; paraprocts fused over most of their length and forming a large, rugulose, roundly triangular plate with a slender posteromedian incision; vomer not visible; poculum elongate with the posterior portion moderately convex, roundly angulate and keeled longitudinally; posterior margin reaching first quarter of anal segment.

*Legs* as in female, but hind legs at least reaching the anterior margin of abdominal segment IX, and usually projecting over apex of abdomen.

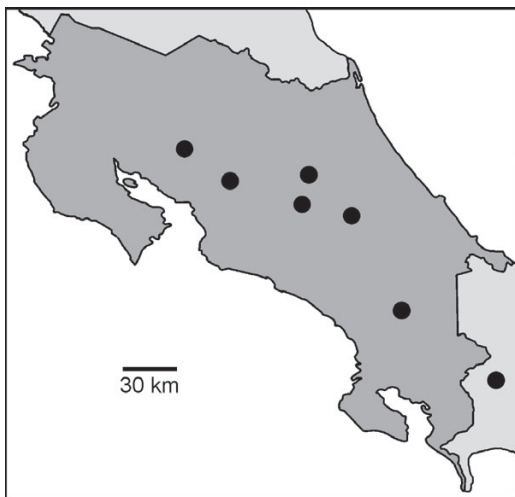
**Egg.** – Fig. 9-11. Capsule distinctly laterally compressed, almost lenticular and surrounded by a dorsoventral keel, about 2× longer than wide. Surface smooth and shiny, enveloped with an indistinct plexus of veins; colour dark brown. Micropylar plate elongate and lanceolate, beige to cream, roughly placed in the center of capsule. Median line distinct and outlined, dark brown. Operculum concave, oval, about 3× longer than wide, with a longitudinal scar in its center reaching from one side to the other.



Fig. 12-13. – *Planudes asperus* n. sp., *in situ* pictures. – 12, ♂ in Monteverde, 2005. – 13, ♀ in Cerro Dantas, 2011.

Table I. – Comparison of *Planudes asperus* n. sp. with the closest related species of the genus *Planudes* Stål, 1875

	<i>P. asperus</i> n. sp.	<i>P. brunni</i> Redtenbacher, 1906, and <i>P. funestus</i> Redtenbacher, 1906	<i>P. melzeri</i> Toledo Piza, 1937	<i>P. perillus</i> Stål, 1875	<i>P. taeniatus</i> Toledo Piza, 1944
<b>Alae</b> (♀)	Slightly projecting over anterior margin of tergum II	At maximum, reaching center of median segment	Projecting over anterior margin of tergum III	Slightly projecting over anterior margin of median segment	At maximum, reaching center of median segment
<b>Legs</b> (♀)	Femora and tibiae of all legs with lobes and/or tubercles	Mid and hind legs without lobes or tubercles	Mid and hind legs without lobes or tubercles	Legs without lobes or tubercles	Legs without lobes or tubercles

Fig. 14. – Map of known distribution of *Planudes asperus*.

**Etymology.** – The species is named *asperus*, referring to its rough body surface. “Asper” is the Latin word for rough. This name is also dedicated to “ASPER”, the French association working on Phasmatodea.

**Discussion.** – Five species of the genus have fully developed alae in males, but very short in the females and are compared with *Planudes asperus* in the table I.

**Biology and distribution.** – *Planudes asperus* n. sp. is found in most regions of Costa Rica, in high altitudes of humid cloud forests as well as in semi-dry forests along the coast. It is for sure the most common species of the genus in Costa Rica. Only one specimen was caught in Panama, in a locality close to Costa Rica (see fig. 14). In captivity

in Europe, the species readily accepted *Rosa spp.* and *Rubus spp.* (Rosaceae) as alternative food plants.

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