

CONTRIBUTION TO THE OPOSTEGIDAE FAUNA OF CENTRAL AMERICA, WITH AN UPDATED CHECKLIST AND DESCRIPTION OF NEW SPECIES FROM COSTA RICA AND MEXICO (INSECTA: LEPIDOPTERA)

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Abstract. In this paper, we report the results of recent fieldwork on the Pacific Coast of Costa Rica and Mexico, i.e., in the areas unrepresented in the material used in the most recent review of Opostegidae. From these new collections, we describe three new species: *Pseudopostega robusta* Remeikis & Stonis, sp. n. (Costa Rica), *P. mexicana* Remeikis & Stonis, sp. n. (Mexico) and *P. latiplana* Remeikis & Stonis, sp. n. (Mexico). Illustrations of adults and male genitalia of all new species are provided together with a distribution map. An updated checklist of all currently known 40 species of Central American Opostegidae is given, with data on taxa distribution outside the region.

Key words: Lepidoptera, Opostegidae, *Pseudopostega*, new species, checklist, Central America, Mexico, Costa Rica

INTRODUCTION

Opostegidae comprise a morphologically distinct family of small, predominantly white moths whose females possess a primitive, monotrysian reproductive system. Together with their sister family Nepticulidae, Opostegidae contain some of the smallest Lepidoptera known, with a wing span ranging from 4 to 16 mm (Davis & Stonis 2007). Many factors combine to entitle Opostegidae as arguably the most difficult family to study among all Lepidoptera. The small size and apparent rarity of most species of Opostegidae, coupled with the great difficulty in locating their usually well-concealed plant-mining larvae, undoubtedly have hindered previous attempts to collect and study this group (Davis & Stonis 2007). Although Opostegidae are generally global in distribution, evidence indicates that the greatest diversity occurs in continental tropical or subtropical regions. Within the last 20 years, notable efforts have appeared to raise this family from obscurity. The first of these was a generic review of the family and world catalogue (Davis 1989), followed by a revision of Oriental Opostegidae (Puplesis & Robinson 1999), and most recently by a review and world catalogue of Nepticuloidea and Tischerioidea (Puplesis & Diškus 2003). However, the biggest boost was given to the number of species known from Central America by Davis and Stonis (2007), who described one new genus

and 30 new species (a total of 68 new species for the entire New World).

In this paper, we report the results of recent fieldwork along the Pacific Coast of Costa Rica and Mexico (in 2008), and in Ecuador (in 2007), i.e., in the areas unrepresented in material recently reviewed by Davis and Stonis 2007. From these new collections, we describe three new species, present new distribution data and provide an updated checklist for Central American Opostegidae.

MATERIAL AND METHODS

Genitalia were prepared following the method of Robinson (1976). After maceration of the abdomen in 10% KOH and subsequent cleaning, the male genital capsule was removed. Morphological structures of genitalia were studied and photographed from specimens in glycerol before permanent mounting in Euparal using Biolam AU-12 and Leica DM 2500 microscopes and Leica DFC420 camera. Other details of methods and terminology are given in Puplesis and Diškus (2003) and in Davis and Stonis (2007).

Descriptions of new species are based on material collected by Simon R. Hill (London, U.K.) and Jonas R. Stonis (Vilnius, Lithuania) during the fieldwork along the Pacific Coast of Central America in 2008,



Figure 1. Primary collecting-sites. (A) Misahualli (Napo Region, SE of Tena, Ecuador, premontane tropical forest at 400–500 m, 77°36'W, 01°04'S). (B) Bucay (=Cumanda, 80 km E of Guayaquil, Ecuador, premontane tropical forest, 650–700 m, 79°5'W, 2°10'S). (C) Puerto Angel (Oaxaca Region, Pacific Coast, Mexico, secondary forest at 45–65 m, 96°29'W, 15°39'N). (D) Manuel Antonio (S of Quepos, Pacific Coast, Costa Rica, tropical forest at 20 m, 84°10'W, 9°21'N).

at two primary collecting-sites: Manuel Antonio (S of Quepos, Pacific Coast, Costa Rica, tropical forest at 20 m a. s. l., 84°10'W, 9°21'N) and Puerto Angel (Oaxaca Region, Pacific Coast, Mexico, secondary forest at 45–65 m a. s. l., 96°29'W, 15°39'N) (Fig. 1C, D). Additional material was collected by Virginijus Sruoga, Jonas R. Stonis and Simon R. Hill in Ecuador in 2007. The primary sites in Ecuador were: Misahualli (Napo Region, SE of Tena, premontane tropical forest at 400–500 m a. s. l., 77°36'W, 01°04'S) and Bucay (=Cumanda, 80 km E of Guayaquil, premontane tropical forest, 650–700 m a. s. l., 79°5'W, 2°10'S) (Fig. 1A, B). In all these sites (in Central America and Ecuador), specimens were collected at light using a standard method for light-collecting.

The type series of the new species and other newly collected Neotropical material are deposited in the collection of Biosystematics Division of Vilnius Pedagogical University (VPU).

RESULTS

Updated checklist of Central American Opostegidae

Prior to Davis and Stonis 2007, Opostegidae of Central and South America had not been revised or reviewed for Central or South America. They reported 4 genera and 91 species from North, Central and South America (including 1 new genus, 68 new species, 2 new subspecies). Recently, one additional species has been described from Guatemala (Heppner & Davis 2009). The greatest richness of opostegid species was reported for the Neotropics (a total of 68 species), including the unusually large number of species for Costa Rica, which was also briefly discussed in Stonis *et al.* 2008.

Based on the new collections from the Pacific Coast of Costa Rica and Mexico, here we describe three new species (*Pseudopostega robusta* from Costa Rica, and *P. mexicana* and *P. latiplana* from Mexico) and provide a revised checklist of Central American Opostegidae to-

Table 1. Checklist of Central American Opostegidae, with distributional data for the taxa now known to occur outside the region (dark shading implies various distribution types).

No.	Genera and species	Caribbean							Central America							South America										
		US	CU	JM	DM	PR	VI	VG	GD	TT	MX	BZ	GT	NI	CR	PA	GF	GY	VE	CO	EC	PE	BR	PY	AR	
1	<i>Neopostega</i> Davis & Stonis, 2007																		●						●	
2	<i>falcata</i> Davis & Stonis, 2007																									
3	<i>petila</i> Davis & Stonis, 2007																									
4	<i>distola</i> Davis & Stonis, 2007																									
5	<i>nigrita</i> Heppner & Davis, 2009																									
6	<i>Pseudopostega</i> Kozlov, 1985																									
7	<i>rotunda</i> Davis & Stonis, 2007																									
8	<i>serrata</i> Davis & Stonis, 2007																									
9	<i>lateriplicata</i> Davis & Stonis, 2007																									
10	<i>robusta</i> Remeikis & Stonis, sp. n.																									
11	<i>microacris</i> Davis & Stonis, 2007																									
12	<i>fumida</i> Davis & Stonis, 2007										●															
13	<i>diskusi</i> Davis & Stonis, 2007										●															
14	<i>spatulata</i> Davis & Stonis, 2007																									
15	<i>mexicana</i> Remeikis & Stonis, sp. n.																									
16	<i>attenuata</i> Davis & Stonis, 2007																									
17	<i>conicula</i> Davis & Stonis, 2007																									
18	<i>brevitapicula</i> Davis & Stonis, 2007																									
19	<i>tanygnatha</i> Davis & Stonis, 2007																									
20	<i>saltatrix</i> (Walsingham, 1897)																									
21	<i>dorsalis</i> Davis & Stonis, 2007																									
22	<i>parakempella</i> Davis & Stonis, 2007																									
23	<i>latiplana</i> Remeikis & Stonis, sp. n.																									
24	<i>adusta</i> (Walsingham, 1897)																									
25	<i>longipedicella</i> Davis & Stonis, 2007																									
26	<i>lobata</i> Davis & Stonis, 2007																									
27	<i>sublobata</i> Davis & Stonis, 2007																									
28	<i>duplicata</i> Davis & Stonis, 2007																									
29	<i>tenuifurcata</i> Davis & Stonis, 2007																									
30	<i>concava</i> Davis & Stonis, 2007																									
31	<i>brevivalva</i> Davis & Stonis, 2007																									
32	<i>bidorsalis</i> Davis & Stonis, 2007*																									
33	<i>latifurcata</i> Davis & Stonis, 2007																									
34	<i>laticapicula</i> Davis & Stonis, 2007																									
35	<i>pumila</i> (Walsingham, 1914)																									
36	<i>bicornuta</i> Davis & Stonis, 2007																									
37	<i>constricta</i> Davis & Stonis, 2007																									
38	<i>brachybasis</i> Davis & Stonis, 2007																									
39	<i>venticola</i> (Walsingham, 1897)																									
40	<i>elachista</i> (Walsingham, 1914)																									
41	<i>perdtigna</i> (Walsingham, 1914)																									

* - The species comprises two subspecies: *P. latifurcata latifurcata* Davis & Stonis, 2007 (currently known from Puerto Rico, Virgin Islands and Dominica) and *P. latifurcata apocлина* Davis & Stonis, 2007 (currently known from Costa Rica).

Abbreviations: US – Florida, CU – Cuba, JM – Jamaica, DM – Dominica, PR – Puerto Rico, VI – United States Virgin Islands, VG – British Virgin Islands, GD – Grenada, TT – Trinidad and Tobago, MX – Mexico, BZ – Belize, GT – Guatemala, NI – Nicaragua, CR – Costa Rica, PA – Panama, GF – French Guiana, GY – Guyana, VE – Venezuela, CO – Colombia, EC – Ecuador, PE – Peru, BR – Brazil, PY – Paraguay, AR – Argentina

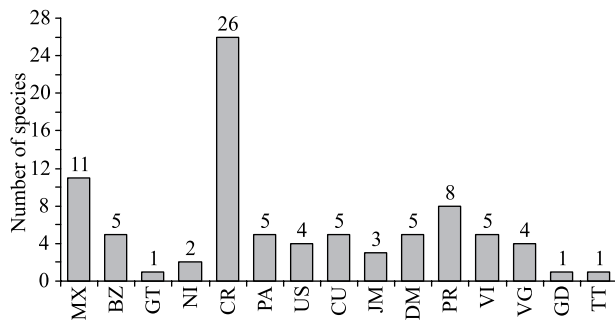


Figure 2. Number of currently known opostegid species in the countries of Central America and the Caribbean (Abbreviations: MX – Mexico, BZ – Belize, GT – Guatemala, NI – Nicaragua, CR – Costa Rica, PA – Panama, US – Florida, CU – Cuba, JM – Jamaica, DM – Dominica, PR – Puerto Rico, VI – United States Virgin Islands, VG – British Virgin Islands, GD – Grenada, TT – Trinidad and Tobago).

gether with distribution data for the species now known to occur outside Central America (Table 1). We present the first records of *Pseudopostega adusta* (Walsingham, 1897) from Costa Rica, *P. parakempella* Davis & Stonis from Mexico, *P. lobata* Davis & Stonis from Ecuador and *P. didyma* Davis & Stonis from the Amazonian Oriente Region of Ecuador. A total of 40 species of Opostegidae are listed in the checklist, with the greatest number of species occurring in Costa Rica (26 species) (Fig. 2).

Description of new species from the Pacific Coast of Costa Rica and Mexico

***Pseudopostega robusta* Remeikis & Stonis, sp. n.** (Figs 1D, 3A, B, 4, 7)

Male (Fig. 3A, B). Forewing 2.6–2.8 mm; wingspan 5.9–6.2 mm. Head: vestiture entirely white; scape white; flagellum pale beige; palpi cream. Thorax and tegulae white. Forewing white, marked with a small, pale brown, dorsal spot just below the middle of dorsal margin, two dark brown, subapical costal strigulae (possibly other strigulae present, but appear rubbed in type series) and a fuscous apical spot; cilia mostly light beige or pale brown. Hindwing and cilia pale brown or beige. Legs cream.

Female. Unknown.

Male genitalia (Fig. 4A–F). Uncus a pair of small, narrow and truncate lobes, widely separated at a distance of length of cucullar lobe. Vinculum broad; anterior margin slightly concave. Gnathos (150 μ m) well-sclerotized, basally divided into two lateral parts (each bearing a lateral fold), with stout caudal process; basal fold indistinct or absent (Fig. 4D–F). Valva with large cucullar lobe (130 μ m), bearing a pectinifer consisting of a single row of 18–20 blunt spines; distal apex of cucullar lobe slightly extended, slender; pedicel broad; valva 0.6 the length of genital capsule. Juxta long rod-like median extension from vinculum.

Biology. Adults fly in March.

Diagnosis. *Pseudopostega robusta* belongs to the *lateriplicata* group and most resembles *P. lateriplicata* Davis & Stonis and *P. floridensis* Davis & Stonis. The male of *P. robusta* can be distinguished by the divided basal part of the gnathos with thickened lateral folds and a stout caudal process.

Distribution. Costa Rica (Pacific Coast) (Figs 1D, 7).

Material examined. Holotype ♂, Costa Rica, Pacific

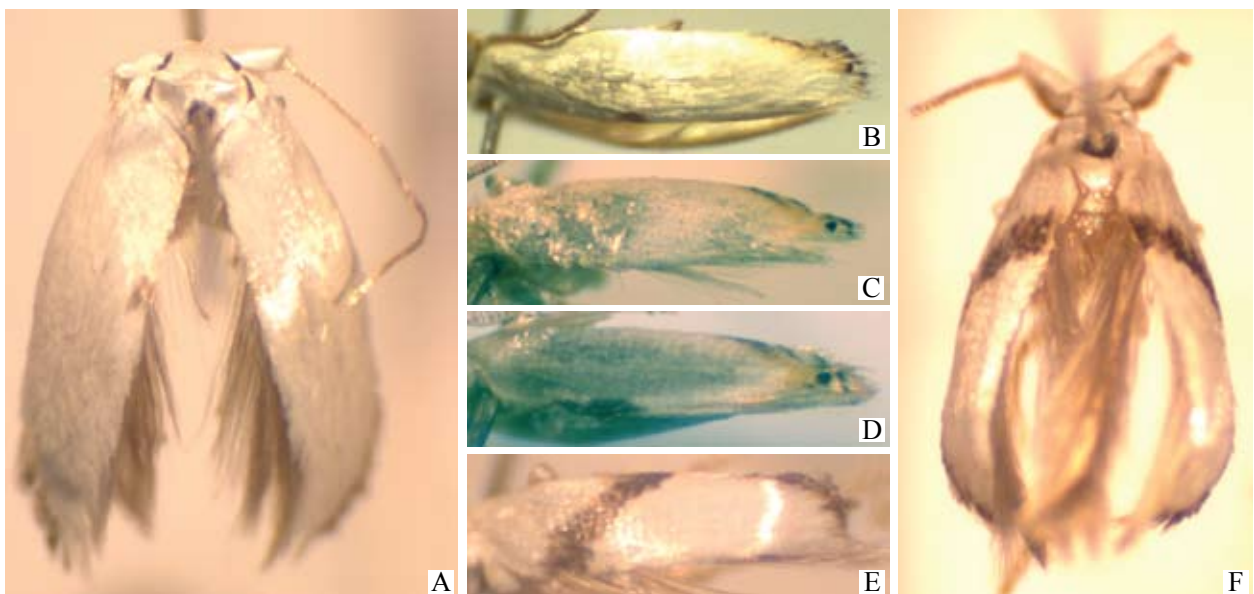


Figure 3. Male adults of new species. (A) *Pseudopostega robusta* sp. n., holotype. (B) the same, paratype. (C) *P. mexicana* sp. n., holotype. (D) the same, paratype. (E, F) *P. latiplana* sp. n., holotype.

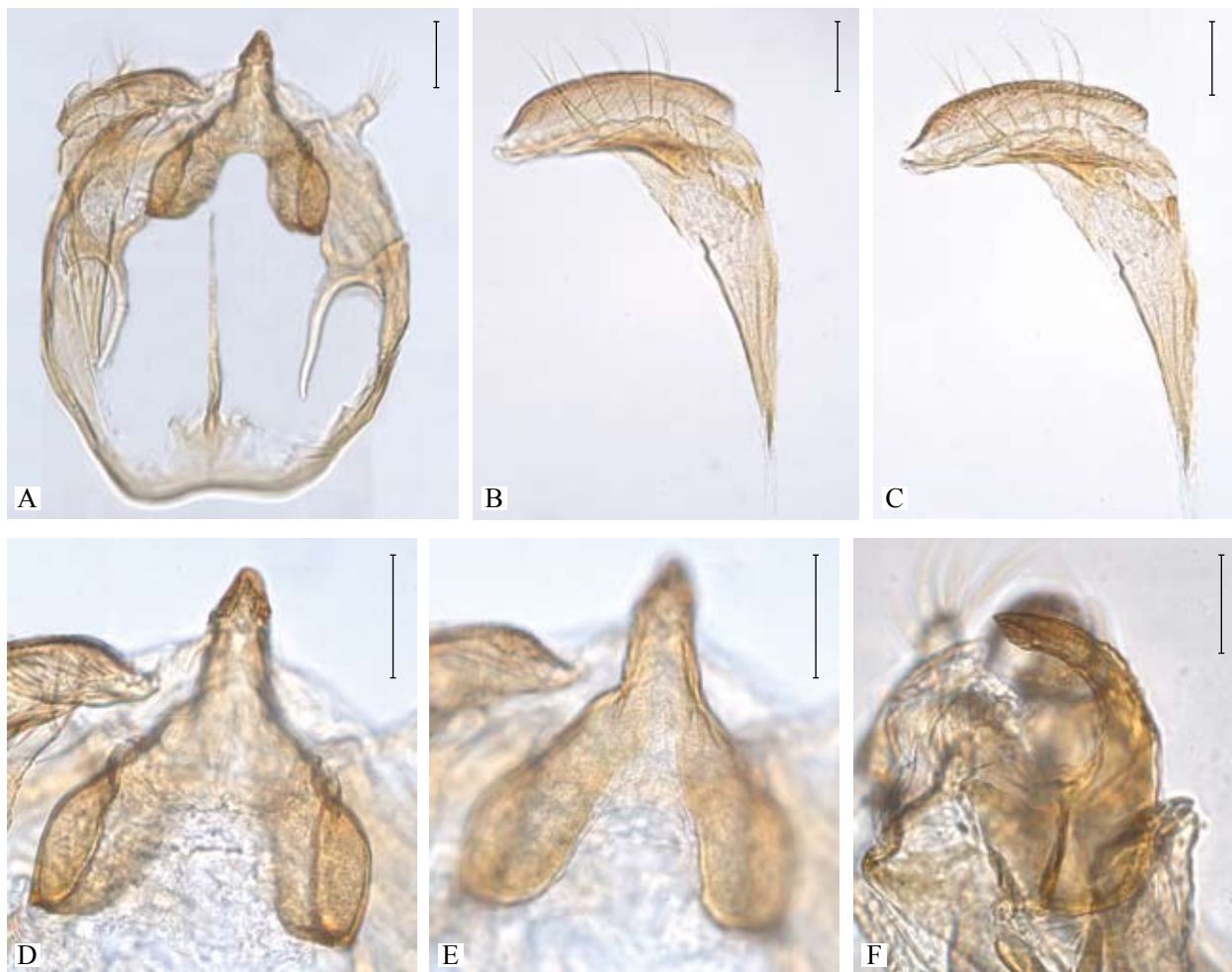


Figure 4. Male genitalia of *Pseudopostega robusta* sp. n. (A) capsule, holotype, slide No. RA216. (B, C) valva, holotype, slide No. RA216. (D, E) gnathos, ventral view, holotype, slide No. RA216. (F) gnathos, lateral view, paratype, in glycerol (scale 50 μ m).

Coast, S of Quepos, Manuel Antonio, 25.iii.2008, at light, Stonis and Hill, genitalia slide no. RA216 (VPU). Paratypes, 6 ♂♂, data as holotype, genitalia slides no. RA213, RA214, RA215, RA217, RA218, RA219 (VPU).

Etymology. The species name is derived from the Latin *robusta* (stout) in reference to the large and strongly thickened gnathos in the male genitalia.

***Pseudopostega mexicana* Remeikis & Stonis, sp. n.** (Figs 1C, 3C, D, 5, 7)

Male (Fig. 3C, D). Forewing 1.7–1.8 mm; wingspan 4.0–4.3 mm. Head: vestiture entirely white; scape white, flagellum cream to pale beige; palpi white. Thorax and tegulae white. Forewing white, with two to three fuscous and almost straight subapical strigulae, one curved or straight apical strigula and black apical dot; underside of forewing densely irrorated with fuscous scales; pale brown. Hindwing and cilia greyish brown.

Forelegs darkened with fuscous scales; midlegs cream, with pale brown banding on terminal tarsal segments; hindlegs cream.

Female. Unknown.

Male genitalia (Fig. 5A–E). Uncus a pair of relatively small, rounded, setose lobes, separated at a distance of 0.4 length of cucullar lobe. Vinculum narrowed, distally truncate. Gnathos (70 μ m) with triangular basal part and large, distally broadened caudal process; basal fold absent; gnathos thickened laterally (but not anteriorly). Valva with large cucullar lobe (116 μ m), bearing a pectinifer consisting of 36–38 blunt spines; distal apex of cucullar lobe swollen; pedicel short and slender; sacculus short, triangular; valva short. Juxta absent or poorly developed.

Biology. Adults fly in November.

Diagnosis. *Pseudopostega mexicana* belongs to the *spatulata* group and most resembles *P. spatulata* Davis & Stonis and *P. truncata* Davis & Stonis, but differs in

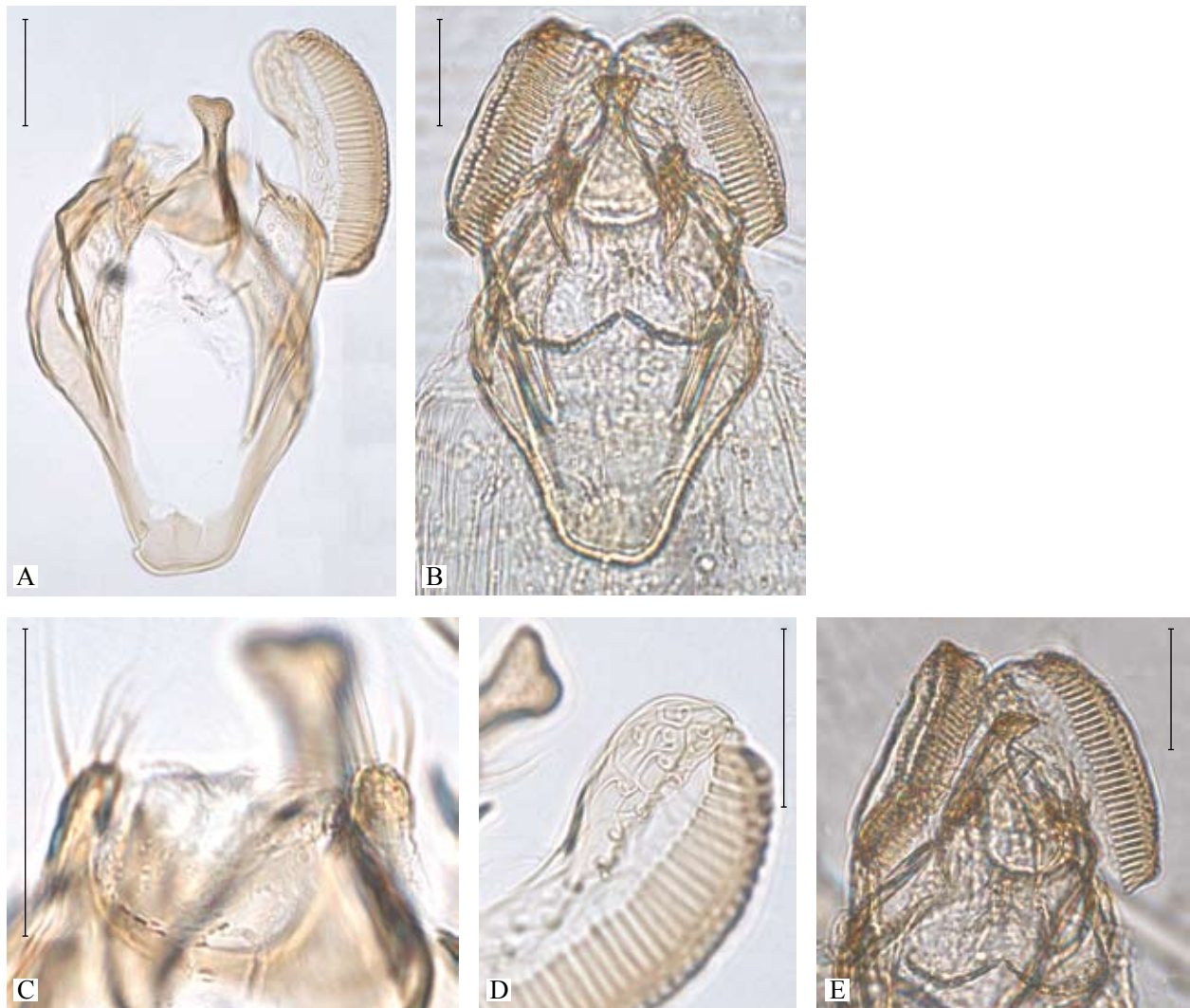


Figure 5. Male genitalia of *Pseudopostega mexicana* sp. n. (A) capsule, holotype, slide No. RA201. (B) capsule, paratype, in glycerol. (C) uncus, holotype, slide No. RA201. (D) part of cucular lobe of valva, holotype, slide No. RA201. (E) gnathos, lateral view, holotype, in glycerol (scale 50 µm).

the combination of a large cucular lobe of the valva, a narrow vinculum and a non-thickened gnathos anteriorly.

Distribution. Mexico (Pacific Coast) (Figs. 1C, 7).

Material examined. Holotype ♂, Mexico, Oaxaca Region, Pacific Coast, Puerto Angel, secondary forest, 29.xi.2008, at light, Stonis and Hill, genitalia slide RA201 (VPU). Paratype, 1 ♂, data as holotype, slide no. RA202 (VPU).

Etymology. The species name refers to the country from which the type series originated (Mexico).

***Pseudopostega latiplana* Remeikis & Stonis, sp. n.** (Figs 1C, 3E, F, 6, 7)

Male (Fig. 3E, F). Forewing 1.8–2.0 mm; wingspan 4.0–4.4 mm. Head: vestiture entirely white; scape white,

flagellum cream; palpi cream to white. Thorax and tegulae white. Forewing white, with dark brown oblique fascia, three fuscous subapical strigulae, black elongate apical dot and three short apical strigulae; underside of forewing greyish brown; cilia grey. Hindwing and cilia greyish brown. Forelegs fuscous; midlegs with brown darkenings distally; hindlegs cream.

Female. Unknown.

Male genitalia (Fig. 6A–H). Uncus a pair of large, rounded, setose lobes, separated by narrow excavation. Vinculum rounded. Gnathos consisting of a very large, anteriorly deeply divided lobe (126 µm), with a stout caudal process and large, broadly rounded basal fold (Fig. 6E, H). Valva with large cucular lobe, bearing a pectinifer consisting of 44–50 blunt spines. Juxta absent.

Biology. Adults fly in November.

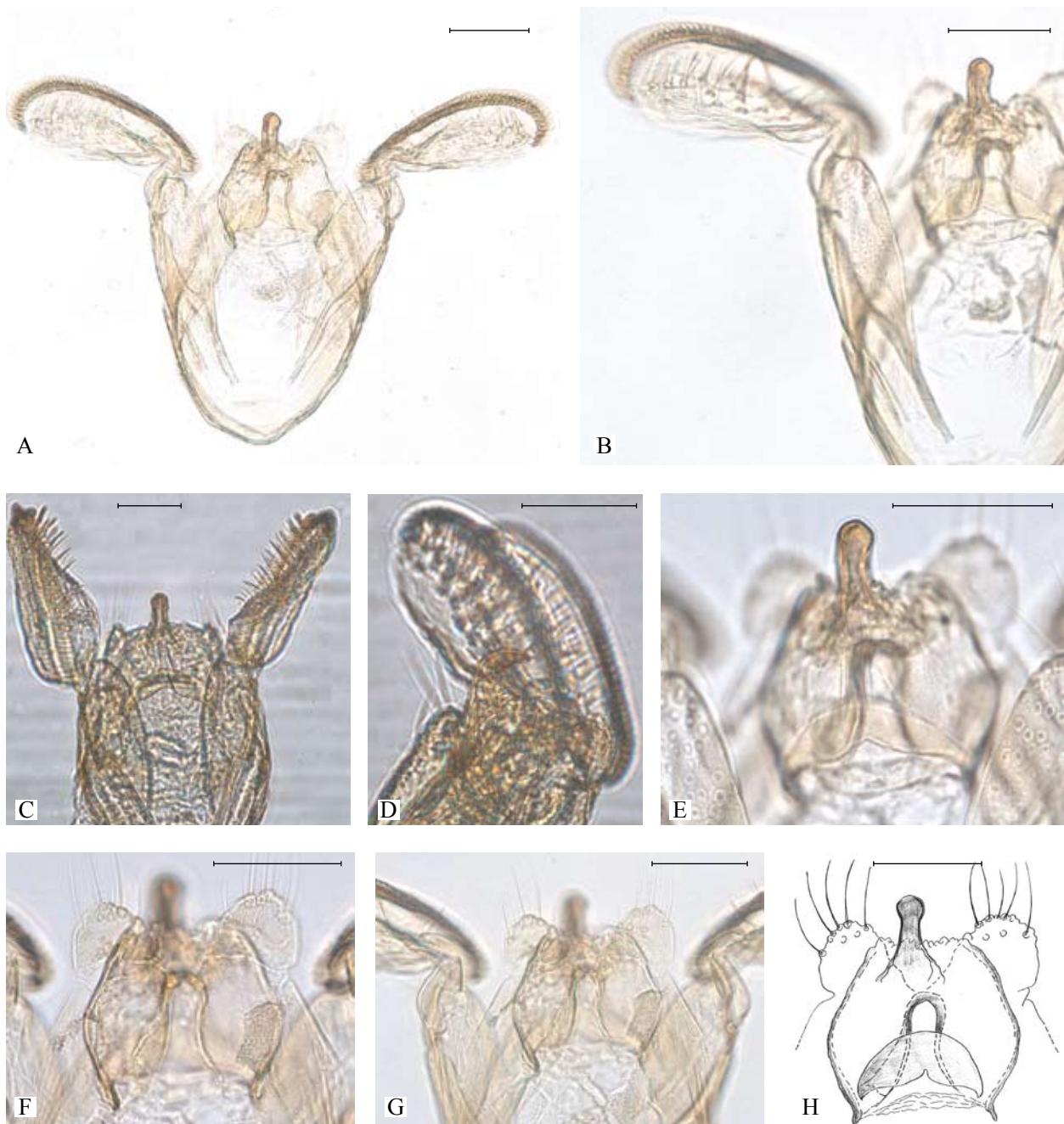


Figure 6. Male genitalia of *Pseudopostega latiplana* sp. n. (A, B) capsule, holotype, slide No. RA204. (C) capsule, paratype, in glycerol. (D) gnathos, lateral view, paratype, in glycerol (E–H) uncus and gnathos, holotype, slide No. RA204 (scale 50 μm).

Diagnosis. *Pseudopostega latiplana* belongs to the *saltatrix* group, but differs in large lobes of the uncus and gnathos, which comprises a very large, anteriorly deeply divided lobe, with a stout caudal process and a large, broadly rounded basal fold.

Distribution. Mexico (Pacific Coast) (Figs. 1C, 7).

Material examined. Holotype ♂, Mexico, Oaxaca Region, Pacific Coast, Puerto Angel, secondary forest, 29.xi.2008, at light, Stonis and Hill, genitalia slide

RA204 (VPU). Paratype, 1 ♂, data as holotype, slide no. RA205 (VPU).

Etymology. The species name is derived from the Latin *lata* (broad, wide) and *plana* (flattened) in reference to the prominent, lateral lobes of the uncus and gnathos.

New distributional data on Opostegidae

Pseudopostega adusta (Walsingham, 1897). New to Costa Rica (this species previously was known from

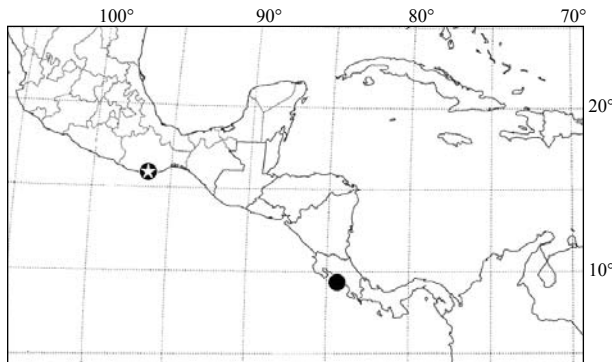


Figure 7. Distribution map of new species (the dot – *Pseudopostega robusta* sp. n., the star – *P. mexicana* sp. n. and *P. latiplana* sp. n.).

Cuba, Dominica, US Virgin Islands, Belize and Ecuador). Material examined: 11 ♂♂, Costa Rica: Pacific Coast, S of Quepos, Manuel Antonio, 25.iii.2008, at light, Stonis and Hill, genitalia slides RA206, RA207, RA208, RA209, RA210, RA211, RA212, RA232, RA233, RA234, RA235 (VPU).

***P. parakempella* Davis & Stonis, 2007.** New to Mexico (this species previously was known only from the type locality – Florida, USA). Material examined: 1 ♂, Mexico, Oaxaca Region, Pacific Coast, Puerto Angel, secondary forest, 29.xi.2008, at light, Stonis and Hill, genitalia slide RA203 (VPU).

***P. lobata* Davis & Stonis, 2007.** New to Ecuador (this species previously was known from Belize, Nicaragua, Costa Rica and Argentina). Material examined: 1 ♂, Ecuador: Oriente, Napo Region, East of Tena, Misahualli, at light, 06-09.ii.2007, Sruoga, Stonis and Hill, genitalia slide RA222 (VPU).

***P. didyma* Davis & Stonis, 2007.** New to the Amazonian Oriente Region of Ecuador (this species previously was known only from the type locality – a moist tropical site located on the western slopes of the Andes of Ecuador). Material examined: 1 ♂, Ecuador: Oriente, Napo Region, East of Tena, Misahualli, at light, 06-09.ii.2007, Sruoga, Stonis and Hill, genitalia slide RA225 (VPU); 1 ♂, Ecuador: 80 km E of Guayaquil, Bucay (= Cumanda), 700 m, at light, 18.ii.2007, Sruoga, Stonis & Hill, genitalia slide RA226 (VPU).

DISCUSSION

New data provided in this paper increase the number of species of the world Opostegidae fauna to 202. Of the currently known 202 species, approximately 88% occurs in subtropical to tropical regions. Of these, 87 species (or 43% of the world fauna) are known to be restricted to

the Neotropical Region. Currently, the Central American fauna comprises 2 genera and 40 species (i.e., 19.8% of opostegid species of the world). More than half of these (26 or 65%) are recorded from Central America alone and only a few Central American species now are known to possess a broader distribution (Table 1). An unusually large number of species was reported for Costa Rica (26 species). According to the current distributional data, Costa Rican species fall into 4 groups. Half of the species (13 or 50%) are recorded from Costa Rica alone and only a few of these are known to possess broader distributions. One species known from Costa Rica also occurs in neighboring Panama; two species (7.7%) from Central America (Costa Rica) and the Caribbean; seven species (27%) are known from Central America and South America (but not the Caribbean); three species (11.5%) are known to have a transneotropical distribution. These data most likely reflect the lack of adequate field surveys in other regions of the Neotropics. No other Neotropical area has been subjected to such intensive collecting efforts for Microlepidoptera as have been conducted in certain areas of Costa Rica. The arthropods of La Selva survey, for example, resulted in 17 species of Opostegidae (of which only *Pseudopostega saltatrix* was previously known) from a very restricted area of Heredia Province, Costa Rica. New taxonomic data provided in this paper make up 1.5% for Opostegidae of the world and 3.4%, 7.5%, 7.7% and 27% for Opostegidae of the Neotropical Region, Central America, Costa Rica and Mexico, respectively.

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CENTRINĖS AMERIKOS BALŲJŲ GAUBTAGALVIŲ (INSECTA, LEPIDOPTERA, OPOSTEGIDAE) FAUNA: NAUJOS MOKSLUI RŪŠYS IR TAKSONOMINIS SĄVADAS

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SANTRAUKA

Identifikavus naują mokslinę medžiagą, surinktą 2008 m. Kosta Rikoje ir Meksikoje (Centrinė Amerika) ir ištyrus papildomą medžiagą, surinktą 2007 m. Ekvadore (Pietų Amerika), aprašomos trys naujos mokslui baltųjų gaubtagalvių (Opostegidae) rūšys: *Pseudopostega robusta* Remeikis & Stonis, sp. n., *P. mexicana* Remeikis & Stonis, sp. n. ir *P. latiplana* Remeikis & Stonis, sp. n. Straipsnyje pateikiami naujų rūšių aprašai bei publikuojamos suaugėlių ir jų genitalinių struktūrų fotografijos. Taip pat skelbiamas Centrinės Amerikos Opostegidae taksonominis sąvadas, nurodantis visų šiuo metu žinomų 40 rūšių paplitimą. Šiame straipsnyje publikuojami faunistiniai duomenys iki šiol žinamus duomenis apie Centrinės Amerikos Opostegidae fauną papildė 7,5 proc., Kosta Rikos – 7,7 proc., o Meksikos – 27 proc.

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