
The New World Agaoninae (pollinators of figs)

Koninklijke Nederlandse Akademie van Wetenschappen
Verhandelingen Afdeling Natuurkunde, Tweede Reeks, Deel 94

The New World Agaoninae (pollinators of figs)

J.T. WIEBES

North-Holland, Amsterdam/Oxford/New York/Tokyo, 1995

Koninklijke Nederlandse Akademie van Wetenschappen
Postbus 19121, 1000 GC Amsterdam, the Netherlands

J.T. WIEBES, Florijn 13, 2353 TC Leiderdorp, the Netherlands

The cover shows the localities where New World fig wasps were collected, and the female of *Pegoscapus argentinensis* (Blanchard) (after Castellanos, 1944, fig. 3 D)

Contents

Introduction	7
Key to the genera	8
<i>Tetrapus</i>	8
<i>Pegoscopus</i>	13
Bibliography	53
Host catalogue	57
Index	59

Introduction

ABSTRACT

Revision of *Tetrapus* Mayr and *Pegoscapus* Cameron. New species: *Pegoscapus groegeri* (Venezuela, host: *Ficus mollicula* Pittier). New synonymy: *Blastophaga augusta* Grandi, 1938 = *Pegoscapus assuetus* (Grandi, 1938).

As a sequel to my treatments of the Old World Agaoninae (Wiebes in Berg & Wiebes, 1992: 195–274, and Wiebes, 1994a) I now present a synopsis of the New World species. The New World fig fauna is simple, I wrote in 1994, and the species are not known to the extent of most Old World groups. On closer inspection, the New World groups are more pluriform than I thought, but the species indeed are not well known, as most have been described and never recorded again; also, for a total of about fifty species, the number of ca. twenty-five localities is rather small (see the map on the cover). The classification of some species (e.g., in the species-groups of *Pegoscapus*) is uncertain. Yet, for a large number the host relationships are known. The present paper presents a synopsis of the described species, and a discussion of their host records.

When Grandi had made his first publications of African and Indo-Australian fig wasps, many of them collected by Prof. F. Silvestri during his search for fruit-pest parasites, there were only three American species described by Mayr (1885, redescribed by Grandi, 1928) and five (that Grandi could not recognize) by Ashmead (1900, 1904 – three of these were redescribed by Wiebes, 1995) and Kirby (1890). Grandi (1919, 1920) studied fig-insects from Costa Rica and some South-American countries (Grandi, 1923, 1934, 1936, 1938, 1952), in which he found a colleague in Hoffmeyer (1932). In 1937, Mangabeiro Filho added a species from Brazil, and in 1944 Blanchard described two from Argentina; Ramirez (1970) described some from Costa Rica. Mainly because no one else was willing to do it, in 1983 I described some American species for which names were required. In 1995, I studied and named the species of Meso-American *Pegoscapus*, mainly from Barro Colorado Island, Panama. In all, about fifty species of wasp are now known from the New World, forty of which associated with a fig name.

Fossil fig wasps are known exclusively from the America's, viz., from the Tertiary (Lower to Middle Miocene, according to MacGinitie as cited by Axelrod, 1954) of Florissant, Colorado (*Tetrapus mayri* Brues, 1910: 16), and

from the Dominican Amber of 25–40 million years ago (Poinar, 1993: 147, fig. 3 – probably *Pegoscapus* sp., but with a full wing-venation).

The host-figs of the New World wasp species belong to two groups, viz., *Americana* Miq. and *Pharmacosycea* Miq., not mentioning the introduced Old World species (mainly Indian, see Nadel c.s, 1992). Reference is here made to the papers by Berg (1989) and Wiebes (1994b) for general comments on fig- and wasp-classifications. I gratefully acknowledge Professor Berg's great help by making available to me his notes and also a manuscript on Meso-American figs that may take some time to be published, but which he allowed me to use.

KEY TO THE GENERA OF NEW WORLD AGAONINAE (figs. 1, 3)

1. The female head is oblong, distinctly longer than wide across the compound eyes; the mandibular appendage bears two longitudinal rows of large teeth. The male antenna is more or less clavate; the mesonotum is distinct, separate from the metanotal plates and the propodeum, which also are separate *Tetrapus*
- The female head is about as long as wide across the compound eyes, or only a bit longer or shorter; the mandibular appendage bears a number of ventral lamellae, not teeth. The male antenna is slender, mostly not at all clavate; the mesonotum is fused with the metanotum, which is incompletely separate from the propodeum *Pegoscapus*

Tetrapus Mayr (fig. 1)

Mayr, Verh. zool.-bot. Ges. Wien **35**, 184–188 (1885, descr. ♀ ♂, type-species *Tetrapus americanus* Mayr); Grandi, Boll. Soc. Ent. Ital. **57**, 1–4 (1925, redescr. ♀ ♂); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 346–347, table 4 (1986, host relationships); Bouček, J. Nat. Hist. **27**, 205–206 (1993, notes on various species).

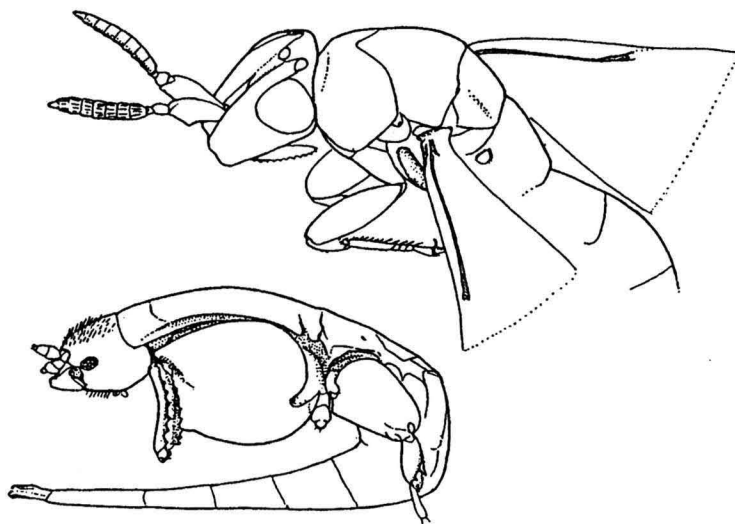


Fig. 1. *Tetrapus* spec. near *ecuadoranus*, female (incomplete) and male from *Ficus tonduzii* Standley, Costa Rica, after Bouček (1993, figs. 53 and 55, resp.).

The female head is distinctly longer than wide across the compound eyes, which are two-thirds to three-quarters of the length of the cheek. There are three large ocelli. The antenna has eleven free segments, the third of which may have a short external prominence, but in most species it is more simple; the fourth to eleventh segments bear oblong sensilla linearia, in one row. The mandible has one or two large apical teeth, and a smaller one on the distal margin (with a gland); the mandibular appendage (in some species split from the apex) has two longitudinal rows of large teeth. On the maxillo-labial complex there are two palp-like appendices, bearing one robust apical seta.

The fore wing has the venation reduced to an incomplete submarginal vein. The fore tibia bears a dorsal comb of three large apical teeth, and the first tarsomere bears a number of ventral, conical spines. The hind tibia has a rather straight apical margin. All tarsi are pentamerous.

The spiracular peritremata of the eighth urotergite are rather large, ovoid. The valves of the ovipositor are approximately as long as the gaster. The total length (head, thorax and gaster) is ca. 2 mm.

The male head is approximately as long as wide. The eyes are well-developed. There are a number of dorso-apical spines, directed posteriad. The antennae are borne in a shallow anterior groove of the head, and they consist of a scape, a pedicel, and three funicular segments shaped together so as to form a club. The mandible is triangular, with dorsal and ventral apical teeth; the maxillo-labial complex consists of two lobes and some setae.

The pronotum is $1\frac{1}{3}$ times as long as wide, and also $1\frac{1}{3}$ times as long as the combined lengths of the remaining terga: a short, transverse mesonotum, two ear-like, lateral parts representing the metanotum, and the propodeum in between, bearing large ovoid spiracular peritremata.

The fore tibia has dorsal and ventral ridges bearing a number (about five) short teeth; the tarsus consists of one short segment, or it may be indistinctly bimerous. The mid leg is reduced to one or two short lobes. The hind tibia bears an apico-ventral ridge bearing four short teeth; the tarsus is tetramerous, but some oligomery may occur. The claspers of the genitalia bear some small claws. The total length is ca. $1\frac{1}{2}$ mm.

There are now seven species known, two of which are unnamed. The species are much alike, and especially the males are very difficult to identify. Ashmead (1900: 251) named *Tetrapus antillarum* from the Antilles (St. Vincent), which is discussed under no. 2, *T. costaricanus*. The species figured by Bouček (1993, figs. 53–55), close to *T. ecuadoranus*, from *Ficus tonduzii* Standley, collected in Costa Rica, cannot be fitted in the key, but it is included in the list (no. 5).

The host species are classified with section *Pharmacosycea*.

KEY TO THE SPECIES OF TETRAPUS (fig. 2)

1. The female mandibular appendage is split from the apex, hence there are two saw-like appendages. The male has three fully developed pairs of legs. *Ficus crassiuscula* (Costa Rica) 6. *Tetrapus* spec. (Ramirez)
- The mandibular appendage is mainly entire, with rows of conspicuous teeth in both inner and outer (longitudinal) rows. The male mid leg is incompletely developed. 2
2. The fourth segment of the female antenna bears a dozen sensilla (figs. a–b); the number of teeth on the mandibular appendage is rather low (10, 11 in the inner and outer rows, resp.). *Ficus maxima* (Brazil, Venezuela, Panama) 1. *T. americanus*
- The fourth segment bears less than ten sensilla (figs. c–d); the number of teeth on the mandibular appendage is higher (11–14, 14–16 in the inner and outer rows, resp.) 3
3. The female mandible has two distinct apical teeth (fig. e); the number of ventral conical spines on the first tarsomere of the fore leg (fig. f) is ca. 25. The male antenna is distinctly clavate (fig. h); the mid leg has one segment. *Ficus yoponensis* (Ecuador, Panama) 4. *T. ecuadoranus*
- The female mandible has only one distinct apical tooth (fig. g); the number of ventral conical spines on the first tarsomere of the fore leg is higher (30–40). The male antenna is less distinctly clavate (fig. i); the mid leg is bimerous 4
4. The third segment of the female antenna has an external prominence (fig. j); the number of cones on the first tarsomere of the fore leg is ca. thirty. *Ficus insipida* (Costa Rica, Panama, Mexico) 2. *T. costaricanus*
- The apical margin of the third antennal segment is more straight (fig. k), without such a prominence; the number of cones is ca. forty. (Mexico) 3. *T. mexicanus*

1. *Tetrapus americanus* Mayr (fig. 2a–b)

Mayr, Verh. zool.-bot. Ges. Wien **35**, 188 (1885, descr. ♀ ♂, Brazil, host: *Ficus* i); Mueller, Kosmos **10**, 59–60 (1886, host: Mayr's *Ficus* 1 = *Pharmacosycea* ? *radula*); Grandi, Boll. Ist. Ent. Univ. Bologna **1**, 197–199 (1928, redescri. ♀ ♂); Wiebes, Zool. Verh. Leiden **83**, 22 (1966, host listed under *Ficus maxima* P. Miller); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 346 (1986, Venezuela, host: *Ficus radula* = *F. maxima* P. Miller); Bouček, J. Nat. Hist. **27**, 206, fig. 56 (♀ mand.).

The female head is $1\frac{1}{4}$ times as long as wide across the compound eyes, which are two-thirds of the length of the cheek. Antenna (fig. 2a–b): the third antennal segment is simple; the fourth bears 6 or 7 sensilla on either facies. The mandible bears one apical tooth; the appendage is four times as long as its maximum width, it has 9 large teeth in the inner row and 11 in the outer. The first tarsomere of the fore leg bears ca. 30 ventral, conical spines.

The male antenna is rather slender. The mid leg is bimerous.

The host species is *Ficus maxima* P. Miller (synonym *F. radula* H.B. ex Willd.). *T. americanus* was collected in Brazil (Santa Catarina), Venezuela (Sucre) and Panama.

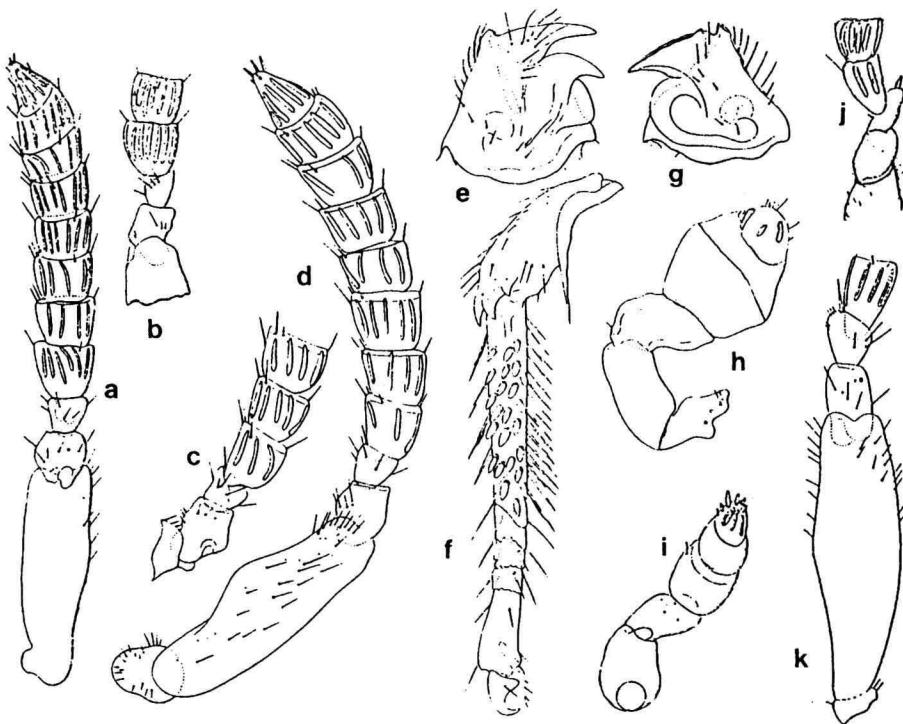


Fig. 2. Details of *Tetrapus*. a-d, j-k, (details of) female antenna, of: a-b, *T. americanus*, c-d, *T. ecuadoranus*, j, *T. costaricanus*, and k, *T. mexicanus*. e, g, female mandible, of: e, *T. ecuadoranus* and g, *T. mexicanus*. f, female fore tibia and tarsus of *T. ecuadoranus*. h-i, male antenna of: h, *T. ecuadoranus*, and i, *T. costaricanus*. a-b, after Grandi (1928, figs. xxxix, 2-3), c-d, e-f, h, after Grandi (1934, figs. i, 2-3, 4, ii, 4, and iii, 2, resp.), i-j, after Grandi (1925, figs. i, 2 and iii, 2), and k, after Grandi (1952, fig. vii, 1).

2. *Tetrapus costaricanus* Grandi (fig. 2i-j)

Grandi, Boll. Soc. Ent. Ital. **57**, 4-13 (1925, descr. ♀♂, Costa Rica); Ramirez, Univ. Kansas Sci. Bull. **49**, 11 (1970, ♀ in key), 42 (Costa Rica and Panama, host: *Ficus glabrata*); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 346 (1986, Mexico and Panama, host: *Ficus insipida* Willd.).

The female head is a bit over $1\frac{1}{3}$ times as long as wide across the compound eyes, which are two-thirds of the length of the cheek. The third antennal segment (fig. 2j) has an external prominence; the fourth bears a few sensilla on either facies. The mandible bears one apical tooth; the appendage is four times as long as its maximum width, it has 12-14 large teeth in the inner row and some 15 in the outer. The first tarsomere of the fore leg bears 30 ventral, conical spines.

The male has a slender antenna (fig. 2i). The mid leg consists of two segments.

The host species is *Ficus insipida* Willd. (synonym *F. glabrata* H.B. & K.) (Costa Rica, Panama, Mexico). Milton c.s. (1982) studied the fruiting phenology of *Ficus insipida* in Panama.

Tetrapus antillarum Ashmead (1900) is un-recognizable from its description (mainly notes on colour): see also Grandi (1934: 190-191). *Ficus insipida* is the only *Pharmacosycea*-fig of St. Vincent, which does suggest a synonymy of *T. antillarum* and *T. costaricanus*, but the last-mentioned has fifteen teeth in the outer row of the mandibular appendage and not nine, as Ashmead recorded for *T. antillarum*.

3. *Tetrapus mexicanus* Grandi (fig. 2g, k)

Grandi, Boll. Ist. Ent. Univ. Bologna **19**, 58–61 (1952, descr. ♀ ♂, Mexico).

The female antenna (fig. 2k) is much like that of *T. costaricanus*, but lacks the outer prominence on the third segment; the fourth segment bears some ten sensilla (in total). The mandible (fig. 2g) bears one apical tooth; the appendage is five times as long as its maximum width, it has 14 large teeth in the inner row, and twelve or 13 in the outer. The first tarsomere of the fore leg bears 40 ventral, conical spines.

The male antenna is not as distinctly clavate as that of *T. ecuadoranus*. The mid leg is reduced to two segments.

The host fig is unknown. The species was recorded from southern Mexico (state of Morelos).

4. *Tetrapus ecuadoranus* Grandi (fig. 2c–f, h)

Grandi, Boll. Ist. Ent. Univ. Bologna **7**, 186–191 (1934, descr. ♀ ♂, Ecuador); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 347 (1986, Panama, host: *Ficus yoponensis* Desv.).

The female head is $1\frac{1}{3}$ times as long as wide across the compound eyes, which are three-quarters of the length of the cheek. Antenna (fig. 2c–d): the third antennal segment is simple; the fourth bears three sensilla on either facies. The mandible has two large apical teeth; the appendage is four times as long as its maximum width, it has 11–12 large teeth in the inner row and 15–16 in the outer. The first tarsomere of the fore leg (fig. 2f) bears 25 ventral, conical spines.

The male has a distinctly clavate antenna (fig. 2h). The mid leg consists of only one segment.

The host species is *Ficus yoponensis* Desv. (Ecuador, Panama). Milton c.s. (1982) studied the fruiting phenology of *Ficus yoponensis* in Panama.

5. *Tetrapus* spec., Bouček (fig. 1)

Bouček, J. Nat. Hist. **27**, figs. 53–55 (1993, figures of *Tetrapus* spec. near *ecuadoranus* Grandi from *Ficus tonduzii*, Costa Rica).

Bouček figured the female (fig. 1) and male of this species from *Ficus tonduzii* Standley (Costa Rica), but did not name or describe it.

6. *Tetrapus* spec., Ramirez

Ramirez, Univ. Kansas Sci. Bull. **49**, 42 (1970, descr. notes ♀ ♂, Costa Rica, host: *Ficus crassiuscula*).

The female mandible has two saw-like appendages (Bouček, 1993: 205, has examined females of three species with appendages of this type, and discussed some characters in which they differ). The male has three fully developed pairs of legs.

The host species is *Ficus crassiuscula* Warb. The species was mentioned for Costa Rica, but a formal description never appeared.

Pegoscopus Cameron (fig. 3)

Cameron, Primer Inf. Anual Est. Centr. Agron. Cuba for 1906, 276 (1906, descr. ♀, type-species *Pegoscopus longiceps* Cameron); Grandi, Boll. Ist. Ent. Univ. Bologna **1**, 211–217 (p.p.), 218–220 (1928, first edition of catalogue) and Ibid. **26**, 328–334 (1963, latest edition); Ramirez, Univ. Kansas Sci. Bull. **49**, 1–44 (1970, subgenus of *Blastophaga* Gravenhorst, spp. of Costa Rica); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 351–354 (1986, host relationships listed and discussed); Bouček, J. Nat. Hist. **27**, 104–105 (1993, key to subgenera, notes on classification); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 167–183 (1995, Meso-American species).

Synonyms: *Eisenia* Ashmead [pre-occupied], Mem. Carnegie Mus. **1**, 233–234 (1904, descr. ♀, type-species *Eisenia mexicana* Ashmead). *Eiseniella* Ashmead [pre-occupied], Proc. Ent. Soc. Wash. **8**, 30–31 (1906, replacement name). *Secundeisenia* Schulz, Spolia Hym., 146 (1906, replacement name, younger than *Pegoscopus* Cameron – see Ramirez, 1970, Univ. Kansas Sci. Bull. **49**, 11). *Allopade* Strand, Arch. Naturgesch. Berlin **77**, 199 (1911, unnecessary replacement name). *Julianiella* Grandi, Boll. Lab. Zool. Portici **13**, 20 (1919, descr. ♀ ♂, type-species *Blastophaga aguilar* Grandi); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, key to species, ♀). *Julianiella* Grandi, Boll. Ist. Ent. Univ. Bologna **1**, 69, 218 (1928, unnecessary replacement name). *Valentiniella* Grandi, Boll. Lab. Zool. Portici **13**, 25–26 (1919, descr. ♀ ♂ type-species *Blastophaga estherae* Grandi). *Valentiniella* Grandi, Boll. Ist. Ent. Univ. Bologna **1**, 69, 219 (1928, unnecessary replacement name). *Tristaniella* Grandi, Boll. Ist. Ent. Univ. Bologna **26**, 240 (1963, descr. ♀ ♂, type-species *Blastophaga astoma* Grandi).

The female head usually is a bit shorter than wide across the compound eyes (0.9–0.95), or more distinctly so (0.8–0.85) or equal in length and width, or a

bit longer (1.05–1.1); in most species the eyes are distinctly longer than the cheek (1.5–2.5), but they may be equal or a little longer (1–1.25)¹.

There are three ocelli. The antennae have eleven free segments (apparently ten in one species, i.e., no. 42, *P. ileanae*); the process of the third segment may reach to half the fifth segment, which has one row of relatively few sensilla. A few authors recorded the total number of sensilla per segment, but Grandi gave the number per facies², as evidently, also did Ramirez. In about one-third of the species the sensilla on the sixth and seventh segments, those on all flagellar segments, those alternately on the 'even' and 'uneven' segments, or only those on the eleventh segment, are situated in 1½–2 rows; in the remaining two-thirds of the species there is only one row. In no. 7, *P. flagellatus*, the sensilla are long and flexible (sensilla chaetica). Some species have more or less, robust (flat) setae on some (especially the) distal segments (nos. 28, *P. flaviscapus*, 24, *P. kraussi*, 26, *P. silvestrii*, 27, *P. tristani* and 25, *P. urbanae*). Next to the median lobe, the epistomal margin has two lateral lobes (especially prominent in nos. 39, *P. cumanaensis* and 10, *P. hoffmeyeri*). The mandibles have two apical teeth, but they may have only one, acute tooth (in nos. 30, *P. jimenezi* and 29, *P. mexicanus*). The maxillae bear two sub-apical setae (exceptionally one, as e.g., in no. 43, *P. orozcoi*, or three, as in no. 16, *P. aguilari*) and one, in a few species three, lateral setae, or none (in four species).

The venation of the fore wing is incomplete: even in the few species that have a distinct postmarginal vein it is not more than two-thirds of the length of the stigmal, but mostly it is non-existent or very short, and in about ten species (of the former subgenus *Julianella*) the venation is reduced to an incomplete sub-marginal vein, ending in the parastigma. There are pollen-pockets (small in a few species) and coxal corbiculae (recorded absent in nos. 50, *P. carlosi* and 34, *P. mariae*). The fore tibia bears a dorso-apical comb of two or three teeth, the hind tibia a bi- or tri-cuspidate antiaxial tooth, which, however, has only one tooth in no. 42, *P. ileanae*, more than three cusps in nos. 24, *P. kraussi* and 25, *P. urbanae*, and a series of additional toothlets in no. 23, *P. estherae*.

The spiracular peritremata of the eighth urotergite are small and sub-circular in most species, but in nos. 8, *P. astomus*, 10, *P. hoffmeyeri* and 9, *P. longiceps* they are large and oval. The hypopygium has a usually short spine, at the base of which in all but one species (i.e., no. 7, *P. flagellatus*) there is a row of seven or eight hyaline setae. The valves of the ovipositor usually are distinctly longer than the gaster (1.2–1.75) in ca. half of the species, distinctly shorter (0.7–0.9) in three and about as long as the gaster (0.95–1.1) in the remainder.

¹ They were recorded by Ramirez (1970) to be a bit shorter in nos. 34, *P. mariae* and 50, *P. carlosi*, but this is not apparent from his figures 102 and 103. The cheek is usually measured from the lower rim of the eye until the mandibular groove ('fino al limite delle fosse mandibolari', in Grandi's words), but Ramirez must have measured the length until the lowest corner of the head.

² Yet, the numbers seen in antiaxial and axial aspects may not be equal: see e.g., Grandi, 1938, fig. III, 1 and 2 (*P. attentus*), v, 1 and 2 (*P. amabilis*), vii, 1 and 2 (*P. ambiguus*), xi, 1 and 2, and xiii, 1 and 2 (*P. assuetus*).

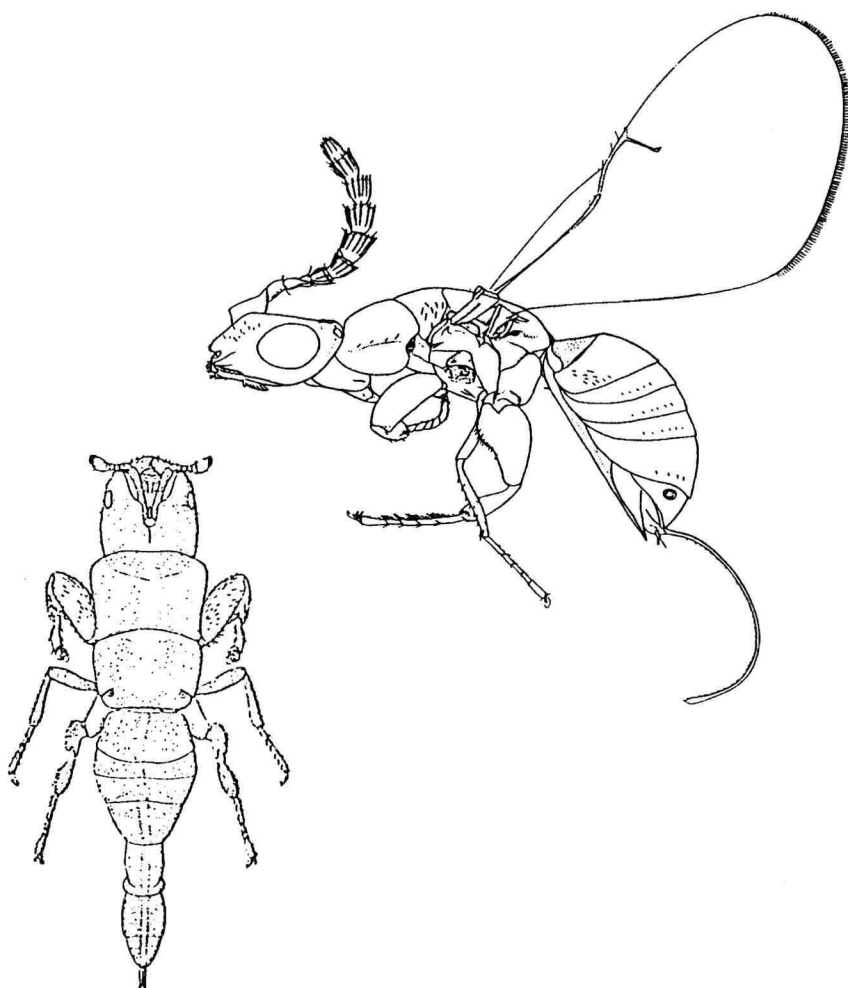


Fig. 3. *Pegoscapus franki*, female, after Bouček (1993, fig. 49), and male of *P. astomus*, after Grandi (1920, fig. III).

The male head usually is longer than wide (1.15–1.4) or approximately as long as wide (0.95–1.1); it is shorter than wide (0.85–0.9) in four species: the long heads are found in nos. 21, *P. grandii*, 20, *P. tomentellae* and 15, *P. tonduzi* (all three 1.4), no. 47, *P. williamsi* (1.35) and no. 22, *P. torresi* (1.25). The epistomal margin usually is more or less straight, but it bears a distinct prominence in no. 47, *P. williamsi*. The eye is situated laterally, in the extreme front of the head, leaving no cheek, and it is one-sixth to one-third of the length of the head. The antennae are borne in a more or less wide and deep, anterior groove, divided in the middle, and consist of a scape, long and slender in no. 8, *P. astomus*, but usually $1\frac{1}{2}$ times as long as wide, a pedicel and one or two anuli (three or two rather long funicular segments in nos. 8, *P. astomus* and 7, *P. flagellatus*) and a usually divided club, four or five times as long as wide, but globular in two

(nos. 8, *P. astomus* and 7, *P. flagellatus*). Except for the normally shaped mandibles, the mouth-parts are reduced.

The pronotum, usually bearing a distinct collar, is longer than wide anteriorly (1.15–2) or approximately as long as wide (0.9–1.1), widening posteriad, but distinctly shorter than wide (0.75) in no. 8, *P. astomus*. The meso- and metanotum are fused, and the propodeum is only more or less distinctly separate antero-laterally; the spiracular peritremata occupy (almost) the whole lateral length of the propodeum in nos. 44, *P. bifossulatus*, 15, *P. tonduzi* and 47, *P. williamsi*, but usually they are shorter (0.5–0.8) or even much shorter (0.25–0.3). The fore tarsi are bimerous (indistinctly pentamerous in no. 8, *P. astomus*), the mid and hind tarsi pentamerous (in no. 47, *P. williamsi* the mid tarsi are tetramerous, and in nos. 12, *P. ambiguus* and 47, *P. williamsi* the hind tarsi may be tetramerous). The colour is yellowish.

There are now 46 species known, two of which, described in the male sex only, remain incertae sedis (nos. 51, *P. danorum* and 52, *P. obscurus*); one nomen nudum is unrecognized¹.

Grandi (1919: 20, 25–26; 1963a: 340; 1963b: 328–334) recognized five subgenera (which he classified in *Blastophaga* Gravenhorst), three of which he considered probably identical (Grandi, 1963b: 333 – *Secundeisenia* probably includes *Pegoscapus* and *Valentinella*). This would leave *Pegoscapus* (the older name), *Julianella* and *Tristaniella*, but I consider it better to recognize a number of species-groups in one genus *Pegoscapus*.

One can try some grouping of *Pegoscapus* on conspicuous differential characters, as follows.

- Some males are immediately distinct by the antennae having three or two rather long funicular segments and a distinctly globular club, such as in nos. 8, *P. astomus* and 7, *P. flagellatus*, respectively, the females of which, moreover, have a peculiar sensory structure in the antennal pedicel (*P. astomus*) and flagellar antennal sensilla (*P. flagellatus*).

- The females of nos. 10, *P. hoffmeyer*i and 9, *P. longiceps*, as also those of 8, *P. astomus*, have large, oval spiracular peritremata on the eighth urotergite, which in the other species are smaller, mostly sub-circular.

- The females of nos. 39, *P. cumanensis* and 10, *P. hoffmeyer*i are distinct by the prominent lateral lobes of the epistomal margin.

- The females of nos. 28, *P. flaviscapus*, 26, *P. silvestrii*, 27, *P. tristani* and 25, *P. urbanae* have robust, flat setae on some distal antennal segments.

- The females of nos. 23, *P. estherae*, 24, *P. kraussi* and 25, *P. urbanae* have

¹ *Blastophaga schwarzi* Ashmead, Trans. ent. Soc. London for 1900, 250–251 (1900, 'from Florida', mentioned in comparison with *B. picipes* and *B. insularis*); Grandi, Boll. Lab. Ent. Bologna 7, 195 (1934, nomen nudum).

more than three cusps in the antiaxial tooth of the hind tibia; no. 42, *P. ileanae* has only one tooth.

The species nos. 8, *P. astomus*, 10, *P. hoffmeyer*i and 25, *P. urbanae* are cited twice in the enumerations above, having more than one, conspicuous differential character. No. 8, *P. astomus* was used as a type-species of a separate subgenus, i.e., *Tristaniella* Grandi.

Obvious differences are found in the sensilla of the female antenna being arranged in 1 or 1½-2 rows, in the female fore wing-venation being reduced, and in the female fore tibia bearing two or three teeth in the dorso-apical comb, but these characters are not at all correlated.

The host-*Ficus* are classified with the section *Americana* of subgenus *Urostigma*. Berg (1989: 608–610) discussed a sub-division of the *Americana*, which can be compared with that of *Pegoscapus*. The grouping of the fig-species involved is as follows.

- *Ficus citrifolia*-complex. Fig wasps are known from *F. citrifolia* (nos. 35, *P. franki*, 15, *P. tonduzi* and 47, *P. williamsi*) and *F. dugandii* (no. 9, *P. longiceps*).

- *Ficus aurea*-complex. Fig wasps are known from *F. aurea* (no. 29, *P. mexicanus*), *F. isophlebia* (no. 25, *P. urbanae*), *F. jimenezii* (no. 30, *P. jimenezii*) and *F. tuerckheimii* (nos. 50, *P. carlosi* and 34, *P. mariae*).

- *Ficus trigonata*-complex. Fig wasps are known from *F. combsii* (no. 46, *P. bruneri*), *F. gomelleira* (no. 45, *P. brasiliensis*), *F. 'lapathifolia'* (no. 16, *P. aguilar*i), *F. trigonata* (no. 21, *P. grandii*) and a fig near *F. trigonata* (no. 19, *P. lopesi*).

- *Ficus pertusa*-complex. Fig wasps are known from *F. padifolia* (nos. 26, *P. silvestrii* and 27, *P. tristani*), *F. turbinata* (no. 11, *P. baschierii*) and *F. ? trachelosyce* (no. 41, *P. aemulus*).

- *Ficus americana*-complex. Fig wasps are known from *F. guinanensis* (no. 7, *P. flagellatus*) and *F. oerstediana* and *F. perforata* (no. 38, *P. insularis*).

The wasp-species, with their hosts, are indicated in table 1: there is a (weak) parallel in (some species of) the *F. aurea*-, *trigonata*- and *pertusa*-groups, but not at all in the other.

There are some records of two species of wasp being associated with one species of fig, and one of one species of wasp being associated with two species of fig.

- Nos. 21, *P. grandii*, 46, *P. bruneri* and 51, *P. danorum* seem to be associated with (forms of) *F. trigonata*.

- Nos. 26, *P. silvestrii* and 27, *P. tristani* both are associated with *F. padifolia*.

- Nos. 50, *P. carlosi* and 34, *P. mariae* develop side by side in the same receptacles of *F. tuerckheimii*. Both species lack coxal corbiculae.

- Ramirez (1970: 43) recorded No. 23, *P. estherae* and a *Pegoscapus* spec. from *F. costaricana*.

- No. 37, *P. gemellus*, is recorded from both *F. bullenei* and *F. popenoei*.

Table 1. The species of *Pegoscapus*, classified in groups, and their species of host-*Ficus*.

ti 1:				antenna with							
2	7.	<i>flagellatus</i>		flagellae	} 1 row of sensilla	<i>Ficus guianensis</i>	■				
2	8.	<i>astomus</i>	} large stigma			<i>dugandii obtusifolia</i>	✱				
3	9.	<i>longiceps</i>									
3	10.	<i>hoffmeyeri</i>									
2	11.	<i>baschierii</i>	} rows on VI-VII		} 1½-2 rows of sensilla	<i>turbinata</i>	♥				
2	12.	<i>ambiguus</i>				<i>nymphaeifolia citrifolia*</i> 'lapathifolia'	✱				
2	13.	<i>amabilis</i>						} rows on ± all segments	♦		
2	14.	<i>piceipes</i>					<i>near trigonata tomentella</i>				
2	15.	<i>tonduzi</i>								} rows only on segm. XI	♦
3	16.	<i>agulari</i>									
2	17.	<i>aerumnosus</i>									
2	18.	<i>philippi</i>									
2	19.	<i>lopesi</i>									
2	20.	<i>tomentellae</i>									
3	21.	<i>grandii</i>									
3	22.	<i>torresi</i>									

1 row of sensilla:

ti 1:		<i>Ficus</i>	ti 1:		<i>Ficus</i>	
3	23.	<i>estherae</i>	2	42.	<i>ileanae</i>	<i>schippii</i>
3	24.	<i>kraussi</i>	2	43.	<i>orozcoi</i>	<i>colubrinae</i>
3	25.	<i>urbanae</i>	2	44.	<i>bifossulatus</i>	
3	26.	<i>silvestrii</i>	2	45.	<i>brasiliensis</i>	<i>gomelleira</i> ♦
3	27.	<i>tristani</i>	2	46.	<i>bruneri</i>	<i>combsii</i> ♦
3	28.	<i>flaviscapus</i>	2	47.	<i>williamsi</i>	<i>citrifolia</i> ✱
			2	48.	<i>groegeri</i>	<i>mollicula</i>
			2	49.	<i>attentus</i>	
			2	50.	<i>carlosi</i>	<i>tuerckheimii</i> ♣

incertae sedis:

3	29.	<i>mexicanus</i> ³	<i>aurea</i> ♣	51.	<i>danorum</i>	<i>trigonata</i> ♦
3	30.	<i>jimenezi</i> ³	<i>jimenezii</i> ♣	52.	<i>obscurus</i>	<i>longifolia</i>
3	31.	<i>argentinensis</i>	<i>maroma</i>			
3	32.	<i>cabrerai</i>	<i>?luschnatiana</i>			
3	33.	<i>elisae</i>				
3	34.	<i>mariae</i>	<i>tuerckheimii</i> ♣			
3	35.	<i>franki</i>	<i>citrifolia</i> ✱			
3	36.	<i>herrei</i>	<i>paraensis</i>			
3	37.	<i>gemellus</i>	<i>bullenei</i> & <i>popenoei</i>			
3	38.	<i>insularis</i>	<i>perforata</i> & <i>oerstediana</i> ■			
3	39.	<i>cumanensis</i>				
3	40.	<i>assuetus</i>				
3	41.	<i>aemulus</i>	<i>?trachelosyce</i> ♥			

¹ anterior tooth ti iii > tri-cuspidate

² antenna with large bristles

³ mandible uni-dentate

✱ *F. citrifolia*-complex

♣ *F. aurea*-complex

♦ *F. trigonata*-complex

♥ *F. pertusa*-complex

■ *F. americana*-complex

* or *F. hemsleyana* ✱

The species may be identified by using the following key. In some of the couplets the differentiation (of the females) is rather weak, but there are reasons to believe the species different, e.g., because Grandi (1938: 63) explicitly said so (couplet no. 12), or because the males differ convincingly (e.g., couplet no. 39).

KEY TO THE SPECIES OF PEGOSCAPUS (mainly females) (figs. 4–5)

1. The antennal segments, from the fifth onwards, bear one whorl of about eight long sensilla chaetica (fig. 4a). [The male antenna (fig. 4c) has a robust scape, two sub-quadrangular anuli, and the club is divided]. *Ficus guianensis* (Peru) . . . 7. *P. flagellatus*
 - These antennal segments bear (a) row(s) of sensilla linearia (fig. 4b) 2
2. The spiracular peritremata of the eighth urotergite are large, oval, about one quarter of the length of the gaster 3
 - The spiracular peritremata are much smaller, sub-circular, as in fig. 3 5
3. The antennal pedicel bears a peculiar oval, sensory structure (fig. 4d). [The male antenna (fig. 4g) has a slender scape, three long funicular segments, and the globular club is composed of three segments]. *Ficus crassiuscula* [?] (Costa Rica) . . . 8. *P. astomus*
 - The antennal pedicel does not bear such a structure. [The male antenna has two short anuli, and the simply divided club is not globular] 4
4. The epistomal margin is evenly lobed (as in fig. 4e). The antennal scape is oval in shape (as in fig. 4i) and the eleventh segment bears one row of sensilla (as in fig. 4i). (Cuba); *Ficus dugandii* (Panama) 9. *P. longiceps*

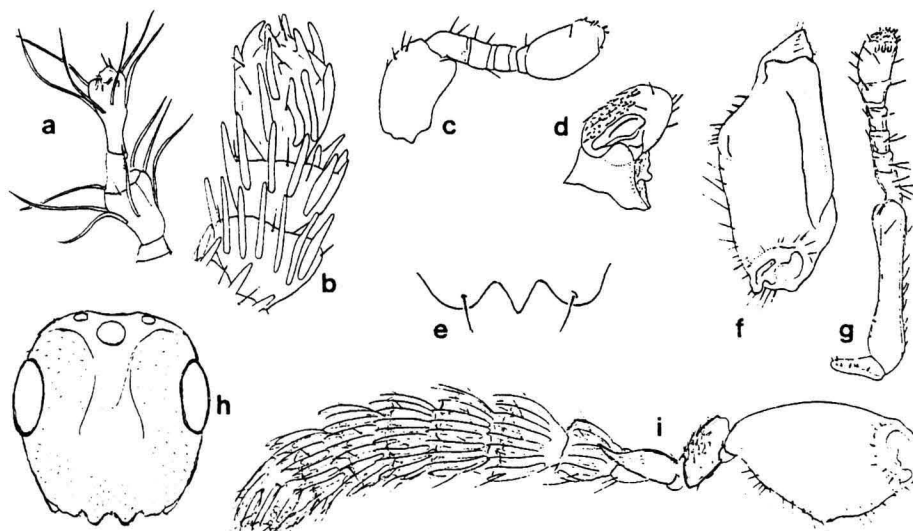


Fig. 4. Details of *Pegoscapus*. a–b, distal segments of female antenna, of: a, *P. flagellatus*, and b, *P. tomentellae*. c and g, male antenna, of: c, *P. flagellatus*, and g, *P. astomus*. d, sensory organ in female pedicel of *P. astomus*. e, female epistomal margin of *P. groegeri*. f, female antennal scape of *P. hoffmeyer*. h, female head of *P. hoffmeyer*. i, female antenna of *P. bruneri*. a–c, after Wiebes (1983, figs. 15, 7, and 22, resp.), d and g, after Grandi (1920, figs. 1, 5 and v, 1), f and h, and i, after Grandi (1934, figs. iv, 2 and 1, and vi, 1, resp.).

- The lateral lobes of the epistomal margin (fig. 4h) are very prominent. The antennal scape is rectangular in shape (fig. 4 f) and the eleventh segment bears 1½ row of sensilla. (Paraguay); *Ficus obtusifolia* (Costa Rica, Panama) 10. *P. hoffmeyer*
- 5. The sensilla on the sixth and seventh segments of the antenna (fig. 5a–b), those on most antennal segments (fig. 5c), or only those on the eleventh (fig. 4b) are arranged in 1½–2 rows 6
 - These antennal segments bear only one row of sensilla (fig. 4i) 16
- 6. Only the sixth and seventh segments bear more than one row 7
 - (Most of) all flagellar segments bear more than one row 9
 - Only the eleventh segment has more than one row 13
- 7. The maxillae bear three lateral setae (fig. 5g). (Mexico); *Ficus turbinata* (Panama, Venezuela) 11. *P. baschierii*
 - The maxillae bear only one lateral seta (fig. 5f) 8
- 8. The fore tibia bears two teeth in the dorso-apical comb (fig. 5h). (Brazil) 12. *P. ambiguus*
 - The fore tibia bears three teeth in the dorso-apical comb (as in fig. 5e). (Brazil) 13. *P. amabilis*
- 9. The eye is distinctly longer than the cheek (1.6–1.8). The valves of the ovipositor are distinctly longer than the gaster 10
 - The eye is not much longer than the cheek. The valves of the ovipositor are about as long as the gaster, or a bit shorter or longer 11
- 10. The maxillae bear one or two lateral setae. The valves of the ovipositor are much longer than the gaster (1.75). [The spiracular peritremata occupy three-fifths of the male propodeum]. (St. Vincent, W.I.); *Ficus nymphaeifolia* (Panama) 14. *P. piceipes*
 - The maxillae bear no lateral setae. The valves of the ovipositor are shorter: 1.2 times as long as the gaster. [The spiracles occupy the total length of the male propodeum]. *Ficus hemsleyana* (Costa Rica, Venezuela); *Ficus citrifolia* (Panama) 15. *P. tonduzi*
- 11. The head is distinctly shorter than wide across the compound eyes (0.85). The maxillae bear three apical and also three lateral setae, the labium two apical setae. The venation of the fore wing is reduced to an incomplete submarginal vein. The fore tibia bears three dorso-apical teeth. *Ficus 'lathifolia'* (Costa Rica) 16. *P. aguilari*
 - The head is about as long as wide across the compound eyes. The maxillae bear two apical setae and one lateral, the labium one apical seta. The venation of the fore wing is more complete, including a short postmarginal vein 12
- 12. Two species that resemble each other very much, but according to Grandi (1938: 63) are distinct specifically:
 - The ovipositor-valves are shorter than the gaster. [The male head is as long as wide]. *Ficus ? adhatodifolia* (Brazil) 17. *P. aerumnosus*
 - The ovipositor-valves are about as long as the gaster. [The male head is longer than wide (1.15)]. (Argentina) 18. *P. philippi*
- 13. The fore tibia bears two teeth in the dorso-apical row 14
 - The fore tibia bears three teeth in the dorso-apical row 15
- 14. The length of the head is three quarters of the width across the compound eyes. The valves of the ovipositor are 1½ times as long as the gaster. (Brazil); *Ficus* near *trigonata* (Panama) 19. *P. lopesi*
 - The head is longer (l/w 0.9). The valves of the ovipositor are shorter relative to the length of the gaster (1.2). *Ficus tomentella* (Brazil) 20. *P. tomentellae*

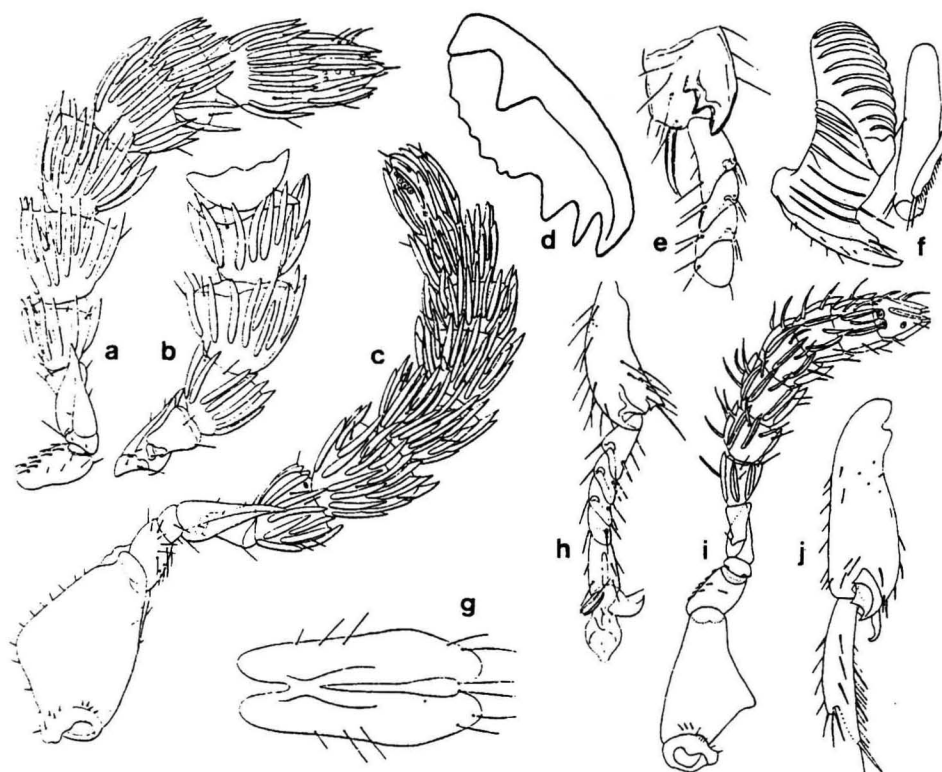


Fig. 5. Details of female *Pegoscapus*. a-b, c, and i, antenna of: a-b, *P. ambiguus*, c, *P. aerumnosus*, and i, *P. urbanae*. d and j, antiaxial tooth of hind tibia of: d, *P. estherae*, and j, *P. urbanae*. e and h, fore tibia of: e, *P. aemulus*, and h, *P. ambiguus*. f and g, mandible and maxillo-labial complex, or only the complex, of: f, *P. mexicanus*, and g, *P. baschierii*. a-c, e, and g, after Grandi (1938, figs. vii, 1 and 2, ix, 1, i, 7, and vii, 8, resp.), f, after Wiebes (1983, fig. 31), g, after Grandi (1952, fig. ii, 4), i and j, after Ramirez (1970, figs. 45 and 51).

15. The eye is $1\frac{1}{2}$ times as long as the cheek. There is only one lateral seta on the maxillae. The valves of the ovipositor are $1\frac{1}{4}$ times as long as the gaster. (Ecuador); *Ficus trigonata* (Panama) 21. *P. grandii*
 - The eye is fully two times as long as the cheek. The maxillae bear four lateral setae. The valves of the ovipositor are a bit shorter than the gaster. *Ficus velutina* (Costa Rica) 22. *P. torresi*
16. The fore tibia bears three teeth in the dorso-apical comb 17
 - The fore tibia bears two teeth in the dorso-apical comb 33
17. The antiaxial tooth of the hind tibia is rather wide and bears a row of six small toothlets, or five large cusps 18
 - The antiaxial tooth of the hind tibia is less wide, tri-cuspidate 20
18. The antiaxial tooth of the hind tibia bears an axial row of small toothlets next to the antiaxial, large cusps (fig. 5d). *Ficus costaricana* (Costa Rica, Panama) 23. *P. estherae*
 - The antiaxial tooth of the hind tibia bears five large cusps (fig. 5j) 19

19. The sixth to tenth antennal segments bear 4–6 sensilla per facies and conspicuous flat, long, projecting bristles (fig. 5i). *Ficus isophlebia* (Costa Rica) 25. *P. urbanae*
- The sixth to tenth antennal segments bear 7–8 sensilla per facies and less flat, projecting bristles. *Ficus cotinifolia* (Mexico) 24. *P. kraussi*
20. The distal antennal segments are rather setose, or they bear rather long setae, much as in fig. 5i) 21
- The distal antennal segments do not bear such setae 23
21. The valves of the ovipositor are about as long as the gaster. *Ficus padifolia* (Costa Rica, Panama) 26. *P. silvestrii*
- The valves of the ovipositor are $1\frac{1}{2}$ times as long as the gaster 22
22. The head is shorter than wide across the compound eyes (0.9) and the eye is 2.2 times as long as the cheek. *Ficus padifolia* (Costa Rica) 27. *P. tristani*
- The head is longer than wide across the compound eyes (1.1) and the eye is 1.8 times as long as the cheek (Brazil) 28. *P. flaviscapus*
23. The mandible bears one acute, apical teeth (fig. 5f) 24
- The mandible is bi-dentate 25
24. The head is distinctly shorter than wide across the compound eyes and the eye is 1.8 times as long as the cheek. The fore wing has a short postmarginal vein. (Mexico); *Ficus aurea* (Florida, USA) 29. *P. mexicanus*
- The head is almost as long as wide across the compound eyes and the eye is two times as long as the cheek. The postmarginal vein is totally lacking. *Ficus jimenezii* (Costa Rica) 30. *P. jimenezi*
25. The sixth to ninth antennal segments bear only 2–3 sensilla per facies. The valves of the ovipositor are distinctly shorter than the gaster (0.7). *Ficus maroma* (Argentina) 31. *P. argentinensis*
- The sixth to ninth antennal segments bear more (ca. 4–10) sensilla per facies. The valves of the ovipositor are longer relative to the length of the gaster 26
26. The sixth to ninth antennal segments bear ca. 4–7 sensilla per facies 27
- These antennal segments bear 8–10 sensilla per facies 32
27. The valves of the ovipositor are shorter than the gaster (0.95). The postmarginal vein of the fore wing seems rather long: one-third of the stigmal. *Ficus ? luschnatiana* (Argentina) 32. *P. cabrerai*
- The valves of the ovipositor are at least as long as the gaster (1–1.6). The postmarginal vein is at most one-fifth of the stigmal 28
28. The eye is a bit longer than the cheek. [The male head is longer than wide (1.2)]. (Peru) 33. *P. elisae*
- The eye is more distinctly longer than the head (1.3). [The male head is longer than wide]. *Ficus tuerckheimii* (Costa Rica) 34. *P. mariae*
- The eye is more than $1\frac{1}{2}$ times as long as the cheek. [The male head is as long as wide, or a bit shorter] 29
29. The valves of the ovipositor are about as long as the gaster 30
The valves of the ovipositor are $1\frac{1}{2}$ times as long as the gaster 31
30. The sensilla on the sixth to ninth antennal segments number about 10–12. *Ficus citrifolia* (Florida, USA) 35. *P. franki*
- There are 5–8 sensilla on the sixth to ninth antennal segments. *Ficus paraensis* (Panama) 36. *P. herrei*

31. The eye is 1.6 times as long as the head. *Ficus bullenei* and *popenoei* (Panama) 37. *P. gemellus*
 - The eye is fully two times as long as the cheek. (St. Vincent, W.I.); *Ficus americana* (Panama) 38. *P. insularis*
32. The maxillae bear no lateral setae; the labium has two apical setae. (Venezuela) 39. *P. cumanensis*
 - The maxillae bear one lateral seta; the labium has two apical setae. (Brazil) 40. *P. assuetus*
 - The maxillae bear one lateral seta; the labium has one apical seta. (Brazil) 41. *P. aemulus*
33. The antiaxial tooth of the hind tibia is simple. The antenna appears to have only ten segments. The maxillae bear no lateral setae. *Ficus schippii* (Costa Rica) 42. *P. ileanae*
 - The antiaxial tooth of the hind tibia is bi-cuspidate. The maxillae bear one lateral seta. *Ficus colubrinae* (Costa Rica, Panama) 43. *P. orozcoi*
 - The antiaxial tooth of the hind tibia is tri-cuspidate 34
34. The venation of the fore wing is reduced to an incomplete submarginal vein (some traces of the marginal and stigmal veins may be visible) 34
 - The fore wing has distinct marginal and stigmal veins 37
35. The valves of the ovipositor are shorter than the gaster (0.9). The fifth to tenth antennal segments bear ca. 10 sensilla. [The spiracular peritremata occupy the total length of the male propodeum]. (Brazil) 44. *P. bifossulatus*
 - The valves of the ovipositor are distinctly longer than the gaster 36
36. The maxillae bear one lateral seta. *Ficus gomelleira* (Brazil) 45. *P. brasiliensis*
 - The maxillae bear two lateral setae. *Ficus combsii* (Cuba, Colombia) 46. *P. bruneri*
37. The mandibular appendage bears 11 ventral lamellae. The maxillae bear no lateral setae. [The male epistomal margin has a median prominence]. (Barbados, W.I.); *Ficus citrifolia* (Puerto Rico) 47. *P. williamsi*
 - The mandibular appendage bears 6–9 ventral lamellae. The maxillae bear one or two lateral setae. [The male epistomal margin is straight] 38
38. The maxillae bear one lateral seta. The eye is $2\frac{1}{2}$ times as long as the cheek. *Ficus mollicula* (Venezuela) 48. *P. groegeri*
 - The maxillae bear two lateral setae (not known for *P. attentus*) 39
39. Two species, the females of which are very difficult to differentiate because of their incomplete description. The males differ:
 - The spiracular peritremata occupy five-eighths of the length of the propodeum (Brazil) 49. *P. attentus*
 - The spiracular peritremata seem to occupy only one-third of the length of the propodeum. *Ficus tuerckheimii* (Costa Rica) 50. *P. carlosi*

7. *Pegoscopus flagellatus* Wiebes (fig. 4a, c)

Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244, 248–250 (1983, descr. ♀♂, Peru, host: *Ficus guianensis* Desv.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 181 (1995, host record discussed).

The female head is distinctly shorter than wide across the compound eyes (0.8), which are 1.6 times as long as the cheek. The antenna has ten segments, which, from the fifth onwards, bear one whorl of ca. eight long, flexible sensilla chaetica (fig. 4a). The mandible has one, rather acute, tooth, and one gland; the appendage bears seven ventral lamellae. The maxilla bears two sub-apical setae only; the labium has one apical seta.

The venation of the fore wing is reduced to the submarginal vein and a faint marginal. The fore tibia has a bidentate dorso-apical comb; the antiaxial tooth of the hind tibia is bi-cuspidate. The spine of the hypopygium bears no hyaline setae. The ovipositor-valves are as long as the gaster. The total length is ca. 1.0 mm. The colour is dark brown.

The male head is a bit wider than long (1.1); the eye is one quarter of the length of the head. The antenna (fig. 4c) has two anuli and the club is divided at one-tenth of its length.

The pronotum is rectangular in outline, distinctly wider than long (1.4). The spiracular peritremata of the propodeum are small, subcircular, dorsal in position. The fore tibia bears two dorso-apical teeth and three ventral; the hind tibia has a bicuspidate antiaxial tooth and a simple axial.

The host fig is *Ficus guianensis* Desv. (Peru), which is a form of *F. americana* Aublet, but in Costa Rica and in the Antilles (St. Vincent), *F. americana*, as *F. oerstediana* and *perforata*, is associated with no. 38, *Pegoscapus insularis*.

The species nos. 8–10, viz., *Pegoscapus astomus*, *longiceps* and *hoffmeyer*i share the large stigmal peritremata of the eighth urotergite in the female ('stigma'), but do not seem to form a close taxonomic group.

8. *Pegoscapus astomus* (Grandi) (figs. 3, ♂; 4d, g)

Grandi, Boll. Lab. Zool. Portici **14**, 252–261 (1920, *Blastophaga*, descr. ♀ ♂, Costa Rica, host: *Ficus crassiuscula* Warb.); Ramirez, Univ. Kansas Sci. Bull. **49**, 4, 36 (1970, *Blastophaga* (*Tristaniella*), host: *Ficus torresiana*); Wiebes, 1986, Proc. Kon. Ned. Akad. Wet. (C) **89**, 352–353 (1986, discussion of host record); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 169 (1995, ♀ in key).

The female head is shorter than wide across the compound eyes (0.85), which are two times as long as the cheek. The antennal pedicel bears a peculiar oval sensory structure (fig. 4d); the fifth to eleventh segments bear one row of sensilla, in the following numbers per facies; the fifth 4, the sixth 5, the seventh and tenth 6, the eighth and ninth 7, and the eleventh 2 or 3. The mandibular appendage bears 5 or 6 ventral lamellae, the proximal one of which is straight, not hooked. The maxillae bear two sub-apical setae; the labium has two apical setae.

The marginal, stigmal, and postmarginal veins of the fore wing are approximately in ratio 2 : 3 : 2. The fore tibia bears two dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The spiracular peritremata of the eighth

urotergite are large (Bouček, 1993: 204). The valves of the ovipositor are three quarters of the length of the gaster. The total length is 1.2–1.25 mm. The colour is chestnut-brown.

The male head is 1.2 times as long as wide; the eye is two times as long as the cheek and one-fifth of the length of the head. The antennal scape (fig. 4g) is long and slender, there are three long anuli and the club is composed of three segments.

The pronotum is subquadrangular, shorter than wide (0.75). The spiracular peritremata are small, subcircular, situated dorsally in the anterior part of the propodeum. The fore tarsus is indistinctly pentamerous.

The host fig was given as *Ficus crassiuscula* Warb. (Costa Rica), but Ramirez recorded the species from *F. torresiana* Standley, a synonym of *F. macbridei* Standley. Both are species of *Pharmacosycea*, and the records may be wrong.

9. *Pegoscapus longiceps* Cameron

Cameron, Primer Informe Anual Est. Centr. Agron. Cuba for 1906, 275–276 (1906, descr. ♀, Cuba); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 352 (1983, syn.: *P. jimenezi* (Grandi)?; Bouček, J. Nat. Hist. **27**, 205 (1993, (syn-)type studied, different from *P. jimenezi*); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 172–173 (1995, redescr. ♀ type, descr. ♂, Panama, host: *Ficus dugandii* Standley).

The female head is a bit longer than wide across the compound eyes (1.1), which are $1\frac{1}{4}$ times as long as the cheek. The fifth to eleventh segments bear one row of usually 7 or 8 sensilla (the eighth segment has 11). The mandibular appendage bears 9 or 10 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has one long, apical seta.

The postmarginal vein of the fore wing is very short. The fore tibia bears three sharp dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The spiracular peritremata of the eighth urotergite are very large, about one-quarter of the length of the gaster. The ovipositor-valves are ca. 1.2 times as long as the gaster. The total length is ca. $1\frac{1}{2}$ mm. The general colour is black.

The male head is as long as wide; the eye is not quite one-fifth of the length of the head. The antenna has one anulus, and the apical segment is divided at one-sixth of its length.

The pronotum is longer than wide anteriorly (1.4) and posteriorly (1.2). The spiracular peritremata are five-eighths of the length of the propodeum.

The species was described from Cuba; the host fig is *Ficus dugandii* Standley (Panama).

10. *Pegoscapus hoffmeyer* (Grandi) (fig. 4f, h)

Grandi, Boll. Lab. Ent. Bologna 7, 191–195 (1934, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Paraguay); Ramirez, Univ. Kansas Sci. Bull. 49, 40 (1970, *Blastophaga* (*Pegoscapus*), Costa Rica and Panama, host: *Ficus obtusifolia* Miq.); Wiebes, Proc. Kon. Ned. Akad. Wet. 98, 173 (1995, ♀ ♂, Panama, host: *Ficus obtusifolia* H.B. & K.).

The female head (fig. 4h) is a bit longer than wide across the compound eyes (1.05), which are $1\frac{1}{4}$ times as long as the cheek. The epistomal margin has prominent lateral lobes and the median lobe is very short. The scape of the antenna (fig. 4f), especially the dorsal comb, is rectangular in shape; the fifth to tenth segments bear one row of sensilla, in the following numbers per facies: the fifth 3, the sixth 5 or 6, the seventh to ninth 8 or 9, the tenth 7, and the eleventh segment bears 5 sensilla in $1\frac{1}{2}$ row. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The spiracular peritremata of the eighth urotergite are large, oval. The valves of the ovipositor are a bit shorter than the gaster. The colour is yellowish.

The male head is about as long as wide, or a bit longer; the eye is one-fifth of the length of the head. The antenna has two anuli, more distinct dorsally than ventrally, where they may be united; the distal segment is divided at one-tenth of its length.

There is a distinct collar; the pronotum is 1.2 times as long as wide anteriorly and as long as wide posteriorly. The spiracular peritremata are 0.7 of the length of the propodeum.

P. hoffmeyer was described from an unidentified species of fig (Paraguay), and later recorded from *Ficus obtusifolia* Kunth (Costa Rica and Panama).

Group of *Pegoscapus baschierii* (nos. 11–13)

11. *Pegoscapus baschierii* (Grandi) (fig. 5g)

Grandi, Boll. Ist. Ent. Univ. Bologna 19, 50–54 (1952, *Blastophaga* (*Julianella*), descr. ♀ ♂, Mexico); Ramirez, Univ. Kansas Sci. Bull. 49, 36 (1970, *Blastophaga* (*Pegoscapus*), Venezuela, host: *Ficus turbinata* (Liebm.) Miq.; Wiebes, Proc. Kon. Ned. Akad. Wet. (C) 86, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. 98, 169 (1995, ♀ in key).

The female head is distinctly shorter than wide across the compound eyes (0.8), which are 1.6 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla (almost $1\frac{1}{2}$ on the sixth and seventh), in the following

numbers per facies: the fifth and eleventh 4, the sixth and eighth 8, the seventh 11, the ninth 9, and the tenth 7. The mandibular appendage bears 7 ventral lamellae. The maxillae bear two sub-apical setae and three lateral (fig. 5g); the labium has two apical setae.

The venation of the fore wing is reduced to the submarginal vein, but some faint traces of the stigmal vein may be visible. The fore tibia seems to have two dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are $1\frac{1}{4}$ times as long as the gaster. The colour is brown.

The male head is 1.3 times as long as wide; the eye is one-sixth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one quarter of its length.

The pronotum has a distinct collar, it is 1.7 times as long as wide anteriorly and approximately as long as wide posteriorly. The spiracular peritremata are half as long as the propodeum.

The host fig was an unidentified species (Mexico), but Ramirez recorded *P. baschierii* from *Ficus turbinata* (Liebm.) Miq. in Venezuela and Panama, which is a synonym of *F. pertusa* Linn.f. See also nos. 26, 27, and 41, *P. silvestrii*, *tristani*, and *aemulus*, which were recorded from the same species of fig.

12. *Pegoscapus ambiguus* (Grandi) (fig. 5a–b, h)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 55–59 (1938, *Blastophaga* (*Valentinella*), descr. ♀♂, Brazil).

The female head is a bit shorter than wide across the compound eyes. Antenna (fig. 5a–b): the fifth and eighth antennal segments bear one row of sensilla, the sixth and seventh $1\frac{1}{2}$; the numbers per facies are: the fifth 6–7, the sixth to tenth ca. 10–12, and the eleventh 6–7. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The veins of the fore wing beyond the submarginal are vague, but still visible. The fore tibia (fig. 5h) has two dorso-apical teeth; the antiaxial tooth of the hind tibia appears to be bi-cuspidate. The valves of the ovipositor are a bit longer than the gaster. The colour is dark brown.

The male head is a bit longer than wide (1.2); the eye is one-fifth of the length of the head. The antenna has two distinct anuli and the distal segment is divided at one-fifth of its length.

The pronotum, with a narrow collar, is $1\frac{2}{3}$ times as long as wide anteriorly and $1\frac{1}{4}$ times as long as wide posteriorly. The spiracular peritremata occupy

four-fifths of the propodeum. In some specimens the hind tarsus is tetramerous, in others pentamerous.

The species of host fig is unknown (Brazil).

13. *Pegoscapus amabilis* (Grandi)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 51–55 (1938, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Brazil); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 177 (1995, possible host discussed).

The female head is a bit shorter than wide across the compound eyes. The fifth antennal segment bears one row of 4–5 sensilla per facies, the sixth and seventh 7–10 in $1\frac{1}{2}$ –2 rows, the eighth to tenth one row of 7–9 sensilla per facies, the eleventh in total 4–5. The mandibular appendage bears 7 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The marginal and stigmal veins of the fore wing are very vague and the post-marginal is totally absent. The fore tibia seems to have two dorso-apical teeth (not quite clear from Grandi, 1938, fig. V, 7); the hind tibia has a tri-cuspidate antiaxial tooth. The ovipositor-valves are longer than the gaster. The colour is dark brown.

The male head is a bit longer than wide. The antenna has one distinct anulus and the distal segment is divided at one-seventh of its length.

The pronotum is ca. $1\frac{1}{2}$ times as long as wide anteriorly, where there is no collar, and a bit longer than wide posteriorly (1.1). The spiracular peritremata are approximately half as long as the propodeum.

The host fig is an unidentified species (Brazil). Ramirez recorded the species from *Ficus nymphaeifolia* in Costa Rica, but he was not quite sure of the identity of the *Pegoscapus*. From this species of fig, no. 14, *P. piceipes* was recorded, which may have been the species seen by Ramirez.

Group of *Pegoscapus piceipes* (nos. 14–18)

14. *Pegoscapus piceipes* (Ashmead)

Ashmead, Trans. Ent. Soc. London for 1900, 250 (1900, *Blastophaga*, descr. ♀, Antilles); ? Ramirez, Univ. Kansas Sci. Bull. **49**, 42 (1970, *Blastophaga* (*Pegoscapus*) *amabilis*, Costa Rica, host: *Ficus nymphaeaeifolia* P. Miller); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 176–177 (1995, ♀ holotype studied, descr. ♀ ♂, Panama, host: *Ficus nymphaeifolia* P. Miller).

The female head is shorter than wide across the compound eyes (0.9), which are $1\frac{5}{8}$ times as long as the cheek. The fifth segment of the antenna bears one row of ca. 6 long sensilla per facies, the sixth and seventh segments $1\frac{1}{2}$ –2 rows of

15 sensilla per facies, the eighth 9, the tenth one row of 7 or 8, and the eleventh again $1\frac{1}{2}$ –2 rows of some 15 sensilla per facies. The mandibular appendage bears 8 or 9 ventral lamellae. The maxilla bears two apical setae and one or two lateral; the labium has one apical seta.

The postmarginal vein of the fore wing is short. The fore tibia bears two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The ovipositor-valves are 1.75 times as long as the gaster. The total length is ca. 1.5 mm. The colour is dark brown.

The male head is almost as wide as long (0.95); the eye is one-fifth of the length of the head. The antenna has one anulus and the distal segment is divided at one-seventh of its length.

The pronotum is $1\frac{1}{2}$ times as long as wide anteriorly, and distinctly longer than wide posteriorly (1.15); anteriorly. The spiracular peritremata are three-fifths of the length of the propodeum.

The species was described from St. Vincent (West Indies), without mention of the host fig. It was later recorded from *Ficus nymphaeifolia* P. Miller (Panama). The record of no. 13, *P. amabilis* from this species of fig in Costa Rica by Ramirez may have concerned *P. piceipes*.

15. *Pegoscopus tonduzi* (Grandi)

Grandi, Boll. Lab. Zool. Portici 13, 45–50 (1919, *Blastophaga* (*Valentinella*), descr. ♀♂, Costa Rica, host: *Ficus hemsleyana* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) 98, 177–178 (1995, ♀♂, Panama, host: *F. citrifolia* P. Miller).

The female head is a bit shorter than wide across the compound eyes (0.9), which are 1.8 times as long as the cheek. The fifth antennal segment has one row of eight long sensilla, the sixth and seventh $1\frac{1}{2}$, the eighth to tenth again one, and the eleventh $1\frac{1}{2}$, consisting of 8, 6 + 10, 3 + 10, 10–12, and ca. 9 sensilla in total, respectively. The mandibular appendage bears 9 or 10 ventral lamellae. The maxilla bears two sub-apical setae only; the labium has two apical setae.

The postmarginal vein of the fore wing is reduced to a short stump. The fore tibia has a bidentate dorso-apical comb; the hind tibia a tri-cuspidate antiaxial tooth. The ovipositor-valves are a bit longer than the gaster (1.2). The total length is ca. 1.5 mm. The colour is dark brown.

The male head is distinctly wider than long (1.4); the eye is one-sixth of the length of the head. The antenna has one distinct anulus, and the apical segment is divided at one-quarter of its length.

The pronotum is about as long as wide (a bit narrower in front, a bit wider behind). The spiracular peritremata are enormous, occupying the total lateral length of the propodeum.

The host fig recorded by Grandi (1919) and Ramirez (1970) is *Ficus hemsleyana* Standley (Costa Rica, Venezuela), but that of the material from Panama (Wiebes, 1995) was given as *F. citrifolia* P. Miller. Prof. Berg wrote to me that *F. hemsleyana* is a misnomer for the sub-typical Meso-American (forms of) *F. citrifolia*. See also nos. 35 and 47, *P. franki* and *P. williamsi*, which were recorded from the same species of fig.

16. *Pegoscapus aguilar* (Grandi)

Grandi, Boll. Lab. Zool. Portici **13**, 20–25 (1919, *Blastophaga* (*Julianella*), descr. ♀ ♂, Costa Rica, host: *Ficus lapathifolia*); Ramirez, Univ. Kansas Sci. Bull. **49**, 36 and 38 (1970, *Blastophaga* (*Pegoscapus*), Costa Rica, host: *F. lapathifolia*); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 352 (1986, discussion of host record); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is distinctly shorter than wide across the compound eyes (0.85), which are 1.2 times as long as the cheek. The fifth antennal segment bears one row of 6–7 sensilla per facies, the sixth to tenth segments alternately bear 10–14 sensilla per facies in $1\frac{1}{2}$ –2 and only one row, and the eleventh segment bears ca. 8 sensilla per facies, in $1\frac{1}{2}$ row. The mandibular appendage bears 8 ventral lamellae. The maxillae bear three sub-apical and three lateral setae; the labium has two apical setae.

The venation of the fore wing is reduced to an incomplete submarginal vein. The fore tibia bears a dorso-apical comb of three teeth; the hind tibia has a tri-cuspidate antiaxial tooth. The ovipositor-valves are a bit longer than the gaster, or equal in length. The total length is ca. 1.6 mm. The colour is chestnut-brown.

The male head is 1.2 times as long as wide; the eye is one-fifth of the length of the head. The antenna has two distinct anuli (or one annulus and the distal segment is divided at one quarter of its length).

Including the collar, the pronotum is $1\frac{1}{2}$ times as long as wide anteriorly (where it is a bit expanded) and slightly longer than wide posteriorly (1.15). The small spiracular peritremata are situated in the anterior part of the propodeum, and they are one quarter of its length. The total length is ca. 1.5 mm.

The host fig recorded by Grandi, i.e., *Ficus lapathifolia* Miq., is a species of *Pharmacosycea*, but the name is often given to material belonging to one of the Meso-American forms of *Ficus trigonata* L. Wiebes (1995: 170) used the synonym *F. morazoniana* Burger (Costa Rica). See also nos. 19, 21, 46, and 51, *P. ? lopesi*, *grandii*, *bruneri*, and *danorum*, which were recorded from the same species of fig.

17. *Pegoscapus aerumnosus* (Grandi) (fig. 5c)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 59–63 (1938, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Brazil, host: *Ficus vermifuga* Miq.; Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **89**, 352 (1986, discussion of host record).

The female head is as long as wide across the compound eyes, or a bit shorter. Antenna (fig. 5c): the fifth to tenth antennal segments bear many long sensilla, in $1\frac{1}{2}$ –2 rows, in the following numbers per facies: 7 in the distal row of the fifth segment and a few in the proximal, the sixth to ninth segments ca. 14–18 sensilla, the tenth ca. 15 in two distinct rows, the eleventh ca. 10. The mandibular appendage bears ca. 6 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has one apical seta.

The postmarginal vein of the fore wing is short. The fore tibia has two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are shorter than the gaster.

The male head is short, approximately as long as wide; the eyes are bulging, one quarter of the length of the head. The anulus of the antenna is half as long as wide, indistinctly divided, and the apical segment is four times as long.

The pronotum is as long as wide anteriorly and one-sixth wider posteriorly. The spiracular peritremata, lateral in position, are half as long as the propodeum.

The host fig is unidentified (Brazil), but a second, probably identical sample (first indicated as *B. arcana* Grandi, nomen nudum) came from *Ficus vermifuga* Miq., which is a synonym of *F. adhatodifolia* Schott. in Spreng. This is a species of *Pharmacosycea*, and thus the record is probably wrong.

18. *Pegoscapus philippi* (Grandi)

Grandi, Boll. Lab. Zool. Portici **30**, 1–5 (1936, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Argentina); ? Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 69 (1938, *Blastophaga* (*Valentinella*), Brazil).

The female head is a bit shorter than wide across the compound eyes, which are a bit longer than the cheek. The fifth to eleventh antennal segments bear $1\frac{1}{2}$ –2 rows of sensilla, in the following numbers per facies: the fifth 6, the sixth and seventh 7 + 7, the eighth and tenth 11, the ninth 10, and the eleventh 5 + 3. The mandibular appendage bears 7 or 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has one apical seta.

The postmarginal vein of the fore wing is short. The fore tibia bears two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are sub-equal in length to the gaster. The colour is chestnut-brown.

The male head is longer than wide (1.1); the eye is one quarter of the length of the head. The antenna bears two anuli, which may be indistinct ventrally.

The pronotum is as long as wide anteriorly and shorter than wide posteriorly (0.8). The spiracular peritremata are five-sevenths of the length of the propodeum.

The host fig is an unidentified species (Argentina, ?Brazil).

Group of *Pegoscapus lopesi* (nos. 19–20 and 21–22)

19. *Pegoscapus lopesi* (Mangabeiro Filho)

Mangabeiro Filho, Mem. Inst. Oswaldo Cruz **32**, 461–468 (1937, *Eupistrina*, descr. ♀ ♂, Brazil); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 173–174 (1995, redescri. ♀ ♂, Panama, host: *Ficus* near *trigonata*; comp. with *P. piceipes* and *tomentellae*).

The female head is one-third shorter than wide across the more or less bulging, compound eyes (0.75), which are approximately $1\frac{2}{3}$ times as long as the cheek. The fifth antennal segment bears 5 sensilla in one row, the sixth to tenth ca. 15 (on the sixth rather irregularly placed), as also on the eleventh, where they are placed in two rows. The mandibular appendage bears 9 ventral lamellae. The maxillae bear two sub-apical setae and three lateral; the labium has two apical setae.

The fore tibia bears two teeth in the dorso-apical comb, the antiaxial tooth of the hind tibia is tri-cuspidate. The ovipositor-valves are $1\frac{1}{2}$ times as long as the gaster. The total length is 1.3–1.5 mm. The colour is dark brown.

The male head is distinctly longer than wide (1.2); the eye is one-fifth of the length of the head. The antenna has two distinct anuli.

The pronotum (with a distinct collar) is $1\frac{1}{2}$ times as long as wide anteriorly, and almost as long as wide posteriorly (0.9). The spiracular peritremata are half as long as the the propodeum.

The species was described from an unidentified species of fig (Brazil); later, the host fig was identified with *Ficus* near *trigonata* L. (Panama). From *F. trigonata* nos. 16, 21, 46, and 51, *P. aguilari*, *grandii*, *bruneri*, and *danorum* were recorded.

20. *Pegoscapus tomentellae* Wiebes (fig. 4b)

Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244, 246–248 (1983, descr. ♀ ♂, Brazil, host: *Ficus tomentella* Miq.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 174 (1995, comp. with *P. lopesi*).

The female head is not quite as long as wide across the compound eyes (0.9), which are $1\frac{3}{4}$ times as long as the cheek. The antennal segments (some: fig. 4b)

bear one row of 9 (the fifth), or ca. 12 (the sixth to tenth), or two rows of (in total ten) sensilla (on the eleventh segment). The mandibular appendage bears 9 ventral lamellae. The maxillae bear two sub-apical setae and three lateral; the labium has two apical setae.

The venation of the fore wing is reduced to an incomplete submarginal. The fore tibia has two teeth in the dorso-apical comb, the hind tibia bears a tri-cuspidate antiaxial tooth. The ovipositor-valves are distinctly longer than the gaster (1.2). The total length is ca. 1.9 mm. The colour is dark brown.

The male head is longer than wide (1.4); the eye is one-sixth of the length of the head. The antenna has one anulus, and in some specimens the apical segment is divided at or before half length.

The pronotum is ca. two times as long as wide at half length. The spiracular peritremata are a little over half as long as the (lateral) length of the propodeum.

The host fig is *Ficus tomentella* Miq. (Brazil).

21. *Pegoscapus grandii* (Hoffmeyer)

Hoffmeyer, Ent. Meddr. **18**, 186–192 (1932, *Blastophaga* (*Julianella*), descr. ♀♂, Ecuador): Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 174–175 (1995, redescr. ♀♂ type-specimens; ♀♂, Panama, host: *Ficus trigonata* L.).

The female head is almost as long as wide across the compound eyes (0.95), which are $1\frac{1}{2}$ times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers: the fifth 8, the sixth 9, the seventh to tenth 12 or 13, and the eleventh some 10. The mandibular appendage bears 9 ventral lamellae. The maxilla bears two apical setae and one lateral, the labium has two apical setae.

The venation of the fore wing is reduced to the submarginal vein. The fore tibia has a tridentate dorso-apical comb of teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are one quarter longer than the gaster. The total length is ca. 1.4 mm. The colour is dark brown.

The male head is distinctly longer than wide (7 : 5); the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is very indistinctly subdivided in three parts, in ratio 1 : 1 : 2.

The pronotum (with a distinct collar) is two times as long as wide anteriorly, and the posterior width is little shorter than the length (0.9). The spiracular peritremata occupy three-fifths of the length of the propodeum.

The species was described from *Ficus* sp. (Ecuador); the host fig in Panama is *Ficus trigonata* L. See also nos. 16, 19, 46, and 51, *P. aguilari*, ? *lopesi*, *bruneri*, and *danorum*, recorded from the same species of fig.

22. *Pegoscapus torresi* (Grandi)

Grandi, Boll. Lab. Zool. Portici **14**, 261–264 (1920, *Blastophaga* (*Julianella*), descr. ♀ ♂, Costa Rica, host: *Ficus velutina* Willd.); Ramirez, Univ. Kansas Sci. Bull. **49**, 39 (1970, *Blastophaga* (*Pegoscapus*), Costa Rica, host: *Ficus velutina* Willd.); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is much shorter than wide across the compound eyes (0.85), which are 2.1 times as long as the cheek. The fifth to tenth antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 6 or 7, the sixth (where the row is a bit irregular) to tenth 6–12; and the eleventh segment has 1½ row of 7 sensilla. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and four lateral; the labium has two apical setae.

The venation of the fore wing is reduced to an incomplete submarginal. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are a bit shorter than the gaster. The total length is 1.75 mm. The colour is brown.

The male head is much longer than wide (1.25); the eye is one-sixth of the length of the head. The antenna has one anulus and the distal segment is divided at one quarter of its length.

The pronotum, which has a distinct collar, is 1½ times as long as wide anteriorly and 1.2 times as long as wide posteriorly. The spiracular peritremata are two-fifths of the length of the propodeum.

The host fig is *Ficus velutina* Willd. (Costa Rica).

Group of *Pegoscapus estherae* (nos. 23–25 [nos. 24 and 25, *P. kraussi* and *P. urbanae* may belong in the next group?])

23. *Pegoscapus estherae* (Grandi) (fig. 5d)

Grandi, Boll. Lab. Zool. Portici **13**, 26–33 (1919, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Costa Rica, host: *Ficus costaricana* Miq.); Ramirez, Univ. Kansas Sci. Bull. **49**, 39 (1970, *Blastophaga* (*Pegoscapus*), Costa Rica, host: *Ficus costaricana* Miq.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 171 (1995, ♀ in key).

The female head is shorter than wide across the compound eyes (0.85), which are 1¾ times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 1, 2, or 3, the sixth 4, the seventh to ninth 5–7, the tenth 5 or 6, and the eleventh 3. The mandibular appendage bears 11 ventral lamellae. The maxillae bear two sub-apical setae and two or three lateral; the labium has two apical setae.

The venation of the fore wing is complete, but the postmarginal vein is very short. The fore tibia bears three large teeth in the dorso-apical comb; the anti-

axial tooth of the hind tibia (fig. 5d) is rather wide, tri-cuspidate, and there is an axial row with a number of smaller teeth. The valves of the ovipositor are as long as the gaster, or a bit shorter. The total length is 1–1.1 mm. The colour is chestnut-brown.

The male head is as long as wide; the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-fifth of its length.

The pronotum has a distinct collar, it is 1.2 times as long as wide anteriorly and 1.1 times as long as wide posteriorly. The spiracular peritremata are half as long as the propodeum.

The host fig is *Ficus costaricana* (Liebm.) Miq. (Costa Rica). I have seen the species also from Panama.

24. *Pegoscapus kraussi* (Grandi)

Grandi, Boll. Ist. Ent. Univ. Bologna **19**, 47–50 (1952, *Blastophaga* (*Valentinella*), descr. ♀, Mexico, host: *Ficus cotinifolia* H.B. & K.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is as long as wide across the compound eyes. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth and sixth 3, the seventh to tenth 6, and the eleventh 4. The mandibular appendage bears 6–9 ventral lamellae. The maxillae bear two sub-apical setae and two lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is very short. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia has five cusps. The valves of the ovipositor are a bit longer than the gaster. The colour is light brown.

The male is not known.

The host fig is *Ficus cotinifolia* H.B. & K. (Mexico).

25. *Pegoscapus urbanae* (Ramirez) (fig. 5i–j)

Ramirez, Univ. Kansas Sci. Bull. **49**, 24–26 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀♂, Costa Rica, host: *Ficus isophlebia* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is a bit shorter than wide across the compound eyes. Antenna (fig. 5i): the fifth to eleventh antennal segments have one row of sensilla, in the following numbers per facies: the fifth 3 or 4, the sixth 4, the seventh 5 or 6, the eighth and tenth 5, the ninth 5 or 6, and the eleventh 3. The fourth to eleventh segments antenna bear flat, long, projecting bristles. The mandibular appendage

bears (10 –)12 ventral lamellae. The maxillae bear two sub-apical setae and three lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia has three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia (fig. 5j) has five cusps. The colour is black.

The male head is as long as wide. The antenna has one anulus.

The pronotum is as long as wide anteriorly and shorter than wide posteriorly (0.8). The spiracular peritremata are half as long as the propodeum.

The host fig is *Ficus isophlebia* Standley (Costa Rica). *F. isophlebia* is part of the complex of *F. aurea*.

Group of *Pegoscapus silvestrii* (nos. 26–28 [also nos. 24 and 25, *P. kraussi* and *urbanae* may belong here?])

26. *Pegoscapus silvestrii* (Grandi)

Grandi, Boll. Lab. Zool. Portici **13**, 39–42 (1919, *Blastophaga* (*Valentinella*), descr. ♀, Costa Rica, host: *Ficus padifolia* H.B. & K.); Grandi, Boll. Lab. Zool. Portici **13**, 36–39 (1919, *Blastophaga* (*Valentinella*) *tristani*, descr. ♂, Costa Rica); Grandi, Boll. Lab. Zool. Portici **14**, 251 (1920, mistake ♂ *B. (V.) silvestrii* – *tristani*, host: *F. padifolia*); Bouček, J. nat. Hist. **27**, fig. 51 (1993, ♂ head); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 180 (1995, Panama, host: *Ficus pertusa* Linn.f.).

The female head is shorter than wide across the compound eyes (0.9), which is 2.2 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth and sixth 4 or 5, the seventh to tenth 7–9, and the eleventh 2 or 3; the distal segments bear robust setae. The mandibular appendage bears (7–)9 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are as long as the gaster. The total length is 1.4 mm. The colour is dark brown.

The male head is longer than wide (1.1); the eye is one-fifth of the length of the head. The antenna has one anulus and the distal segment is divided at one quarter of its length.

The pronotum, which has a distinct collar, is longer than wide anteriorly (1.4) and posteriorly (1.1). The spiracular peritremata are two-thirds of the length of the propodeum.

The host fig is *Ficus padifolia* H.B. & K. (Costa Rica, Panama), which is a synonym of *F. pertusa* Linn.f. See also nos. 11, 27, and 41, *P. baschierii*, *tristani*, and *aemulus*, which were recorded from the same species of fig.

27. *Pegoscapus tristani* (Grandi)

Grandi, Boll. Lab. Zool. Portici **13**, 33–36 (1919, *Blastophaga* (*Valentinella*), descr. ♀, Costa Rica); Grandi, Boll. Lab. Zool. Portici **13**, 42–44 (1919, *Blastophaga* (*Valentinella*) *silvestrii*, descr. ♂, Costa Rica); Grandi, Boll. Lab. Zool. Portici **14**, 251 (1920, mistake ♂ *B. (V.) silvestrii* – *tristani*, host: *Ficus* sp.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 180 (1995, ♀♂, Panama, host: *Ficus pertusa* Linn.f.).

The female head is shorter than wide across the compound eyes (0.9), which are 2.2 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth and sixth ca. 3 (1–4), the seventh to ninth 3 or 4, the tenth 3, and the eleventh 1 or 2; the distal segments bear robust setae. The mandibular appendage bears (6–)9 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are $1\frac{1}{2}$ times as long as the gaster. The total length is 1.25 mm. The colour is chestnut-brown.

The male head is a bit longer than wide; the eye is one-fifth of the length of the head. The antenna has one anulus and the distal segment is divided at one quarter of its length.

The pronotum has a distinct collar and is 1.2 times as long as wide anteriorly and as long as wide posteriorly. The spiracular peritremata are half as long as the propodeum.

The host fig is *Ficus padifolia* H.B. & K. (Costa Rica, Panama), a synonym of *F. pertusa* Linn.f. The biological notes published by Bronstein (1987, 1988a–c, 1991) and Bronstein & Hoffmann (1987) under the name of *Pegoscapus silvestrii* may rather concern *P. tristani* (Wiebes, 1995: 180). See also nos. 11, 26, and 41, *P. baschierii*, *silvestrii*, and *aemulus*, which were recorded from the same species of fig.

28. *Pegoscapus flaviscapus* (Ashmead)

Ashmead, Mem. Carnegie Mus. **1**, 394 (1904, *Eisenia*, descr. ♀, Brazil).

The female head is a little longer than wide across the compound eyes (1.1), which are ca. 1.8 times as long as the cheek. There only is one complete antenna (the left) and there seems to be only one row of sensilla per segment and rather many long setae, which make the flagellum brush-like. The mandibular appendage bears 6 or 7 ventral lamellae.

The veins of the fore wing (only one present, folded) are not visible. The fore tibia has a dorso-apical comb of three teeth. The spiracular peritremata of the

eighth urotergite are small and subcircular. The valves of the ovipositor are approximately 1.75 times as long as the gaster. The total length is ca. 1 mm. The colour is black, polished.

The male is not known.

The host fig is unknown (Brazil). Thanks to the kind help of Drs. J.E. Rawlins (Pittsburgh) and E.E. Grissell (Washington) I could locate and study the holotype female (the only specimen known), which is now kept in the National Museum of Natural History (Washington), not in the Carnegie Museum (Pittsburgh) (see e.g., Wallace, 1948: 17). It is well preserved and several important characters are visible, such as the almost bushy antenna and the tri-dentate fore tibia, by which the species can be classified with the group of *Pegoscapus silvestrii*.

Group of *Pegoscapus mexicanus* (nos. 29–41)

29. *Pegoscapus mexicanus* (Ashmead) (fig. 5f)

Ashmead, Mem. Carnegie Mus. **1**, 233–234, 373 (1904, *Eisenia*, descr. ♀ ♂ in key, Mexico); Girault, Ent. News Philad. **29**, 126 (1918, *Secundeisenia* (*Eiseniella*), descr. ♀); Gahan & Peck, J. Wash. Acad. Sci. **36**, 315 (1946, *Secundeisenia*, type (from Mexico); Wolcott, J. Agric. Univ. Puerto Rico **32**, 771 (1948, *Secundeisenia*, Puerto Rico, host: *Ficus laevigata*); Muesebeck, Krombein & Townes, Agric. Monogr. U.S. Dept. Agric. **2**, 519 (1951, *Secundeisenia*, Florida, hosts: *Ficus aurea* and wild sp. of *Ficus*); Butcher, Florida Entom. **47**, 235 (1964, ♀ ♂, Florida, hosts: *Ficus aurea* and *leavigata*); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 175–176 (1995, redescri. ♀ type, descr. ♂, = *P. jimenezi* sensu Wiebes, 1983, Proc. Kon. Ned. Akad. Wet. (C) **86**, 252, not *P. jimenezi* Grandi, 1919; Florida, host: *F. aurea* Nuttall).

The female head is shorter than wide across the compound eyes (0.8), which are 1.8 times as long as the cheek. The fifth to tenth antennal segments bear one row of in total 8–10 sensilla, the eleventh has 6. Mouth-parts (fig. 5f): the mandible has a sharp, pointed apex; the appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is reduced to a very short stump. The fore tibia has a dorso-apical comb of three short teeth; the hind tibia bears a tri-cuspidate antiaxial tooth. The ovipositor-valves are not quite 1½ times as long as the gaster. The total length is ca. 1.1 mm. The colour is dark brown.

The male head is as wide as long; the eye is one-sixth of the length of the head. The antenna has two distinct anuli and the apical segment is divided at one-fifth of its length.

The pronotum, which has a distinct collar, is 1.2 times as long as wide anteriorly and a bit shorter than wide posteriorly (0.9). The spiracular peritremata are half as long as the propodeum.

The host fig is *Ficus aurea* Nuttall (Mexico, California, Florida). See for comparison no. 30, *Pegoscapus jimenezi*.

30. *Pegoscapus jimenezi* (Grandi)

Grandi, Boll. Lab. Zool. Portici **13**, 50–56 (1919, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Costa Rica, host: *Ficus jimenezii* Standley); Ramirez, Univ. Kansas Sci. Bull. **49**, 49 (1970, Costa Rica, host: *Ficus jimenezii* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 and 176 (1995, ♀ in key & ♀ ♂ comp. with *P. mexicanus*).

The female head is a bit shorter than wide across the compound eyes (0.95), which are 2.2 times as long as the cheek. The fifth to tenth antennal segments bear one row of 3–5 sensilla per facies, the eleventh ca. 3 in total. The mandible has a very sharp apical tooth; the mandibular appendage bears 6, or 7 or 8, ventral lamellae. The maxillae bear two sub-apical setae and three lateral; the labium has one or two apical setae.

The postmarginal vein of the fore wing is reduced to a very short stump. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are one-third longer than the gaster. The total length is ca. 1.15 mm. The colour is chestnut-brown.

The male head is as long as wide; the eye is one-sixth of the length of the head. The antenna has two distinct anuli and the distal segment is divided at one-fifth of its length.

The pronotum, which has a distinct collar, is longer than wide anteriorly (1.2) and almost as long as wide posteriorly (0.9). The spiracular peritremata are half as long as the propodeum.

The host fig is *Ficus jimenezii* Standley (Costa Rica). Berg has *F. jimenezii* as a synonym of *Ficus aurea* Nuttall, the host of no. 29, *Pegoscapus mexicanus*. *Pegoscapus jimenezi* is very similar to *P. mexicanus*, yet distinct, e.g. by the longer female head (l/w 0.95 vs. 0.8) and compound eye (2.2 times the cheek vs. 1.8), and three lateral maxillar setae (vs. only one); in the male sex e.g., by having only one distinct antennal anulus.

31. *Pegoscapus argentinensis* (Blanchard) (♀, cover)

Blanchard, Acta Zool. Lilloana **2**, 301–303 (1944, *Blastophaga*, descr. ♀, Argentina, host: *Ficus maroma* Cast., acc. to Castellanos, 1944, Rev. Bot. Inst. 'Miguel Lillo' **10**, 485).

The female head is shorter than wide across the compound eyes (0.85), which are half as long as the head. The fifth to eleventh antennal segments bear one row of 4 (the fifth and sixth), 7–8 (the seventh to ninth), 6 (the tenth), or 5 sensilla (the eleventh). The mandibular appendage bears 7 ventral lamellae.

The postmarginal vein of the fore wing is distinct, almost half as long as the stigmal, but not totally pigmented. The fore tibia has a dorso-apical comb of three teeth. The valves of the ovipositor are shorter than the gaster (ca. 0.7). The total length is ca. 1.1 mm. The colour is black.

The male is not known.

The host fig was described by Castellanos and named *Ficus maroma* Cast. (Argentina).

32. *Pegoscapus cabrerai* (Blanchard)

Blanchard, Acta Zool. Lilloana **2**, 303–305 (1944, descr. ♀, *Blastophaga*, Argentina, host: *Ficus* ? *Monkii*).

The female head is much shorter than wide across the compound eyes (0.8), which are half as long as the head. The fifth to eleventh antennal segments bear one row of 5 sensilla (the fifth), 9 (the sixth and ninth), 11 (the seventh and eighth), 8 (the tenth), and 6 sensilla (the eleventh). The mandibular appendage bears 9 ventral lamellae.

The postmarginal vein of the fore wing is distinct: ca. one-third of the length of the stigmal, but not totally pigmented. The fore tibia seems to have a dorso-apical comb of three teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are slightly shorter than the gaster (0.95). The total length is ca. 1.4 mm. The colour is dark brown.

The male is not known.

The host fig is *Ficus* ? *Monkii* (Argentina): according to Vazquez (1985: 382) this is a synonym of *Ficus luschnatiana* (Miq.) Miq.

33. *Pegoscapus elisae* (Grandi)

Grandi, Boll. Lab. Zool. Portici **30**, 5–8 (1936, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Peru); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 177 (1995, comp. with *P. piceipes*).

The female head is a bit shorter than wide across the compound eyes, which are a bit longer than the cheek. The fifth to eleventh antennal segments have one row of sensilla, in the following numbers per facies: the fifth 3 or 4, the sixth 5, the seventh 6, the eighth to tenth 7, and the eleventh 4. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The venation of the fore wing is fully developed, the postmarginal vein is short. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial

tooth of the hind tibia is tri-cuspidate. the valves of the ovipositor are distinctly longer than the gaster. The colour is more or less dark, chestnut-brown.

The male head is a bit longer than wide (1.2); the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-tenth of its length.

The pronotum has a distinct collar: it is $1\frac{1}{2}$ times as long as wide anteriorly and 1.2 times as long as wide posteriorly. The spiracular peritremata are two-thirds of the length of the propodeum.

The host fig is unknown (Peru).

34. *Pegoscapus mariae* (Ramirez)

Ramirez, Univ. Kansas Sci. Bull. **49**, 16–20 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀ ♂, Costa Rica, host: *Ficus tuerckheimii* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is shorter than wide across the compound eyes (0.9), which are longer than the cheek (1.3). The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 2, the sixth 3 or 4, the seventh to tenth 5, and the eleventh 3. The mandibular appendage bears 7 (up to ten) ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is atrophied. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The colour is blackish, the gaster has a broad dorsal spot.

The male head is longer than wide. The antenna has one anulus and the distal segment is divided at one-seventh of its length.

The pronotum is shorter than wide anteriorly (0.9) and posteriorly (0.8). The spiracular peritremata are one quarter of the length of the propodeum.

The host fig is *Ficus tuerckheimii* Standley (Costa Rica). *F. tuerckheimii* is part of the complex of *F. aurea*. See also no. 50, *P. carlosi*, which was recorded from the same fig.

35. *Pegoscapus franki* Wiebes (fig. 3, ♀)

Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 178–179 (1995, descr. ♀ ♂, = *P. assuetus* sensu Wiebes, 1983, Proc. Kon. Ned. Akad. Wet. (C) **86**, 252–252, not Grandi, 1938; Florida, host: *Ficus citrifolia* P. Miller); Bouček, J. nat. Hist. **27**, fig. 49 (1993, *P. assuetus*, ♀).

The female head is a bit shorter than wide across the compound eyes (0.9), which are $1\frac{2}{3}$ times as long as the cheek. The fifth to eleventh segments of the antenna have one row of sensilla, in the following numbers: the fifth ten, the sixth and

seventh 11, the eighth 14, and the ninth to eleventh 10. The mandibular appendage bears 8 ventral lamellae. The maxilla bears two sub-apical and one lateral; the labium has two apical setae.

Most veins of the fore wing are normally developed, but the postmarginal is non-existent. The fore tibia has a dorso-apical comb of three teeth; the anti-axial tooth of the hind tibia is tri-cuspidate. The ovipositor-valves are as long as the gaster. The total length is 1.3 mm. The colour is dark brown.

The male head is a bit longer than wide (0.9); the eye is one quarter of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-seventh of its length.

The pronotum is longer than wide anteriorly (1.3) and as long as wide posteriorly. The spiracular peritremata occupy two-thirds of the length of the propodeum. The total length is 0.95 mm.

The host fig is *Ficus citrifolia* P. Miller (Florida, U.S.A.). See also nos. 15 and 47, *P. tonduzi* and *P. williamsi*, which are associated with forms of the same species of fig.

36. *Pegoscapus herrei* Wiebes

Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 179–180 (1995, descr. ♀ ♂, Panama, host: *Ficus paraensis* (Miq.) Miq.).

The female head is a bit shorter than wide across the compound eyes (0.95), which are 1.85 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla in the following numbers: the fifth 5, the sixth to tenth 7 or 8, and the eleventh 4. The mandibular appendage bears 9 ventral lamellae. The maxilla bears two apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is reduced to a short stump, not quite half as long as the marginal. The fore tibia has a dorso-apical comb of three strong teeth; the anti-axial tooth of the hind tibia is tri-cuspidate. The ovipositor valves are as long as the gaster. The total length is ca. 1.6 mm. The colour is black.

The male head is a bit narrower than long (0.85); the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-eighth of its length.

The pronotum is longer than wide anteriorly (1.7) and posteriorly (1.25). The spiracular peritremata occupy two-thirds of the length of the propodeum. The total length is ca. 1.2 mm.

The host fig is *Ficus paraensis* (Miq.) Miq. (Panama).

37. *Pegoscapus gemellus* Wiebes

Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 181–182 (1995, descr. ♀ ♂, Panama, hosts: *Ficus bullenei* I.M. Johnston [type] and *F. popenoei* Standley).

The female head is a bit shorter than wide across the compound eyes (0.9), which are 1.6 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers: the fifth 5, the sixth 10, the seventh to tenth 12 or 13, and the eleventh 7 or 8. The mandibular appendage bears 7 or 8 ventral lamellae. The maxillae bear two apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia has a dorso-apical comb of three teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The ovipositor-valves are 1.6 times as long as the gaster. The total length is ca. 1.3 mm. The colour is black.

The male head is not nearly as wide as long (0.9); the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-sixth of its length.

The pronotum, with a distinct collar, is $1\frac{1}{2}$ times as long as wide anteriorly, and distinctly longer than wide posteriorly (1.15). The spiracular peritremata are three-fifths of the length of the propodeum. The total length is 0.9 mm.

I found no specific difference between the pollinators of *Ficus bullenei* and *popenoei* (both from Panama), but the male thorax of those from *F. popenoei* appears a bit more elongate than that of the wasps from *F. bullenei*.

38. *Pegoscapus insularis* (Ashmead)

Ashmead, Trans. Ent. Soc. London for 1900, 251 (1900, *Blastophaga*, descr. ♀, Antilles); Ramirez, Univ. Kansas Sci. Bull. **49**, 26–29 (1970, *Blastophaga (Pegoscapus) standleyi*, descr. ♀ ♂, Costa Rica, host: *Ficus oerstediana* Standley [= *F. americana* Aublet]; Gaud & Martorell, J. Agric. Univ. Puerto Rico **57**, 252 (1973, Puerto Rico, host: *F. laevigata* [= *F. citrifolia* !]); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 180–181 (1995, ♀ type-specimens studied; descr. ♀ ♂, Panama, host: *Ficus perforata* L. [= *F. americana* Aublet]).

The female head is a bit shorter than wide across the compound eyes (0.9), which are two times as long as the cheek. The fifth to eleventh antennal segments have one row of sensilla, in the following numbers: the fifth and sixth 7, the seventh to tenth 9–11, and the eleventh 6. The mandibular appendage has 8 ventral lamellae. The maxillae bear two apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short. The fore tibia bears three dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are ca. $1\frac{1}{2}$ times as long as the gaster. The total length is ca. 1.2 mm. The colour is dark brown.

The male head is as long as wide; the eye is one quarter of the length of the head. The antenna has two anuli, which may be indistinct ventrally, and the distal segment is divided at one-fifth of its length.

The pronotum is a bit longer than wide anteriorly (1.4) and distinctly longer than wide posteriorly (1.1). The spiracular peritremata are two-fifths of the length of the propodeum. The hind tibia has a ventral complex of five teeth (Ramirez, 1970, fig. 73).

The host fig is *Ficus americana* Aublet (St. Vincent, West Indies). In Costa Rica the host was given as *F. oerstediana* (Miq.) Miq., and in Panama as *F. perforata* L.: both are forms of the *F. americana*-complex.

39. *Pegoscapus cumanensis* (Ramirez)

Ramirez, Univ. Kansas Sci. Bull. **49**, 13–15 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀ ♂, Venezuela); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 (1995, ♀ in key).

The female head is slightly shorter than wide across the compound eyes, which are as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 6 or 7, the sixth 8 or 9, the seventh 11, the eighth and ninth 10, the tenth 9, and the eleventh 6. The epistomal margin has very prominent lateral lobes. The mandibular appendage bears 6 ventral lamellae. The maxillae bear two sub-apical setae only; the labium has two apical setae.

The postmarginal vein of the fore wing is atrophied. The fore tibia bears three teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are longer than the gaster. The total length is ca. 2.1 mm. The colour is blackish.

The male head is slightly shorter than wide. The antenna has one distinct anulus.

The pronotum is $1\frac{1}{2}$ times as long as wide anteriorly and about as long as wide posteriorly. The spiracular peritremata are four-sevenths of the length of the propodeum.

The host fig is an unidentified species (Ramirez' no. 4, Venezuela).

40. *Pegoscapus assuetus* (Grandi)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 63–66 (1938, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Brazil); Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 66–69 (1938, *Blastophaga* (*Valentinella*) *augusta*, descr. ♀ ♂, Brazil; nov. syn.).

The female head is as long as wide across the compound eyes. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 6–8, the sixth to eighth generally 8, but also 9 or 10, the ninth

8, the tenth 10, and the eleventh ca. 6. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is short: one-third of the length of the stigmal vein. The dorso-apical comb of the fore tibia bears three teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are a bit longer than the gaster. The colour is chestnut-brown.

The male antenna has two distinct anuli (which may be united ventrally) and the distal segment is indistinctly divided at one-fifth of its length.

The pronotum has a short collar, and it is only a little longer than wide anteriorly (1.1) and distinctly shorter than wide posteriorly (0.85). The spiracular peritremata are four-sevenths of the length of the propodeum.

The host fig is an unidentified species (Brazil). Grandi (1938: 69) noted that *B. augusta* is 'estremamente' similar to his *B. assueta*. In my opinion, the two cannot be differentiated and must be united.

41. *Pegoscapus aemulus* (Grandi) (fig. 5e)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 44–48 (1938, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Brazil, host: *Ficus luschnatiana* Miq.); Ramirez, Univ. Kansas Sci. Bull. **49**, 40–42 (1970, *Blastophaga* (*Pegoscapus*), Costa Rica, host: *Ficus* ? *trachelosyce* Dug.); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 169 (1995, note on host-record).

The female head is a little shorter than wide across the compound eyes. The antennal segments have the sensilla arranged in one row: the fifth and sixth 4–5 in one facies and 2–3 in the other, and the seventh to tenth 5–6 per facies, the eleventh has 3 sensilla per facies. The mandibular appendage bears 8–9 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has one apical seta.

The postmarginal vein of the fore wing is short. The fore tibia (fig. 5e) bears a dorso-apical comb of three teeth; the hind tibia has a tri-cuspidate antiaxial tooth. The ovipositor-valves are distinctly longer than the gaster. The colour is chestnut-brown.

The male antenna has a distinct anulus and the apical segment is divided at one-sixth of its length.

Including the collar, the pronotum is approximately as long as wide anteriorly and $1\frac{1}{4}$ times as long as wide posteriorly. The spiracular peritremata are oval in shape, dorsal in position, and they occupy three-fifths of the length of the propodeum.

With some doubt, Grandi recorded the host fig to be *Ficus luschnatiana* (Miq.) Miq. (Brazil) – see no. 32, *Pegoscapus cabrerai*, which, also with doubt, at first

was recorded from this species of fig. For his material from Costa Rica, Ramirez mentioned *F. ? trachelosyce* Dug. as the host, which Berg has as a synonym of *F. pertusa* Linn.f. See nos. 11, 26, and 27, *P. baschierii*, *silvestrii*, and *P. tristani*, which were recorded from the same species of fig.

Group of *Pegoscapus ileanae* (nos. 42–45)

42. *Pegoscapus ileanae* (Ramirez)

Ramirez, Univ. Kansas Sci. Bull. **49**, 33–35 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀, Costa Rica, host: *Ficus schippii* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 169 (1995, ♀ in key).

The female head is shorter than wide across the compound eyes. The eleventh antennal segment is very very small, without sensilla, the fifth to tenth have one row of sensilla, in the following numbers per facies: the fifth 5 or 6, the sixth and tenth 6, the seventh to ninth 7. The mandible appears to be unidentate, the mandibular appendage bears 6 ventral lamellae. The maxillae bear two sub-apical setae and no lateral; the labium has one apical setae.

The wing-venation was not described. The fore tibia bears two dorso-apical teeth; the hind tibia has only one apical tooth. The total length is less than 1 mm. The colour is blackish.

The male is unknown.

The host fig is *Ficus schippii* Standley (Costa Rica).

43. *Pegoscapus orozcoi* (Ramirez)

Ramirez, Univ. Kansas Sci. Bull. **49**, 29–33 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀ ♂, Costa Rica, host: *Ficus colubrinae* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 173 (1995, ♀ ♂, Panama, host: *Ficus colubrinae* Standley).

The female head is shorter than wide across the compound eyes (0.95), which are 1.7 times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 4, the sixth and seventh 6 or 7, the eighth to tenth 6, and the eleventh 3 or 4. The mandibular appendage bears 7 or 8 ventral lamellae. The maxillae bear one sub-apical seta and one lateral; the labium has one apical seta.

The postmarginal vein of the fore wing is atrophied. The fore tibia bears two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is bi-cuspidate. The valves of the ovipositor are a bit longer than the gaster (1.1). The colour is blackish.

The male head is as long as wide. The antenna has one anulus.

The pronotum is as long as wide anteriorly and shorter than wide posteriorly (0.8). The spiracular peritremata are two-fifths of the length of the propodeum.

The host fig is *Ficus colubrinae* Standley (Costa Rica, Panama).

44. *Pegoscapus bifossulatus* (Mayr)

Mayr, Verh. zool.-bot. Ges. Wien **35**, 181–182 (1885, *Blastophaga*, descr. ♀ ♂, Brazil); Grandi, Boll. Lab. Ent. Bologna **1**, 167–170 (redescr.); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key).

The female head is a bit shorter than wide across the compound eyes (0.95), which are $1\frac{3}{4}$ times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 9, the sixth, eighth and ninth 10, the seventh 11, the tenth 8, and the eleventh 6. The mandibular appendage bears 6 ventral lamellae.

The fore tibia bears a dorso-apical row of two teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are a bit shorter than the gaster (0.9). The total length is 1.4–1.5 mm. The colour is dark brown.

The male head is longer than wide (1.1); the eye is one quarter of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one-sixth of its length.

The pronotum is longer than wide anteriorly (1.1) and posteriorly (1.25). The spiracular peritremata are very large, ovoid, dorsal in position, occupying the entire length of the propodeum.

The host fig is an unidentified species (Brazil; Müller's *Ficus* no. 8). Some characters are not at all clear from Mayr's description and Grandi's redescription: Mayr (1885: 181) mentioned a 'Radius' in the fore wing, which is 'gerade, nur das Knöpfchen etwas gekrümmt', which would indicate a complete stigmal vein, but might also refer to a terminal parastigma of the submarginal vein, as found in some species of *Pegoscapus*. Wiebes (1983: 244) included *P. bifossulatus* in his key to the species with a reduced wing-venation.

Mayr (1885: 181) described the valves of the ovipositor as a bit longer than the gaster, but according to the measurements by Grandi (1928: 167) they are shorter.

45. *Pegoscapus brasiliensis* (Mayr)

Mayr, Verh. zool.-bot. Ges. Wien **35**, 180–181 (1885, *Blastophaga*, descr. ♀ ♂, Brazil); Grandi, Boll. Lab. Ent. Bologna **1**, 164–167 (redescr.); Wiebes, Tijdschr. Ent. **106**, 95 (1963, disc. host records; host: *Ficus gomelleira* Kunth. & Bouch.); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244–246 (1983, descr. ♀, Brazil, host: *Ficus gomelleira* Kunth. & Bouch.).

The female head is distinctly shorter than wide across the compound eyes (0.8), which are $1\frac{1}{2}$ times as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth, 5, the sixth to tenth 7 or 8, and the eleventh 4. The mandibular appendage bears 6 ventral lamellae. The maxilla bears two sub-apical setae and one lateral; the labium has two apical setae.

The veins of the fore wing are reduced to an incomplete submarginal. The fore tibia has two dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The ovipositor-valves are $1\frac{1}{2}$ times as long as the gaster. The total length is ca. $1\frac{1}{2}$ mm.

The male head is longer than wide (1.2); the eye is one-fifth of the length of the head. The antenna has one distinct anulus and the distal segment is divided at one quarter of its length.

The pronotum is 1.6 times as long as wide anteriorly and 1.2 times as long as wide posteriorly. The spiracular peritremata occupy three quarters of the length of the propodeum.

The host fig is *Ficus gomelleira* K. & B. (Brazil). *F. gomelleira* is a close relative of *F. trigonata*.

46. *Pegoscapus bruneri* (Grandi) (fig. 4i)

Grandi, Boll. Ist. Ent. Univ. Bologna **7**, 195–197 (1934, *Blastophaga* (*Julianella*), descr. ♀, Cuba, host: *Ficus coombsii* Warb. – see Alayo Dalman, 1973, La Habana Inst. del Libro: 75 [= *F. trigonata* L.]); Ramirez, Univ. Kansas Sci. Bull. **49**, 39 (1970, *Blastophaga* (*Pegoscapus*), Colombia, host: prob. *F. coombsii*); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 170 and 175 (1995, ♀ in key, & comp. with *P. grandii*).

The female head is a bit shorter than wide across the compound eyes. Antenna (fig. 4i): the fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 5, the sixth to tenth 8–9, and the eleventh 6. The mandibular appendage bears 6 or 7 ventral lamellae. The maxillae bear (? sub-apical and) two lateral setae.

The venation of the fore wing is reduced to an incomplete submarginal vein, but there are vague traces of marginal, stigmal, and postmarginal veins. The fore tibia bears two dorso-apical teeth; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are distinctly longer than the gaster. The colour is chestnut-brown.

The male is unknown.

The host fig was given as *Ficus coombsii* Warb. (Cuba, Colombia), which is a synonym of *F. trigonata* L. See also nos. 16, 19, 21, and 51, *P. aguilari*, ? *lopesi*, *grandii* and *danorum*, which were recorded from the same species of fig.

47. *Pegoscapus williamsi* (Grandi)

Grandi, Bull. Ent. Res. **13**, 297–299 (1923, *Blastophaga*, descr. ♀, Antilles); Wiebes, Proc. Kon. Ned. Akad. Wet. (C) **86**, 244 (1983, ♀ in key); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 178 (1995, ♀ ♂, Puerto Rico, host: *Ficus citrifolia* P. Miller).

The female head a bit shorter than wide across the compound eyes (0.95), which are as long as the cheek. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers: the fifth 9, the sixth 10, the seventh to tenth 12, and the eleventh 6. The mandibular appendage bears 11 ventral lamellae. The maxillae bear two sub-apical setae only; the labium has two apical setae.

The postmarginal vein of the fore wing is obsolete and the stigmal is only partly visible. The fore tibia bears two teeth in the dorso-apical comb; the anti-axial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are about equal in length to the gaster, or a bit longer (1.1). The total length is ca. 1.4 mm. The colour is brown.

The male head is $1\frac{1}{3}$ times as long as wide; the eye is one quarter of the length of the head. The epistomal margin has a median prominence. The antenna has one long anulus (one-third of the length of the distal segment).

The pronotum is longer than wide anteriorly (1.5) and posteriorly (1.1). The large, mostly dorsal spiracular peritremata occupy the whole length of the propodeum. The mid tarsus is tetramerous, and also the hind tarsus has four segments, the fourth of which is indistinctly notched dorsally.

The species was described from Barbados (West Indies), and lately recorded from *Ficus citrifolia* P. Miller (Puerto Rico). Prof. Berg wrote to me that *F. citrifolia* from Florida (with no. 35, *P. franki*) and Puerto Rico are one and the same species; the Meso-American form (with no. 15, *P. tonduzi*) differs, but not specifically.

48. *Pegoscapus groegeri* spec. nov. (fig. 4e)

Material. - A series of ♀ ♂ from *Ficus mollicula* Pittier, collected in Venezuela, Edo. Amazonas, Inselberg near Betania de Topocho (5° 58' N 67° 22' W), 100–200 M alt., by A. Gröger, 16.x.1993; coll. RMNH no. 5511 (type: ♀).

The female head is distinctly shorter than wide across the compound eyes (0.85), which are $2\frac{1}{2}$ times as long as the cheek. The epistomal margin has distinct lateral lobes (fig. 4e). The antennal segments, from the fifth onwards, bear one row of wide sensilla: 8 on the fifth, 7 on the sixth and seventh, 9 on the eighth to tenth, and 6 on the eleventh. The mandible has two teeth and two glands; the appendage bears 6 or 7 ventral lamellae. The maxillae bear two apical setae and one lateral, the labium has one apical seta.

The wings are clear, with small microtrichiae; the fringe is half as long as the stigmal vein of the fore wing (2 : 1); the postmarginal vein is obsolete, the stigmal is approximately two times as long as the marginal. There is a pollen pocket, as well as a fore coxal corbicula; the fore tibia has a bidentate dorso-apical comb of teeth; the hind tibia a tri-cuspidate antiaxial tooth.

The spiracular peritremata of the eighth urotergite are small, subcircular; the spine of the hypopygium is triangular, as long as wide at the base, where it bears a row of seven slender, hyaline setae; the valves of the ovipositor are a bit longer than the gaster (1.1). The total length is ca. 1 mm. The colour is dark brown.

The male head is almost as wide as long (0.85); the eye is almost one quarter of the length of the head. The epistomal margin is straight. The antennal club is ten times as long as the anulus, and it is very indistinctly divided at approximately one-seventh of its length.

The length of the pronotum (inclusive the distinct collar) is $1\frac{1}{4}$ times its anterior width, and equal to its posterior width. The meso/metanotum is a bit over half as long as wide anteriorly (0.55) and it narrows posteriad; the propodeum is $2\frac{1}{2}$ times as wide as long, and the spiracular peritremata occupy two-thirds of the length.

The female of *Pegoscopus groegeri* belongs in the group with a bidentate fore tibia and one row of antennal sensilla. It resembles no. 47, *P. williamsi*, but it has less sensilla on the antenna (3–5, vs. 6–7 per facies) and also less ventral lamellae on the mandibular appendage (6 or 7, vs. 11). The male does not show the protrusion on the epistomal margin, so characteristic for *P. williamsi*.

The host fig is *Ficus mollicula* Pittier (Venezuela).

49. *Pegoscopus attentus* (Grandi)

Grandi, Boll. Ist. Ent. Univ. Bologna **10**, 48–51 (1938, *Blastophaga* (*Valentinella*), descr. ♀ ♂, Brazil).

The female head is shorter than wide across the compound eyes. The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 2 or 3, the sixth 3 or 4, the seventh to ninth 5–7, the tenth 6, and the eleventh 3. The mandibular appendage bears 8 ventral lamellae. The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is reduced to a short stump. The fore tibia seems to have two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are distinctly longer than the gaster. The colour is chestnut-brown.

The male antenna has two distinct anuli (united ventrally) and the distal segment is divided at one-fifth of its length.

The pronotum (including the collar) is about as long as wide anteriorly and shorter than wide posteriorly (0.8). The spiracular peritremata are $\frac{5}{8}$ of the length of the propodeum.

The host fig is an unidentified species (Brazil).

50. *Pegoscapus carlosi* (Ramirez)

Ramirez, Univ. Kansas Sci. Bull. **49**, 30–44 (1970, *Blastophaga* (*Pegoscapus*), descr. ♀ ♂, Costa Rica, host: *Ficus tuerckheimii* Standley); Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 169 (1995, ♀ in key).

The female head is shorter than wide across the compound eyes (0.85), which are longer than the cheek (1.4). The fifth to eleventh antennal segments bear one row of sensilla, in the following numbers per facies: the fifth 4 or 5, the sixth 5, the seventh and eighth 6 or 7, the ninth and tenth 7, and the eleventh 5. The mandibular appendage bears 8 or 9 ventral lamellae (some specimens have 7). The maxillae bear two sub-apical setae and one lateral; the labium has two apical setae.

The postmarginal vein of the fore wing is atrophied. The pollen-pockets are small. The fore coxa has no corbicula, the tibia bears two teeth in the dorso-apical comb; the antiaxial tooth of the hind tibia is tri-cuspidate. The valves of the ovipositor are longer than the gaster. The total length is ca. 1.7 mm. The colour is black.

The male head is longer than wide. The antenna has two narrow anuli.

The pronotum is subquadrangular: it is longer than wide anteriorly (1.15) and approximately as long as wide posteriorly. The spiracular peritremata seem to be situated in the middle of the lateral margin of the propodeum and seem to be one-third of its length.

The host fig is *Ficus tuerckheimii* Standley (Costa Rica). See also no. 34, *P. mariae*, which is associated with the same fig.

Incertae sedis

51. *Pegoscapus danorum* (Hoffmeyer)

Hoffmeyer, Ent. Meddr. **18**, 197–199 (1932, *Blastophaga*, descr. ♂, Antilles, host: *Ficus* ? *crassior*).; Wiebes, Proc. Kon. Ned. Akad. Wet. **98**, 168 (1995, type lost).

The female is not known.

The male head is shorter than wide (0.9); the eye is one-third of the length of

the head. The antenna has one distinct anulus and the distal segment appears divided at one-eighth of its length.

The pronotum is 1.6 times as long as wide anteriorly and 1.3 times as long as wide posteriorly. The spiracular peritremata were described as 'linear'.

The host fig was indicated as: '*Ficus* sp. (*crassior*?)' (St. Croix, West Indies). In his catalogue, Grandi (1963: 129) noted for the host: 'forsitan *F. crassinervia* Desf.', which, according to DeWolf (1960: 160) is a synonym of *Ficus trigonata* L. See also nos. 16, 19, 21 and 46, *P. aguilari*, ? *lopesi*, *grandii* and *bruneri*, which were recorded from the same species of fig.

52. *Pegoscopus obscurus* (Kirby)

Kirby in Ridley, J. Linn. Soc. (Zool.) **20**, 537 (1890, *Blastophaga*, descr. ♂, Fernando Noronha).

The female was not described.

The male is 'brown or yellowish brown, smooth, except for a few short hairs on the tarsi. Front tarsi apparently 3-jointed, middle and hind tarsi 5-jointed; tarsal claws very strong, and front and hind tibiae ending in strong spines.'

The host fig is unknown (Fernando Noronha). Kirby considered it useless to give a detailed description. 'The locality will probably serve to fix the species'. Quite so: Prof. Berg wrote to me that the fig species from Fernando de Noronha probably is identical with *F. longifolia* Schott.

Bibliography

- Alayo Dalman, Pastor – Lista anotado de los Himenopteros de Cuba. La Habana, Inst. del Libro, 218 pp. (1970).
- Ashmead, W.H. – Report on the aculeate Hymenoptera of the islands of St. Vincent and Granada, with additions to the parasitic Hymenoptera and a list of the described Hymenoptera of the West Indies. Trans. Ent. Soc. London for 1900, 207–367 (1900).
- Ashmead, W.H. – Classification of the Chalcid flies or the family Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. Mem. Carnegie Mus. **1**, 1-x, 225–551 (1904).
- Ashmead, W.H. – Classification of the foraging and driver ants or the family Dorylidae, with a description of the genus *Ctenopyga*. Proc. Ent. Soc. Wash. **8**, 21–31 (1906).
- Axelrod, D.A. – Revision of the Florissant flora. Evolution **8**, 82–83 (1954).
- Berg, C.C. – Classification and distribution of *Ficus*. Experientia **45**, 605–611 (1989).
- Berg, C.C. & J.T. Wiebes – African fig trees and fig wasps. Verh. Kon. Ned. Akad. Wet., afd. Natk., 2de reeks, **89**, 1–298 (1992).
- Blanchard, E.E. – Dos nuevas especies de Agaonidos Argentinos. Acta Zool. Lilloana **2**, 301–305 (1944).
- Bouček, Z. – The genera of chalcidoid wasps from *Ficus* fruit in the new World. J. Nat. Hist. **27**, 173–217 (1993).
- Bronstein, J.L. – Maintenance of species-specificity in a neo-tropical fig-pollinator mutualism. Oikos **48**, 39–46 (1987).
- Bronstein, J.L. – Predators of fig wasps. Biotropica **20**, 215–219 (1988a).
- Bronstein, J.L. – Limits to fruit production in a monoecious fig: consequences of an obligate mutualism. Ecology **69**, 207–214 (1988b).
- Bronstein, J.L. – Mutualism, antagonism, and the fig-pollinator interaction. Ecology **69**, 1298–1302 (1988c).
- Bronstein, J.L. – Mutualism at the edge of its range. Experientia **45**, 622–637 (1989).
- Bronstein, J.L. – The nonpollinating wasp fauna of *Ficus pertusa*: exploitation of a mutualism? Oikos **61**, 175–186 (1991).
- Bronstein, J.L. – Seed-predators as mutualists: ecology and evolution of the fig/pollinator interaction. In: E. Bernays (ed.), Insect-Plant Interactions **IV**, 1–44. CRC Press, Boca Raton (1992).
- Bronstein, J.L. & K. Hoffmann – Spatial and temporal variation in frugivory at a Neotropical fig, *Ficus pertusa*. Oikos **49**, 261–268 (1987).
- Bronstein, J.L. & A. Patel – Causes and consequences of within-tree phenological patterns in the Florida strangling fig, *Ficus aurea* (Moraceae). Amer. J. Bot. **79**, 41–48 (1992a).
- Bronstein, J.L. & A. Patel – Temperature-sensitive development: consequences for local persistence in two tropical fig wasp species. Amer. Midl. Natur. **128**, 397–403 (1992b).
- Brues, C.T. – The parasitic Hymenoptera of the Tertiary of Florissant, Colorado. Bull. Mus. Comp. Zool., Harvard **54**, 3–125 (1910).
- Burger, W. – Moraceae. In: W. Burger (ed.), Flora Costaricana **52**. Field. Bot. **40**, 94–215 (1977).
- Butcher, F. Gray – The Florida fig wasp, *Secundeisenia mexicana* (Ashm.), and some of its hymenopterous symbionts. Florida Entom. **47**, 235–238 (1964).

- Callan, E.M.C.C. – Notes on Agaonidae, Torymidae and Eupelmidae from Trinidad (Hymenoptera: Chalcidoidea). *Studia Ent.* **20**, 291–295 (1978).
- Cameron, P. – Algunos Himenópteros (la mayoría no descrita) coleccionados por el professor Baker en Cuba. *Primer Inf. Anual Est. Centr. Agron. Cuba*: 275–285 (1906).
- Castellanos, A. – La especie de *Ficus* del noroeste argentino. *Rev. Bot. Inst. 'Miguel Lillo'* **10**, 483–491 (1944).
- DeWolf, G.P. – *Ficus* (Tourn.) L. In: R.E. Woodson jr., R.W. Schery & al., *Flora of Panama*, part IV, fascicule 2. *Ann. Missouri Bot. Gdn.* **47**, 146–165 (1960).
- Frank, S.A. – The behavior and morphology of the fig wasps *Pegoscapus assuetus* and *P. jimenezi*: descriptions and suggested behavioral characteristics for phylogenetic studies. *Psyche* **91**, 289–308 (1984).
- Frank, S.A. – Are mating and mate competition by the fig wasp *Pegoscapus assuetus* (Agaonidae) random within a fig? *Biotropica* **17**, 170–172 (1985).
- Gahan, A.B. & O. Peck – Notes on some Ashmeadian genotypes in the hymenopterous superfamily Chalcidoidea. *J. Wash. Acad. Sci.* **36**, 314–317 (1946).
- Gaud, S.M. & L.F. Martorell – New insect records for Puerto Rico. *J. Agric. Univ. Puerto Rico* **57**, 247–254 (1973).
- Girault, A.A. – New and old West Indian and North American Chalcid flies (Hym.). *Ent. News, Philad.* **29**, 125–131 (1918).
- Grandi, G. – Contributo alla conoscenza degli Agaonini (Hymenoptera – Chalcididae) dell'America. Agaonini di Costa Rica. *Bull. Lab. Zool. Portici* **13**, 15–56 (1919).
- Grandi, G. – Descrizione di una nuova *Blastophaga* a maschi completamente astomi e di una nuova *Julianella* di Costarica. *Boll. Lab. Zool. Portici* **14**, 251–264 (1920).
- Grandi, G. – Identification of some fig insects (Hymenoptera) from the British Museum (Natural History). *Bull. ent. Res.* **13**, 295–299 (1923).
- Grandi, G. – Morfologia del gen. *Tetrapus* Mayr e descrizione di una nuova species della Costa Rica. *Boll. Soc. Ent. Ital.* **57**, 1–13 (1925).
- Grandi, G. – Revisione critica degli Agaonidi descritti da Gustavo Mayr e catalogo ragionato delle specie fino ad oggi descritte di tutto il mondo. *Boll. Ist. Ent. Univ. Bologna* **1**, 107–233 (1928).
- Grandi, G. – Nuovi Agaonidi (Hymenoptera – Chalcidoidea) della fauna neotropica. *Boll. Ist. Ent. Univ. Bologna* **7**, 186–197 (1934).
- Grandi, G. – Agaonini raccolti dal Prof. F. Silvestri dell'America del Sud. *Boll. Lab. Zool. Portici* **30**, 1–8 (1936).
- Grandi, G. – Nuovi Agaonidi (Hymenoptera – Chalcidoidea) raccolti nel Brasile dal Prof. F. Silvestri. *Boll. Ist. Ent. Univ. Bologna* **10**, 44–69 (1938).
- Grandi, G. – Insetti dei fichi messicani, malesi ed australiani. *Boll. Ist. Ent. Univ. Bologna* **19**, 47–67 (1952).
- Grandi, G. – Istituzione di un nuovo sottogenere di *Blastophaga* Grav. (Hymenoptera Chalcidoidea). *Boll. Ist. Ent. Univ. Bologna* **26**, 239–240 (1963a).
- Grandi, G. – Catalogo ragionato degli Agaonidi del mondo descritti fino a oggi (6a edizione). *Boll. Ist. Ent. Univ. Bologna* **26**, 319–373 (1963b).
- Herre, E.A. – Coevolution of reproductive characteristics in 12 species of New World figs and their pollinator wasps. *Experientia* **45**, 637–647 (1989).
- Hoffmeyer, E.B. – Neue Agaontiden I. (Hym. Chalc.). *Ent. Meddr.* **18**, 186–199 (1932).
- Kirby, W.F. – Insecta, excepting Coleoptera. In: H.N. Ridley, *Notes on the zoology of Fernando Noronha*. *J. Linn. Soc. (Zool.)* **20**, 530–548 (1890).
- Mangabeiro Filho, O. – Contribuição ao conhecimento dos insectos que vivem em figos do Brasil. Uma nova especie de *Eupistrina* Saunders (Hym. Agaonidae, Agaonini). *Mem. Inst. Oswaldo Cruz* **32**, 461–468 (1937).
- Mayr, G. – Feigeninsecten. *Verh. zool.-bot. Ges. Wien* **35**, 147–250 (1885).
- Milton, K., D.M. Windsor, D.W. Morrison & M.A. Estribi – Fruiting phenologies of two neotropical *Ficus* species. *Ecology* **63**, 752–762 (1982).

- Mueller, F. – Feigenwespen. Kosmos (Stuttgart) **10**, 55–62 (1886).
- Muesebeck, C.F.W., K.V. Krombein & H.K. Townes – Hymenoptera of America north of Mexico. Agric. Monogr. U.S. Dept. Agric. **2**, 1–1420 (1951).
- Nadel, H., J. Howard Frank & R.J. Knight – Escapees and accomplices: the naturalization of exotic *Ficus* and their associated faunas in Florida. Florida Entom. **75**, 29–38 (1992).
- Poinar, G.O. – Insects in amber. Ann. Rev. Ent. **46**, 145–159 (1993).
- Ramirez B., W. – Taxonomic and biological studies of Neotropical fig wasps (Hymenoptera: Agaonidae). Kansas Univ. Sci. Bull. **49**, 1–44 (1970).
- Schulz, W.A. – Spolia Hymenopterologica. Paderborn, 355 pp. (1906).
- Strand, E. – Sechzehn Novitäten der Gattung *Stenopistha* Strand und zwei neue Gattungsnamen in Chalcidoidea. Arch. Naturgesch. **77**, 199–210 (1911).
- Torres Rojas, R. de – Agaoninos de Costa Rica. Ardua **1**, 83–85 (1921).
- Vazquez Avila, M. – *Ficus luschnatiana* (Miq.) Miq., nombre correcto para *Ficus monckii* Hassler. Darwiniana **26**, 381–382 (1985).
- Wallace, G. E. – Notice. Ent. News Philad. **59**, 17 (1948).
- Waterston, J. – Notes on fig insects, including descriptions of three new species and a new Blastophagine genus. Trans. Ent. Soc. London for 1920, 128–136 (1920).
- Wiebes, J.T. – Provisional host catalogue of fig wasps (Hymenoptera, Chalcidoidea). Zool. Verh. Leiden **83**, 1–44 (1966).
- Wiebes, J.T. – Records and descriptions of *Pegoscapus* Cameron (Hymenoptera Chalcidoidea, Agaonidae). Proc. Kon. Ned. Akad. Wet. (C) **86**, 243–253 (1983).
- Wiebes, J.T. – Agaonidae (Hymenoptera Chalcidoidea) and *Ficus* (Moraceae): fig wasps and their figs, i. Proc. Kon. Ned. Akad. Wet. (C) **89**, 335–355 (1986).
- Wiebes, J.T. – The Indo-Australian Agaoninae (pollinators of figs). Verh. Kon. Ned. Akad. Wet., afd. Natk., 2de reeks, **92**, 1–208 (1994a).
- Wiebes, J.T. – Agaonidae (Hymenoptera Chalcidoidea) and *Ficus* (Moraceae): fig wasps and their figs, xiv (Conclusion – Old World). Proc. Kon. Ned. Akad. Wet. **97**, 491–495 (1994b).
- Wiebes, J.T. – Agaonidae (Hymenoptera Chalcidoidea) and *Ficus* (Moraceae): fig wasps and their figs, xv (Meso-American *Pegoscapus*). Proc. Kon. Ned. Akad. Wet. **98**, 167–183 (1995).
- Windsor, D.M., D.W. Morrison, M.A. Estribi & B. de Leon – Phenology of fruit and leaf production by 'strangler' figs on Barro Colorado Island, Panama. Experientia **45**, 647–653 (1989).
- Wolcott, G.N. – The insects of Puerto Rico. J. Agric. Univ. Puerto Rico **32**, 749–882 (1948).

Host catalogue

- F. adhatodifolia* Schott. – see *F. vermifuga*
F. americana Aublet – see *F. nymphaeifolia*, *oerstediana* & *perforata*,
and also *F. guianensis*
F. aurea Nuttall – 29. *Pegoscapus mexicanus* (Ashmead)
F. bullenei I.M. Johnston – 37. *Pegoscapus gemellus* Wiebes
F. citrifolia Miller – 35. *Pegoscapus franki* Wiebes
– 15. *Pegoscapus tonduzi* (Grandi)
– 47. *Pegoscapus williamsi* (Grandi)
F. colubrinae Standley – 43. *Pegoscapus orozcoi* (Ramirez)
F. combsii Warb. – 46. *Pegoscapus bruneri* (Grandi)
F. costaricana (Liebm.) Miq. – 23. *Pegoscapus estherae* (Grandi)
F. cotinifolia Kunth – 24. *Pegoscapus kraussi* (Grandi)
F. crassior [?] – 51. *Pegoscapus danorum* (Hoffmeyer)
F. crassinervia Desf. – see *F. crassior*
F. crassiuscula Standley – 8. *Pegoscapus astomus* (Grandi)
– 6. *Tetrapus spec.* (Ramirez, 1970)
F. dugandii Standley – 9. *Pegoscapus longiceps* Cameron
F. glabrata Kunth – see *F. insipida*
F. gomelleira K. & B. – 45. *Pegoscapus brasiliensis* (Mayr)
F. guianensis Desv. – 7. *Pegoscapus flagellatus* Wiebes
F. hemsleyana Standley – 15. *Pegoscapus tonduzi* (Grandi)
F. insipida Willd. – 2. *Tetrapus costaricanus* Grandi
F. isophlebia Standley – 25. *Pegoscapus urbanae* (Ramirez)
F. jimenezii Standley – 30. *Pegoscapus jimenezi* (Grandi)
F. laevigata Vahl – see *F. aurea*
F. lapathifolia (Liebm.) Miq. – 16. *Pegoscapus aguilari* (Grandi)
F. longifolia Schott. – 52. *P. obscurus* (Kirby)
F. luschnatiana (Miq.) Miq. – 41. *Pegoscapus aemulus* (Grandi)
– see *F. monkii*
F. macbridei Standley – see *F. torresiana*
F. maroma Cast. – 31. *Pegoscapus argentinensis* (Blanchard)
F. maxima Miller – 1. *Tetrapus americanus* Mayr
F. mollicula Pittier – 48. *Pegoscapus groegeri* Wiebes
F. monkii [?] – 32. *Pegoscapus cabrerai* (Blanchard)
F. morazoniana Burger – see *F. lapathifolia*
F. nymphaeifolia Miller – 14. *Pegoscapus piceipes* (Ashmead)
F. obtusifolia Kunth – 10. *Pegoscapus hoffmeyeri* (Grandi)
F. oerstediana (Miq.) Miq. – 38. *Pegoscapus insularis* (Ashmead)
F. padifolia Kunth – 26. *Pegoscapus silvestrii* (Grandi)
– 27. *Pegoscapus tristani* (Grandi)
F. paraensis (Miq.) Miq. – 36. *Pegoscapus herrei* Wiebes

F. perforata L. – 38. *Pegoscapus insularis* (Ashmead)
F. pertusa Linn.f. – see *F. padifolia* & *trachelosyce*
F. popenoei Standley – 37. *Pegoscapus gemellus* Wiebes
F. radula Willd. – see *F. maxima*
F. schippii Standley – 42. *Pegoscapus ileanae* (Ramirez)
F. tomentella Miq. – 20. *Pegoscapus tomentellae* Wiebes
F. tonduzii Standley – 5. *Tetrapus spec.* (Bouček, 1993)
F. torresiana Standley – 8. *Pegoscapus astomus* (Grandi)
F. trachelosyce Dug. – 41. *Pegoscapus aemulus* (Grandi)
F. trigonata L. – see *F. combsii* & *lapathifolia*
 – 51. *Pegoscapus danorum* (Hoffmeyer)
 – 21. *Pegoscapus grandii* (Hoffmeyer)
F. near trigonata – 19. *Pegoscapus lopesi* (Mangabeiro Filho)
F. tuerckheimii Standley – 50. *Pegoscapus carlosi* (Ramirez)
 – 34. *Pegoscapus mariae* (Ramirez)
F. turbinata (Liebm.) Miq. – 11. *Pegoscapus baschierii* (Grandi)
F. velutina Willd. – 22. *Pegoscapus torresi* (Grandi)
F. vermifuga Miq. – 17. *Pegoscapus aerumnosus* (Grandi)
F. yoponensis Desv. – 4. *Tetrapus ecuadoranus* Grandi

Index

aemula Grandi, 1938 (Blastophaga) = 41. *Pegoscapus aemulus*
aerumosa Grandi, 1938 (Blastophaga) = 17. *Pegoscapus aerumnosus*
aguilari Grandi, 1919 (Blastophaga) = 16. *Pegoscapus aguilari*
amabilis Grandi, 1938 (Blastophaga) = 13. *Pegoscapus amabilis*
ambigua Grandi, 1938 (Blastophaga) = 12. *Pegoscapus ambiguus*
americanus Mayr, 1885 (Tetrapus) = 1. *Tetrapus americanus*
antillarum Ashmead, 1900 (Tetrapus) (see discussion under 2. *T. costaricanus*)
arcana Grandi, 1938 (Blastophaga) = 17. *Pegoscapus aerumnosus*
argentinensis Blanchard, 1944 (Blastophaga) = 31. *Pegoscapus argentinensis*
assueta Grandi, 1938 (Blastophaga) = 40. *Pegoscapus assuetus*
astoma Grandi, 1920 (Blastophaga) = 8. *Pegoscapus astomus*
attenta Grandi, 1938 (Blastophaga) = 49. *Pegoscapus attentus*
augusta Grandi, 1938 (Blastophaga) = 40. *Pegoscapus assuetus*

baschierii Grandi, 1952 (Blastophaga) = 11. *Pegoscapus baschierii*
bifossulata Mayr, 1885 (Blastophaga) = 44. *Pegoscapus bifossulatus*
brasiliensis Mayr, 1885 (Blastophaga) = 45. *Pegoscapus brasiliensis*
bruneri Grandi, 1934 (Blastophaga) = 46. *Pegoscapus bruneri*

cabrerae Blanchard, 1944 (Blastophaga) = 32. *Pegoscapus cabrerai*
carlosi Ramirez, 1970 (Blastophaga) = 50. *Pegoscapus carlosi*
costaricanus Grandi, 1925 (Tetrapus) = 2. *Tetrapus costaricanus*
cumanensis Rammirez, 1970 (Blastophaga) = 39. *Pegoscapus cumaniensis*

danorum Hoffmeyer, 1932 (Blastophaga) = 51. *Pegoscapus danorum*

ecuadoranus Grandi, 1934 (Tetrapus) = 4. *Tetrapus ecuadoranus*
elisae Grandi, 1936 (Blastophaga) = 33. *Pegoscapus elisae*
estherae Grandi, 1919 (Blastophaga) = 23. *Pegoscapus estherae*

flagellatus Wiebes, 1983 (*Pegoscapus*) = 7. *Pegoscapus flagellatus*
flaviscapa Ashmead, 1904 (*Eisenia*) = 28. *Pegoscapus flaviscapus*
franki Wiebes, 1995 (*Pegoscapus*) = 35. *Pegoscapus franki*

gemellus Wiebes, 1995 (*Pegoscapus*) = 37. *Pegoscapus gemellus*
grandii Hoffmeyer, 1932 (Blastophaga) = 21. *Pegoscapus grandii*
groegeri Wiebes, 1995 (*Pegoscapus*) = 48. *Pegoscapus groegeri*

herrei Wiebes, 1995 (*Pegoscapus*) = 36. *Pegoscapus herrei*
hoffmeyerii Grandi, 1934 (Blastophaga) = 10. *Pegoscapus hoffmeyerii*

ileanae Ramirez, 1970 (Blastophaga) = 42. *Pegoscapus ileanae*
 insularis Ashmead, 1900 (Blastophaga) = 38. *Pegoscapus insularis*

 jimenezi Grandi, 1919 (Blastophaga) = 24. *Pegoscapus jimenezi*

 kraussi Grandi, 1952 (Blastophaga) = 30. *Pegoscapus kraussi*

 longiceps Cameron, 1906 (Pegoscapus) = 9. *Pegoscapus longiceps*
 lopesi Mangabeiro Filho, 1937 (Eupistrina) = 19. *Pegoscapus lopesi*

 mariae Ramirez, 1970 (Blastophaga) = 34. *Pegoscapus mariae*
 mayri Brues, 1910 (Tetrapus) = † *Tetrapus mayri* (p. 7)
 mexicanus Ashmead, 1904 (Eisenia) = 29. *Pegoscapus mexicanus*
 mexicanus Grandi, 1952 (Tetrapus) = 3. *Tetrapus mexicanus*

 obscura Kirby, 1890 (Blastophaga) = 52. *Pegoscapus obscurus*
 orozcoi Ramirez, 1970 (Blastophaga) = 43. *Pegoscapus orozcoi*

 philippi Grani, 1936 (Blastophaga) = 18. *Pegoscapus philippi*
 picipes Ashmead, 1900 (Blastophaga) = 14. *Pegoscapus picipes*

 schwarzii Ashmead, 1900 (Blastophaga) = incertae sedis (p. 16)
 silvestrii Grandi, 1919 (Blastophaga) = 26. *Pegoscapus silvestrii*
 spec. Bouček, 1993 (Tetrapus) = 5. *Tetrapus spec.*
 spec. Ramirez, 1970 (Tetrapus) = 6. *Tetrapus spec.*
 standleyi Ramirez, 1970 (Blastophaga) = 38. *Pegoscapus insularis*

 tomentellae Wiebes, 1983 (Pegoscapus) = 20. *Pegoscapus tomentellae*
 tonduzi Grandi, 1919 (Blastophaga) = 15. *Pegoscapus tonduzi*
 torresi Grandi, 1920 (Blastophaga) = 22. *Pegoscapus torresi*
 tristani Grandi, 1919 (Blastophaga) = 27. *Pegoscapus tristani*

 urbanae Ramirez, 1970 (Blastophaga) = 25. *Pegoscapus urbanae*

 williamsi Grandi, 1923 (Blastophaga) = 47. *Pegoscapus williamsi*