



Studies on Neotropical Phasmatodea X: Redescriptions of Aplopocranidium Zompro, 2004 and JeremiaRedtenbacher, 1908, with a Survey of the Tribe Cladomorphini Brunner v. Wattenwyl, 1893 and Keys to the Genera (Insecta: Phasmatodea: “Anareolatae”: Cladomorphinae)

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Studies on Neotropical Phasmatodea X: redescriptions of *Aplopocranidium* Zompro, 2004 and *Jeremia* Redtenbacher, 1908, with a survey of the tribe Cladomorphini Brunner v. Wattenwyl, 1893 and keys to the genera (Insecta: Phasmatodea: "Anareolatae": Cladomorphinae)

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Abstract

A taxonomic survey of the anareolate neotropical tribe Cladomorphini Brunner v. Wattenwyl, 1893 (subfamily Cladomorphinae) is provided, along with a redescription and keys to the seven genera now contained. Two genera previously only known from the females, are redescribed and revised at the species level.

The monotypical *Aplopocranidium* Zompro, 2004 (Type-species: *Bacteria waechneri* Günther, 1940) was misplaced in Cranidiini Günther, 1953 and is here transferred to the tribe Cladomorphini Brunner v. Wattenwyl, 1893. It is closely related to *Jeremia* Redtenbacher, 1908 and *Jeremiodes* Hennemann & Conle, 2007, but differs from both by the prominent spines of the thorax. The previously unknown male is described and illustrated for the first time and a new extended generic description provided.

The genus *Jeremia* Redtenbacher, 1908 (Type-species: *Jeremia grossedentata* Redtenbacher, 1908) is redescribed and a key provided to distinguish the two species contained (*J. grossedentata* Redtenbacher, 1908 and *J. gymnota* Günther, 1930). The previously unknown male and eggs are described and illustrated for the first time. *Jeremia* is closely related to *Jeremiodes* and *Aplopocranidium*, but differs by the distinct ventral teeth of the middle and hind legs.

Key words

Phasmatodea, South America Cladomorphini, keys, *Aplopocranidium*, *Jeremia*, descriptions, illustrations, males, eggs

Introduction

The stick-insects of the Neotropical Region, and the Amazon basin in particular, are still comparatively poorly studied. This, the tenth part of an ongoing study of the New World Phasmatodea, redescribes the two striking, but rarely found, genera *Aplopocranidium* Zompro, 2004 and *Jeremia* Redtenbacher, 1908, both of which were previously only known from the females. Several specimens of these genera, including the previously unknown males, were traced during studies on the New World material contained in the Academy of Natural Sciences (ANSP), Natural History Museum London (BMNH), Museo de Ciencias Naturales Madrid (MNCN), Museum d'Histoire Naturelle Paris (MNHN) and State Zoological Collections Munich (ZSMC). The males of *Aplopocranidium* clearly show this genus to be misplaced in the tribe Cranidiini Günther, 1953 and to belong in Cladomorphini Brunner v. Wattenwyl, 1893. Structures of the genitalia prove this genus to be particularly closely related to *Jeremiodes* Hennemann & Conle, 2007, hence it is here transferred to the tribe Cladomorphini. The males of *Aplopocranidium* and *Jeremia* and the eggs of the latter genus are described for the first time and updated generic descriptions presented, taking the previously unknown males

into account. In addition to the descriptions of these two genera, a survey and rediagnosis of the tribe Cladomorphini Brunner v. Wattenwyl, 1893 (*sensu* Bradley & Galil, 1977) appeared warranted and is presented herein along with keys to the genera contained.

Material and Methods

The present study is based on examination of all necessary type specimens as well as non-type material in various public collections, which has received support from all curators of the concerned museums and institutions. All specimens examined were dried and pinned. Measurements were taken using a digital caliper and are given to 0.1 mm. Examinations of the insects' genitalia and eggs were carried out using a binocular microscope and an entomological magnifying lens with 4× magnification. The coloration is described, almost without exception, from dried specimens, so the original colors may have changed or faded during the preservation process.

Depositories of specimens and type status are abbreviated as follows:

ANSP: Academy of Natural Sciences, Philadelphia/USA.
 BMNH: Natural History Museum, London/England.
 ESALQ: Museo de Zoologia, Universidade de Sao Paulo/Brazil.
 MHNG: Museum d'Histoire Naturelle, Geneve/Switzerland.
 MNCN: Museo de Ciencias Naturales, Madrid/Spain.
 MNHN: Museum d'Histoire Naturelle Paris/France.
 MNHU: Museum für Naturkunde der Humboldt-Universität, Berlin/Germany.
 NHMW: Naturhistorisches Museum Wien, Vienna/Austria.
 SMTD: Staatliches Museum für Tierkunde, Dresden/Germany.
 ZMPA: Polish Academy of Sciences, Warsaw/Czech Republic.
 ZSMC: Zoologische Staatssammlung, München/Germany.
 HT: Holotype; LT: Lectotype; PLT: Paralectotype.

Results

Tribe Cladomorphini Brunner v. Wattenwyl, 1893

Type-genus.—*Cladomorphus* Gray, 1835: 15.

Cladomorphi Brunner v. Wattenwyl, 1893: 98.
 Cladomorphini Bradley & Galil, 1977: 189 (in part); Otte & Brock, 2005: 32 (in part); Hennemann & Conle, 2007: 2 (in part).
 Cladoxerinae Karny, 1923: 237 (in part).
 Cranidiini, Zompro, 2004b: 134 (in part); Otte & Brock, 2005: 32 (in part); Hennemann, Conle & Delfosse, 2007: 358 (in part).

Phibalosomatini Günther, 1953: 557 (in part).

Phibalosomatini (Sectio V: Phibalosomata) Redtenbacher, 1908: 399 (in part).

Description.—Medium-sized to very large (body length: ♂ 60.0-145.0 mm, ♀, including subgenital plate, 104.0-245.0 mm), moderately slender to robust Cladomorphinae with strong sexual dimorphism. Body more or less stick-like and of more or less uniform width; cylindrical to subcylindrical. Female apterous and considerably larger and broader than male; male much smaller and more slender than female, mostly with scale-like tegmina and well-developed alae (exception: apterous male of *Otocraniella*). Anal region of alae hyalinous. Color mostly grey or brown, rarely green; males may be multicolored. Body surface to a variable degree granulose, rugulose or tuberculose with sculpturing more decided in female; abdomen may be smooth. Ocelli lacking. Head longer than wide, ovoid to globose; vertex ranging from gently rounded and smooth to conically rounded, armed with a variable number of tubercles. Gula present. Antennae long, filiform and longer than combined length of head, pro- and mesothorax; with > 50 antennomeres. Scapus dorsoventrally flattened and more or less laterally expanded, remaining antennomeres cylindrical. Mesothorax elongate and at least 2× longer than head and pronotum combined, often armed with enlarged tubercles, spines or irregular swellings (female in particular). Mesosternum without specializations. Abdomen longer than head and complete thorax combined. Median segment longer than metanotum. Abdominal segments II-VII longer than wide. Tergites V and/or VI often with a posteromedian pair of crenulate lobes (*Cladomorphus*, *Jeremia* and *Xylodus*) or a rounded lobe posterolaterally (*Hirtuleius*). Sternum VII of female with a more or less distinct praepoculum organ (exceptions: *Jeremiodes* and *Aplopocranidium*). Anal segment of males usually with paired thorn pads on ventral surface of posterior margin (exceptions: *Jeremiodes* and *Aplopocranidium*). Lower Gonapophyses of female strongly elongated, filiform and projecting considerably over apex of abdomen. Gonapophyses IX considerably shorter than gonapophyses VIII. Gonopods developed but much smaller than gonapophyses VIII. Subgenital plate of female elongated and often extending greatly over apex of abdomen; shape naviculate, lanceolate or irregularly spatulate, with the apex often more or less expanded. Poculum of male bulgy, roundly convex and cup-like in basal portion; posterior margin either not reaching to apex of anal segment and with two terminal teeth (*Jeremiodes* and *Jeremia*) or with a long tube-like or spatulate posterior appendage which greatly extends over the apex of the abdomen (*Cladomorphus* and *Otocraniella*). Vomer well developed and sclerotized, rather elongate and more or less hook-like with one (e.g., *Jeremia* and *Jeremiodes*) or two (*Cladomorphus*) terminal teeth. Cerci small in females, either small (*Cladomorphus* and *Otocraniella*) or strongly enlarged, more or less incurving and longer than anal segment (*Aplopocranidium*, *Jeremia* and *Jeremiodes*) in males. All legs distinctly carinate, the carinae in females often more or less expanded and lamellate; on mid- and hind legs granulose to minutely spinulose. Profemora triangular in cross-section, with anterodorsal carina raised and posterodorsal carina considerably lowered; medioventral carina distinct, lamellate and more or less conspicuously displaced towards anteroventral carina. Meso- and metafemora and all tibiae trapezoidal in cross-section with dorsal carinae strongly approaching each other; often with single enlarged teeth, spines or lobes. Medioventral carina unarmed.

Eggs: Medium-sized, capsule more or less laterally compressed and oval to elliptical in cross-section. Micropylar plate elongate,

slender, roughly parallel-sided and more than 2/3 length of capsule. Internal plate open with a narrow posteromedial gap and a distinct but separated median line. Operculum oval and flat with a raised, hollow and net-like capitulum.

Comments.—The tribe Cladomorphini exceptionally includes continental South American genera. Bradley & Galil (1977) distinguished it from the three other tribes of Cladomorphinae (Hesperophasmata, Cranidiini and Cladoxerini) by the distinct medioventral carina, of the profemora, which strongly approaches the anteroventral carina instead of being midway on the ventral surface. The tribe is furthermore characteristic for the specializations of the male poculum and cerci, as well as the strongly elongated and filiform gonapophyses VIII of the female. A re-arrangement of the entire subfamily Cladomorphinae by the authors is in preparation and will provide more detailed characteristics and differentiations of the tribes currently contained.

Detailed examination of *Aplopocranidium* and knowledge of the previously unknown male, clearly show this genus was misplaced in Cranidiini by Zompro (2004b: 134). The elongate, not laterally dilated, body and lack of a tuberculate longitudinal median bulge on the mesosternum of females, as well as structures of the male genitalia, such as the conspicuously enlarged cerci and apically bidentate poculum, show *Aplopocranidium* to be closely related to *Jeremiodes* Hennemann & Conle, 2007 and *Jeremia* Redtenbacher, 1908, consequently to belong in the tribe Cladomorphini. Hence, the generic name "*Aplopocranidium*", a combination of *Aplopus* Gray, 1835 (= *Haplopus* Burmeister, 1838) and *Cranidium* Westwood, 1843 (both currently in Cranidiini), is a very inappropriate choice, since it postulates close relation to either genus. In fact, *Aplopocranidium* does not belong in the tribe Cranidiini and is not at all closely related to the West Indian *Haplopus*.

Otocrania Redtenbacher, 1908 was originally placed in the sectio Phibalosomata by Redtenbacher (1908: 399) and subsequently retained in Phibalosomatini or Cladomorphini respectively, by all subsequent authors (e.g., Günther 1953, Bradley & Galil 1977, Otte & Brock 2005). However, careful examination has revealed the genus to be misplaced and to belong in the "*Phanocles*-group" of Diapheromerinae: Diapheromerini, where it is obviously close to *Phanocles* Stål, 1875. *Otocrania* will therefore be removed from Cladomorphini and transferred to the tribe Diapheromerini (Hennemann & Conle in press), hence is excluded from the list of genera below.

The systematic position of the only Madagascan genus in the tribe, *Parabactridium* Redtenbacher, 1908 (Type-species: *Parabactridium mirum* Redtenbacher, 1908: 403), is very questionable: this genus may belong to Cladoxerini Karny, 1923. Unfortunately, the unique type-specimen appears to be lost, so any broader discussion must await fresh material. Being rather unlikely to belong in Cladomorphini, *Parabactridium* is also excluded from the generic list below.

There appear to be two generic groups within present Cladomorphini which are not only distinguished by morphological features, but also by their geographic distribution. The genera *Cladomorphus* Gray, 1835, *Otocraniella* Zompro, 2005, *Xylodus* Saussure, 1859 and *Hirtuleius* Stål, 1875 are distributed throughout the eastern regions of South America, being represented in French Guiana, eastern Brazil, Paraguay, Uruguay and northern Argentina. Males of the first three genera are characteristic for the long apical appendage of the poculum, while those of the latter genus are not known. Paired ventral thorn pads are present on the posterior margin of the anal segment. Females are characteristic for a strongly sculptured body surface,

distinct praeopercular organ and crenulate posteromedian swellings or lobes on abdominal tergites IV-VI, or lateral lobes of tergites V and VI. The subgenital plate is undulate with the apex broadened. The second group would contain the closely related *Aplopocranidium* Zompro, 2004 and *Jeremiodes* Hennemann & Conle, 2007, as well as *Jeremia* Redtenbacher, 1908, all of which are restricted to a narrow strip of lowland tropical rainforest along the eastern slopes of the Andes in Colombia, Ecuador, Peru and Bolivia. Males of all three genera are well recognized by the strongly enlarged and fattened, often incurving or hook-like cerci and reduction of paired ventral thorn pads on the anal segment, which appear to be functionally replaced by the specialized cerci. Females of *Aplopocranidium* and *Jeremiodes* are furthermore characteristic for the long lanceolate subgenital plate, which has the apex narrow or acutely pointed and lack a distinct praeopercular organ of sternum VII. However, any broader discussion on the inter generic systematization of Cladomorphini deserves knowledge of the so far unknown females of *Otocraniella* and males of *Hirtuleius*. Furthermore, only the eggs of *Cladomorphus* and *Jeremia* are known, the latter described and illustrated here for the first time. Based on morphological comparison, close relationship between Cladomorphini and the "Phanocles group" of Diapheromerinae: Diapheromerini seems obvious, but any analysis would at present be highly hypothetical and must await a better and more comprehensive knowledge of the subordinate taxa of both groups.

Distribution.—Great parts of the continental portions of the Neotropical region, which includes the complete Amazonian subregion, as well as the northern portions of the Chacoan subregion and parts of the Parana subregion (Morrone 2006: 480 ff.). This comprises the Amazon basin from Colombia and French Guiana as far south as Bolivia and northern Argentina (biogeographical provinces Chaco and Pampa).

Genera included.—

1. *Aplopocranidium* Zompro, 2004b: 134. Type-species: *Bacteria waehneri* Günther, 1940: 495, fig. 18, by original designation of Zompro, 2004b: 134. [Here transferred from the tribe Craniidiini Günther, 1953].
2. *Cladomorphus* Gray, 1835: 15. Type-species: *Cladomorphus phyllinus* Gray, 1835: 15, by subsequent designation of Rehn, 1904: 61. = *Phibalosoma* Gray, 1835: 42. Type-species: *Phibalosoma lepelletieri* Gray, 1835: 42, by monotypy. [Synonymised by Kirby, 1904: 356].
3. *Hirtuleius* Stål, 1875: 29. Type-species: *Hirtuleius laeviceps* Stål, 1875: 81, by monotypy.
4. *Jeremia* Redtenbacher, 1908: 425. Type-species: *Jeremia grossedentata* Redtenbacher, 1908: 425, pl. 19: 4, by monotypy.
5. *Jeremiodes* Hennemann & Conle, 2007: 2. Type-species: *Jeremiodes guianensis* Hennemann & Conle, 2007: 6, figs. 4-10, 12-13, by original designation of Hennemann & Conle, 2007: 2.
6. *Otocraniella* Zompro, 2004b: 137. Type-species: *Otocraniella flagelloantennata* Zompro, 2004b: 137, fig. 3, by original designation of Zompro, 2004b: 137.*
7. *Xylodus* Saussure, 1859: 62. Type-species: *Xylodus adumbratus* Saussure, 1859: 62, by monotypy.

* The unique type-specimen of *Otocraniella flagelloantennata* in ES-ALQ was erroneously stated to be a female by its original describer (Zompro 2004b, p. 137, fig. 3). The specimen is a male, with genital structures very similar to *Cladomorphus*. Zompro (2004b, p. 138)

misinterpreted the tube-like posterior extension of the poculum as an elongated female subgenital plate and failed in recognizing the true systematic position of the genus, stating it was an intermediate between *Otocrania* and *Cladomorphus*. In fact *O. flagelloantennata* only differs from males of *Cladomorphus* by the lack of wings and the flat unarmed head. Thus the validity of *Otocraniella* is doubtful and deserves clarification by knowledge of the so far, unknown females and eggs. The only feature that Zompro (2004b, p. 137) mentioned for distinguishing *Otocraniella* from *Cladomorphus*, the relatively longer profemora, does not hold true, since in both genera the legs of males are considerably longer than in corresponding females. Another male from Brazil in the collection of A. Finot in MNHN was briefly examined.

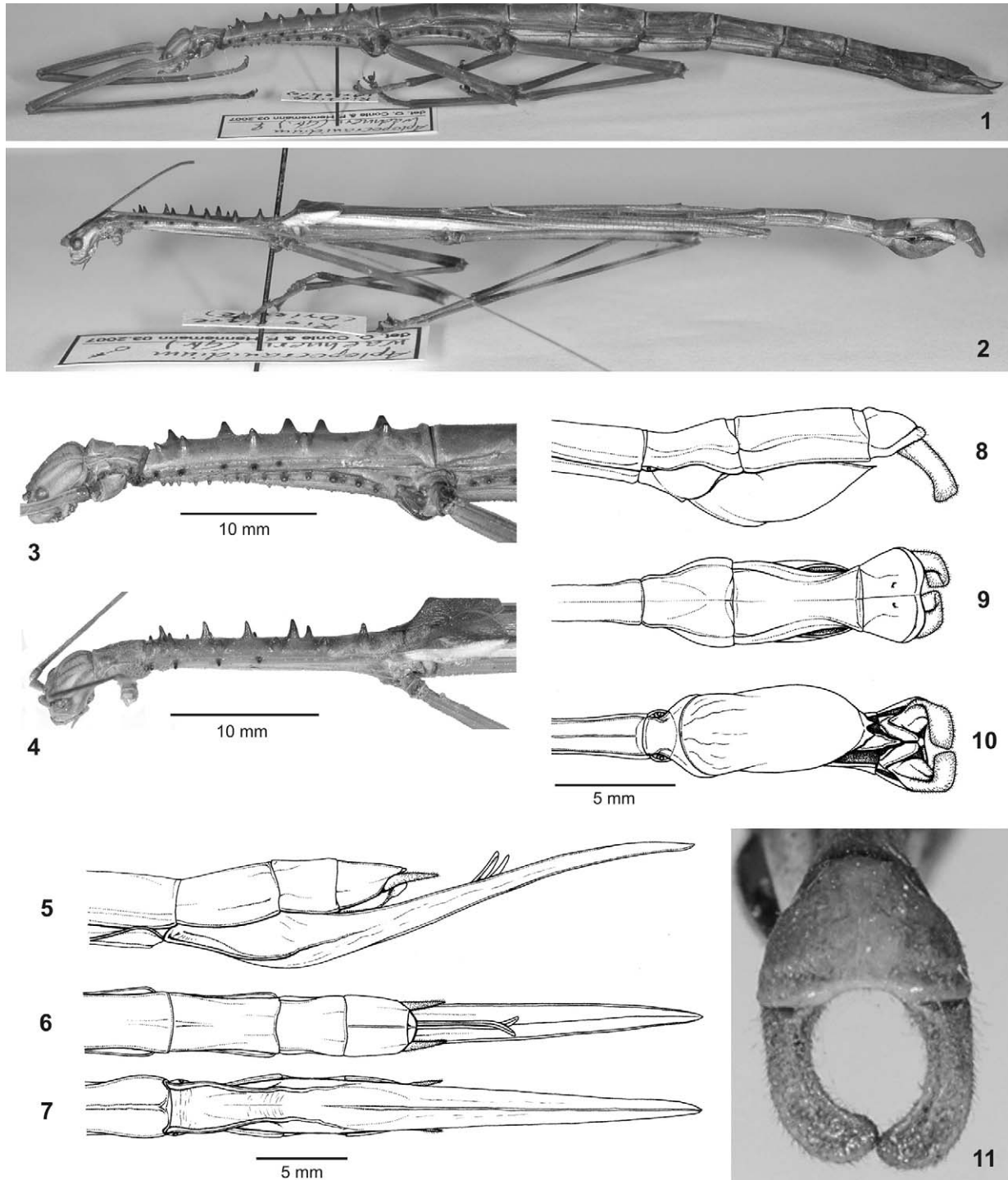
Key to the genera of Cladomorphini

Females*

1. Meso- and metasternum unarmed; medioventral carina of four posterior femora and tibiae unarmed 2
 - Meso- and metasternum spinose; medioventral carina of four posterior femora and tibiae dentate (Figs 25, 26) *Jeremia*
 2. Body subglabrous; legs slender and unarmed (only with small subapical spines on two outer ventral carinae of femora) 3
 - Body rough; legs with several carinae expanded and more or less lamellate/undulate, often with single teeth or lobes 4
 3. Mesonotum and meso-/metapleurae spinose (Fig. 3) *Aplopocranidium*
 - Mesonotum and meso-/metapleurae unarmed *Jeremiodes*
 4. Abdominal tergite V with two crenulate lobes posteromedially, V-VI parallel-sided; vertex strongly convex and tuberculate 5
 - Abdominal tergites V and VI with a lobe posterolaterally, V smooth dorsally; vertex rounded, smooth to granulose *Hirtuleius*
 5. Large insects (body > 15 cm); subgenital plate extending greatly over apex of abdomen; gonapophyses VIII not reaching tip of subgenital plate *Cladomorphus*
 - Smaller insects (body < 14 cm); subgenital plate extending over apex of abdomen by no more than length of anal segment; gonapophyses VIII projecting over tip of subgenital plate *Xylodus*
- * Females of *Otocraniella* Zompro, 2004 are not known.

Males**

1. Poculum with slender, spatulate appendix and extending greatly over abdomen apex; cerci small, no longer than anal segment, with paired thorn pads 2
 - Poculum not extending beyond apex of abdomen; cerci strongly enlarged and broadened; longer than anal segment, without paired thorn pads 4
 2. Alate; vertex convex and armed 3
 - Apterous; vertex flat *Otocraniella*
 3. Body > 12 cm; vertex tuberculate *Cladomorphus*
 - Body < 12 cm; vertex with a pair of crenulate, laterally compressed lobes *Xylodus*
 4. Posterior margin of poculum bidentate; medioventral carina of four posterior femora and tibiae unarmed 5
 - Posterior margin of poculum entire (Fig. 22); medioventral carina of four posterior femora and tibiae dentate *Jeremia*
 5. Mesonotum unarmed *Jeremiodes*
 - Mesonotum spinose (Fig. 4) *Aplopocranidium*
- ** males of *Hirtuleius* Stål, 1875 are not known.



Figs 1-11. *Aplopocranidium waehneri* (Günther, 1940). 1. Habitus of ♀ (MNCN). 2. Habitus of ♂ (MNCN). 3. Head and thorax of ♀, lateral view (MNCN). 4. Head and thorax of ♂, lateral view (MNCN). 5. Apex of abdomen ♀ (lateral view). 6. Apex of abdomen ♀ (dorsal view). 7. Apex of abdomen ♀ (ventral view). 8. Apex of abdomen ♂ (lateral view). 9. Apex of abdomen ♂ (dorsal view). 10. Apex of abdomen ♂ (ventral view). 11. Anal segment and cerci of ♂ (caudal view).

Genus *Aplopocranidium* Zompro, 2004
(Figs 1-11)

Aplopocranidium Zompro, 2004b: 134; Otte & Brock, 2005: 49.
Bacteria, Günther, 1940: 456, 495.

Type species.—*Bacteria waehneri* Günther, 1940: 456, 495, by original designation.

Description.—Medium-sized (body lengths: ♂ 83.9 mm, ♀ including subgenital plate 130.0 to 150.3 mm). Cladomorphini; females apterous, males alate (length of alae 43.4 mm). Body cylindrical in

males, oval in cross-section in females; dorsal body surface smooth and subglabrous (female in particular). Females green, yellow or brown, males rather colorful insects, being green with black knees and a bluish green mesonotum. Head about 1.3× longer than wide and roundly rectangular; vertex very gently convex and smooth. No ocelli. Eyes rather small and circular, eye length contained about 2.5× (♂) to 3.5× (♀) within that of cheeks. Antennae long and filiform, reaching to median segment in females and about 3/4 length of body in males. Scapus flattened dorsoventrally, rectangular in dorsal aspect and about 1.5× longer than wide. Pedicellus about 2/3 length of scapus and round in cross-section. III a little longer than pedicellus; IV-V shorter than III; remaining antennomeres gradually increasing in length. Pronotum roughly 2/3 the length and distinctly narrower than head, gently constricted medially. Transverse median sulcus faint and just not reaching lateral margins of segment. Mesothorax elongate and roughly 2× (♀♀) to 2.2x (♂♂) longer than head and pronotum combined; parallel sided in males, slightly gradually widened toward the posterior in females. Mesonotum of females slightly trapezoidal with posterior margin almost 2× broader than anterior margin; in both sexes dorsally armed with a variable number of very prominent rather acute (♂) or very blunt and hump-like (♀), lateral margins, with 4 to 6 rather pointed spines in anterior half (Figs 3, 4). Meso- and metapleurae of female with a longitudinal, marginal row of prominent blunt and rather finger-like spines (Fig. 3); unarmed in male. Meso- and metasternum simple and densely granulose to rugulose (less distinct in male). Tegmina of male small and scale-like (length 6.0 mm) with a moderately raised, conical central protuberance; alae reaching to posterior margin of abdominal segment V. Median segment longer than metanotum. Abdominal segments II-V of similar length, VI-X decreasing in length. II-V > 4× longer than wide and parallel sided in male, indistinctly longer than wide and III-V gently widened in female. All tergites smooth, VII parallel sided. Abdominal sternites II-VII smooth and with a longitudinal median keel, very prominent in female. No praepopular organ on sternum VII of female. Sternites V-VII of female with lateral margins expanded into a lamella-like carina. Tergite VIII of male distinctly widened in posterior half, IX about 1.8× longer than VIII and strongly constricted medially. Anal segment roundly expanded laterally and considerably broader, but shorter, than IX; posterior margin with a shallow median indentation (Fig. 9; no paired ventral thorn pads at posterior margin. Anal segment of female about as long as IX and rounded posteriorly; supra-anal plate small and roundly transverse (Fig. 6). Cerci elongate, about 2/3 length of anal segment and tapered towards a narrow and pointed tip in female (Figs 5,6). Cerci of male strongly enlarged and longer than anal segment, club-like, dorsoventrally flattened and gently incurving (Fig. 11). Vomer well developed and sclerotised, shape very elongate with a long and pointed filiform terminal hook. Poculum of male rather bulgy, roundly convex and tub-like with the posterior margin bidentate; slightly projecting over posterior margin of tergite IX (Fig. 10). Subgenital plate of female distinctly keeled longitudinally, lanceolate and projecting over anal segment by more than combined length of tergites VIII-X; apex pointed and lateral surfaces with a prominent longitudinal lamella-like carina in basal portion (Figs 5-7). Gonapophyses VIII of female elongate, filiform, upcurving in apical portion and projecting over anal segment by roughly the length of tergite VIII. All legs rather long and slender, unarmed except for 1 or 2 minute subapical spines on the two outer ventral carinae of the meso- and metafemora of female. All femora and tibiae trapezoidal in cross-section, with all carinae well developed and rather acute. Profemora curved and compressed

basally, longer than mesonotum in female and slightly longer than head, pro- and mesonotum combined in male; anterodorsal carina raised and slightly lamellate. Medioventral carina of profemora distinct and very slightly displaced towards anteroventral carina, in meso- and metafemora distinct and armed with a row of minute tubercles (♀). Medioventral carina of tibiae terminating in a minute spine at apex of each tibia. Mesofemora about as long as mesonotum in female and about as long as pro- and mesonotum combined in male. Metafemora reaching (♂) or almost reaching (♀) posterior margin of abdominal segment IV. Basitarsi carinate dorsally and slightly shorter than following four tarsomeres combined, unarmed. Eggs unknown.

Differentiation.—This striking genus is very close to *Jeremiodes* Hennemann & Conle, 2007 and can, with some certainty, be regarded as its sister taxon. Common features are the unarmed legs and ovate, unarmed head of both sexes, smooth abdomen and lanceolate, apically pointed subgenital plate of females and the bidentate posterior margin of the poculum of males. *Aplopocranidium* however, only differs from *Jeremiodes* by: the prominently spinose mesonotum, densely granulose to rugulose meso- and metasternum and longitudinally keeled abdominal sternites of both sexes; spinose meso- and metapleurae of females, as well as the simple mesosternum (longitudinally keeled in *Jeremiodes*) and club-like, gently incurving cerci of males (conspicuously hook-like in *Jeremiodes*). For a more detailed comparison and differentiation, see Table 1.

Distribution.—Amazon subregion of South America, so far recorded from Brazil (Manaos), E Ecuador (Napo Province: Rio Tigre & Aguamo) and SE Colombia (Cauca Province: Cali 1035 m). According to Morrone (2006) all known records pertain to the biogeographical Provinces Napo, Imeri, Cauca and western portions of the Varzea Province, which predominantly comprise tropical lowland rainforest.

Species included.—

Bacteria waehneri Günther, 1940: 495, fig. 18 (♀).

***Aplopocranidium waehneri* (Günther, 1940)**
(Figs 1-11)

Bacteria waehneri Günther, 1940: 456, 495, fig. 18 (♀). HT, ♀: Manaos, 1939 (SMTD); PT, ♀: 175; Aguamo (Ecuad.), R. Haensch S.; *Bacteria* (?) *waehneri* K. Gthr. i. mscrt.; K. Günther det. (ZMPA).

Phanocles waehneri, Zompro, 2003: 42.

Aplopocranidium waehneri, Zompro, 2004b: 134, fig. 1 (♀); Otte & Brock, 2005: 49.

Further material.— [5 ♂♂, 3 ♀♀]:

COLOMBIA: 1 ♀: Colombia, Cali (1,035 m); Drings, January 1960 (ESALQ – not examined).

ECUADOR: 1 ♀, 1 ♂: Rio Tigre (Oriente) (MNCN). 1 ♀, 4 ♂♂: Ecuador, Prov. Napo, Rio Tigre 30.IX. / 13.X.1997, leg. Amedegnato & Poulain (MNHN – briefly examined from photos only).

Description.—Since this genus is monotypical, the description of the type species corresponds to the detailed generic description presented above. Hence, only the coloration is described in more detail below.

♀ (Fig. 1): coloration of body and legs variable and ranging from

pale yellow (female in ESALQ) through green (female in MNHN) to pale creamish brown (HT and female in MNCN). A live female from Ecuador, examined from a photograph, is greyish brown with great parts of the dorsal surface of the mesonotum, metanotum, median segment and abdominal tergites II-VII, bright apple green. The legs in this specimen are dull green with a slight brownish wash. Head with several faint dark longitudinal lines. Antennae dark brown. All spines of the mesonotum, meso- and metapleurae dull red, the marginal spines of the mesonotum with distinct black points. Interior surfaces of profemora pale to dull red. Apical margins of all femora more or less distinctly black.

Male: (Fig. 2) head, prothorax and abdomen pale to middle brown, remaining parts of body pale to middle green. Head with several faint darker brown longitudinal stripes. Antennae reddish middle brown. Great parts of mesonotum bluish green to dull blue, the mesonotal spines dull red basally with black points. Abdominal tergite IX with a large whitish anteromedian marking and a smaller, longitudinal posterior marking at lateral margins. Tegmina brown with the anterior margin broadly white. Costal region of alae middle to dull green with a slight brownish wash and distinctly contrasting brown longitudinal veins; basal half of anterior margin white. Legs middle brown, the interior surface of the profemora red. Apices of all femora dark brown to black, the tibiae with three more or less distinct dark brown transverse bands.

Comments.—Although only a few specimens of this striking genus are known, it is seen to show considerable variation in size, coloration and in the armature of the mesothorax. Eggs unknown.

Genus *Jeremia* Redtenbacher, 1908
(Figs 12-28)

Type species.—*Jeremia grossedentata* Redtenbacher, 1908: 425, pl. 19: 4, by monotypy.

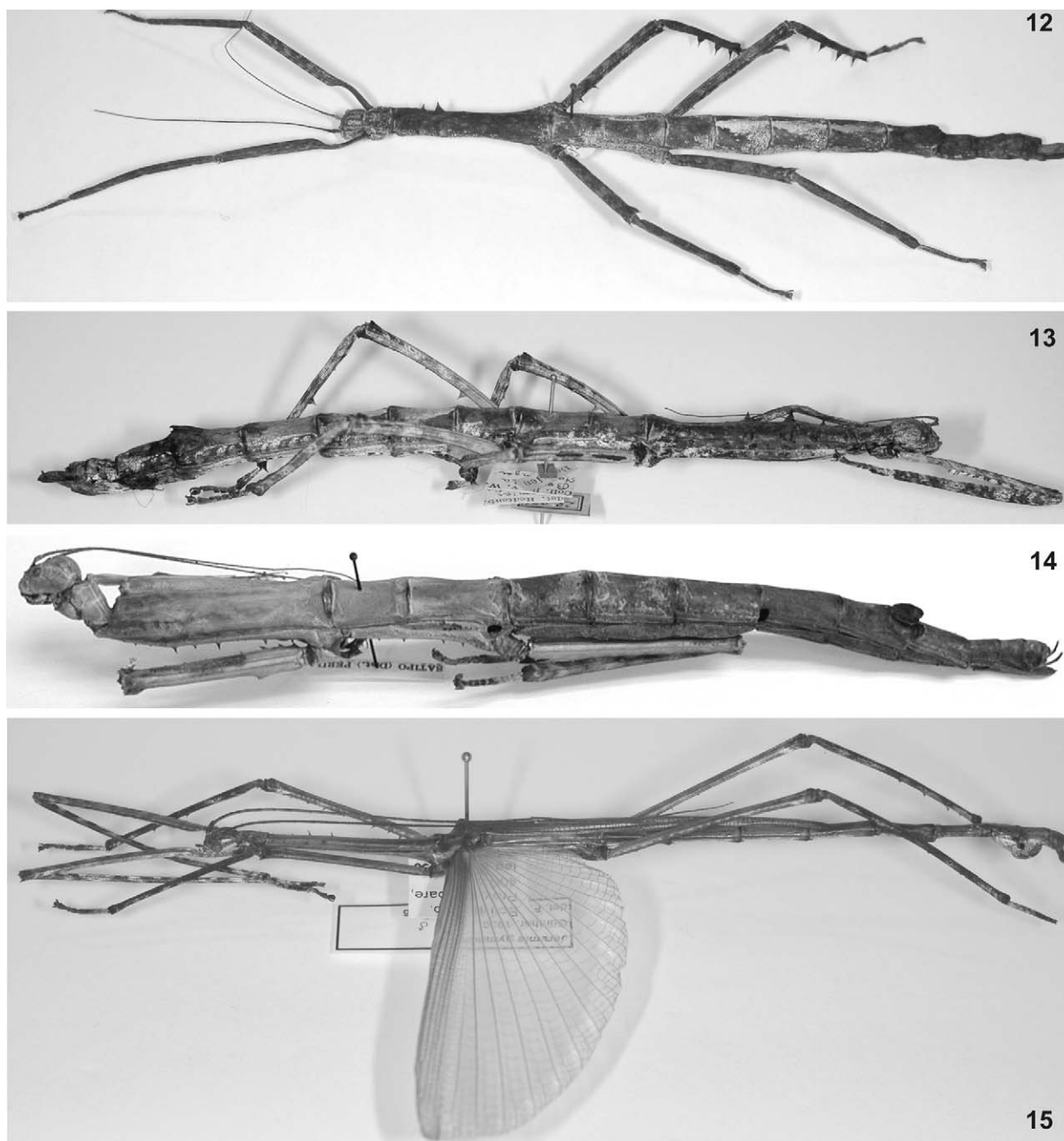
Jeremia Redtenbacher, 1908: 425, pl. 19: 4; Günther, 1930: 568, fig. 10; Bragg, 2001: 635; Zompro, 2004a: 312; Otte & Brock, 2005: 165.

Description.—Medium-sized, cylindrical Cladomorphini (body lengths: ♂ *ca* 90.0-111.5 mm, ♀ including subgenital plate 136.5-168.0 mm); female robust and apterous, male moderately slender and alate. Body surface smooth, not shiny. General color brown, often with whitish markings and speckles, great parts of ventral body surface white or pale grey. Head globose and more or less 1.3× longer than wide, vertex roundly convex and smooth. Eyes circular and of moderate size, their length contained less than 3× in that of cheeks. Antennae filiform and reaching to posterior margin of mesonotum (♀) or projecting over posterior margin of median segment (♂). Scapus dorsoventrally compressed, about 1.5× longer than wide and slightly constricted towards the base. Pedicellus cylindrical and about half length of scapus. III about as long, but narrower than pedicellus; IV half the length of III. Following antennomeres first increasing then decreasing in length toward apex of antennae. Pronotum shorter and distinctly narrower than head, slightly trapezoidal with anterior margin narrower than posterior margin. Transverse median sulcus distinct, gently curved and more or less reaching lateral margins of segment. Mesothorax elongate, < 3× longer than head and pronotum combined, slender and parallel sided in male, gently swollen premedially in female. Mesonotum with a fine longitudinal median carina (more distinct in male); either smooth or with two longitudinal rows of spines in anterior

half (Fig. 24). Meso- and metapleurae with a longitudinal row of tubercles (♂) or blunt spines (♀). Meso- and metasternum irregularly set with pointed granules (♂) or several prominent spines (♀); mesosternum in male with a longitudinal median keel. Tegmina of male short, scale-like and with a roundly conical central protuberance. Alae at least reaching to abdominal tergite V. Median segment longer than metanotum. Abdominal segments II-VII longer than wide and parallel-sided: II slightly shorter than following, III-VI roughly of equal length, VII a little shorter and distinctly narrower than previous segments. Tergite VI with a pair of crest-like dorsal carinae or lobes at posterior margin (indistinct in male). Abdominal sternites II-VII smooth. Praeopercular organ formed by two humps or short carinae near posterior margin of sternum VII of female. Posterior margin of female anal segment broadly rounded and with a very minute median indentation (Figs 17, 19). Supraanal plate very small, semicircular and with an acute median keel. Anal segment of male transverse and wider than VIII-IX, broadened toward the posterior and with the lateral surfaces convex and rounded; posterior margin with a shallow median indentation and lacking paired ventral thorn pads. Cerci subcylindrical in cross-section and either small (Fig. 18) or conspicuously enlarged and obtuse in female (Figs 16, 17), shorter than anal segment. Cerci of male strongly enlarged and longer than anal segment, club-like, incurving and dorsoventrally flattened in the apical portion (Fig. 23). Vomer well developed and sclerotised, elongate and spatulate, but small and with a fairly blunt apex. Poculum of male bulgy, roundly convex and tub-like; roughly reaching posterior margin of tergite IX (Fig. 22). Subgenital plate of female projecting over posterior margin of anal segment by less than combined length of tergites VIII-X and strongly longitudinally keeled basally (Figs 16-19). Gonapophyses VIII elongate, filiform, upcurving and projecting over anal segment. Legs of moderate length, rather robust in female, slender in male; armature much more prominent in female. Profemora shorter to slightly longer than mesothorax, mesofemora shorter than mesothorax, and metatarsi just not reaching (♀) or slightly projecting over apex of abdomen (♂). All femora and tibiae distinctly trapezoidal in cross-section, with dorsal carina strongly nearing each other; all carinae very distinct and more or less lamellate. Forelegs unarmed, profemora with anterodorsal carina slightly raised and lamellate. In female all carinae of protibiae moderately elevated and lamellate. Medioventral carina of profemora distinct and noticeably displaced towards anteroventral carina. Medioventral carina of meso- and metafemora and tibiae very distinct and armed with a row of minute (♂) or prominent teeth (♀); those of the tibiae laterally compressed and acutely triangular (Figs 25, 26). All remaining carinae of legs unarmed, but occasionally there are teeth on the anteroventral aspect and a subbasal elevation of the posteroventral carina of the meso- and metafemora of female (Fig. 26). Basitarsi at least as long as following three tarsomeres combined, unarmed; either slender or with a raised dorsal carina.

Eggs: (Figs 27, 28) large (overall length 4.9 mm). Capsule lens-shaped, laterally compressed, indistinctly longer than high, constricted at anterior margin and with an impression at the polar area. Capsule surface roughly pitted. Micropylar plate convex, very elongate, slender and roughly parallel sided, about ¾ the length of capsule. Posterior end of micropylar plate with a distinct polar mound and a median notch. Median line short but distinct. Operculum oval, convex and irregularly covered with warty structures.

Differentiation.—Distinguished from all other genera of Cladomorphini by the prominently spinose medioventral carina of the



Figs 12-15. Habitus of *Jeremia* spp. 12. *J. grossedentata* Redtenbacher, 1908: ♀ (BMNH). 13. *J. grossedentata* Redtenbacher, 1908: HT, ♀ (NHMW). 14. *J. gymnota* Günther, 1930: ♀ (ANSP). 15. *J. gymnota* Günther, 1930: ♂ (ZSMC).

mid and hind legs of both sexes, as well as the spinose meso- and metasternum of female. For a more detailed differentiation from *Aplopocranidium* and *Jeremiodes*, see Table 1.

Comments.—Redtenbacher (1908: 425) placed *Jeremia* in close relation to *Cladomorphus* and *Hirtuleius* and distinguished it from these two genera by the prominently spinose medioventral carinae of the mid and hind legs, and by the presence of two crest-like lobes on abdominal tergite VI of the female. The eggs indicate relation to *Cladomorphus* by having the same conspicuously elongate, slender and parallel-sided micropylar plate. The males were unknown to Redtenbacher, but their genitalia show striking similarity to *Jer-*

emiodes and confirm the close relation between these two genera already suggested by Hennemann & Conle (2007) and emphasized by the generic name.

Distribution.—Tropical regions of Bolivia, Peru and Ecuador east of the Andes and below 1000 m. According to Morrone (2006) all known records fall into the biogeographical Provinces Napo and Ucayali, western portions of the Varzea Province as well as the Yungas Province towards the south.

Species included.—

1. *Jeremia grossedentata* Redtenbacher, 1908: 425, pl. 19: 4 (♀).

[Distribution: Bolivia & SE-Peru]

2. *Jeremia gymnota* Günther, 1930: 568, fig. 10 (♀). [Distribution: SE-Colombia, E-Ecuador, E-Peru and NE-Bolivia]

Key to the species of *Jeremia*

Females

1. Small species (body length 136.5-146.0 mm); mesonotum spinose; anteroventral carina of meso- and metafemora smooth (Fig. 25); basitarsi lobed dorsally *grossedentata*
 - Larger species (body length 145.0-168.0 mm); mesonotum unarmed; anteroventral carina of meso- and metafemora dentate (Fig. 26); basitarsi simple *gymnota*

Males

1. Body length < 100 mm; alae reaching half way along abdominal tergite VI; metatibiae with a rounded dorso-apical lobe; basitarsi lobed dorsally *grossedentata*
 - Body length > 100 mm; alae reaching half way along abdominal tergite V; metatibiae smooth dorsally; basitarsi slender . . . *gymnota*

Jeremia grossedentata Redtenbacher, 1908

(Figs 12-13, 16-17, 25)

Jeremia grossedentata Redtenbacher, 1908: 425, pl. 19: 4 (♀). HT, ♀: Bolivien; Coll. Br. v. W., Bolivia, Staudinger; det. Redtenb. *Jeremias gorossedentatus*; 22.074 (NHMW, No. 823); Brock, 1998: 32; Otte & Brock, 2005: 165.

Further material.—[1♂, 1♀]: PERU: 1♀: Peru, 74, 53 (BMNH); 1♂: Peru, Dept. Cordoba (MNHN – briefly examined from photos only).

Diagnosis.—Distinguished from *J. gymnota* by: the smaller body size, rounded dorsal apical lobe of the metatibiae and dorsally lobed basitarsi of both sexes; spinose mesonotum; slightly shorter median segment; longer subgenital plate; conspicuously enlarged cerci (Figs 16, 17) and smooth anteroventral carina of the meso- and metafemora of female (Fig. 25), as well as the relatively longer alae of male, which reach about half way along abdominal tergite VI.

Description.—Female: (Figs 1, 2) Medium-sized (body length 131.0-140.0 mm, including subgenital plate 136.5-146.0 mm), moderately robust insects (maximum body width 7.2-8.0 mm). General coloration greyish or yellowish middle brown with darker and paler brown speckles. Head with five more or less prominent darker brown longitudinal, sub-parallel lines. Mesonotum dark brown with a fine longitudinal pale brown median line. Meso- and metasternum and sternites II-VII of abdomen pale greyish brown with distinct white mottling. Spines of the mesothorax and thoracic sterna brown with black points. Abdominal tergites III-V each with a bold, roughly triangular white marking. Antennae brown and becoming darker toward the apex. Eyes dark reddish brown. Legs pale greyish to middle brown with whitish mottling and darker grey, transverse bands.

Head: vertex with a slightly impressed coronal line. Between the bases of the antennae with a triangular impression.

Thorax: pronotum about 1.5× longer than wide, anterior margin raised, posterior margin gently rounded. Prosternum trapezoidal, smooth. Anterior portion of mesothorax gently widening, medial portion roughly parallel sided and posterior portion broadened.

Mesonotum armed with 4-6 large, conical spines in anterior half (2-3 on each side of the median line), a few smaller spines are present close to anterior margin. Metanotum about 2/5 the length of mesonotum, rectangular and about 1.2× longer than wide. Meso- and metapleurae each with a longitudinal row of variously sized, blunt spines. Meso- and metasternum sparsely set with small spines of variable sizes.

Abdomen: median segment 2× longer than wide and slightly constricted medially, about 1.3× longer than metanotum. Segments IV-VII swollen and slightly broadened posteriorly. II-VI about 1.3× longer than wide. VI with two distinct and curved, crest-like lobes in posterior half. Praeopercular organ formed by a pair of short converging carinae at posterior margin of sternum VII. Tergite VIII 3/4 the length and narrower than VII, and about 1.5× longer than wide. IX about 2/3 the length of VIII, roughly quadrate. Anal segment shorter and broader than IX, transverse and with a very faint median carina. Cerci large, obtuse, cylindrical in cross-section and almost as long as anal segment; finely bristled (Figs 16-17). Gonapophyses VIII projecting over apex of abdomen by more than length of the anal segment and almost reaching apex of subgenital plate. Subgenital plate projecting over apex of abdomen by 2× length of the anal segment; apex spatulate and rounded (Figs 16-17).

Legs: profemora about as long as mesonotum, metafemora reaching to posterior margin of tergite IV. All carinae of middle and hind legs, except for medioventral carina. Medioventral carina of meso- and metafemora obtuse and armed with 3-6 moderately sized spines (Fig. 25), medioventral carina of meso- and metatibiae strongly raised and armed with 3-5 (mesotibiae) or 5-7 (metatibiae) prominent, laterally compressed, triangular teeth. Anterodorsal carina of metatibiae with a rounded apical lobe. Basitarsi about as long as following three tarsomeres combined. Dorsal carina of probasitarsus with a distinct triangular lobe, the dorsal carina of the meso- and metabasitarsi gradually raised towards the apex.

Male: a unique male in MNHN was briefly examined from photographs, hence only a short characterization is given below.

Fairly small (body length < 100.0 mm) and moderately slender for the genus. General color reddish middle brown with greyish mottling on the head, pronotum, tegmina, costal region of the alae and three terminal abdominal segments. Anterior margin of tegmina and basal portion of anterior margin of alae whitish. Antennae dark blackish brown. Legs with irregular pale greyish transverse bands. Vertex roundly convex. Antennae reaching to abdominal segment III. Mesothorax about 2.5× longer than head and pronotum combined, the mesonotum in anterior half set with about seven rather distinct spines. Alae reaching about half way along abdominal segment VI. Abdominal segments II-VI roughly 3× longer than wide. Tergite VI with a pair of low converging carinae posteromedially. Anal segment wider than long, with the lateral margins roundly expanded; posterior margin with a wide median emargination. Cerci distinctly longer than anal segment, dorsoventrally compressed, widened towards a broadly rounded apex and gently incurving. Profemora about equal in length to mesonotum, metatibiae almost reaching apex of abdomen. Medioventral carina of meso- and metafemora spinose, medioventral carina of mesotibiae with four and that of metatibiae, armed with five prominent and acutely triangular teeth. Anterodorsal carina of metatibiae with a rounded apical lobe. All basitarsi with the dorsal carina roundly raised.

Comments.—Redtenbacher (1908: 425, pl. 19: 4) originally described *Jeremia grossedentata* from a unique female in NHMW and provided an effective illustration of the specimen. It appears to be rare as there

are only two known Peruvian specimens in addition to the HT, a female in BMNH and a male in MNHN. Eggs unknown.

Distribution.— Central Bolivia (Province Chapare 400 m) & East Peru (Dept. Cordoba).

Jeremia gymnota Günther, 1930
(Figs 14-15, 18-24, 26-28)

Jeremia gymnota Günther, 1930: 568, fig. 10 (♀). HT, ♀: Canelos, Ecuador, FeyerS.V., *Jeremia* n. sp. Günther det., *Phibalosom.*; Typus (MNHU); Otte & Brock, 2005: 166; Zompro, 2005: 265.

Further material.— [2 ♂♂, 5 ♀♀, 1 ♀ nymph, 2 eggs]: PERU: 1 ♀, 2 eggs (ex abdomen): Satipo, Peru, F. Tippmann, Wien, 5.5.38 (ZSMC); 2 ♀♀: Satipo (Dist.) Peru (ANSP); 1 ♀: June 1944, Satipo (Dist.) Peru (ANSP); 1 ♀: Aug. 1944, Satipo (Dist.) Peru (ANSP); 1 ♀ (penultimate instar): Satipo (Dist.) Peru, II. 1944 (ANSP); 1 ♂: Chanchamayo, Peru (ANSP). BOLIVIA: 1 ♂: Bolivia trop., Prov. Chapare, 400 m, leg. 20.VIII.1950 Zischka (ZSMC).

Diagnosis.—Distinguished from *J. grossedentata* by: the larger body size; lack of a rounded dorsal apical lobe on the metatibiae and slender basitarsi of both sexes; unarmed mesonotum; slightly longer median segment*. In *J. gymnota* it is relatively longer than in *J. grossedentata*, in relation to the metanotum; shorter subgenital plate; much smaller cerci (Fig. 18) and dentate anteroventral carina of the meso- and metafemora of female (Fig. 26), as well as the shorter alae of male which reach only about half way along abdominal tergite V.

Description.— Female: (Fig. 14) large (body length 142.0-162.5 mm, including subgenital plate 145.0-168.0 mm) and robust insects (maximum body width 7.5-10.0 mm). General coloration middle brown with indistinct darker and paler brown mottling and speckles. Head with six indistinct darker brown longitudinal, sub-parallel lines. Pronotum with a faint medial, oval brown marking at lateral margins. Meso- and metasternum and pleurae pale creamish or greyish, abdominal sternites II-VII greyish brown with whitish mottling. Spines of the meso- and metapleurae and thoracic sterna beige to yellow with black points. Antennae brown and becoming darker toward apex. Eyes dark reddish brown.

Head: between the bases of the antennae with a triangular impression. **Thorax:** pronotum 1.5× longer than wide and gently constricted medially; anterior margin raised, posterior margin rounded. Almost complete dorsal surface with a slightly impressed, longitudinal median line. Prosternum trapezoidal and with a slightly impressed median line in posterior half. Anterior portion of mesothorax gently widening, medial portion roughly parallel sided and posterior portion broadened. Mesonotum smooth, except for a few scattered minute granules and a fine longitudinal median carina. Metanotum about 1/3 length of mesonotum, rectangular and about 1.3× longer than wide; smooth except for a few minute granules and a conspicuously raised posterior margin. Meso- and metapleurae each with a longitudinal row of variously sized strong spines. Meso- and metasternum sparsely set with strong spines of variable sizes.

Abdomen: median segment 2× longer than wide and slightly constricted medially, about 1.3× longer than metanotum. Segment II shorter than median segment and following segments; 1.3× longer

than wide. III-VI 1.54× longer than wide; VI slightly swollen. Tergite VI with two prominent and curved, crest-like lobes in posterior half (Figs 18-19). Tergite VIII half the length and distinctly narrower than VII, about 2× longer than wide. IX 2/3 the length of VIII, roughly quadrate. Anal segment with a longitudinal median keel and a faint posteromedian notch, posterolateral angles rounded. Cerci small, oval in cross-section and tapered towards the apex; finely bristled. Gonapophyses VIII projecting distinctly over anal segment and roughly reaching to apex of subgenital plate (Figs 18, 19). Subgenital plate strongly keeled in basal half and projecting over abdomen by slightly more than length of anal segment; apex narrowed, rounded and with a minute median indentation.

Legs: profemora about as long as mesonotum and metafemora, reaching to posterior margin of tergite IV. Anteroventral carina of mesofemora with 7-8 laterally compressed teeth, which decrease in size toward apex of femur (Fig. 26); posteroventral carina with a distinct roundly triangular, sub-basal elevation. Medioventral carina of meso- and metafemora obtuse and armed with 3-6 prominent spines; medioventral carina of meso- and metatibiae strongly raised and armed with 2-5 (mesotibiae) or 3-6 (metatibiae) prominent, laterally compressed, triangular teeth. Basitarsi about as long as following three tarsomeres combined, slender.

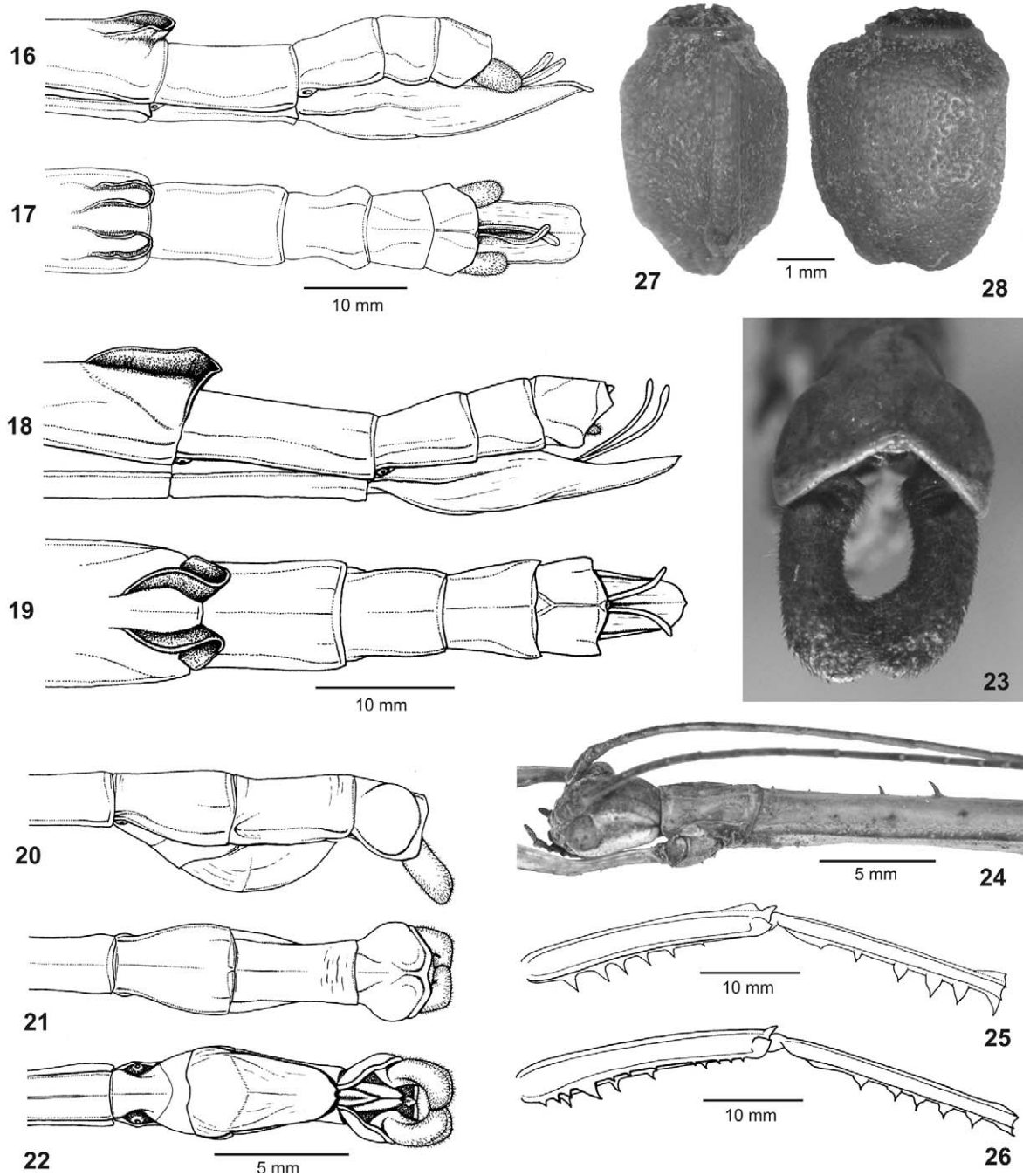
Male: (Fig. 15) medium-sized (body length 111.5 mm) and rather slender insects (maximum body width 3.2 mm), with well-developed alae (49.5 mm). General coloration greyish to yellowish brown, great parts of ventral body surface white and the mesosternum with a slight greenish wash. Head brown, white posteriorly and with a short, white postocular line. Eyes creamish middle brown. Antennae dark brown and slightly reddish in basal 1/3. Tegmina plain greyish brown with the anterior margin broadly white. Costal region of alae greyish brown and in basal 2/3 with a bold, longitudinal white line along anterior margin. Anal region transparent with brown veins. Basal half of poculum white and abdominal tergite IX with an oval white patch close to lateral margins. Cerci dark brown. Legs dull grey with distinct white transverse bands on ventral surfaces. Spines of the thorax and legs ochre with black points.

Head: generally as in female but impression between bases of antennae more distinct. Eyes projecting hemispherically. Antennae reaching to posterior margin of abdominal segment III.

Thorax: pronotum as in female. Mesothorax about 5× longer than pronotum. Mesonotum in anterior half set with two rows of 4-5 slender spines, which increase in size towards the posterior (Fig. 24). Posterior half with a few very minute granules. Mesosternum sparsely set with black granules. Metasternum smooth with a yellowish brown median line and with a very few small granules. Metanotum indistinctly longer than wide. Terminalia slightly projecting over posterior margin of metanotum, constricted anteriorly and broadly rounded in posterior half. Alae reaching about half way along abdominal tergite V.

Abdomen: median segment about 3× longer than metanotum and gently narrowed toward the posterior. Segments II-V shorter than median segment and about 3× longer than wide, VI slightly shorter, VII as long as VI. Tergite VI with two longitudinal, slightly diverging carinae posteriorly. Sternites II-VII with a faint longitudinal median carina. Tergite VIII roughly half the length of VII and gradually widening towards the posterior, trapezoidal in dorsal aspect. IX slightly longer but narrower than VIII, decidedly constricted medially. Anal segment 2/3 the length and almost 2× the width of IX, lateral surfaces roundly expanded and convex toward the dorsal surface. Posterior margin with a very shallow median indentation (Fig. 21). Supraanal plate very small and hidden underneath anal segment,

*The 'median segment' is the first abdominal tergum in Phasmatodea.



Figs 16-28. *Jeremia* spp. 16. *J. grossedentata* Redtenbacher, 1908: apex of abdomen ♀ (lateral view). 17. *J. grossedentata* Redtenbacher, 1908: apex of abdomen ♀ (dorsal view). 18. *J. gymnota* Günther, 1930: apex of abdomen ♀ (lateral view). 19. *J. gymnota* Günther, 1930: apex of abdomen ♀ (dorsal view). 20. *J. gymnota* Günther, 1930: apex of abdomen ♂ (lateral view). 21. *J. gymnota* Günther, 1930: apex of abdomen ♂ (dorsal view). 22. *J. gymnota* Günther, 1930: apex of abdomen ♂ (ventral view). 23. *J. gymnota* Günther, 1930: anal segment and cerci of ♂ (caudal view). 24. *J. gymnota* Günther, 1930: head and thorax of ♂ (ZSMC). 25. *J. grossedentata* Redtenbacher, 1908: middle leg of ♀ (lateral view). 26. *J. gymnota* Günther, 1930: middle leg of ♀ (lateral view). 27. *J. gymnota* Günther, 1930: egg, dorsal view. 28. *J. gymnota* Günther, 1930: egg, lateral view.

carinate dorsally. Cerci a little longer than anal segment, almost cylindrical in basal portion and increasingly flattened dorsoventrally towards the broadened apex; incurving (Fig. 23). Vomer elongate but fairly small, spatulate and with a blunt apex. Poculum with a faint median indentation at posterior margin (Fig. 22).

Legs: profemora about as long as pro- and mesonotum combined,

mesofemora slightly longer than mesonotum and metatibiae, almost reaching apex of abdomen. Medioventral carina of meso- and metafemora distinct and armed with a longitudinal row of 7-8 spines which decrease in size towards apex of femur. Medioventral carina of meso- and metatibiae with 3-4 triangular teeth. Anterodorsal carina of meso- and metatibiae gently rounded apically. Basitarsi slightly longer than remaining tarsomeres combined.

Table 1. Comparison of *Aplopocranidium* Zompro, 2004, *Jeremiodes* Hennemann & Conle, 2007 and *Jeremia* Redtenbacher, 1908.

| | <i>Aplopocranidium</i> | <i>Jeremiodes</i> | <i>Jeremia</i> |
|--|--|---|---|
| Head | Elongate, ovate; vertex flattened | Elongate, ovate; vertex flattened | Globose; vertex roundly convex |
| Mesonotum | Surface smooth but armed with several prominent spines and a marginal row of spines (Figs 3-4) | Densely granulose | Surface smooth; occasionally armed with single prominent spines (Fig. 24) |
| Meso- and metasternum (♀♀) | Densely granulose/rugulose | Densely granulose | Sparsely spinose |
| Mesosternum (♂♂) | Simple | With a fine longitudinal median carina | With a longitudinal median keel |
| Meso- and metaplaeurae (♀♀) | Spinose (Fig. 3) | Unarmed | Spinose |
| Abdominal tergite VI (♀♀) | Unarmed (Fig. 1) | Unarmed | With two crest-like posteromedian lobes (Figs 16-19) |
| Abdominal sternites II-VII (♀♀) | With a blunt longitudinal median keel (V-VII with lateral margins expanded into a lamella-like carina) | Simple | Simple |
| Praeopercular organ (♀♀) | No | No | Two small humps Or carinae near posterior margin of sternum VII |
| Subgenital plate (♀) | Elongate and lanceolate, extending greatly over apex of abdomen; apex acute (Figs 5-7) | Elongate and lanceolate, extending greatly over apex of abdomen; apex acute | Short and at best projecting over apex of abdomen by combined length of tergite IX and X; apex rounded (Figs 16-19) |
| Poculum (♂♂) | Posterior margin bidentate (Fig. 10) | Posterior margin bidentate | Posterior margin with a minute median indentation (Fig. 22) |
| Cerci (♂♂) | Club-like and gently incurving (Fig. 11) | Hook-shaped; apex broadened and angled inward | Club-like and gently incurving (Fig. 23) |
| Cerci (♀♀) | Elongate gradually narrowed with apex pointed; about 2/3 the length on anal segment (Figs 5-6) | Elongate gradually narrowed with apex pointed; less than 1/2 the length on anal segment | Apex blunt, size variable (Figs 16-18) |
| Medioventral carina of the mid and hind legs | Unarmed | Unarmed | Armed with prominent, spines (Figs 25-26) |
| Basitarsi | Simple | Simple | Dorsal carina may be raised and rounded |

Nymphs: the penultimate instar female nymph in ANSP measures a body length of 123.0 mm and has the ventral teeth of the meso- and metatibiae considerably less developed than do the adults.

Eggs.— (Figs 27, 28) Two eggs were extracted from the abdomen of the female from Satipo, Peru in ZSMC, one of which is fairly well developed and served for the following description. Large, capsule strongly laterally compressed with a distinct longitudinal bulge on dorsal and ventral surface and polar-area. Capsule 1.2× longer than high and distinctly constricted towards anterior margin. Lateral surfaces flattened and polar area with a shallow indentation. Entire capsule surface roughly and irregularly pitted. Micropylar plate slightly raised from capsule surface, very elongate, slender and roughly parallel sided, about 3/4 the length of capsule. Surface of plate strongly convex, bulge-like and structured like capsule. Posterior end roundly expanded, notched and with a prominent, impressed polar mound. Median line short but distinct, terminating just before polar indentation of capsule. Operculum oval,

convex and irregularly covered with warty-structures or tubercles (opercular structures certainly not fully developed). Capsule plain sepia with the anterior margin slightly greenish. Micropylar plate orange-brown. Operculum black with the central wart-like structures reddish brown.

Measurements.—Length (including operculum) 4.9 mm, length 4.2 mm, width 3.0 mm, height 3.8 mm, length of micropylar plate 3.4 mm.

Comments.—Günther (1930: 568) described *Jeremia gymnota* from a single, remarkably large female from Cañelos (southeast Ecuador) in MNHU and provided a detailed description in German, as well as a figure of the holotype. All other examined females are from the Satipo Province of Northeast Peru and are apparently smaller than the HT (Table 3). The material of Bolivian Phasmatodea in ZSMC contained the so far unknown male of *J. gymnota*, which is the first record of this species from Bolivia. A second male in ANSP lacks

Table 2. Measurements [mm] of *Aplopocranidium waehneri* (Günther, 1940).

| | HT, ♀ (SMTD) | ♀ (ESALQ)* | ♀ (MNCN) | ♂ (MNCN) |
|--------------------------|--------------|------------|----------|----------|
| Body (incl. subgen. pl.) | > 135.0 | 150.3 | > 130.0 | - |
| Body | 129.0 | - | 125.5 | 83.9 |
| Pronotum | 5.0 | 4.1 | 4.6 | 3.9 |
| Mesonotum | 22.0 | 22.1 | 22.8 | 14.0 |
| Metanotum | 9.0 | 9.0 | 8.9 | - |
| Median segment | 10.0 | 10.7 | 10.9 | - |
| Tegmina | - | - | - | 6.0 |
| Alae: | - | - | - | 43.4 |
| Profemora | 22.0 | 27.5 | 26.2 | - |
| Mesofemora | 22.5 | 24.6 | 21.0 | 17.6 |
| Metafemora | 26.0 | 27.8 | 26.5 | 21.3 |
| Protibiae | 27.8 | 29.3 | 25.2 | - |
| Mesotibiae | 22.5 | 23.7 | 20.5 | 16.6 |
| Metatibiae | 28.7 | 30.8 | 27.1 | 22.0 |
| Antennae | ca. 50.0 | 57.6 | - | > 59.0 |

* according to Zompro (2004b: 135).

Table 3. Measurements [mm] of *Jeremia* spp.

| | <i>grossedentata</i> | | <i>gymnota</i> | | |
|----------------------|----------------------|----------|----------------|-------------|-----------|
| | HT, ♀ (NHMW) | ♀ (BMNH) | HT, ♀ (MNHU) | ♀♀ | ♂♂ |
| Body (incl. sg. pl.) | 136.5 | 146.0 | 168.0 | 145.0-157.5 | - |
| Body | 131.0 | 140.0 | 162.5 | 142.0-153.5 | 111.5 |
| Head | - | - | 8.8 | 8.0-9.1 | 4.3-4.8 |
| Pronotum | 5.4 | 6.3 | 8.0 | 6.8-7.1 | 4.1-4.3 |
| Mesonotum | 28.1 | 31.3 | 33.5 | 31.5-33.5 | 18.8-21.8 |
| Metanotum | 8.0 | 10.5 | 11.6 | 9.8-10.5 | 5.0 |
| Median segment | 10.2 | 11.9 | 13.9 | 12.4-13.9 | 15.0 |
| Tegmina | - | - | - | - | 6.2-7.8 |
| Alae | - | - | - | - | 44.8-49.5 |
| Profemora | 25.5 | 29.8 | 30.0 | 26.8-29.8 | 23.9-27.6 |
| Mesofemora | 21.0 | 25.0 | 28.2 | 21.5-27.0 | 19.4-22.2 |
| Metafemora | 25.5 | 30.2 | 32.8 | 29.0-31.0 | 25.0-27.0 |
| Protibiae | 25.8 | 30.3 | 30.0 | 25.9-28.0 | 29.8-32.7 |
| Mesotibiae | 22.1 | 25.0 | 27.0 | 21.2-25.5 | 23.8 |
| Metatibiae | 27.2 | 31.8 | 32.4 | 28.9-32.4 | 21.3-30.8 |
| Antennae | 41.0 | > 52.0 | > 50.0 | 62.0 | 68.0 |

the terminal six abdominal segments.

J. gymnota appears to be more common than *J. grossedentata* and certainly not rare in Satipo Province of Northeast Peru.

Distribution. — East Ecuador (Province Pastaza: Upper Rio Bobonaza, Cañelos 450 m), East Peru (Province Junín: Satipo & Chanchamayo) and Central Bolivia (Province Chapare 400 m).

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References

- Bradley J.C., Galil B.S. 1977. The taxonomic arrangement of the Phasmatodea with keys to the subfamilies and tribes. *Proceedings Entomological Society of Washington* 79: 176-208.
- Brock P.D. 1998. Catalogue of type specimens of Stick and Leaf-Insects in the Naturhistorisches Museum Wien (Insecta: Phasmida). *Kataloge der wissenschaftlichen Sammlungen des Naturhistorischen Museums in Wien* 13: 5-72.
- Brunner v. Wattenwyl C. 1893. Révision du système des Orthoptères et Description des espèces rapportées par H. Leonardo Fea de Birmanie. *Annali del Museo civico de Storia naturale Giacomo Doria, Genova* 2: 76-101, pls. 2-4.
- Burmeister H. 1838. *Handbuch der Entomologie, Band 2*. T.C.F. Enslin, Berlin.
- Gray G.R. 1835. *Synopsis of the species of insects belonging to the family of Phasmidae*. Longman, Rees, Orme, Brown, Green and Longman, London.

- Günther K. 1930. Neue und wenig bekannte Phasmoiden von Südamerika. Mitteilungen aus dem Zoologischen Museum in Berlin. 15: 558-570.
- Günther K. 1940. Über die Verbreitung einiger Insekten im Gebiete des Amazonasstromes und die Frage eines columbischen Faunendistriktes in der brasilianischen Subregion. Archiv für Naturgeschichte, N. F., 9: 450-500.
- Günther K. 1953. Über die taxonomische Gliederung und die geographische Verbreitung der Insektenordnung der Phasmatodea. Beiträge zur Entomologie, Berlin, 3: 541-563.
- Hennemann F.H., Conle O.V. 2007. Studies on Neotropical Phasmatodea IV. *Jeremiodes* gen. nov., a new genus of the subfamily Cladomorphinae, and the description of two new species. Spixiana 30: 1-11.
- Hennemann F.H., Conle O.V., Delfosse E. 2007. Studies on Neotropical Phasmatodea VI. The genus *Cranidium* Westwood, 1843 (Phasmatodea, Phasmatidae, Cladomorphinae). Bulletin de la Société entomologique de France, 112: 357-368.
- Hennemann F.H., Conle O.V. In press. Studies on Neotropical Phasmatodea XI. Generic revision and re-arrangement of the tribe Cladomorphini Brunner v. Wattenwyl, 1893, including the descriptions of several new species. (Phasmatodea: „Anareolatae“: Diapheromeridae). Zootaxa.
- Kirby W.F. 1904. A synonymic catalogue of Orthoptera. British Museum, London, Vol. I.
- Morrone J.J. 2006. Biogeographic areas and transition zones of Latin America and the Caribbean Islands based on panbiogeographic and cladistic analyses of the entomofauna. Annual Reviews of Entomology 51: 467-494.
- Otte D., Brock P.D. 2005. Phasmid Species File. Catalog of Stick and Leaf Insects of the World. The Insect Diversity Association and the Academy of Natural Sciences, Philadelphia. CafePress.com. 414 p.
- Redtenbacher J. 1908. Die Insektenfamilie der Phasmiden. III. Phasmidae Anareolatae (Phibalosomini, Acrophyllini, Necrosciini). Verlag Wilhelm Engelmann, Leipzig. pp.341-589, pls. 16-27.
- Stål C. 1875. Recensio Orthopterorum, 3. Revue critique de Orthoptères décrits par Linné, de Geer et Thunberg. P.A. Norstedt & Söner, Stockholm. 105 pp.
- Westwood J.O. 1843: Arcania Entomologica, or illustrations of new, rare and interesting exotic insects. 2: 49-50, pl. 61.
- Zompro O. 2001: A generic revision of the insect order Phasmatodea: The New World genera of the stick Insect subfamily Diapheromeridae: Diapheromerinae = Heteronemiidae: Heteronemiinae sensu Bradley & Galil, 1977. Revue suisse de zoologie, 108: 129-255.
- Zompro O. 2003. Catalogue of type-material of the insect order Phasmatodea deposited in the Museum für Tierkunde, Dresden, Germany. Phasmid Studies 11: 31-44.
- Zompro O. 2004a. Revision of the genera of the Areolatae, including the status of *Timema* and *Agathemera* (Insecta, Phasmatodea). Abhandlungen des Naturwissenschaftlichen Vereins in Hamburg (NF) 37. 327 pp.
- Zompro O. 2004b. A Key to the stick-insect genera of the „Anareolatae“ of the New World, with description of several new taxa. Studies on Neotropical Fauna and Environment 39: 133-144.
- Zompro O. 2005. Catalogue of type-material of the insect order Phasmatodea, housed in the Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany and in the Institut für Zoologie der Martin-Luther-Universität in Halle (Saale), Germany. Mitteilungen aus dem Museum für Naturkunde in Berlin. Deutsche Entomologische Zeitschrift 52: 251-290.