

A new genus of the flat bug family Aradidae (Hemiptera: Heteroptera) from the Early Cretaceous Crato fossil beds in Brazil

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Abstract

The extant fauna of Neotropical Aradidae is rich and diverse, comprising to date 509 species and subspecies of 80 genera. Fossil Neotropical members of Aradidae are only described from Miocene Dominican amber. Although there are a great number of Heteroptera already reported from the Early Cretaceous Crato fossil beds in Brazil, only one undescribed specimen of an aradid has been mentioned in the literature. In the present paper *Protophyllotingis magna* gen.n. et sp.n. from the subfamily Mezirinae is described and imaged from Crato sediments.

Key words: Hemiptera, Heteroptera, Aradidae, Mezirinae, new genus, new species, fossil, Crato, Brazil.

Zusammenfassung

Von der artenreichen rezenten Aradidenfauna der Neotropis sind bisher 509 Arten aus 80 Gattungen beschrieben worden. Fossile neotropische Aradiden sind nur aus dem miozänen Bernstein der Dominikanischen Republik bekannt. Aus den kreidezeitlichen – und damit wesentlich älteren – Ablagerungen der Crato-Formation in Brasilien wird *Protophyllotingis magna* gen.n. et sp.n. aus der Unterfamilie Mezirinae beschrieben und abgebildet.

Introduction

Aradidae is a large family within the suborder Heteroptera of which 509 species and subspecies assigned to 80 genera are recorded to date from the Neotropical Region (COSCARON & CONTRERAS 2012). The majority of this diverse fauna belongs to the subfamily Mezirinae comprising 339 species and subspecies of 42 genera.

The peculiar strictly Neotropical genus *Phyllotingis* WALKER, 1873 is represented by five species: *P. lanceolata* (FABRICIUS, 1803) from Brazil; *P. eximia* (HAGLUND, 1868) from Brazil and Colombia; *P. interjecta* (BERGROTH, 1894) from Brazil, Colombia, and Panama; *P. triangula* HEISS, 1993 from Brazil; *P. reducta* HEISS, 1993 from Trinidad (HEISS 1993). Species of this genus are recognized by a combination of characters, e.g., long antennae, long apically contiguous genae, and shape of pronotum, laterally expanded dorsal external laterotergites (deltg), at least of abdominal segments VI and VII.

Fossil Neotropical Aradidae have been described only from Miocene Dominican amber, comprising nine species of seven genera (FROESCHNER 1992, HEISS 2000, POINAR 2011, HEISS & POINAR 2012, HEISS 2012). The rich deposits of the much older Early Cretaceous Crato fossil beds of Brazil, recently treated in a comprehensive study by MARTILL et al. (2007), contain a great number of Heteroptera species of which few are described yet; however only one specimen of Aradidae is mentioned, apparently belonging to the modern subfamily Mezirinae (POPOV & BECHLY 2007: 326). This single specimen is – according to my knowledge – not yet described and could not be located.

Therefore the presence of another fossil Aradidae from Crato deposits is of great interest. The well preserved specimen is recognized as a new taxon and described and figured below.

Material and methods

The fossil described in this paper originates from a positive impression on a slab of limestone ($10.7 \times 9.8 \times 1.0$ cm) from the Crato geological formation. Its age is estimated to be late Aptian, dated about 115 million years (MARTILL & HEIMHOFFER 2007). The slab is deposited in the collection of the author (Crato EH 15/39) at the Tiroler Landesmuseum Ferdinandeum, Innsbruck.

Measurements are given in millimetres. Photos were taken with a Nikon Coolpix P300 digital camera at different light conditions to highlight structural details (Figs. 4–7).

Systematic paleontology

Order Hemiptera LINNAEUS, 1758

Suborder Heteroptera LATREILLE, 1810

Family Aradidae BRULLÉ, 1836

Subfamily Mezirinae OSHANIN, 1908

Protophyllotingis gen.n.

Type species: *Protophyllotingis magna* sp.n. by monotypy.

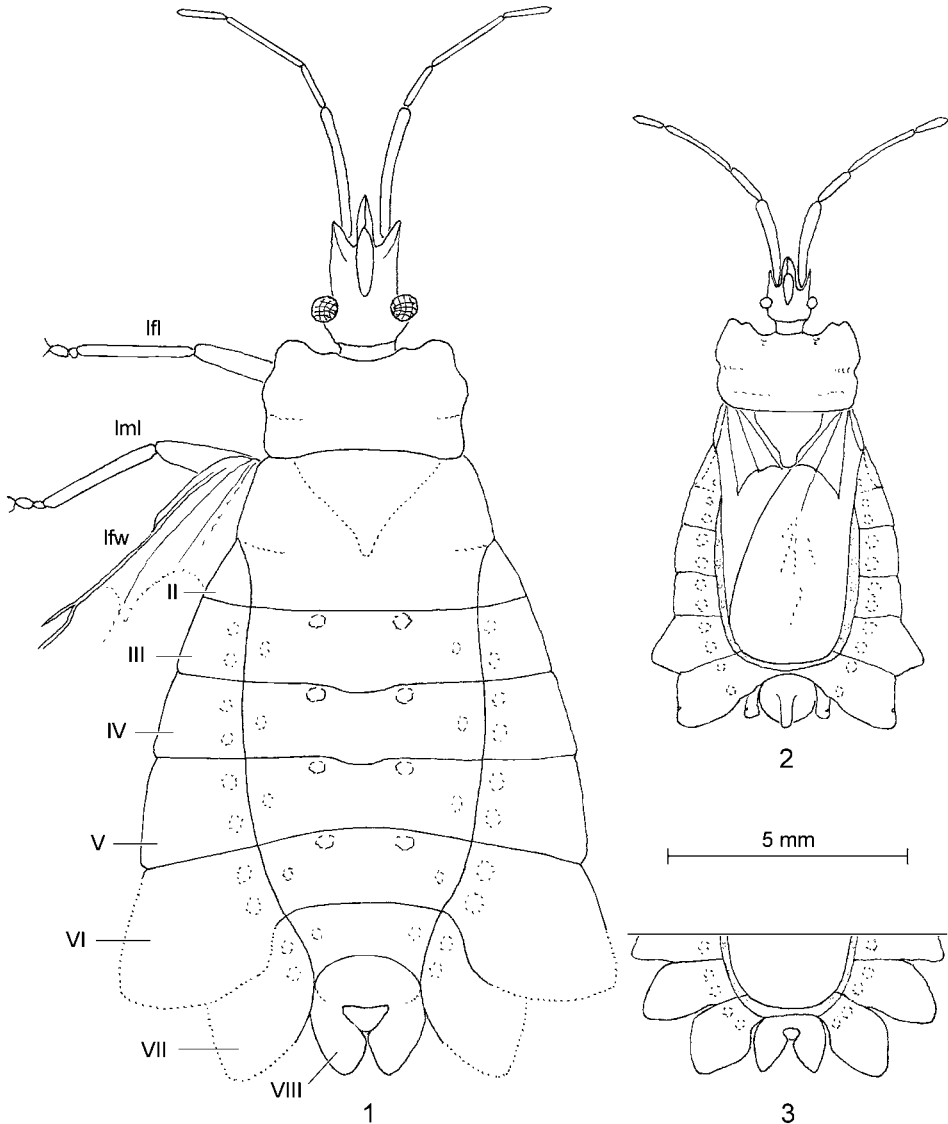
Diagnosis: General body shape and structure as of the extant genus *Phyllotingis* WALKER, 1873. It is distinguished, however, by its unusual large size, the more elongate head and relatively shorter antennae. Other structures as described for the type species.

Etymology: Refers to “proto” (Greek) first, foremost, for a supposed ancestor of the extant related genus *Phyllotingis* WALKER, 1873.

Protophyllotingis magna sp.n. (Figs. 1, 4–7)

Holotype: Nearly complete individual, dorso-ventrally depressed, legs and antennae partly preserved, deltg of terminal segments VI–VIII incomplete. Deposited as “Crato 15/39” in the collection of the author.

Diagnosis: Large macropterous female, abdomen distinctly widening posteriorly, deltg II–V without lateral expansions which are hypothesized to occur on deltg VI–VII as indicated by the partly basally preserved segmental borders and the fact that all extant species show such structures (dotted line in Fig. 1).



Figs. 1–3: (1) *Protophylloitingis magna* sp.n., female, holotype, dorsal, reconstruction. (2) Male of *Phylloitingis triangula* with expanded deltg VI–VII, dorsal. (3) Terminal segments of female *Phylloitingis lanceolata*, dorsal; Abbreviations: I–VII = deltg I–VII; VIII = paratergite VIII; lfl = left fore leg; lfw = left forewing; lml = left middle leg.

Description: Head distinctly longer than width across eyes, genae surpassing clypeus, apex acute and contiguous; antennae about 3× as long as width of head, segment I longest, II shortest, II–IV thinner than I, eyes globular; postocular lobes converging posteriorly.

Pronotum rectangular, lateral margins sinuate, anterolateral angles roundly produced. Legs: femur, tibia and tarsus of left fore- and middle leg recognizable, tarsi two-segmented.

Hemelytra: Remnants of left forewing spread and few veins preserved and visible, indicating a macropterous specimen.

Abdomen. Lateral margins triangularly widening posteriorly; deltg II–V increasingly enlarged laterally but without lamellate expansions; outline of deltg VI–VII damaged and only basally traceable. Tergite VIII with elongate, posteriorly rounded paratergites; deltg II–VI separated by distinct sutures. Tergal plate consisting of mediotergites (mtg) III–VI separated by transverse sutures, laterally delimited by a raised and carinate margin; invaginations at middle of posterior margin of mtg III and IV may indicate thoracic scent glands. Surface of deltg II–VII and that of tergal plate punctate, there fading at middle along mtg III–VI, the punctures laterally increasing in size toward connexivum; on deltg III–VII two apodemal impressions (glabrous areas) are present, on tergal plate one midlateral close to lateral margin and one median close to anterior margin of mtg III–VI.

Measurements: Length from apex of genae to paratergite VIII 18.0 mm; length of antennae about 6.2 mm; width of head across eyes 1.9 mm; width across posterior margin of mediotergite (mtg) IV 4.9 mm (widest at middle 5.0 mm); mtg V 4.3 mm; mtg VI 3.2 mm, mtg VII 2.2 mm; width across tergite V (mtg + deltg) 9.0 mm.

Etymology: Refers to the unusually large size of this taxon, from “magna” (Latin, fem.) large.

Discussion: Compared to all extant species of *Phyllotingis*, this new species most resembles *P. triangula* HEISS, 1993 described from a male from Mato Grosso in Brazil sharing the posteriorly widening deltg II–V without lateral expansions (Fig. 2). It is however nearly twice as large (18.0 mm against 9.6 mm of *P. triangula* and at most 10.5 mm of all other species).

The relative length of the pronotum compared with that of recent species of *Phyllotingis* seems much shorter in the new species. Although its posterior margin is not clearly delimited in the fossil impression, it can be inferred from the position of the anterolateral angle of the left forewing (corium) marking the limit between pro- and mesonotum. *Protophyllotingis magna* sp.n. also shows shorter antennae (about 3× width of head – 4.8–5.9× in recent *Phyllotingis* spp.), and the portion of head between eyes and apex of antenniferous lobes is distinctly longer than the length of postocular lobe including eyes (shorter or at most of same length in species of *Phyllotingis*).

Contrary to the standard arrangement of two lateral, two midlateral and one median apodemal impression (formula 2 : 2 : 1) on dorsal abdominal segments, characteristic for the subfamilies Mezirinae, Carventinae and Aneurinae (USINGER & MATSUDA 1959), the arrangement formula for the new genus and species is 2 : 1 : 1. This is typical for Aradinae and Calisiinae, but *Phyllotingis* and *Protophyllotingis* gen.n. belong to Mezirinae. Therefore the taxonomic implications of this aberrant morphological character cannot be estimated yet.

Because of its general similarity to extant *Phyllotingis* but of Early Cretaceous age, *Protophyllotingis* gen.n. is hypothesized to be an ancestral member of this modern Mezirinae clade.

Figs. 4–7: *Protophyllotingis magna* sp.n., fossil impression of female, holotype, dorsal, at different light conditions.



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