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## **The first known female of *Archeoradus burmensis* HEISS & GRIMALDI, 2001, in Cretaceous Burmese Amber (Heteroptera: Aradidae)**

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### A b s t r a c t

A second inclusion in Upper Cretaceous Burmese Amber contains a well-preserved specimen of an Aradidae which shares all the essential characters of the male holotype of *Archeoradus burmensis* HEISS & GRIMALDI. Hence, it is probably the unknown female of that species. Because of characters now clearly observed in *Archeoradus*, it cannot be placed in one of the extant subfamilies; consequently a new subfamily, *Archeoradinae* subfam. nov., is erected to accommodate it.

### Z u s a m m e n f a s s u n g

Eine nun vorliegende zweite Insekteninkluse der Oberkreide in burmesischem Bernstein enthält eine gut erhaltene Rindenwanze, welche alle wesentlichen Merkmale des männlichen Holotypus von *Archeoradus burmensis* HEISS & GRIMALDI aufweist und daher die Annahme berechtigt erscheint, dass es sich um das unbekannte Weibchen dieser Art handelt. Die nun beobachtete Kombination von morphologischen Merkmalen lässt keine Zuordnung zu einer der rezenten Unterfamilien zu, sodaß dafür eine neue Unterfamilie *Archeoradinae* subgen. nov. errichtet wird.

**Key words:** Heteroptera, Aradidae, mesozoic, amber, *Archeoradinae*, new subfamily, *Archeoradus*, Myanmar, Burma.

### I n t r o d u c t i o n

The oldest known Aradidae species in amber was described very recently as *Archeoradus burmensis* HEISS & GRIMALDI, 2001, from the Upper Cretaceous of Myanmar (Burma), represented by a single male.

Now another inclusion from the same locality has been discovered and examination of this indicates it is the hitherto unknown female of the described species.

This female shares all essential characters of the male, except the lamellate expansions of the dorsal external laterotergites (deltg), which are sometimes sexually dimorphic. The good visibility of particularly the ventral side, as well as the dorsal side, of the abdomen allows one to recognize additional structures that are important for classification of the fossil within the family Aradidae:

- \* Metapleural scent-gland opening (only visible on the right side) with a conspicuous deep pit and a bristle-like structure arising from middle, but no external evaporative area can be discerned
- \* All spiracles II – VII lateral at the edge of the connexivum, VIII terminal
- \* Nearly straight ventral sutures of abdomen even in the female
- \* Pattern of glabrous spots 1 (2?):1:1 on the dorsal and 1:1:1 on the ventral side
- \* Trochanters separated by distinct sutures from the femora

As already stated in the description of the male, this combination of characters does not fit into any of the eight presently recognized subfamilies of Aradidae. To place this exceptional Mesozoic genus and species within the framework of the current classification (USINGER & MATSUDA, 1959), it is proposed to erect a new subfamily to accommodate them.

#### M a t e r i a l a n d m e t h o d s

Examined piece of amber: 14 x 12 x 2 mm, with a female Aradidae embedded in epoxide resin with attached label: Amber: Myanmar (Burma) / Upper Cretaceous / Katchin: Tanai Village (on Ledo Rd. / 105 km NW Myitkyna) / coll. Leeward Capitol Corp., 2000 / AMNH Bu-1336.

The insect is complete, tarsi are missing on right middle and both hind legs; left middle leg is displaced; all parts are visible except head and pronotum on dorsal side.

It is deposited in the American Museum of Natural History, New York.

Measurements were taken with a micrometer eyepiece, 40 units equal to 1 mm.

#### A r c h e a r a d i n a e s u b f a m . n o v .

T y p e g e n u s : *Archearadus* HEISS & GRIMALDI, 2001.

D e s c r i p t i o n : Body flattened, surface granular; labium short, arising well beyond apex of elongate clypeus, enclosed by bucculae at base, with open atrium; eyes pedunculate; only known species showing dimorphic wing development with macropterous male and brachypterous female; corium laterally dilated at base; metathoracic scent-gland openings conspicuous in the form of a pit, with an erect bristle-like structure arising from middle; legs long and slender, without spines, trochanters not fused with femora; tarsi two-segmented with claws bearing pulvilli; abdominal terga III – VI separated by sutures and not fused to a tergal plate; pattern of glabrous spots 2:1:1 above and 1(2?):1:1 below; eighth abdominal segment well developed in both sexes, their lateral lobes produced on either side of bilobate segment IX.

#### D i s c u s s i o n

Although this subfamily is based on only one genus and species, it is distinguished from the other subfamilies by a particular set of characters. *Archearadus* is suggestive of typical *Aradus* in body form, head structure, insertion of labium and free abdominal mediotergites III-VI. However, Aradinae possess no pulvilli and no conspicuous metapleural scent-gland opening. The latter is most similar to that of Prosymptestinae of Gondwanian

distribution, which in turn have a fused tergal plate with a posterior margin on tergites II-V, deflected backwards and no rostral groove. Chinamyersiinae from New Zealand and Australia seem to be related by the structure of the labium, pulvilli and genital segments of the abdomen; however, their metapleural scent-gland opening is divided by a prominent curved ridge and a tergal plate is present.

In conclusion, considering the age of about 90–100 Ma (GRIMALDI et al. 2002), the free labium, the rostrum enclosed by bucculae and open rostral atrium, the straight ventral sutures of the abdomen, the free abdominal tergites III-VI, the lateral location of the spiracles and the lobe-like pulvilli, all indicate a primitive condition of Archearadinae. This suggests that it is an ancestral group at the base of the phylogenetic cladogram of subfamilies of Aradidae provided by GROZEVA & KERZHNER, 1992.

*Archearadus burmensis* HEISS & GRIMALDI (Photo 1-2, fig. 1-2)

Short description of the female (as far as differing from male and new characters observed):

Brachypterous; body surface granulate.

**H e a d** : As long as wide across eyes (40 / 40); clypeus long, nose-like, reaching beyond antennal segment II; antennae thin, 1.23 x as long as width of head (49 / 40); relative length of I / II / III / IV = 5 / 10 / 20 / 17; eyes pedunculate and produced laterally.

**P r o n o t u m** : General shape and lateral dentation as in male; measurements were not possible, as this dorsal part is concealed by other inclusions.

**S c u t e l l u m** : Of subtriangular shape, about as long as wide, with rounded apex and carinate lateral margins; disk depressed.

**H e m e l y t r a** : Owing to the brachypterous condition, the hemelytra are reduced to ovate wing pads that are about as long as the scutellum, reaching anterior margin of tergite III.

**A b d o m e n** : Ovate, egg-shaped; lateral margins of deltg II – VII slightly concave with a larger spiracle-bearing tubercle at middle; anterolateral angles projecting, most prominent on deltg VII; eighth segment exposed, with triangular posterior expansions bearing the spiracles on either side of bilobate segment IX.

**V e n t e r** : Pro-, meso- and metasternum separated by sutures; metapleural scent-gland opening eye-shaped with a deep pit and a bristle-like structure arising from middle; sternites I + II fused, sutures to metasternum and sternite II present; sutures separating sternites III – VII nearly straight; sternite VII and VIII split at middle; border of ventral laterotergites (as part of the dorsum) and mediosternites marked by a shallow depressed line.

**M e a s u r e m e n t s** : Length 5.10 mm; total length of antennae 1.22 mm; width of abdomen across tergite IV = 2.75 mm.

**R e m a r k s** : The ratio of antennal length / width of head differs considerably from that reported for the male (1.23 / 1.68); however, the latter is obviously incorrect due to the distortion of the head of the male specimen.

The conspicuous metapleural scent-gland opening is visible only on the right side; on the left side the middle leg it is displaced posteriorly, covering with its femur the location of the scent-gland. In addition, an impurity in the amber piece obscures the spot.

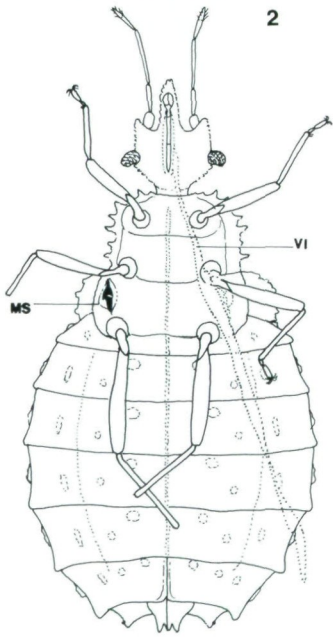
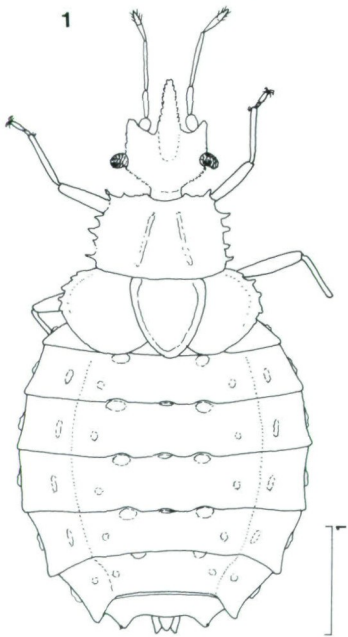


Photo 1-2, fig. 1-2: *Archeonadus burmensis*, female. Photo 1, fig. 1 – dorsal view; photo 2, fig. 2 – ventral view. MS = metapleural scent-gland opening, VI = ventral impurity. Scale 1 mm.

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