

Evolutionary insights from a rare male palm bug (Thaumastocoridae) in Cretaceous amber

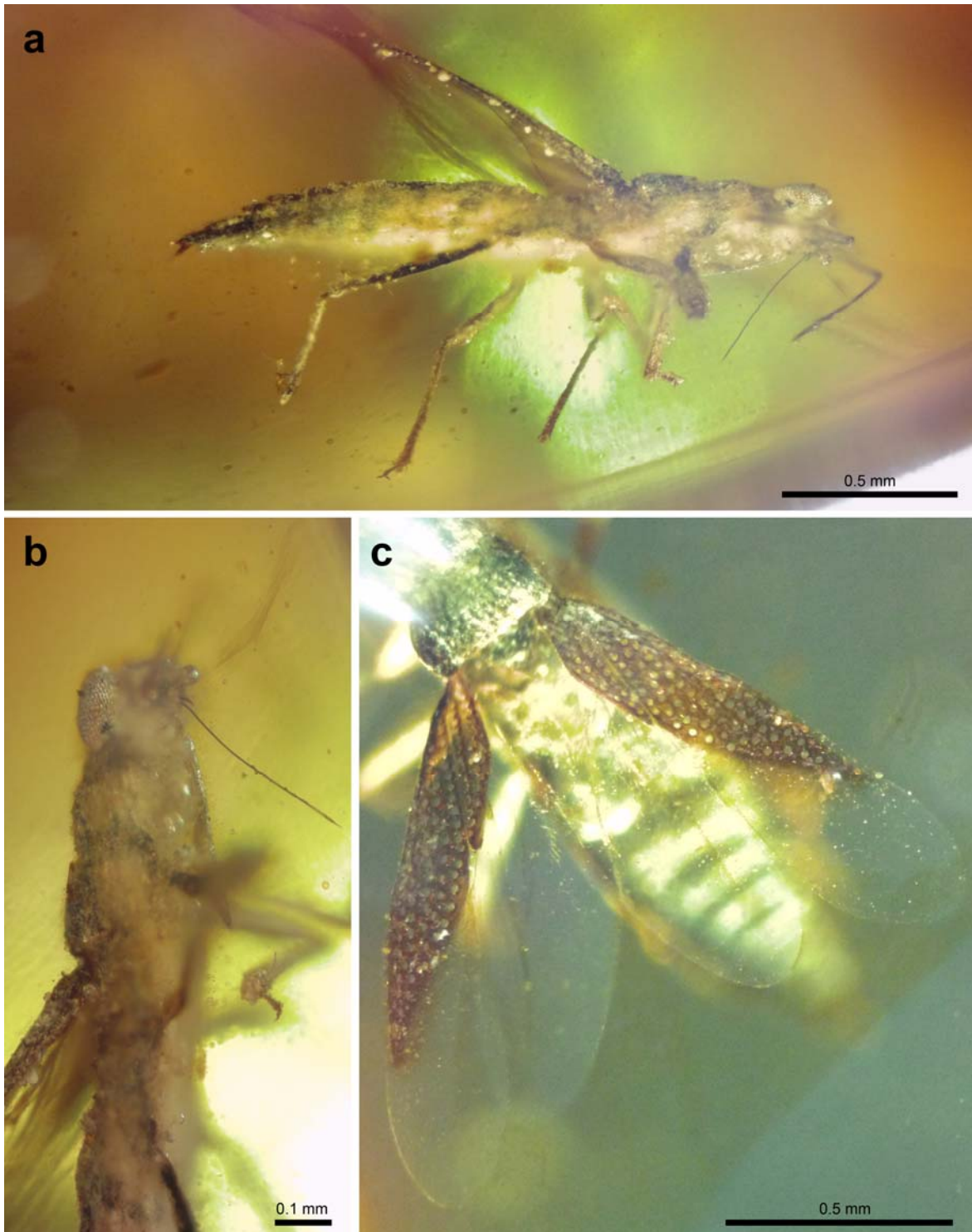
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SUPPLEMENTARY MATERIALS

Supplementary Figure 1: *Popovocoris punctatus* nov. gen. et sp., holotype MGM-7911X (male)

Supplementary Appendix 1: Descriptive list of characters, taxa used in the phylogenetic analysis (all terminal taxa are species, all characters for each terminal are coded directly from species) and character matrix

Supplementary References



Supplementary Figure S1. *Popovocoris punctatus* nov. gen. et sp., holotype MGM-7911X (male). Habitus, lateral view (**a** and **b**) and dorsal view (**c**).

Supplementary Appendix 1

Descriptive list of characters, taxa used in the phylogenetic analysis (all terminal taxa are species, all characters for each terminal are coded directly from species) and character matrix.

List of characters

Body

[0] General outline of the body: (0) elongate, but less than 4 times as long as maximum pronotal width; (1) much longer than wide, at least 5 times as long as maximum pronotal width; (2) ovoid, scarcely longer than wide. Modified from Du *et al.*, 2016.

[1] Punctures on pronotum and scutellum: (0) unpunctured; (1) weakly punctured, diameter of punctures narrower than space between; (2) heavily punctured, diameter of punctures as wide as space between; (3) areolate, diameter of punctures distinct wider than space between. This coding is derived from Du *et al.*, 2016.

Head

[2] Head laterally: (0) conical or sub-conical; (1) dorso-ventrally flattened. This coding is derived from Grazia *et al.*, 2008.

[3] Mandibular plates: (0) normal size, not extending to apex of clypeus, or reduced; (1) enlarged, extending to apex of clypeus. This coding is derived from Schuh *et al.*, 2009.

[4] Length of bucculae: (0) very short or reduced, never extending to antennal insertion; (1) long, narrow, extending half-length of head or more. This coding is derived from Henry, 1997.

[5] Gular groove: (0) absent; (1) present. This coding is derived from Henry, 1997.

[6] Eyes: (0) eyes simple, not stylate; (1) eyes stylate. This coding is derived from Henry, 1997.

[7] Ocelli: (0) present; (1) absent. This coding is derived from Henry, 1997.

[8] Sutures between ocelli and compound eyes: (0) absent; (1) weakly developed; (2) strongly developed. This coding is derived from Henry, 1997.

[9] Length of labium: (0) short, not extending posteriorly to forecoxae; (1) longer, usually extending posteriorly to mesocoxae. This coding is derived from Schuh & Slater, 1995.

[10] Antennal bases: (0) base arising below level of eye, partially obscured by mandibular plates; (1) base arising above level of eye, completely visible in dorsal view. This coding is derived from Henry, 1997.

[11] Antennal pedicelar trichobothria: (0) without trichobothria; (1) one trichobothrium or more than one. This coding is derived from Schuh *et al.*, 2009

[12] Length of antennal segment I: (0) short, slightly exceeding or not attaining apex of head; (1) elongate, slender, over 3 times as long as diameter; (2) very long, slender, over 10 times as long as diameter. This coding is derived from Du *et al.*, 2016.

Thorax

[13] Pronotum shape: (0) trapezoidal; (1) hexagonal, semicircular or other. This coding is derived from Henry, 1997.

- [14] Pronotal carinae: (0) absent; (1) 1–5 present. This coding is derived from Cassis & Schuh, 2010.
- [15] Labial groove on mesosternum: (0) without sulcus; (1) deeply sulcate. This coding is derived from Henry, 1997.
- [16] Metathoracic scent-gland evaporator structures: (0) no evaporatorium, no peritreme; (1) peritreme only; (2) evaporatorium and peritreme. This coding is derived from Schuh *et al.*, 2009.
- [17] Briendley's gland: (0) absent; (1) present. This coding is derived from Schuh *et al.*, 2009.
- [18] Armature on scutellum: (0) absent; (1) armed with median carinae, conical or globose tubercle, or slender spine. This coding is derived from Schuh & Slater, 1995.
- [19] Corium: (0) no transparent; (1) at least in part transparent or translucent. This coding is derived from Zheng, 1995.
- [20] Processus corial: (0) absent; (1) present. This coding is a diagnostic feature of Microphysidae.
- [21] Veins on corium: (0) well developed, raised and keel-like; (1) reduced.
- [22] Costal area/embolium: (0) narrow to carinate; (1) explanate, not areolate; (2) explanate, areolate. This coding is derived from Cassis *et al.*, 2023.
- [23] Type of veins on membrane forewing: (0) normal, raised and keel-like; (1) absent- lacking veins. This coding was modified from Du *et al.*, 2016, adding stage 1 according to this new specimen.
- [24] Claval commissure: (0) well developed, distinctly longer than scutellum, close to two times of length of scutellum; (1) developed, but distinct longer than scutellum, usually shorter than scutellum; (2) absent, claval apices concealed by scutellum; (3) absent, claval apices not concealed by scutellum. This coding is derived from Du *et al.*, 2016.
- [25] Areolate hemelytra: (0) no; (1) yes. This coding is derived from Henry, 1997.
- [26] Hemelytral membrane texture: (0) not aerolate; (1) areolate (at least in part). This coding is derived from Cassis *et al.*, 2023.
- [27] Costal fracture: (0) absent; (1) present, with corium-membrane boundary subvertical, formed a cuneus. This coding is derived from Cassis *et al.*, 2023.
- [28] Cuneus: (0) absent; (1) present. This coding is derived from Cassis *et al.*, 2023.
- [29] m-cu crossvein of hindwing: (0) present; (1) absent. This coding is derived from Schuh *et al.*, 2009.
- [30] Distal sector of R+M in hindwing: (0) not branching; (1) branching. This coding is derived from Cassis & Schuh, 2010.

Legs

- [31] Femoral trichobothria: (0) absent; (1) present. This coding is derived from Schuh *et al.*, 2009.
- [32] Tibial appendix: (0) absent; (1) present. This coding is derived from Schuh *et al.*, 2009.
- [33] Number of tarsal segments of the hind leg: (0) four or three; (1) two; (2) one. This coding is derived from Henry, 1997.
- [34] Tarsal dilation: (0) tarsi of uniform diameter; (1) tarsi dilated distally. This coding is derived from Schuh *et al.*, 2009.
- [35] Pulvillus: (0) absent; (1) present and long; (2) short or reduced. This coding is modified from Henry, 1997.
- [36] Dorsal arolium: (0) reduced, as small bump; (1) absent.

[37] Articulation of metacoxae: (0) directed laterally; (1) directed posterolaterally. This coding is derived from Henry, 1997.

[38] Coxae shape: (0) conical elongated; (1) globose. This coding is derived from Cassis *et al.*, 2023.

Abdomen

[39] Fusion of abdominal sterna: (0) all segments separate, with conjunctive membranes; (1) sterna 2–4 fused; (2) sterna 2–6 fused; (3) sterna 2–7 fused. This coding is derived from Henry, 1997.

[40] Sternite VII: (0) sternite VI, VII split by ovipositor; (1) sternite VII split by ovipositor; (2) entire.

[41] Abdominal trichobothrial pattern on each sternum: (0) absent; (1) 1–3 or more than 3.

[42] Parameres (symmetry): (0) symmetrical; (1) asymmetrical; (2) left paramere only; (3) obsolete. This coding is derived from Cassis *et al.*, 2023.

[43] Position of spiracles: (0) all ventral; (1) only II dorsal, remainder ventral; (2) II, III, and IV dorsal, V and VII ventral; (3) II, III, IV, V, and sometimes VI dorsal, VII dorsal or on ventral edge; (4) all dorsal. This coding is derived from Henry, 1997.

[44] Type of ovipositor: (0) lanceolate; (1) plate-like to reduced. This coding is derived from Schuh *et al.*, 2009.

[45] Spermatheca: (0) present; (1) absent or vestigial. This coding is derived from Henry, 1997.

[46] Dorsal laterotergites: (0) not fused with mediotergites; (1) fused with mediotergites. This coding is derived from Schuh *et al.*, 2009.

[47] Abdominal male segment VIII: (0) opening of pygophore dorsal or posterior, articulation dorsoventral; (1) opening of pygophore lateral, articulation anteroposterior. This coding is derived from Schuh *et al.*, 2009.

[48] Pygophore shape: (0) conical to suboval; (1) tubiform.

List of taxa

Species	Family
<i>Malcus</i> sp.	Malcidae
<i>Triatoma</i> sp.	Reduviidae
<i>Loricula elegantula</i> Bärensprung, 1858	Microphysidae
<i>Trilaccus mimeticus</i> Chan & Cassis, 2019	Miridae
<i>Inoma stysi</i> Cassis & Symonds, 2008	Tingidae
<i>Epimixia vulturna</i> Kirkaldy, 1908	Tingidae
<i>Onymocoris barberi</i> Drake & Slater, 1957	Thaumastocoridae (Tahumastocorinae)
<i>Thaumastocoris peregrinus</i> Carpintero & Dellapé, 2006	Thaumastocoridae (Tahumastocorinae)
<i>Discocoris dominicanus</i> Slater & Baranowski, 2000	Thaumastocoridae (Xylastodorinae)
<i>Discocoris drakei</i> Slater & Ashlock, 1959	Thaumastocoridae (Xylastodorinae)
<i>Popovocoris punctatus</i> nov. sp.	

Character matrix

	00000000001111111111222222222233333333334444444444
	0123456789012345678901234567890123456789012345678
<i>Malcus</i> sp.	120011101100100120000100100000100001-101210300000
<i>Popovocoris punctatus</i>	1010001000000000?0000111010001000200111020????11?
<i>Triatoma</i> sp.	1000000000111000111000002001111000000100100011000
<i>Loricula elegantula</i>	1000000000101100200010000001101011000100100011100
<i>Trilaccus mimeticus</i>	0001000100101100100001001001110110020000201011000
<i>Inoma stysi</i>	1011000101000010001001213111010001101100200011000
<i>Epimixia vulturna</i>	1011000101000010001001213111010001101100200011000
<i>Discocoris dominicanus</i>	2011000000100000000001111100010001001110203011111
<i>Discocoris drakei</i>	2011000000100000000001111100010001001110203011111
<i>Thaumastocoris peregrinus</i>	1011001000100000000001111100010011001010202011111
<i>Onymocoris barberi</i>	1011001000100000000001111100010011001010202011111

Supplementary References

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