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SHORT NOTE

Two new species of *Austrelatus* diving beetles from continental Southeast Asia, linking the distribution area of the genus (Coleoptera: Dytiscidae: Copelatinae)

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Abstract. Two new species of predominantly Australasian genus *Austrelatus* Shaverdo et al., 2023 are described and illustrated: *Austrelatus mirai* sp. nov. from Selangor State in Peninsular Malaysia is similar in habitus to the South Indian species *A. boukali* (Hendrich & Balke, 1998) and *A. davidi* (Wewalka, 2017); however, the shape of the male genitalia suggests that it is closely related to *Austrelatus* species from Kalimantan. *Austrelatus riberai* sp. nov. from Shan State in Myanmar is most similar to Sino-Japanese *A. parallelus* (Zimmermann, 1920). Findings of *Austrelatus* species in continental Southeast Asia fill the gap in the distribution area of the genus between India, China and Japan on one side, and the Sunda Islands on the other side.

Key words. Coleoptera, Dytiscidae, *Austrelatus*, taxonomy, new species, Malaysia, Myanmar, Oriental Region

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Introduction

The predominantly tropical subfamily Copelatinae represents the second largest group of predaceous diving beetles or Dytiscidae. The subfamily currently comprises about 850 species in nine genera, including the most diverse dytiscid genus *Copelatus* Erichson, 1832 with nearly 450 known species (Nilsson & Hájek 2024) and many more waiting for description. Recently, Shaverdo et al. (2023) described the molecularly well-defined lineage of predominantly Australasian *Copelatus* species as the new genus *Austrelatus* Shaverdo, Hájek, Hendrich, Surbakti, Panjaitan & Balke, 2023, including 31 new species from New Guinea. The new genus is based on characteristic structures of male genitalia. Subsequently, Shaverdo et al. (2024) added another 42 species and one subspecies from New Guinea, establishing *Austrelatus* with 104 species as the third largest genus of Copelatinae.

Although *Austrelatus* members are distributed predominantly in Australia, Fiji, Solomon Islands and New Guinea, Shaverdo et al. (2023) also transferred to this genus four species from the Moluccas, one species from the Lesser Sundas, one Sino-Japanese species and five species from the Indian subcontinent. However, *Austrelatus* has been unknown from continental Southeast Asia so far, making the distribution area of the genus disjunctive. The description of two new *Austrelatus* species from Peninsular Malaysia and Myanmar, respectively, which is the aim of the present paper, bridges this gap and documents a continuous distribution area of *Austrelatus* in eastern Asia, Australia and the Pacific Islands.

Material and methods

The material was examined using an Olympus SZX12 stereomicroscope. Habitus photographs were taken using a Canon EOS 550D digital camera with an attached Canon MP-E65mm f/2.8 1–5× macro lens as numerous separate images at different focal planes and afterwards combined using Helicon Focus 8.2.0 software. The male genitalia were studied and illustrated in temporary glycerine mounts using an Olympus BX41 transmitted light microscope with a Canon DS126291 attachment; they were subsequently washed in distilled water and mounted in DMHF on the same card as the beetle.

Measurements were taken with an ocular graticule.

The following abbreviations were used in the descriptions: TL – total length of body measured from clypeal margin to apex of elytra; TL-h – total length without head measured from anterior margin of pronotum to apex of elytra; MW – maximum width of body measured at right angles to TL. The terminology to denote the orientation of the genitalia follows Miller & Nilsson (2003).

Exact label data are cited and given in quotation marks for the type material. Authors' additional remarks are provided in square brackets; [p] – preceding data are printed. Separate label lines are indicated by a slash (/), separate labels by a double slash (//).

The specimens included in this study are deposited in the following collections:

NHMW Naturhistorisches Museum Wien,Vienna, Austria (Helena Shaverdo);

NMPC National Museum of the Czech Republic, Prague, Czech Republic (Jiří Hájek).

Taxonomy

Austrelatus mirai sp. nov.

(Figs 1, 3–4)

Type locality. Malaysia, Selangor State, Rawang Township, Templer Park Forest Reserve, ca. 03°17′N 103°38′E.

Type material. Holotype: ♂ (NHMW), labelled: 'MALAYSIA 21.I.1992 / SELANGOR: Templer / Park N K.L. / leg. Jäch (1) [p] // HOLOTYPE ♂ / *AUSTRELATUS* / *mirai* sp. nov. / J. Hájek & H. Shaverdo det. 2024 [p, red label]'. Paratypes: 1 ♂ 2 ♀♀, same label data as holotype (NHMW, NMPC). All paratypes are provided with the respective red printed labels.

Description. ***Male holotype.*** *Habitus* (Fig. 1) elongate oblong oval, broadest in one third of elytral length, dorsally convex; body outline continuous, without angle between base of pronotum and elytra. Dorsal surface submatt.

Colouration. Head ferruginous with darker circumocular band; pronotum ferruginous, somewhat darkened along anterior and posterior margin; elytra brown-blackish with paler base; appendages orange; ventral side ferruginous.

Head moderately broad, ca. 0.66× width of pronotum, semicircular. Anterior margin of clypeus indistinctly concave. Antenna with antennomeres long and slender. Reticulation consisting of very weakly impressed, hardly perceptible polygonal isodiametric meshes. Punctation double, consisting of coarse setigerous punctures and fine punctures spread sparsely on surface; row of coarse punctures present alongside inner margin of eyes, several punctures present also in fronto-clypeal depressions. Surface between eyes with several short longitudinal strioles; a few short transverse strioles present also in centre of head.

Pronotum strongly transverse (width/length ratio = 2.46), broadest between posterior angles, lateral margins moderately curved. Lateral sides with thin beading except for anterior angles. Reticulation similar to that of head, but even less perceptible. Punctation similar to that of head; rows of coarse setigerous punctures present along anterior margin, close to lateral sides and in shallow basolateral depressions along basal margin. Whole surface of pronotum covered with long longitudinal strioles.

Scutellum transversely triangular.

Elytra. Base of elytra as broad as pronotal base; lateral margins of elytra slightly diverging in basal third, subparallel in middle third, distinctly narrowing to apex in apical third. Eleven dorsal striae and one submarginal longitudinal stria present on each elytron: all striae beginning at base; striae 1, 3, 5–6, 8 and 11 ending subapically; striae 2 and 4 longest, ending close to apex; striae 7, 9–10 progressively shorter, the latter ending at apical fourth; submarginal stria long, beginning before elytral mid-length and ending subapically. Reticulation similar to that of head. Punctation consisting of coarse setigerous punctures and very fine sparse punctures; coarse punctures present along elytral striae and lateral margins of elytra.

Legs. Protibia broadened anteriorly, club shaped. Pro- and mesotarsomeres 1–3 distinctly broadened, with rows of adhesive setae on their ventral side; posterior (outer) protarsal claw slightly broader and more curved than anterior claw.

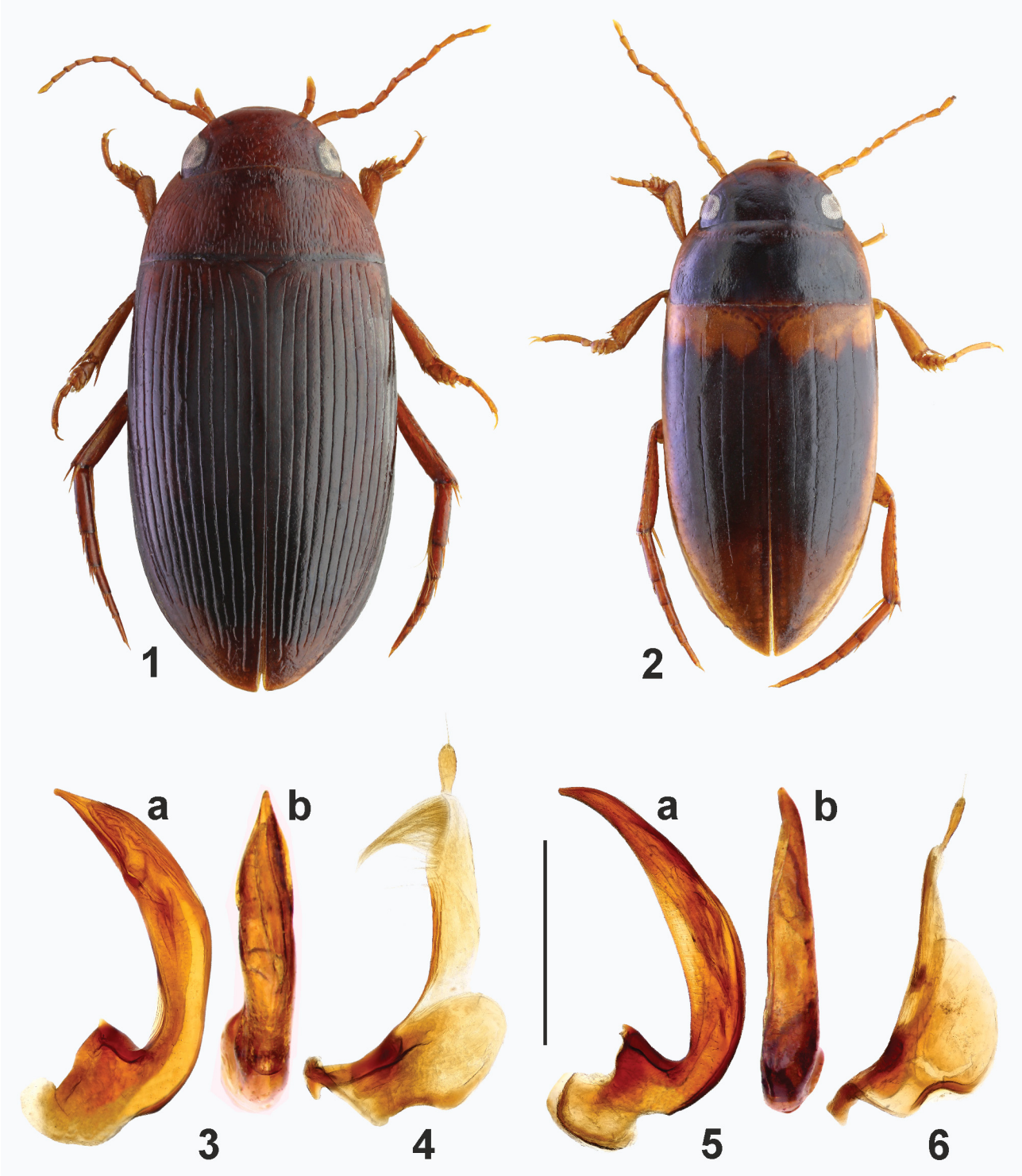
Ventral surface. Prosternum sinuate anteriorly, obtusely keeled medially; rather coarsely punctate; reticulation consisting of fine transverse meshes. Prosternal process shortly lanceolate, in cross-section convex, apex obtuse; process distinctly bordered laterally; reticulation consisting of shallow, hardly perceptible polygonal meshes. Metaventrite with reticulation consisting of transverse polygonal meshes; lateral parts of metaventrite ("metasternal wings") tongue-shaped, slender. Metacoxal lines nearly complete, absent only close to metaventrite. Metacoxal plates covered with rather long, oblique strioles; reticulation consisting of elongate, longitudinal polygonal meshes. Metacoxal processes rounded at posterior margin. Abdominal ventrites I–II with longitudinal strioles; ventrites III–IV with oblique strioles laterally; ventrite V with a few transverse striolae laterally. Tuft of setae present antero-medially on ventrites III–V; ventrite VI with setigerous punctures laterally on either side. Abdominal reticulation consisting of elongate polygonal meshes, longitudinal on ventrites I–II, oblique on ventrite III and transverse on ventrites IV–VI. Punctation consisting of fine, sparsely distributed punctures.

Male genitalia. Median lobe of aedeagus in lateral view sickle-shaped, widest after mid-length, then rather subparallel and in apical eighth tapering to pointed apex (Fig. 3a); in ventral view, indistinctly constricted in two thirds of its length, then tapering to pointed apex (Fig. 3b); ventral lobe apically pointed, closely pressed from left side to dorsal lobe in ventral view (Fig. 3b). Paramere narrowly triangular, with basal part broad, laterally rounded; distal part narrow, subparallel, apically with long setae; apical lobe club-shaped (Fig. 4).

Female. Identical to male in habitus. Pro- and mesotarsomeres 1–3 not dilated, without adhesive setae; proclaws slender.

Variability. All specimens of the type series are identical. Small variability can only be seen in extent of longitudinal striolae on pronotum.

Measurements. TL: 5.0–5.6 mm (mean value: 5.35 ± 0.20 mm); holotype: 5.6 mm. TL-h: 4.5–4.9 mm (mean value: 4.75 ± 0.15 mm); holotype: 4.9 mm. MW: 2.3–2.5 mm (mean value: 2.45 ± 0.10 mm); holotype: 2.5 mm.



Figs 1–6. 1–2 – habitus of *Austrelatus* holotypes: 1 – *A. mirai* sp. nov.; 2 – *A. riberai* sp. nov. 3–6 – male genitalia of *Austrelatus*: 3–4 – *A. mirai* sp. nov.; 5–6 – *A. riberai* sp. nov. 3, 5 – median lobe in lateral (a) and ventral (b) view; 4, 6 – parameres. Scale bar = 0.5 mm (Figs 3–6).

Differential diagnosis. With rather small body length, more or less unicolour ferruginous colouration and presence of 11 dorsal striae + a submarginal stria on each elytron, the new species is most similar to South Indian *Austrelatus boukali* (Hendrich & Balke, 1998) and *A. davidi* (Wewalka, 2017). However, *A. mirai* sp. nov. can be recognised from those species based on more subparallel habitus, presence of long striolae on pronotum, and different shape of male genitalia. We assume, that the new species is most closely related to several, so far undescribed, *Austrelatus* species from Borneo Island (J. Hájek et al., unpublished data).

Etymology. The new species is dedicated to Miroslav Vít (Chyňava, Czech Republic); the specific epithet is a noun in the genitive case.

Collecting circumstances. The species was collected in the ca. 2–3 m wide forest stream with bottom of granite stones and much sand between them and some leaf litter (Fig. 7). The altitude was ca. 200 m a.s.l.; there was a

primary forest in the stream's upper reaches (M. A. Jäch, pers. comm.).

Distribution. *Austrelatus mirai* sp. nov. is known only from the type locality in Selangor State, Peninsular Malaysia.

Austrelatus riberai sp. nov.

(Figs 2, 5–6)

Type locality. Myanmar, Shan State, SE of Mintaingbin Forest Camp, ca. 20°55.64′N 96°33.63′E.

Type material. Holotype: ♂ (NHMW), labelled: 'Myanmar (151) Shan State / SE Mintaingbin Forest Camp / forest pools and in leaf litter / near stream, 17.06.2004 / leg. Shaverdo & Schillhammer [p] // HOLOTYPE ♂ / *AUSTRELATUS* / *riberai* sp. nov. / J. Hájek & H. Shaverdo det. 2024 [p, red label]'. Paratype: 1 ♂, labelled: 'MYANMAR: Shan State / Inle Lake, E-shore, 13.5.1999 / 10 km S Nyaungshwe, 940 m / 20°36.48′N 96°56.53′E / leg. Schillhammer & Schuh (39c) [p]' (NMPC). The paratype is provided with the respective red printed label.

Description. ***Male holotype.*** *Habitus* (Fig. 2) elongate oblong oval, broadest in anterior third of elytral length, dorsally convex; body outline continuous, without angle between base of pronotum and elytra. Dorsal surface submatt.

Colouration. Head dark brown, clypeus orange; pronotum dark brown, laterally broadly orange, anterior and posterior margins orange-brown translucent; elytral disc dark brown, with broad, irregularly shaped, basal orange band reaching suture, lateral sides orange; appendages orange; ventral side brown.

Head moderately broad, ca. 0.71× width of pronotum, semicircular. Anterior margin of clypeus indistinctly concave. Antenna with antennomeres long and slender. Reticulation consisting of moderately deeply impressed polygonal isodiametric meshes. Punctation double, consisting of coarse setigerous punctures and fine punctures spread sparsely on surface; row of coarse punctures present alongside inner margin of eyes, several punctures present at frontal level of eyes, and antero-laterally to eyes in fronto-clypeal depressions.

Pronotum transverse (width/length ratio = 2.40), broadest before posterior angles, lateral margins moderately curved. Lateral sides with beading very thin and indistinct. Reticulation similar to that of head. Punctation similar to that of head; rows of coarse setigerous punctures present along anterior margin, close to lateral sides, several punctures present also in shallow basolateral depressions along basal margin. Pronotum baso-laterally with several longitudinal strioles. Centre of disc with indistinct median longitudinal smooth line.

Scutellum transversely triangular.

Elytra. Base of elytra as broad as pronotal base; lateral margins of elytra slightly diverging in basal third, then distinctly narrowing to apex. Four shallowly impressed and fragmented dorsal striae present on each elytron: all striae beginning posterior to base; stria 1 shortest, ending at two thirds of elytral length; striae 2–3 longer, ending at three fourths of elytral length; stria 4 beginning more closely to base, apically fragmented, ending at second third of elytral length. Submarginal stria absent. Reticulation similar to that of head and pronotum, but less impressed.

Fig. 7. Habitat of *Austrelatus mirai* sp. nov. in Templer Park Forest Reserve, Selangor, Malaysia.

Punctation consisting of coarse setigerous punctures and very fine sparse punctures; coarse punctures present along elytral striae and lateral margins of elytra.

Legs. Protibia broadened anteriorly, club shaped. Pro- and mesotarsomeres 1–3 distinctly broadened, with rows of adhesive setae on their ventral side; posterior (outer) protarsal claw shorter and more curved than anterior claw.

Ventral surface. Prosternum sinuate anteriorly, obtusely keeled medially. Prosternal process shortly lanceolate, in cross-section convex, apex obtuse; process distinctly bordered laterally; reticulation imperceptible. Metaventrite with reticulation consisting of transverse polygonal meshes; lateral parts of metaventrite ("metasternal wings") tongue-shaped, slender. Metacoxal lines nearly complete, absent only very close to metaventrite. Metacoxal plates covered with a few long transverse and numerous shorter longitudinal strioles; reticulation consisting of elongate, longitudinal polygonal meshes. Metacoxal processes rounded at posterior margin. Abdominal ventrites I–II with longitudinal strioles; ventrites III–IV with oblique strioles laterally. Tuft of setae present antero-medially on ventrites III–V; ventrite VI with setigerous punctures laterally on either side. Abdominal reticulation consisting of elongate polygonal meshes, longitudinal on ventrites I–II, oblique on ventrite III and transverse on ventrites IV–VI. Punctation consisting of fine, sparsely distributed punctures.

Male genitalia. Median lobe of aedeagus in lateral view sickle-shaped, broadest at mid-length, tapering continu-

ously to dorsally bent truncate apex (Fig. 5a); in ventral view, tapering to left-curved obtusely pointed apex (Fig. 5b); ventral lobe closely pressed from left side to dorsal lobe in ventral view (Fig. 5b). Paramere triangular; basal two thirds broad, laterally rounded; distal third slender, with indistinct setation on medial margin; apical lobes club-shaped (Fig. 6).

Female. Unknown.

Variability. Both specimens of the type series are rather uniform in habitus, reticulation and colouration. They differ slightly in elytral striation – striae are more fragmented in paratype specimen; minor variability can be seen also in shape and size of yellow elytral markings.

Measurements. TL: holotype: 4.3 mm; paratype: 4.2 mm. TL-h: holotype: 3.8 mm; paratype: 3.7 mm. MW: holotype and paratype: 1.85 mm.

Differential diagnosis. The new species can be easily recognised from all other *Austrelatus* by the combination of small body length, disc of elytra with four longitudinal striae (Fig. 2) and the shape of male genitalia (Fig. 5). It is most similar to Sino-Japanese *A. parallelus* (Zimmermann, 1920) (see Jiang et al. 2023), but their relationships are presently not clear.

Etymology. The new species is dedicated to the late Ignacio Ribera (1963–2020), renowned specialist on aquatic beetles; the specific epithet is a noun in the genitive case.

Collecting circumstances. The Mintaingbin Forest Camp specimen was among the beetles collected from a deep pool between limestone rocks (size ca. 5 × 3 m, steep banks, water transparent, bottom of limestone gravel covered with leaf litter), small, shallow puddles with leaf litter near it and from the ground among leaf litter in the forest close to a stream, at the altitude ca. 1250 m. The Inle Lake specimen was collected at light.

Distribution. *Austrelatus riberai* sp. nov. is so far known only from two close localities (situated ca. 55 km apart) in Shan State, central Myanmar.

Discussion

Although the genus *Austrelatus* was delineated predominantly based on molecular analysis (E. Toussaint et al., unpublished data), Shaverdo et al. (2023) introduced several morphological characteristics on male genitalia distinguishing *Austrelatus* from *Copelatus*: median lobe of aedeagus with evident dorsal and ventral sclerites in *Austrelatus*, sclerites usually subequally developed; ventral sclerite large, usually strongly sclerotised and modified, distinctly visible in lateral view; paramere simple, usually of triangular shape. However, those characters represent the plesiomorphic condition and are shared with various other genera of Copelatinae – in the Australasian Region namely with *Exocelina* Broun, 1886, from which *Austrelatus* can be recognised based on distinctly widened male protarsomeres 1–3, and protarsomere 4 simple, without large, thick, hook-like anterolateral seta.

In addition, there are differences in the shape of male genitalia between the eastern lineage (Moluccas, New Guinea, Australia) and western lineage (India, continental SE Asia, Sunda Islands) of *Austrelatus*: while ventral and dorsal sclerites of median lobe are well separated, apically often bifid, and parameres are compact, narrowly to broadly triangulate in eastern species; in western species, sclerites of median lobes are usually pointed and pressed together, and parameres are often from two parts (see Figs 3–6, or Sheth et al. 2018: Figs 17–22).

Inclusion of species from India in *Austrelatus* by Shaverdo et al. (2023) made the distribution area of the genus highly disjunctive with the gap between India and southern China in the West, and the Lesser Sundas (Bali) and Moluccas in the East. However, since the beginning, it had been clear that this was an artificial state due to insufficient knowledge of Oriental copelatines. The present description of two new species from Peninsular Malaysia and Myanmar, respectively, filled the gap in continental Southeast Asia. Numerous additional, presumably undescribed *Austrelatus* species from Sumatra and Borneo, available to us, confirm the continuous distribution area of *Austrelatus* in the Oriental and Australian zoogeographical regions.

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