

The first fossil record of cylvapinous plant bugs from the Lower Miocene of Spain: *Aragocylapus miocaenicus* n. gen., n. sp. (Heteroptera: Miridae: Cylapinae)

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ABSTRACT

Fossil mirids, representatives of the subfamilies Cylapinae and Bryocorinae from the Lower Miocene in the Rubielos de Mora Basin of Eastern Spain, are presented. One of them belonging to the subfamily Cylapinae is described and discussed: *Aragocylapus miocaenicus* n. gen., n. sp. A synopsis of a number of external characters in the related genera from the Baltic amber (Late Eocene) in question is given.

Keywords: Heteroptera. Miridae. Cylapinae. Oil shale. Lower Miocene. Rubielos de Mora. Teruel. Spain.

RESUMEN

En este trabajo se expone el registro fósil de la familia Miridae, representada por las subfamilias Cylapinae y Bryocorinae, en el Mioceno Inferior de la cuenca de Rubielos de Mora, en el Este de España. Uno de los ejemplares hallados, perteneciente a Cylapinae, es descrito y comentado: *Aragocylapus miocaenicus* n. gen., n. sp. Se comparan sus caracteres externos con los presentes en géneros afines hallados en el ámbar del Báltico (Eoceno tardío).

Palabras clave: Heteroptera. Miridae. Cylapinae. Ritmita bituminosa. Mioceno Inferior. Rubielos de Mora. Teruel. España.

INTRODUCTION

Fossil mirids are quite common among other known fossil bugs, especially in Cenozoic heteropteran faunas of Europe and North America. Fossil investigated mirid

specimens have been found from the Lower Aragonian (Lower Miocene) of Rubielos de Mora site (province of Teruel, East Spain). This locality is situated in the Rubielos de Mora Basin which is bounded by normal faults and it is located in the South-eastern of the Iberian Chain

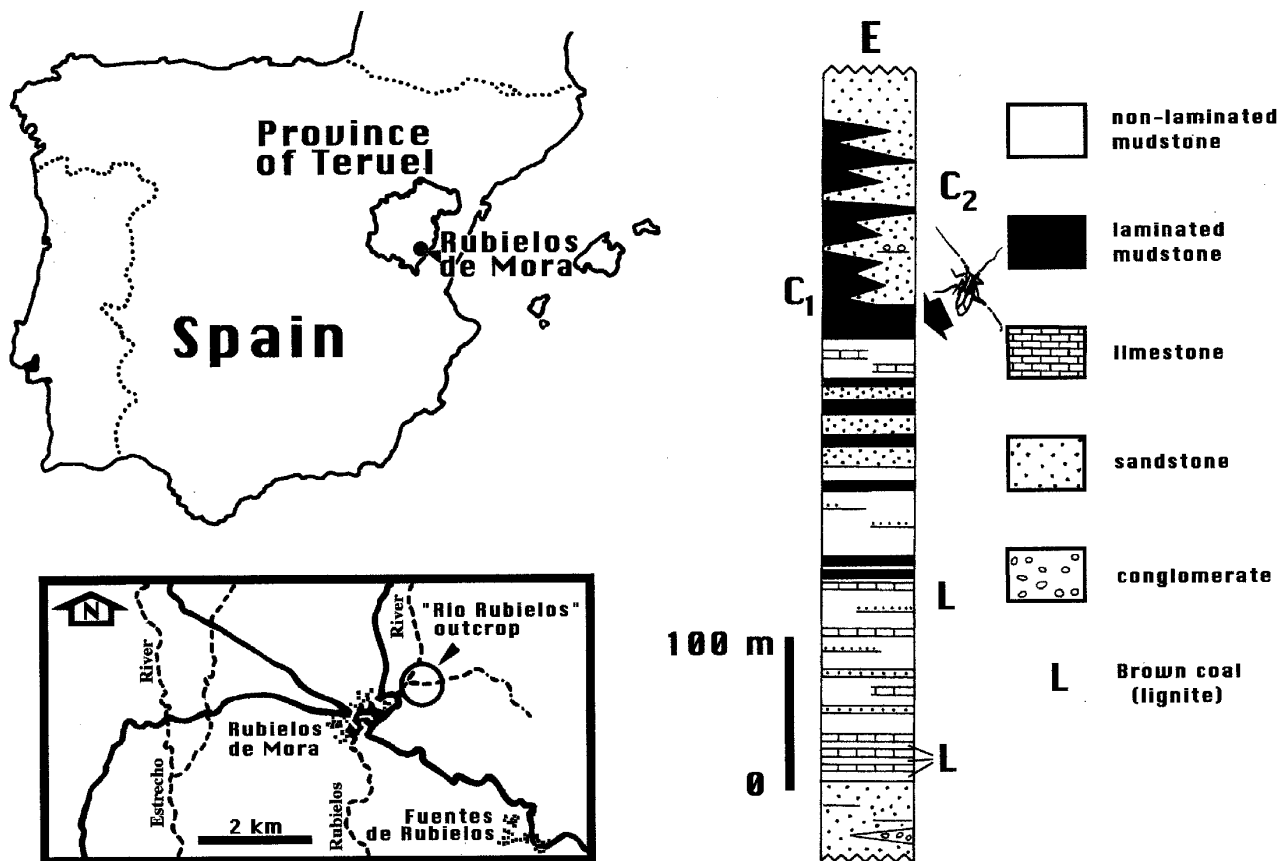


Figure 1. Geographical setting of Rubielos de Mora locality and synthetic stratigraphic log of Eastern Basin; arrow indicates the level where the mirid specimen was found (stratigraphic log sensu Anadón et al., 1988).

(Fig. 1). The fossil record is quite varied and appears in oil shales (laminated mudstones) formed by a sedimentation of a meromictic lake. Rubielos de Mora fossil site is a *Konservat-Lagerstätte* where the remains are well preserved (Peñalver, 1998; Peñalver et al., 1999). It is an important palaeobotanical locality. The macroflora remains and palynoflora indicate some temperate environmental conditions; the presence of megathermic and megamesothermic elements seem to aim some warm tempered conditions (Barrón and De Santisteban, 1999; Peñalver et al., 1999). There are various outcrops with fossil insects in the Rubielos de Mora locality but all mirid specimens have been found in the outcrop named "Río Rubielos" (Fig. 1). The stratigraphy of the Rubielos de Mora Basin was divided into three main depositional units by Anadón et al. (1988): Lower (A), Middle (B) and Upper (C). The main depositional unit C was divided into three minor units and the mirid specimens have been found in the unit C1, that consists mainly of laminated mudstones with high organic matter content (Fig. 1).

These specimens belong to family Miridae, the largest recent family of true bugs, embracing almost 10,000 described species (Schuh, 1995). The precedent of this paper is the adscription of some of specimens found to dicyphinous-group of the large heterogeneous subfamily Bryocorinae, exactly to the recent genus *Dicyphus* (Peñalver, 1998; Peñalver and Baena, 1998, 2000). In this paper, mirid specimen which are being described belongs to the the subfamily Cylapinae, one of dominating heteropteran groups in Baltic amber of the Late Eocene (Popov and Herczek, 1993). This primarily tropical mirid group seems to be ecologically associated with some coniferous vegetation and fungi, recent representatives of which occur in all zoogeographical regions, mainly in tropical and subtropical ones.

SYSTEMATICS

Order: Hemiptera LINNAEUS, 1758
Suborder: Heteroptera LATREILLE, 1810

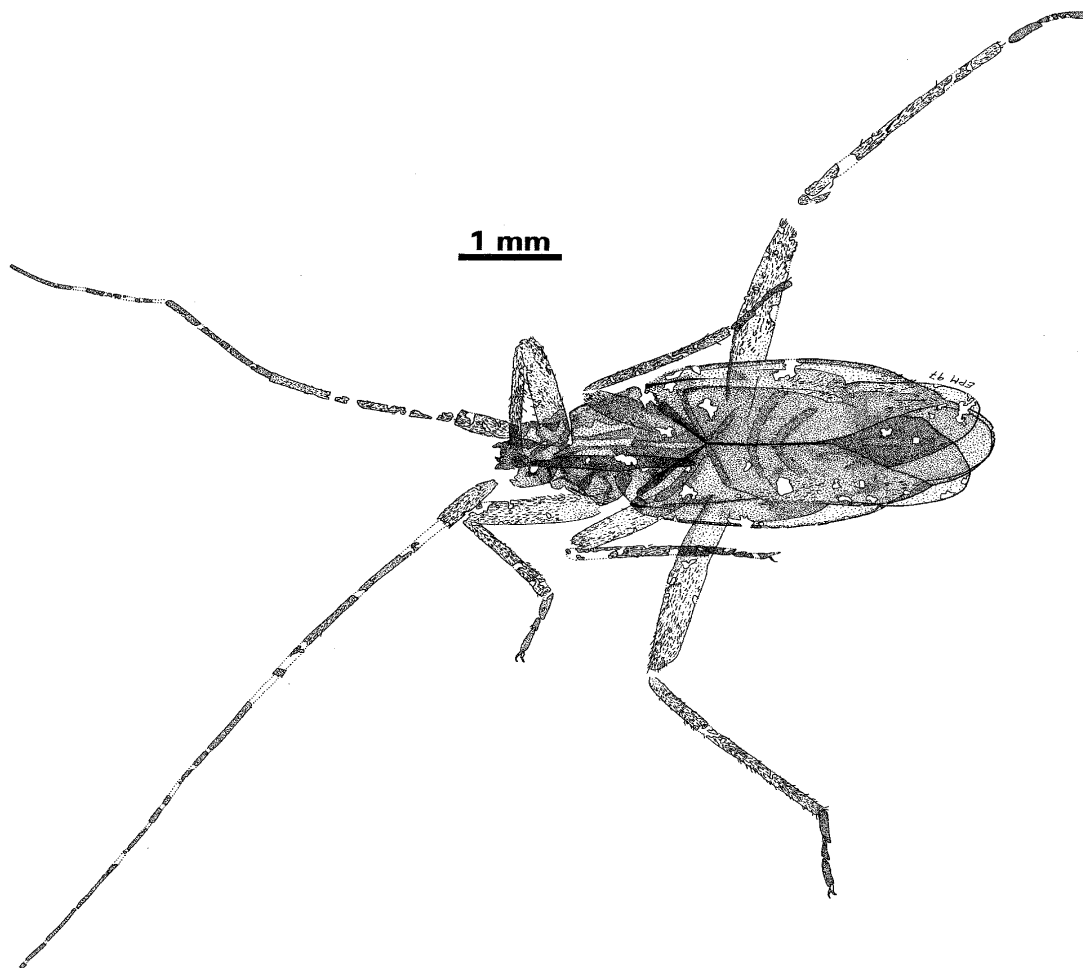


Figure 2. *Aragocylapus miocaenicus* n. gen., n. sp. (Heteroptera: Miridae: Cylapinae)- camera lucida drawing dorsal view (holotype N° MPV-60-RM; Museo Ciencias Naturales Coll., Valencia, Spain).

Infraorder: Cimicomorpha LESTON, PENDER-GRAST & SOUTHWOOD, 1954

Superfamily: Miroidea HAHN, 1833

Family: Miridae HAHN, 1833

Subfamily: Cylapinae KIRKALDY, 1903

GENUS *Aragocylapus* n. gen.

Type species: *Aragocylapus miocaenicus* n. sp. here designated.

Species composition: Monotypic genus.

Etymology: The name is combination of the word "Aragón", Autonomous Community in Eastern Spain where the outcrop is located, and the generic name *Cylapus*.

Gender: Masculine.

Description: Holotype. Rather small size, ca. 5 mm. Generally oblong-oval, lateral body margins almost parallel; dorsal surface not punctated (Figs. 2, 3.1). Head rather short (but the head is not clear preservation and perhaps it is lightly protruding forwards), 1.5 times wider than long; clypeus prominent front of eyes; eyes quite large, slightly prominent, contiguous to anterior margins of pronotum; vertex narrow, ca. 3 times narrower than eye width; antennae very thin and long, considerably longer than body length; antennal joint I slightly thicker than others and reaching beyond head apex; joint II longest, 3 times longer than I and 1.5 times longer than III, IV longer than III; rostrum robust. Pronotum trapezoidal, considerably transverse, twice as wide as long; calli not visible; humeral angles moderately rounded; anterior margin almost straight, lateral sides moderately convergent (LSP = 2.8); posterior border weakly emarginate (0.07). Hemelytra with well sep-

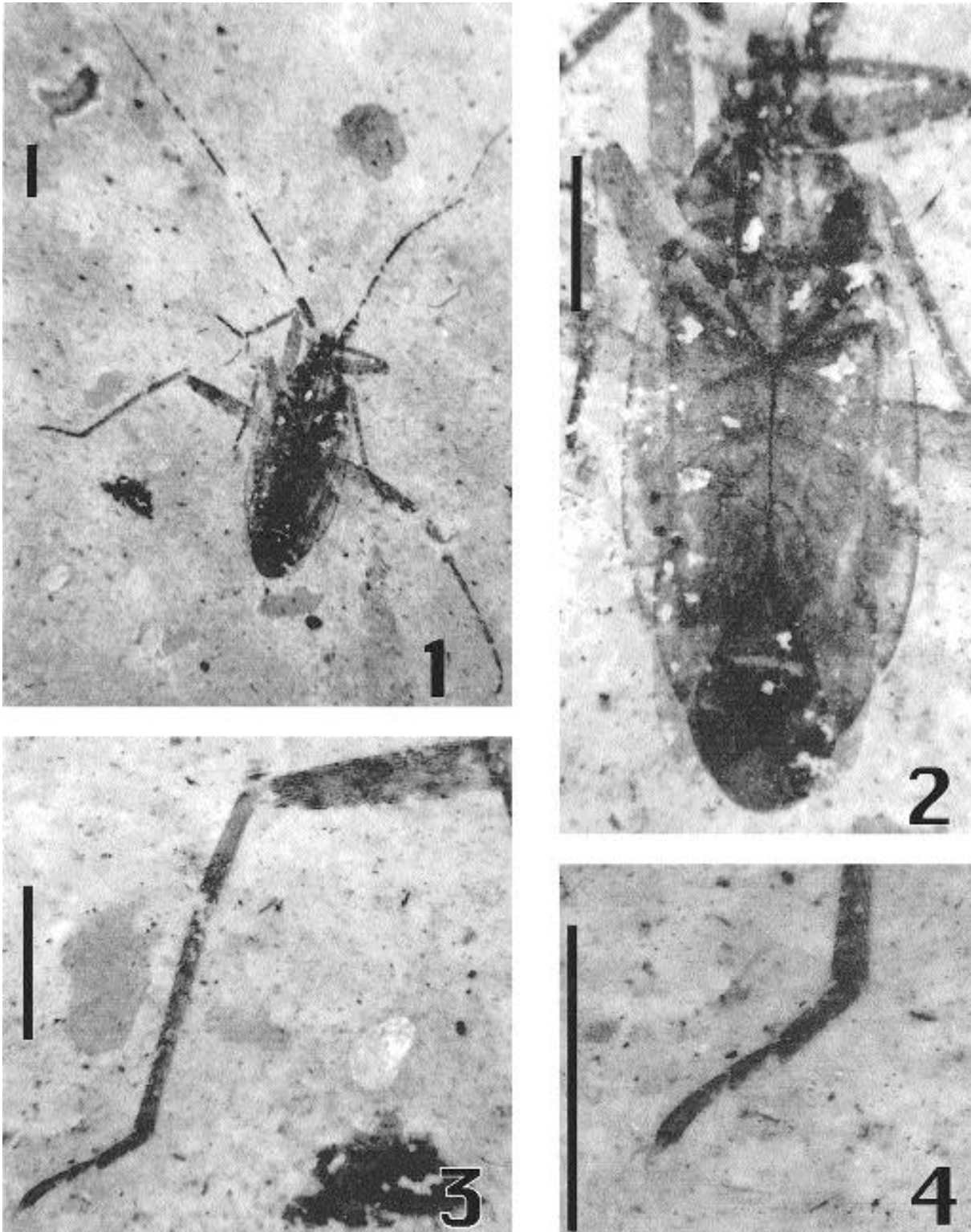


Figure 3. *Aragocylapus miocaenicus* n. gen., n. sp. (Heteroptera: Miridae: Cylapinae)- 1.- total habitus; 2.- dorsal view; 3.- hind leg; 4.- apex of tibia and tarsus with claws of the hind leg (holotype N° MPV-60-RM; Coll. Museo Ciencias Naturales, Valencia, Spain). Scale bar = 1 mm.

arated cuneus, costal fracture and veins indistinct, slightly elongate; membrana dark, hyaline, distinctly crumpled (Fig. 3.2), with two cells, one large and long cell reaching slightly beyond of cuneus apex. Legs slender and quite long (Fig. 3.3); femora of all pair of legs equal thickness; hind tibia slightly shorter than femur; tarsi 3-segmented and quite long; hind tarsi only 2.7 shorter than hind tibia, I joint longest and almost equal size of III, II very short (distinctly shorter than I or III); claws moderately long, weakly curved; subapical tooth not visible (Fig. 3.4).

Discussion: The new genus belongs to cypelin bugs having very short head among fossil Cylapinae and mostly resembles the genus *Epigonomiris* HERCZEK AND POPOV (Herczek and Popov, 1998) from the Baltic amber (Late Eocene). But *Aragocylapus* n. gen. clearly differs from the latter by the more narrowed towards pronotum (LSP = 2.8), the slender and not incrassate hind femora, the much longer tarsi (the hind tarsi shorter than hind tibia only ca. 3 times in comparison with *Epigonomiris* - ca. 7 times).

Aragocylapus n. gen. also reminds some other close cypelinous genera (*Archeofulvius*, *Jordanofulvius*, *Oligocoris*, and *Germarofulvius*) from the Baltic amber (Late Eocene) differing from them by robust and short rostrum, by the longer 4 antennal joint in comparison with 3rd one, by the less narrowed towards pronotum (LPS=2.8), by the almost equal size of hind femora and tibiae and also robust tarsi (except *Jordanofulvius gummosus*) with very short 2nd joint.

As a base for the short analysis we have chosen some characters of external morphology in above-mentioned genera published before (Herczek and Popov, 1997, 1999). The 1st antennal joint does not reach the head apex in all species of *Jordanofulvius*, reaching in *Germarofulvius*, surpassing slightly in *Oligocoris*, whereas it is distinctly surpassing in two other genera: *Archeofulvius* and *Aragocylapus* n. gen. The length ratio of antennomeres 1-4 is quite variable in species of these genera: the 2nd joint is usually 3-3.3 times longer than 1st one (except most species of *Jordanofulvius* where this joint 4-5 times longer than 1st one) and 1.5-1.7 times longer than 3rd (except *Oligocoris*, 2nd joint 2.3 times longer than 3rd one) in all these genera; the 4th joint longer 1.3-1.5 times in *Jordanofulvius*, 1.8 times in *Archeofulvius* and 2.2-2.3 times in *Oligocoris* and *Germarofulvius*, but it shorter than 4th in *Aragocylapus* n. gen.

The trapezoidal pronotum usually not less than twice as wide as long, but lateral margins differently converging

anteriorly (LSP), consequently from more narrowing toward (1.7-2.0 in *Jordanofulvius* and 2.0 in *Oligocoris*) to less narrowing do (2.5 in *Germarofulvius* and 2.8 in *Aragocylapus* n. gen.). The length ratio of hind tibiae and femora is 1:1.2-1.3 in *Archeofulvius*, *Germarofulvius* and *Oligocoris*, 1:1.4-1.7 in *Archeofulvius* and 1.03:1 in *Aragocylapus* n. gen. The femora of all pair of legs are quite different: femora 1 and specially femora 3 are considerably incrassate in *Jordanofulvius*, femora 1 are incrassate in *Archeofulvius* and femora 3 are quite incrassate in *Germarofulvius*, but all femora are slender in *Oligocoris* and *Aragocylapus* n. gen. The length of hind tarsi are also variable, specially in the genus *Jordanofulvius* where tibiae is 3-4 times longer tarsi (3 times in *J. gummosus*, 3.6 times in *J. fuscus*, 3.7 times in *J. punctiger* and 4 times in *J. electrinus*); the most short tarsi has *Oligocoris* (5 times shorter than tibiae), whereas there are longest hind tarsi in *Aragocylapus* n. gen. (only 2.7 times shorter than tibiae). A considerable variability is also found in the length of tarsal joints which is characterized every genus quite well. Thus, the 1st joint of hind tarsi shorter than 2nd or 3rd one in *Jordanofulvius*, the 1st joint longer than 2nd or 3rd one in *Oligocoris*, the 1st joint slightly longer than 2nd and 3rd together (the latter are equal size) in *Archeofulvius*, the all tarsal joints are equal size in *Germarofulvius* and the 1st joint longest and almost equal size of the 3rd (the joint very short). Furthermore, the Miocene *Aragocylapus* n. gen. has some robust tarsi which is generally seems to be not typical for all recent Cylapinae.

The Cylapinae bugs usually present a thin, elongate rostrum, probably adapted to feed on fungi; the robust rostrum of *Aragocylapus* n. gen. could have been related to a diet of fungi of the group Polyporaceae, of whose consistence is rather hard (Baena, pers. comm.)

Aragocylapus miocaenicus n. sp.

Figures 2 - 3

1991 Miridae indet.; Martínez-Delclòs, Peñalver y Belinchón, p. 128, Pl. I, fig. 6.

Holotype: MPV-60-RM, only one preserved impression is present; this specimen is associated on the same bedding plane as a thysanopteran (Thripidae, MPV-2239-RM). Museo de Ciencias Naturales Coll. (formerly Museo Paleontológico de Valencia), Valencia, Spain.

Locus typicus: "Río Rubielos" outcrop (Montoya et al., 1996), Rubielos de Mora, Province of Teruel, Spain.

Stratum typicum: Specimen discovered in lacustrine oil shales from the Lower Aragonian (Lower Miocene; 18-19 Ma B.P.) of Rubielos de Mora Basin (Iberian Chain, Spain).

Etymology: From the geological time "Miocene".

Description: As for genus.

Dimensions in mm: length of body until apex of hemelytra 4.9, width 1.78; length of head 0.5, width 0.76; width of eye 0.34; width of vertex 0.11; antennal joints I: 0.61, II: 1.82, III: 1.22, IV: 1.52; length of rostrum 1.97; length of pronotum 0.61 (min.) and 0.68 (max.), width 0.84 (min.) and 1.33 (max.); length of scutellum 0.65, width 1.1; claval commissura 1.22; hind legs: length of femora 2.35, width 0.3; length of tibiae 2.28; length of tarsi 0.85, tarsal joints I:II:III = 0.34:0.21:0.3.

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