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The oldest Cenozoic passandrid (Coleoptera: Cucujoidea: Passandridae) from the Paleocene of Menat (France)

Le plus ancien passandride (Coleoptera: Cucujoidea: Passandridae) du Paléocène de Menat (France)

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ABSTRACT

The new oldest representative of the subfamily Passandrinae (Passandridae) was found in materials from Menat (Puy-de-Dôme, France). It was preliminarily assigned to the genus *Passandra* Dalman in Schönherr, 1817, although the new species (?) *Passandra plenaria* sp. n. in contrast to other congeners, demonstrates the exposed labrum and absence of preapical groove or impression on hypopygidium. Some notes on fossil records and classification of the family Passandridae are made. The position of *Mesopassandra* Jin, Ślipiński, Zhou et Pang, 2019 (type genus of Mesopassandrinae) among the family Passandridae is regarded as problematical and in need of a further revision.

Key words: fossil record, classification, new genus, new species, France

RÉSUMÉ

Le nouveau représentant le plus ancien de la sous-famille Passandrinae (Passandridae) est décrit du Paléocène de Menat (Puy-de-Dôme, France). Il est attribué de manière préliminaire au genre *Passandra* Dalman in Schönherr, 1817, bien que la nouvelle espèce (?) *Passandra plenaria* sp. n. contrairement à ses congénères, a un labrum exposé et ni sillon préapical ni impression hypopygidale. Le registre fossile et la classification des Passandridae sont discutés. La position de *Mesopassandra* Jin, Ślipiński, Zhou et Pang, 2019 (type genre de Mesopassandrinae) au sein de la famille Passandridae est considérée comme problématique et doit faire l'objet d'une révision.

Mots clés: registre fossile, classification, nouveau genre, nouvelle espèce, France

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1. Introduction

The cucujoid family Passandridae Blanchard, 1845 is represented by somewhat more than one hundred of species of nine genera in the extant fauna mostly from tropical and subtropical territories (Jin et al., 2019), with a reduced fossil record (Menge, 1856; Klebs, 1910; Kirejtshuk & Ponomarenko, 2019; etc.). All recent members of this family seem to be associated with wood; the larvae are known as ectoparasites on wood-inhabiting insect larvae or pupae, such as longhorn beetles, bark and ambrosia beetles, weevils, and hymenopterans. One fossil species was described as a member of this family, *Passandra septentrionaria* Bukejs, Alekseev et McKellar, 2016 from Eocene Baltic amber. Jin et al. (2019) described a new species from Upper Cretaceous Burmese amber, for which a new genus and a new subfamily were proposed (*Mesopassandra* Jin, Ślipiński, Zhou et Pang, 2019 (type genus of Mesopassandrinae Jin, Ślipiński, Zhou et Pang, 2019: see below Discussion). Besides, one fossil species (*Catogenus punctatus* Ramírez, Consorini et di Orio, 2016 from the Middle Eocene of Argentina) initially described as a passandrid (Ramírez et al., 2016), was later transferred to cucujids (Jin et al., 2019). In this paper one new species is described from the Paleocene of Menat, which is the oldest member of the family Passandridae or the subfamily Passandrinae sensu stricto (if *Mesopassandra* can really be placed in the passandrids).

2. Material and methods

The holotype of the new species is deposited in the Menat Town Museum, Village of Menat, Puy-de-Dôme (further MTM). This specimen was studied using a stereomicroscope Olympus SCX9 with Olympus camera in MNHN, and with a Tescan Vega LSU scanning electron microscope in MNHN with the Low Vacuum Secondary Electron TESCAN Detector (LVSTD).

3. Geological setting and locality information

The Middle Paleocene Menat fossil site (Menat Basin, Puy-de-Dôme, France) is a volcanic maar containing a paleolake ca. 1 km in diameter (46°06' N; 2°54' E), which at present contains sedimentary rocks (spongo-diatomites) with remains of diverse aquatic and terrestrial flora and fauna (Piton, 1940; Nel, 1989, 2008; etc.). The composition of faunal and floral remains makes it possible to conclude that this lake was surrounded by a forest. The palaeoenvironment was warm and humid (Wedmann et al., 2018). Following the pollen, mammalian stratigraphic, and radiometric K/Ar analyses, the age of Menat was estimated as 59 Myrs (Kedves and Russel, 1982; Nel, 2008). However, the new estimate based on macroflora postulated its age within 60–61 Myrs (Wappler et al., 2009). Some preliminary results of studies on the beetle fauna from Menat outcrop were published by Nabozhenko and Kirejtshuk (2014, 2017), Kirejtshuk et al. (2016), Legalov et al. (2017), and Kirejtshuk and Nel (2018).

4. Systematics

Family: PASSANDRIDAE Blanchard, 1845

Subfamily: PASSANDRINAE Blanchard, 1845

Passandra Dalman, 1817

Type species: *Passandra sexstriata* Dalman, 1817, by monotypy

= *Hectarthrum* Newman, 1838 (type species: *Hectarthrum curtipes* Newman, 1838, by monotypy)

Notes. The new species should be regarded as a member of the generic complex with 11-segmented antenna, short tarsomere 1 and absence of median groove of head (*Catogenus* Westwood, 1830, *Passandra*, *Passandrina* Reitter, 1878, *Nicolebertia* Burckhardt et Slipinski, 1995). It is preliminarily assigned to the genus *Passandra* due to the small number of grooves on elytra and probable absence of shoulder rib (characteristic of *Catogenus* and *Nicolebertia*). Besides, the new

species has not observable pronotal sublateral lines, present in almost all extant species of *Passandra* (except *Passandra sexstriata* Dalman, 1817). Also the Eocene species *P. septentrionaria* possesses these lines only in the basal one-third of the pronotum. However the new species is distinct from the latter in the different **formula** and configuration of grooves on its head. The admedian grooves of head of the new species are very weak to unclear and do not reach occipital groove (as in *Passandra sexstriata*); while in other congeners they are distinct, more or less deep and reach the occipital groove (in general the admedian grooves of head of the new species are reminiscent of those in members of *Catogenus* and *Nicolebertia*). The abdominal ventrite 5 (hypopygidium) has no trace of preapical groove or impression observable in other species of the generic complex (*Catogenus*, *Passandra*, *Passandrina* and *Nicolebertia*) and most other passandrid genera, except for *Ancistria* Erichson, 1845 (Burckhardt & Slipinski, 2003). Unfortunately, presence or absence of oblique keel of the ultimate antennomere is untestable in the holotype of the new species (the ultimate antennomere of the mentioned four genera with a sharp keel or “indistinctly keeled” in *Nicolebertia*: Burckhardt & Slipinski, 2003). Finally, the Passandrinae is characterised by the small labrum inclined ventrally between mandibles and not visible from above. The labrum of the new species is shaped as in other passandrines but clearly visible in the imprints of the holotype examined. Thus, the new species is most similar to the species of *Passandra* (defined by Slipinski, 1987; Burckhardt & Slipinski, 2003), although it demonstrates the exposed labrum and absence of preapical groove or impression on its hypopygidium, and it is a reason why its attribution is here considered as preliminary.

(?) *Passandra plenaria* sp. n.

(Figs. 1–4)

Etymology. The species name derives from Latin “*plenarius*” (complete, finished).

Type locality and stratum. Menat Basin, Puy-de-Dôme, France. Middle Paleocene (46°06' N; 2°54' E), collected in a new, small outcrop near the south-east of the village of Menat.

Holotype: “Nel 3036”, imprint and counterimprint (obliquely cracked through its midlength), well preserved on rather smooth pieces of rock; the specimen shows the main parts of body sclerites in upper and lower views, but some left antennomeres, three tibiae and most tarsomeres are missed.

Description of holotype. Body length 11.8 mm, maximum width 3.6 mm. Body elongate-oval, 3.3 times as long as wide.

Head with eyes slightly wider than long and slightly narrower than pronotum; impunctate. Admedian grooves diverging anteriorly, expressed in anterior third of head length and becoming obliterated posteriorly, sublateral grooves well-developed throughout their entire lengths, curved along lateral angles of frons and joined posteriorly to occipital groove; occipital groove clear, sinuate medially. Median projection of frons moderately narrow, with emarginate anterior margin. Eyes moderately small, apparently about as long as antennomere 1 (scape) wide, slightly prominent, moderately convex. Antennae long and slender, extending to basal one-third of elytra; scape large, subcylindrical, about 1.2× as long as wide; pedicel small, about as long as wide and approximately 0.6 times as long as antennomere 3; antennomeres 3–10 subcylindrical and slightly thickened apically, about twice as long as wide; antennomere 11 elongate-oval, about twice as long as wide.

Pronotum slightly transverse, 1.1 times as wide as long, widest at anterior angles, sides subparallel in anterior two-thirds and distinctly narrowed posteriad. Anterior angles slightly protruding, subrectangular, narrowly rounded; anterior margin slightly bisinuate, with bordering joined to bordering of pronotal sides; pronotal sides with narrow and complete border. Disc impunctate; sublateral lines absent.

Scutellum moderately large, about as long as wide, pentagonal. Elytra about 1.8 times as long as their combined width; base markedly wider than pronotal posterior margin. Elytra with three complete striae (1, 5, 6); stria 1 grooved throughout entire length and joined at apex to bordering of elytral sides; striae 5 and 6 grooved in basal four-fifths of length; stria 4 distinct in basal fourth of elytral length, striae 2 and 3 indistinct. Intervals smooth.

Legs short and robust. Femora rather thick. Protibia looking like moderately and metatibia rather wide. Pro- and metatarsi five-segmented. Tarsomere 1 of pro- and metatarsi short, distinctly shorter than tarsomere 2, partly covered by tibial apex; tarsomeres 2–4 short; protarsomere 5 about as long as tarsomeres 3–4 combined. Protarsal claws small.

Abdomen with five ventrites; ventrite 5 without visible groove or impression along posterior margin.

5. Discussion and conclusions

The extant members of the family Passandridae are distributed mostly in tropical and subtropical territories beyond Europa. Only few species of *Passandra*, *Ancistria*, and *Aulonosoma* Motschulsky, 1858 have been recorded in the southern part of the Palaearctic Asia, including South Korea and Japan (Park et al., 2005; Jin et al., 2019), while two fossil species of the subfamily Passandrinae sensu str. originated from European outcrops of Paleogene (Baltic amber: Alekseev et al. (2016) and Menat), however one species of the subfamily Mesopassandrinae was found in the Albian-Cenomanian Burmese amber (Jin et al., 2019). The latter subfamily demonstrates some characters that make it possible to assign it as to the family Passandridae as to the family Laemophloeidae, and its placement needs to be clarified by new data and arguments. Most of diagnostic peculiarities of the Mesozoic subfamily (labrum broad and well exposed dorsally, mandibles narrow, strongly angled externally and bidentate apically, antennae with antennomere 3 distinctly longer than antennomeres 4 or 5 and male tarsal formula 5-5-4 occur in various members of Laemophloeidae. Crowson (1967) argued the distinctness of the family Passandridae mostly by the presence of the confluent gular sutures and contiguous anterior tendons in adults, while all other “clavicornian” families (Cucujoidea sensu lato, including cerylonid-families or Coccinelloidea) have separate gular sutures. Crowson (1967) joined this family with Cucujidae (including Silvaninae, Phlaeostichinae, Laemophloeinae, Prostominae). Burckhardt & Slipinski (2003) added to the above-mentioned diagnostic characters of Passandridae also the “large mandibles with exposed articulation”, “usually closed mesocoxal cavities” and “strongly unequal tibial spurs”. However, the gular sutures that in Passandridae should be confluent at head base are not observable in *Mesopassandra*. Moreover, the convergent paramedian longitudinal impressions behind mentum can be traced in some passandrids and they are reminiscent of gular sutures of other cucujoids. Lawrence and Ślipiński (2013) indicated strongly projecting genal process (“jugular lobes”) as an important passandrid character. Their presence in *Mesopassandra* was interpreted by Jin et al. (2019) as a strong support to place it among passandrids. However, the development of these process demonstrates a great variability in this family and scarcely can be a reliable indication of a passandrid attribution. Also the tibial spurs of laemophloeids are unequal and generally much smaller than those of passandrids. Thus, the tibial spurs also are equivocal characters for this family. The same pertains the closed mesocoxal cavities and some other ambiguous structural peculiarities of *Mesopassandra* (bifid mandibular apices, wide and exposed labrum, narrowly separated meso- and metacoxae, etc.). The sexual dimorphism in tarsal formula can be interpreted as scarcely plesiomorphic cucujoid character, as was supposed by Jin et al. (2019). As a result, only the “mandibles with exposed articulation” remains as an argument

to join this genus with passandrids. Therefore, it is reasonable to regard its attribution to Passandridae as rather problematical, needing further arguments thanks to additional fossil material.

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CAPTIONS TO FIGURES

Fig. 1. (?) *Passandra plenaria* sp. n., holotype. Habitus. A: imprint; B: counterimprint; C: imprint. Body length 11.8 mm.

Fig. 1. (?) *Passandra plenaria* sp. n., holotype. Habitus. A : empreinte ; B : contre-empreinte ; C: empreinte. Longueur du corps 11,8 mm.

Fig. 2. (?) *Passandra plenaria* sp. n., holotype. Body reconstructions. A: dorsal; B: ventral. Body length 11.8 mm.

Fig. 2. (?) *Passandra plenaria* sp. n., holotype. Reconstruction du corps. A : empreinte ; B : contre-
empreinte. Longueur du corps 11,8 mm.

Fig. 3. (?) *Passandra plenaria* sp. n., holotype. Photographs under Tescan Vega LSU scanning
electron microscope (LVSTD). A: body, imprint; B: body, counterimprint; C: thorax, imprint. Body
length 11.8 mm.

Fig. 3. (?) *Passandra plenaria* sp. n., holotype. Photographies au microscope électronique à
balayage Tescan Vega LSU (LVSTD). A : corps, empreinte ; B: corps, contre-empreinte ; C: thorax,
empreinte. Longueur du corps 11,8 mm.

Fig. 4. (?) *Passandra plenaria* sp. n., holotype. Photographs under Olympus SCX9 with camera
Olympus. A: head and prothorax, imprint; B: pterothorax and abdomen, imprint; C: head and
prothorax, counterimprint; D: pterothorax and abdomen, counterimprint. Body length 11.8 mm.

Fig. 4. (?) *Passandra plenaria* sp. n., holotype. Photographies sous Olympus SCX9. A : tête et
prothorax, empreinte; B : ptérothorax et abdomen, empreinte ; C: tête et prothorax, contre-empreinte
; D: ptérothorax et abdomen, contre-empreinte. Longueur du corps 11,8 mm.