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STEFANO DOMINICI <sup>(1)</sup>, GIOVANNI PASINI <sup>(2)</sup>, ALESSANDRO GARASSINO <sup>(3)</sup>

## REAPPRAISAL OF *TRIBOLOCEPHALUS LAEVIS* RISTORI, 1886 (CRUSTACEA, LYREIDIDAE) FROM THE PLIOCENE OF ORCIANO PISANO (TUSCANY, ITALY)

**Abstract** - S. DOMINICI, G. PASINI, A. GARASSINO, *Reappraisal of Tribolocephalus laevis Ristori, 1886 (Crustacea, Lyreididae) from the Pliocene of Orciano Pisano (Tuscany, Italy).*

*Tribolocephalus laevis* Ristori, 1886, from the Pliocene of Orciano Pisano (Tuscany, Central Italy) is revisited. Based on the restudied original material of Ristori, the species is considered poorly defined. Moreover, because of lack of important taxonomic characters on the holotype the species cannot be assigned confidently on the genus level. We therefore treat it in open nomenclature and simultaneously refuse to suggest possible relationship with a particular genus. The resulting binomen is Genus? *laevis*.

**Key words** - Decapoda, Podotremata, Raninoidea, Lyreidinae, systematics, Cenozoic, Pliocene, Tuscany, Italy

**Riassunto** - S. DOMINICI, G. PASINI, A. GARASSINO, *Rivalutazione di Tribolocephalus laevis Ristori, 1886 (Crustacea, Lyreididae) del Pliocene di Orciano Pisano (Toscana, Italia).*

*Tribolocephalus laevis* Ristori, 1886 del Pliocene di Orciano Pisano (Toscana, Italia centrale) è revisionata. Sulla base dello studio del materiale originale di Ristori, la specie è scarsamente definita. Inoltre, la mancanza di importanti caratteri tassonomici dell'olotipo non permettono un'assegnazione a livello generico. In conclusione la specie viene trattata in nomenclatura aperta, rifiutando allo stesso tempo possibili relazioni con un particolare genere. Il binomio suggerito è Genus? *laevis*.

**Parole chiave** - Decapoda, Podotremata, Raninoidea, Lyreidinae, sistematica, Cenozoico, Pliocene, Toscana

### INTRODUCTION

Ristori (1886: 127-128) described *Tribolocephalus laevis* (Decapoda, Raninoidea, Lyreididae) based on a single mirrored figured specimen (Ristori, 1886: pl. 2, fig. 9) from the Pliocene clays of Orciano Pisano (Tuscany, central Italy). The reappraisal of the sole available specimen highlighted the lack of generic characters, useful to keep valid *Tribolocephalus* within the Lyreididae Guinot, 1993. Based on the state of preservation of the holotype (see discussion below), *laevis* could belong to one of the other genera within the Lyreididae. Therefore, we prefer to treat it in open nomenclature, refusing possible relationship with the other genera of the family.

### GEOLOGICAL AND STRATIGRAPHIC SETTING

According to a tag handwritten in the early twentieth century associated with the holotype IGF 616E, the only specimen available to Ristori had belonged to the Pisan collector Vittorio Pecchioli (1790-1870) and was posthumously acquired from him by the Florence Museum in 1875. At that time the paleontological collections were housed at the Museum of Natural History, also known as La Specola. The collections had meanwhile grown to a considerable size, so they were boxed and transferred to Piazza San Marco around 1880. In the first decades of the twentieth century, a dozen meters from that temporary deposit, a new building for a new institution called "Regio Museo di Geologia e Paleontologia" was erected. Fossils were placed in new boxes and housed in the second floor. This is the time when the only label presently associated with the specimen was written (Cioppi & Dominici, 2010). The specimen has been handled in the following decades at least once, when it was catalogued. On the occasion no mention was made of its state of preservation (Delle Cave, 1981). Around 1999, some of the old wooden cabinets were dismissed and all Pliocene specimens within their boxes transferred to modern metal drawers where they still are. It is possibly due to the many handlings and to its somehow rounded shape, facilitating friction against the box, that the specimen acquired a worn surface that it probably did not have when first collected. It is thus highly likely that the three acute points of the frontal margin shown by Ristori's original figure were actually present at that time, and were subsequently lost.

The locality of provenance, Orciano Pisano, in north-western Tuscany (Fig. 1), is associated with a stratigraphic unit described around the time of acquisition of the specimen as richly fossiliferous (Cocchi, 1867) and formed by mudstones and sandy mudstones (Pecchioli, 1864; D'Ancona, 1871). The specimen here in study is associated with a similar sandy mudstone matrix. This unit has been recently redescribed, at-

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tributed to the middle Piacenzian, and recognised as an open shelf paleoenvironment, based on the interpretation of its diverse molluscan fauna (Dominici *et al.*, 2009, 2018; Dominici & Danise, 2022). Other stratigraphic units crop out in the area, but these are characterised by different lithologies (claystone, sandstone) and distinct assemblages. For this reason a middle Piacenzian age is assigned to the fossil.



Figure 1. Orciano Pisano fossiliferous locality.

## MATERIAL

A three-dimensionally poorly preserved carapace, lacking the frontal margin.

The specimen is housed in the Museo di Geologia e Paleontologia dell'Università di Firenze (the acronym "IGF" stands for "Istituto Geologico di Firenze").

## SYSTEMATIC PALAEOLOGY

Section Podotremata Guinot, 1977  
 Superfamily Raninoidea De Haan, 1839  
 Family Lyreididae Guinot, 1993  
 Genus undetermined

Genus? *laevis* Ristori, 1886  
 Fig. 2, 3A-C

1886 *Tribolocephalus laevis* Ristori, p. 128, pl. 2, fig. 19.  
 1927 *Tribolocephalus laevis* Ristori; Van Straelen, p. 85.  
 1929 *Tribolocephalus laevis* Ristori; Glaessner, p. 388.  
 1969 *Tribolocephalus laevis* Ristori; Glaessner, R502.  
 1981 *Tribolocephalus laevis* Ristori; Delle Cave, p. 45.  
 2006 *Tribolocephalus laevis* Ristori; De Angeli & Garassino, p. 39.

2009 *Tribolocephalus laevis* Ristori; De Angeli *et al.*, p. 195.  
 2010 *Tribolocephalus laevis* Ristori; Dominici, p. 137, fig. 9.4.  
 2010 *Tribolocephalus laevis* Ristori; Schweitzer *et al.*, p. 72.  
 2012 *Tribolocephalus laevis* Ristori; Garassino *et al.*, p. 51.  
 2014 *Tribolocephalus laevis* Ristori; Karasawa *et al.*, p. 253, S3.  
 2018 *Tribolocephalus laevis* Ristori; Schweitzer *et al.*, p. 20, fig. 10.6.

**Type material** - IGF 616E.

**Type locality** - Orciano Pisano (Pisa, Tuscany, Italy).

**Type age** - Pliocene.

**Original description by Ristori (1886)** - Oval carapace with an axial longitudinal keel; lateral margins smooth; frontal margin bearing three acute and equal spines; anterolateral margins slightly curved and converging frontally; posterolateral margins slightly convex, longer than the anterolateral ones; posterior margins convex medially; carapace regions poorly distinct; gastric and cardiac regions separated from the epigastric and hepatic regions by a scarcely raised ridge; hepatic and branchial regions indistinct; irregular granulations on the dorsal carapace; pleonal and thoracic structures not preserved (description in modern terms based on Ristori's original description).

**Emended description (this study)** - Carapace much longer than wide; frontal margin poorly preserved; smooth antero- and posterolateral margins slightly curved; posterior margin slightly convex; no evidence of an axial longitudinal carina; dorsal surface of the carapace covered with small tubercles uniformly arranged.

**Discussion** - Schweitzer *et al.* (2018) provided a short diagnosis for *Tribolocephalus*, reporting characters, diagnostic of the family, such as the triangular rostrum and carapace with longitudinal carina, but not diagnostic of the genus. Ristori (1886: 128, pl. 2, fig. 19) described *Tribolocephalus laevis* mainly having "frontal margin bearing three acute and equal spines" as visible in the original line drawing (Fig. 2a). This character is typical of the Lyreididae to which the species was assigned. However, based on the description provided by Ristori, there are not sufficient characters to justify the description of a new genus, or distinguish it from the other genera of the family. Based on Schweitzer *et al.* (2018), the five genera of the family distinguish themselves from each other essentially by three characters, namely the trifold front more or less narrow, the number of spines on the anterolateral margins, and the axial carina more or less developed along the entire carapace length. Though we can suppose the presence of the trifold front and axial carina when Ristori described the species, these characters

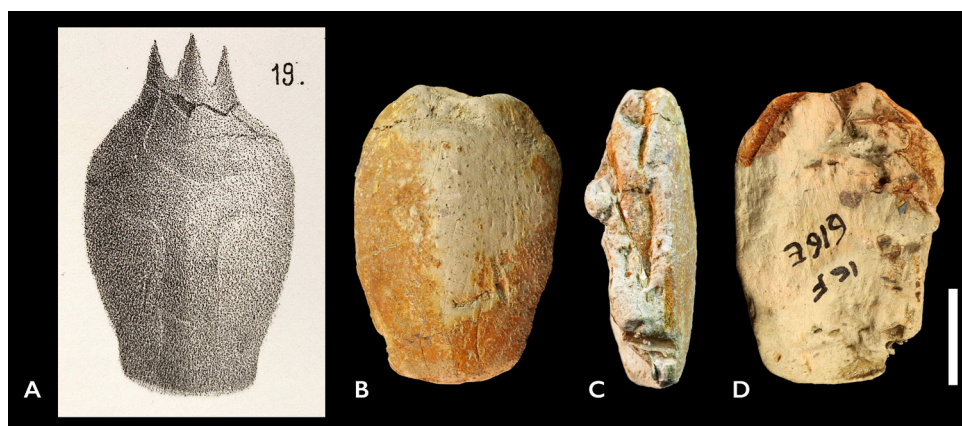


Figure 2. *Tribolocephalus laevis* Ristori, 1886, holotype, IGF 616E. A) original drawing by Ristori (1886: pl. 2, fig. 19). B) Dorsal view. C) Lateral view. D) Ventral view. Scale bar equals 1 cm.

are diagnostic of the family, but not enough to justify the description of a new genus. Ristori did not mention the presence or absence of spines on the anterolateral margins, diagnostic character within the genera of the family. Therefore, if we suppose that the anterolateral margins were spineless, *laevis* could be assigned to *Lyreidus* de Haan, 1841, whereas if the anterolateral margins were spiny, *laevis* could be assigned to *Giulianolyreidus* Karasawa, Schweitzer & Feldmann, 2014, *Ranidina* Bittner, 1893, or *Symethoides* Van Bakel, Guinot, Artal, Fraaije & Jagt, 2012. Moreover, Ristori did not mention if the axial carina (= keel *sensu* Schweitzer *et al.*, 2018) was developed along the entire carapace length. The lack of the axial carina in *Lyreidus* would rule out the belonging of *laevis* to this genus, but Ristori's species could belong to *Giulianolyreidus*, *Ranidina*, and *Symethoides* having axial carina. Based on these observations, we attest that the state of preservation of the holotype of *laevis*, previously and currently, does not have sufficient characters to justify the description of a new genus since *laevis* could be easily assigned to a known fossil genus within the family. Moreover, we consider the placement of *laevis* to the other genera of the family as untenable, but simultaneously we do not find sufficient taxonomic characters in the holotype to classify it within any known (fossil or extant) genus.

In conclusion, the lack of generic characters of *laevis* (as currently preserved) does not allow us to assign it confidently on the genus level. We treat it in open nomenclature and simultaneously refuse to suggest possible relationship with the other genera of the family. Therefore, we consider the species of Ristori (1886) as a representative of an undetermined genus (Genus?) and the binomen Genus? *laevis* is herein proposed.

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#### REFERENCES

- D'ANCONA C., 1871. Malacologia Pliocenica Italiana. *Memorie del Regio Comitato Geologico d'Italia* 1: 308-358.
- CIOPPI E., DOMINICI S., 2011. *Origin and development of the geological and paleontological collections*. In: Monechi S., Rook L. (eds), *Il Museo di Storia Naturale dell'Università degli Studi di Firenze*. Volume III: 18-55. Firenze University Press, Firenze.
- COCCHI I., 1867. L'uomo fossile nell'Italia centrale. *Memorie della Società Italiana di Scienze Naturali* 2: 3-80.
- DE ANGELI A., GARASSINO A., PASINI G., 2009. New reports of anomurans and brachyurans from the Cenozoic of Tuscany (Italy). *Atti della Società italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano* 150(2): 163-196.
- DE ANGELI A., GARASSINO A., 2006. Catalog and bibliography of the fossil Stomatopoda and Decapoda from Italy. *Memorie della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 35(1): 3-88.
- DE HAAN H.M., 1833-1849. *Crustacea*. In: Siebold P.F. v. (ed.), *Faunas Japonica, sive descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis superiorum, qui summum in India Batava imperium tenet, suscepto, annis 1823-1830 collegit, notis, observationibus a adumbrationibus illustravit*. J. Müller et Co., Lugduni Batavorum.
- DELLE CAVE L., 1981. Catalogue of type specimens in the invertebrate palaeontological collections of the Museum of Geology and Palaeontology of the University of Florence (Italy). *Crustacea, Decapoda*. *Atti della Società Toscana di Scienze Naturali, Memorie, Serie A* 88: 43-50.
- DOMINICI S., 2010. Pliocene invertebrates. In: Monechi S., Rook L. (eds), *Il Museo di Storia Naturale dell'Università degli Studi di Firenze*. Volume III: 135-149. Firenze University Press, Firenze.
- DOMINICI S., CIOPPI E., DANISE S., BETOCCHI U., GALLAI G., TANGOCCHI F., VALLERI G., MONECHI S., 2009. Mediterranean fossil whale falls and the adaptation of mollusks to extreme habitats. *Geology* 37(9): 815-818. doi: 10.1130/G30073A.1
- DOMINICI S., DANISE S., 2022. Mediterranean onshore-offshore gradient in the composition and temporal turnover of benthic molluscs across the middle Piacenzian Warm Period. In: Nawrot R., Dominici S., Tomašových A., Zuschin M. (eds), *Conservation Palaeobiology of Marine Ecosystems*. *Geological Society, Special Publications*, 529. doi: 10.1144/SP529-2022-35

- DOMINICI S., DANISE S., BENVENUTI M., 2018. Pliocene stratigraphic paleobiology in Tuscany and the fossil record of marine megafauna. *Earth-Science Reviews* 176: 277-310. doi: 10.1016/j.earscirev.2017.09.018
- GARASSINO A., PASINI G., DE ANGELI A., CHARBONNIER S., FAMIANI F., BALDANZA A., BIZZARRI R. 2012. The decapod community from the Early Pliocene (Zanclean) of “La Serra” quarry (San Miniato, Pisa, Toscana, central Italy): sedimentology, systematics, and palaeoenvironmental implications. *Annales de Paléontologie* 98: 1-61. doi: 10.1016/j.annpal.2012.02.001
- GLAESSNER M.F., 1929. *Crustacea Decapoda*. In: Pompeckj F.J. (ed.), *Fossiliumcatalogus*, 1: Animalium, 41, 1-464. W. Junk, Berlin.
- GLAESSNER M.F., 1969. *Decapoda*. In: Moore R.C. (ed.), *Treatise on Invertebrate Paleontology, Part R, Arthropoda 4*, vol. 2: 400-533, 626-628. The Geological Society of America, Inc. & The University of Kansas Press.
- GUINOT D., 1993. Données nouvelles sur les Raninoidea de Haan, 1841 (Crustacea Decapoda Brachyura Podotremata). *Comptes Rendus de l'Académie des Sciences* 316(11): 1324-1331.
- KARASAWA H., SCHWEITZER C.E., FELDMANN R.M., LUQUE J., 2014. Phylogeny and classification of Raninoidea (Decapoda: Brachyura). *Journal of Crustacean Biology* 34(2): 216-272. doi: 10.1163/1937240X-00002216
- PECCHIOLI V., 1864. Descrizione di alcuni nuovi fossili delle argille subappennine toscane. *Atti della Società Italiana di Scienze Naturali* 6: 498-521.
- RISTORI G., 1886. I crostacei brachiuri e anomuri del Pliocene italiano. *Bollettino della Società Geologica Italiana* 5: 93-128.
- SCHWEITZER C.E., FELDMANN R.M., GARASSINO A., KARASAWA H., SCHWEIGERT G., 2010. Systematic list of fossil decapod crustacean species. *Crustaceana Monographs* 10: 1-222. doi: 10.1163/ej.9789004178915.i-222
- SCHWEITZER C.E., FELDMANN R.M., KARASAWA H., LUQUE J., 2018. Part R, Revised, Volume 1, Chapter 8S: *Systematic descriptions: Section Raninoidea*. *Treatise Online*, 113: 1-42.
- VAN STRAELEN V. 1927. Connaît-on des larves de Brachyours fossiles. *Annals de la Société Géologique de Belgique* 50(4): 85-88.

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