

Paul D. Taylor*, Gérard Breton**, Danièle Guinot***,
Antonio De Angeli**** & Alessandro Garassino*****

The Cenozoic age of the supposed Jurassic crab *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007 (Crustacea, Decapoda, Brachyura)

Abstract - The specific name of the crab *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007, reflects the belief that the single known specimen is of Jurassic age and hence would represent a very early heterotreme eubrachyuran. The specimen was collected from a quarry at Ranville in Calvados, France, where Bathonian limestones of the Calcaire de Langrune Formation outcrop. However, bryozoans in the matrix of the specimen are of undoubted Cenozoic, probably Miocene, in age. Good preservation of both crab and bryozoans in the same matrix allows the assumption that they are contemporaneous, necessitating re-dating of *H. jurassica* as probably Miocene in age. It seems likely that the piece of matrix was discarded in the Ranville quarry by a fossil collector who had previously visited a Cenozoic locality elsewhere. Despite the revised dating, the genus *Hebertides* and species *H. jurassica* are distinct from related Corystidae and the names can be retained.

Key words: Decapoda, Jurassic, Miocene, Bryozoa, France.

Résumé - L'âge Cénozoïque pour le supposé Jurassique crabe *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007 (Crustacea, Decapoda, Brachyura).

Le crabe *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007, a été nommé ainsi parce que le seul spécimen connu était supposé être d'âge jurassique et donc représenter un Eubrachyura Heterotremata très précoce. Le spécimen avait en effet été recueilli dans une carrière à Ranville (Calvados, France), où sont exploités des calcaires bathoniens en particulier de la Formation des Calcaire de Langrune. Toutefois, les bryozoaires dans la gangue de l'échantillon sont incontestablement cénozoïques, probablement miocènes. Le bon état de conservation du crabe et des bryozoaires

* Department of Palaeontology, Natural History Museum, Cromwell Road, London, SW7 5BD, UK; e-mail: p.taylor@nhm.ac.uk

** 6 rue des Réservoirs, F-76600 Le Havre. Chercheur libre rattaché au Laboratoire Géosciences, Université de Rennes I, France; e-mail: gerardbreton@free.fr

*** Muséum national d'Histoire naturelle, Département Milieux et peuplements aquatiques, 61 rue Buffon, CP53, F-75231 Paris cedex 05, France; e-mail: guinot@mnhn.fr

**** Museo Civico "G. Zannato", Piazza Marconi 15, 36075 Montecchio Maggiore, Vicenza, Italy; e-mail: antonio.deangeli@alice.it

***** Museo di Storia Naturale, Corso Venezia 55, 20121 Milano, Italy; e-mail: alessandro.garassino@comune.milano.it; alegarassino@gmail.com

dans la même gangue permet de démontrer leur contemporanéité. Ceci la nécessité de proposer une nouvelle datation pour *H. jurassica*, qui est donc cénozoïque, probablement miocène. Il semble probable que le fossile soit tombé du sac d'un collectionneur qui avait auparavant visité, ailleurs, une localité du Cénozoïque. Malgré cette nouvelle assignation stratigraphique de l'holotype, le genre *Hebertides* et l'espèce *H. jurassica* sont distincts de tous les autres Corystidae connus, et leurs noms sont valides et confirmés.

Mots clés: Decapoda, Jurassique, Miocène, Bryozoières, France.

Riassunto - L'età cenozoica del presunto granchio giurassico *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007 (Crustacea, Decapoda, Brachyura).

Il nome specifico del granchio *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007, riflette la convinzione che l'unico esemplare conosciuto sia di età giurassica e, quindi, rappresenti il più antico eubrachiuro Heterotremata. Il campione è stato raccolto nella cava di Ranville nel Calvados, Francia, dove affiorano i calcari di età batoniana della Formazione di Langrune. Tuttavia, i briozoi rinvenuti nella matrice del campione sono di indubbia età cenozoica, probabilmente attribuibili al Miocene. Il fatto che il granchio e i briozoi siano conservati nella stessa matrice indica che sono contemporanei. Quindi è stata necessaria una ridatazione di *H. jurassica* che è quindi cenozoica, probabilmente di età miocenica. L'ipotesi più verosimile è che l'esemplare sia stato lasciato nella cava di Ranville da un collezionista che aveva precedentemente visitato una località di età cenozoica, posta in prossimità della cava stessa. Nonostante la nuova datazione stratigrafica, il genere *Hebertides* e la specie *H. jurassica* sono distinti dai relativi Corystidae e i nomi vengono considerati validi.

Parole chiave: Decapoda, Giurassico, Miocene, briozoi, Francia.

Introduction

The discovery almost twenty years ago of a new fossil crab (Fig. 1) at the well-known Middle Jurassic (Bathonian) quarry of Ranville in Calvados, France, caused great excitement when decapod specialists examined the specimen. Close similarities between this fossil crab and the extant family Corystidae Samouelle, 1819, were apparent, despite the seeming antiquity of the fossil (c. 165 Ma). The fossil was presented at the 3rd *Symposium on Mesozoic and Cenozoic Decapod Crustaceans* in Milano in May 2007 (Guinot *et al.*, 2007a) and subsequently described formally as a new genus and species of corystid, *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007, by Guinot *et al.* (2007b). It apparently represented an exceptionally early heterotreme eubrachiuran crab.

The matrix associated with the single known specimen of *Hebertides jurassica* contains numerous well-preserved bryozoans. This was seemingly consistent with the provenance of the crab: Ranville is a famous Jurassic bryozoan locality, exposing marine fossiliferous limestones including the 'Calcaire à polypiers' named on account of the abundant bryozoans present. However, as demonstrated below, the bryozoans associated with *H. jurassica* are not Jurassic species but instead are of Cenozoic, probably Miocene, in age. The purpose of this paper is to correct the age of *H. jurassica* and to evaluate the validity of the genus and species in the light of this re-dating.

The authors of this paper are designated by their initials: Paul D. Taylor (PDT), Danièle Guinot (DG), Antonio De Angeli (ADA), Alessandro Garassino (AG), and Gérard Breton (GB). Others are abbreviated: Thierry Rebours (TR), Françoise Hébert (FH), and Rodney M. Feldmann (RF).

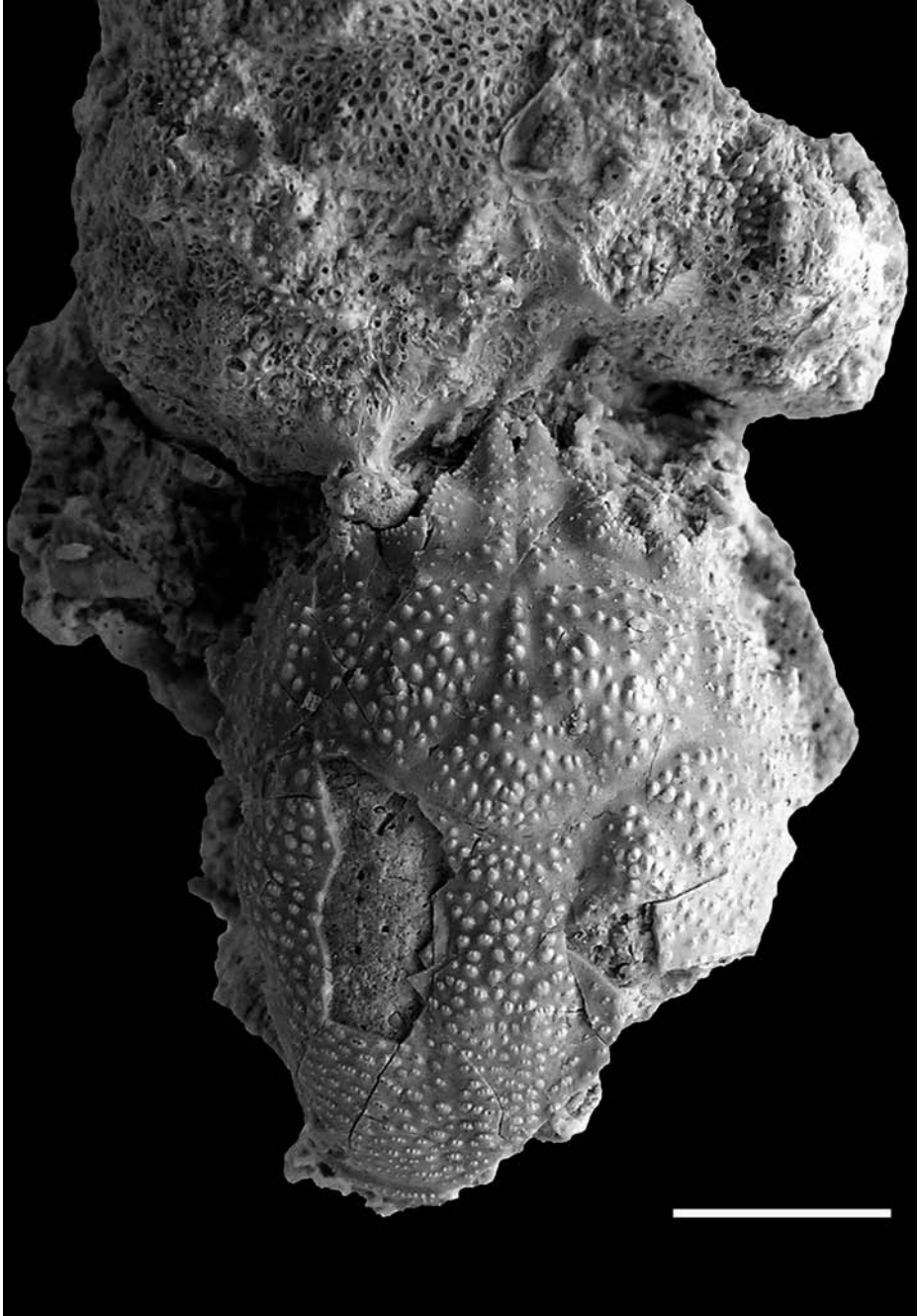


Fig. 1 - Holotype specimen (MNHN A24530 - Muséum national d'Histoire naturelle, Paris) of the crab *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007, allegedly from the Jurassic Calcaire de Langrune Formation of Ranville, Calvados, but more likely to be of Miocene age on the basis of the associated bryozoans which are visible on the top. Scale bar: 5 mm.

The story of the erroneous stratigraphical attribution of *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007

In 2003, TR, an amateur palaeontologist and highly regarded geologist and populariser of the science (Rebours & Hébert, 2001, 2002; Lebrun, 2010), found in the Ranville quarry (Calvados, France) a small block on the surface of the Jurassic Langrune Limestone containing a crab (“... j’ai pu récolter, toujours en épave, un autre crustacé...”: Rebours, reported by Lebrun, 2010). At first sight, the matrix of the block, a pale bioclastic limestone containing bryozoans, was identical with the Langrune Limestone, apparently confirming the stratigraphical provenance of this loose block. TR asked DG for an identification of the crab, stating that the fossil had been found *in situ* “from the top of the *Hollandi* Sub-zone (*Discus* Zone) of the Calcaire de Langrune Fm” (Guinot *et al.*, 2007a: 53; 2007b: 242).

The middle and late Bathonian limestones and marls of the Ranville quarry are exploited for a cement works. Apart from a few superficial remnants of Early Pleistocene deposits and Holocene loess, the entire quarry is dug in sediments of Bathonian age. There are late Callovian outcrops not far from the Ranville quarry, but there are no Cretaceous or Cenozoic rocks outcropping in the vicinity of Ranville: the closest Cretaceous rocks are outcrops of Cenomanian age in the cuesta of the Dives valley, 14 km from Ranville, while the closest fossiliferous Cenozoic outcrops are much more distant.

DG was very surprised by the discovery of this apparent Jurassic crab which she identified as being very close to the modern *Corystes* Bosc, 1802, at least belonging to the family Corystidae. She proposed to AG and ADA, who were familiar with Italian fossil corystids, a paper introducing what she thought to be an exceptionally early heterotreme eubrachiuran crab for the 3rd *Symposium on Mesozoic and Cenozoic Decapod Crustaceans* (Milano, 23-25 May 2007) (Guinot *et al.*, 2007a). Because ADA and AG did not know of any corystids older than Oligocene, ADA took a small sample of the matrix of the crab for microfossil analysis by Livia Beccaro (University of Padova). Unfortunately, this sample did not contain any foraminifera or calcareous nanoplankton. DG, AG and ADA therefore accepted the Jurassic age of the crab. DG asked for *in situ* samples from the Ranville quarry, which were kindly supplied by TR and FH who collected sediment from the supposed site of collection of the crab. However, micropalaeontological analysis was not possible at this time and, in any case, this would only have falsely confirmed the supposed Bathonian age of *Hebertides jurassica*!

Arguing against the likelihood of a Jurassic eubrachiuran, RF refereed the paper and asked for a re-evaluation of the systematic position of the fossil, affirming that it should be a raninid without really doubting its provenance. The crab was confirmed as a corystid in a second version of the paper containing a fuller description of the fossil. This revised version was accepted, augmented by a comparison between the two families, Corystidae (Eubrachiura) and Raninidae (Podotremata) (Guinot *et al.*, 2007b).

Following the Milano symposium, RF visited the Museum of Montecchio Maggiore, examined the crab, and a photograph of the specimen was given by ADA showing the well preserved bryozoans in the surrounding matrix. This picture was later published by Guinot *et al.* (2007a: fig. 1; see also 2007b: figs. 2-4). RF sent the image to PDT who replied that the bryozoans could not be Jurassic but were Cretaceous or younger in age.

An earlier mistake about bryozoans supposedly from the Ranville quarry and of Bathonian age was pointed out by PDT: Gregory (1894, 1896) described two species of cheilostome bryozoans which Voigt (1968) later proved to have come from the Maastrichtian of the Cotentin in Normandy. This mistake, although showing some similarities to the *Hebertides jurassica* story, has a different origin and, as we will show below, the type specimen of *H. jurassica* actually came from neither the Bathonian of Ranville, nor the Maastrichtian of the Cotentin.

During the summer of 2007, GB had the opportunity to examine carefully the matrix of the holotype of *H. jurassica*. This is a pale bioclastic limestone with a fine micritic cement. The bioclasts are mainly bryozoan fragments. Quartz grains are estimated to represent less than 0.5%, and there are rare spots of MnO₂. No oolites or glauconitic grains are present. The bryozoans are preserved in a range of taphonomic grades, from pristine to fragmented and worn. Other visible bioclasts include two small echinoid spines, and fragments of a bivalve shell and a serpulid tube. While the overall aspect of the matrix is, at first sight, not very different from the Calcaire de Langrune Fm., the complete lack of oolites is notable given that this formation is oolitic throughout.

As a consequence of this problem, GB visited the Ranville quarry on 27 July 2007 and 14 October 2007, together with TR and FH, to search for a bed within the 40 m or so of exploited limestones and marls that matched the matrix of the crab. He was not able to find such a bed. PDT had only seen the picture sent by RF and not the fossil itself when he suggested that the bryozoans were post-Jurassic in age. Fellow bryozoologist Françoise Bigey, examining other pictures taken by GB, was of the same opinion as PDT.

DG, ADA and AG did not know at this time that the crab had been in fact found as a loose block in the quarry, among blocks of the Calcaire de Langrune Fm., stating (Guinot *et al.*, 2007b: 242): “The studied specimen was collected directly *in situ* by F. Hébert in the Calcaire de Langrune...”. With the discordant opinions about the age of the specimen, they wanted the associated fossils in the matrix to be examined more closely without damage to the crab itself. PDT agreed to undertake a scanning electron microscope study of the bryozoans in the matrix of the holotype of *Hebertides jurassica* using a SEM equipped with a low vacuum chamber that allowed the entire specimen to be studied without coating. The results, given below, demonstrate unequivocally that this specimen is not Jurassic in age but comes from the Cenozoic, probably the Miocene.

How did this piece of matrix come to be found in the Ranville quarry among blocks of superficially similar Calcaire de Langrune Fm.? The only explanations we can offer is that it was either deliberately discarded or accidentally fell from a geologist's bag. When GB was in the Ranville quarry with TR and FH on 14 October 2007 he found a pile of Liassic fossils apparently from another quarry located 17 km from Ranville. These common, badly preserved fossils were almost certainly left behind by a collector who visited the two quarries in succession. Similar contamination has been noticed by ADA in the quarries of Vicenza where crabs and other fossils collected from different quarries are commonly discarded by collectors.

Associated bryozoans

Crucially, the fossil crab is associated with several well-preserved bryozoans. While not directly encrusting the carapace of *Hebertides jurassica*, the colour of the bryozoans matches that of the crab and their general condition is sufficiently

similar to leave no doubt that they are contemporaneous. The fine preservation of the crab carapace (Figs 1, 2A) shows that the crab is not a remain fossil derived from an older deposit and resedimented with the bryozoans. Therefore, the bryozoans can be used to provide a reliable stratigraphical age for *H. jurassica*.

At least thirteen species of bryozoans are present, eight cheilostomes and five cyclostomes (Table 1). Most apparently encrust a small, rounded bio- or lithoclast. The presence of so many cheilostomes immediately indicates that the specimen is not Jurassic in age as only two species of primitive cheilostomes are known from the entire Jurassic (see Taylor & Ernst, 2008), and the oldest of these is no older than Oxfordian in age. In contrast, true Bathonian bryozoan faunas contain only cyclostomes, apart from occasional uncalcified boring and bioimmured ctenostomes. Walter (1970: 237) noted a predominance of the cyclostome *Entalophora annulosa* (Michelin, 1845) in the 'Pierre de Langrune' of Ranville, along with *Cerilocava corymbosa* (Lamouroux, 1821), *Ripisoecia conifera* (Lamouroux, 1821), *Mesenteripora undulata* (Michelin, 1845) and *Heteropora lorieri* (d'Orbigny, 1850). None of these distinctive species are present in the matrix associated with *H. jurassica*, nor are there any of the 'Berenicea'-type encrusting colonies that dominate Jurassic bryozoan faunas.

Among the bryozoans identified from the matrix (Table 1), the following warrant particular comment:

Tab. 1 - Bryozoans in the matrix associated with the holotype specimen of *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007.

Order	Family	Genus and species
Cheilostomata	Steginoporellidae	<i>Steginoporella</i> cf. <i>transversa</i> Vigneaux, 1949
	Cribrilinidae	<i>Membraniporella</i> ? <i>diadema</i> (Reuss, 1848)
	Cribrilinidae	<i>Puellina</i> sp.
	Phidoloporidae	<i>Schedocleidochasma</i> <i>incisa</i> (Reuss, 1874)
	Bitectiporidae	? <i>Hippoporina</i> sp.
	Lepraliellidae	<i>Celleporaria</i> ? <i>elatior</i> (Duvergier, 1923)
	?Celleporidae	indet. 'celleporid' sp.
	?	<i>Ascophora</i> sp. indet. juv.
Cyclostomata	?Oncousoeciidae	? <i>Oncousoecia</i> sp.
	Tubuliporidae	<i>Platonea</i> sp.
	Plagioeciidae	<i>Mesenteripora</i> sp.
	Lichenoporidae	indet. sp.
	?Horneridae	indet. sp. (erect base)

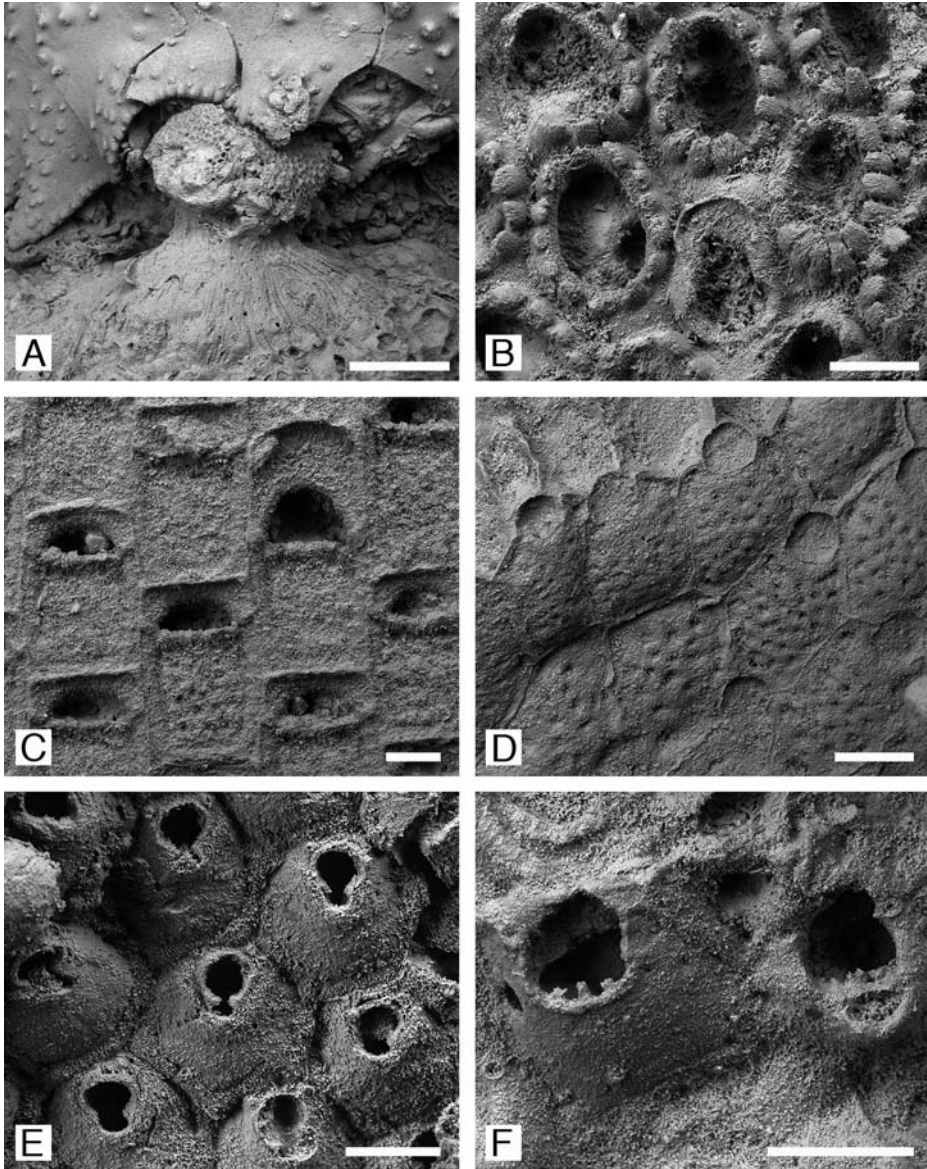


Fig. 2 - Scanning electron micrographs of Cenozoic, probably Miocene, bryozoans associated with the holotype specimen of the crab *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007 (MNHN, Paris A24530). A) base of an erect cyclostome (?Horneridae) with part of the crab carapace above. B) cheilostome *Membraniporella ?diadema* (Reuss, 1848) showing broken costal spines in the autozooids and a vicarious avicularium (lower centre). C) cheilostome *Steginoporella* cf. *transversa* Vigneaux, 1949 showing A-zooids and a single B-zooid (right of centre). D) cheilostome *?Hippoporina* sp. E) cheilostome *Schedocleidochasma incisa* (Reuss, 1874). F) two zooids of the cheilostome *Celleporaria ?elator* (Duvergier, 1923) preserving the orificial denticles. Scale bars: A = 1 mm; B-F = 200 μ m.

Membraniporella ?diadema (Reuss, 1848) (Fig. 2B). This Miocene cheilostome was recorded from the Badenian of the Vienna Basin and Messinian of Morocco by Moissette (1988). Interzooidal avicularia are apparent, similar to those figured by Moissette (1988: pl. 11, fig. 1) though stated to be absent in his description (p. 72) of the species.

Steginoporella cf. *transversa* Vigneaux, 1949 (Fig. 2C). Originally described from the Burdigalian of Aquitaine, *S. transversa* was regarded as a subspecies of *S. elegans* (Milne Edwards, 1836) by Pouyet & David (1979). The genus *Steginoporella* Smitt, 1873, notable for having polymorphic A- and B-zooids, ranges from Eocene to Recent.

?*Hippoporina* sp. (Fig. 2D). This ascophoran cheilostome closely resembles a species from the Tortonian of southern Spain that was figured by Berning (2006, fig. 91). Note, that it exhibits few distinctive characters and could alternatively belong to some other genera (e.g. *Cryptosula* Canu & Bassler, *Cheiloporina* Canu & Bassler). However, these are all Cenozoic.

Schedocleidochasma incisa (Reuss, 1874) (Fig. 2E). Redescribed by Berning (2006), this species has been recorded from various Miocene as well as some Pliocene localities in Europe and North Africa.

Celleporaria ?elator (Duvergier, 1923) (Fig. 2F). Belonging to another typically Cenozoic genus, this Miocene species occurs in the Aquitanian of the Aquitaine Basin, France (Pouyet, 1973).

Taken overall, the bryozoan fauna is certainly Cenozoic, and strongly suggestive of a Miocene age. While it is not possible to match the bryozoan assemblage with any well-characterised bryozoan fauna, in part reflecting the paucity of modern SEM-based studies of Cenozoic bryozoan faunas, it seems probable that the bryozoans originated from France (e.g. Aquitaine or Rhone basins) or elsewhere in Europe, probably in the western Mediterranean (B. Berning, pers comm., 2011). Notably, the assemblage is unlike the only Neogene bryozoan faunas described from Normandy (Pouyet, 1997), which come from the Pliocene of the Carentan and Saint-Sauveur-le-Vicomte basins.

Reappraisal of *Hebertides jurassica* Guinot, De Angeli & Garassino, 2007

As noted above, *Hebertides jurassica* was initially asserted as collected *in situ* on the surface of the Jurassic Calcaire de Langrune Fm. in Ranville quarry, Calvados (see Guinot *et al.*, 2007a, 2007b). The collectors, Thierry Rebourts and Françoise Hébert, to whom the genus was dedicated, later declared that the crab was found as a “loose block” on the surface of the Langrune Limestone (Rebourts, reported by Lebrun, 2010). As the associated bryozoans demonstrate that *H. jurassica* is probably Miocene in age, it is necessary to verify whether *Hebertides jurassica* remains a valid taxon.

Corystidae comprises three extant genera, *Corystes* Bosc, 1802, *Gomezia* Gray, 1831, and *Jonas* Hombron & Jacquinot, 1846 (Ng *et al.*, 2008: 56), plus several fossil genera. While the identification of *Hebertides* with *Gomezia* and *Jonas* may be eliminated because of the presence of several anterolateral teeth (generally nine), a new comparison with the other known corystids is necessary.

Hebertides vs *Corystes* Bosc, 1802

Corystes is monospecific, with *C. cassivelaunus* (Pennant, 1777) from the eastern Atlantic and Mediterranean Sea, as the type species. Despite some sim-

ilarities, the differences between *Hebertides* and *Corystes* are unambiguous (Guinot *et al.*, 2007a, 2007b). Principal differences are: (1) the proportions of the body, slightly wider anteriorly in *Hebertides*, in which the distance between the two extraorbital teeth (fronto-orbital margin) is larger than in *Corystes*; (2) in *Hebertides* the dorsal surface of the carapace shows well-marked areolation and wide and smooth grooves (vs regions practically not defined, without grooves except the branchiocardiac, in *Corystes*); (3) the presence of small, smooth areas on frontal and suborbital regions in *Hebertides* (absent in *Corystes*); and (4) the distribution of the granules on the carapace dorsal surface, which are less numerous and more irregularly distributed, stronger and even pointed on the anterior region in *Hebertides* (vs more numerous, smaller, but more dense and regularly distributed in *Corystes*, which is completely granulated). In the posterior half of the carapace, the ornamentation, which consists of smaller granules grouped into short clumps of two or three flat granules, is more similar in the two genera.

There is only one fossil record of *C. cassivelaunus*, a mould of a male specimen exposing only the ventral surface, from the Pliocene, early Piacenzian, of Noord-Brabant, The Netherlands (Van Bakel *et al.*, 2009: fig. 2E). The thoracic sternum of this fossil does not perfectly correspond to that of extant representatives.

***Hebertides* vs *Micromithrax* Noetling, 1881**

The type species of *Micromithrax* Noetling, 1881, is *Micromithrax holsatica* Noetling, 1881, from the Early Miocene to Middle Pliocene of northern Germany, northeast Belgium and The Netherlands. The placement of *Micromithrax holsatica* in *Corystes* proposed by Gripp (1967: 123, pl. 21, fig. 8.) and followed by both Moths (2005: 84, fig. 4) and Van Bakel *et al.* (2004: 101, fig. 3, pl. 4, figs. 1, 2, 6–8; 2006: 173) is erroneous, as pointed out by Guinot *et al.* (2007b) who signalled the mistake to Van Bakel (2006). Subsequently, the idea of *Micromithrax* as a junior synonym of *Corystes* was abandoned, and *Micromithrax* was revised by Van Bakel *et al.* (2009: fig. 2D, F–H). The photograph of the holotype of *M. holsatica* (Van Bakel *et al.*, 2004: fig. 3; Van Bakel *et al.*, 2009: fig. 2F) shows the main characteristics of the genus: distinctly convex carapace; dorsal surface markedly areolated, with a prominent central tubercle on each region and tubercles disposed on median axis; presence of distinct grooves; front with two triangular teeth; three unequal anterolateral teeth laterally oriented plus a dorsally visible, curved subhepatic spine. *Corystes* cf. *holsaticus* Montag, 1987 (p. 78), from northern Germany is considered to be a synonym of *Micromithrax holsatica* by Van Bakel *et al.* (2009: 82).

Hebertides may be distinguished from *Micromithrax* in particular by its less deeply areolated carapace and the absence of prominent tubercles. It is difficult to say anything about the lateral spines since the sides of *Hebertides* are incomplete. The presence of sparse big tubercles is reminiscent of the extant genera *Gomeza* and *Jonas*.

We agree with Van Bakel *et al.* (2009: 82) that the two other species referred to *Micromithrax* [*M. minusculus* Feldmann & Wilson, 1988 (p. 486, fig. 16)], from the Eocene (La Meseta Formation) of Seymour Island Antarctica; and *M. grippi* Müller, 1974 [(pp. 279, 284, pl. 2, figs. 1, 2), from the Middle Miocene

of the Budapest region, Hungary], cannot be retained in *Micromithrax*, nor in Corystidae (see also Müller, 1984: 79).

***Hebertides* vs *Corystites* Müller, 1984**

The genus *Corystites* Müller, 1984, was introduced by Müller (1984: 75) as a replacement name for *Microcorystes* Lörenthey in Lörenthey & Beurlen, 1929 (p. 137, pl. 8, fig. 4a-d). *Microcorystes* Fritsch, 1893, with *M. parvulus* Fritsch, 1893, as type species (Fritsch, 1893), is a podotreme crab, included in Pithonotidae Glaessner, 1933, by Shirk (2006) but “unplaced at family level” by De Grave *et al.* (2009: 28) and Schweitzer *et al.* (2010: 61).

The type species of *Corystites* is *Microcorystes latifrons* Lörenthey in Lörenthey & Beurlen, 1929, from the Middle Miocene (Badenian) of the Budapest region, Hungary. Unfortunately, the holotype is lost and no additional specimens are known (Van Bakel *et al.*, 2009: 82). *Microcorystes latifrons*, which is described by small specimens less than 5 mm in length, differs from *Hebertides* by the more marked dorsal regions, the ornamentation consisting of large granules, the lateral margins armed with five or six teeth, and the front formed of two wide, raised lobes.

A second species assigned to *Corystites* is *C. vicetinus* De Angeli, Garassino & Ceccon, 2010 (p. 158, fig. 9), known from three specimens from Italy (Vicenza, Altavilla Vicentina). It has an areolated carapace with smooth grooves, a dorsal surface ornamented in the anterior part by rounded granulations, and in posterior part by oval, transversely arranged granulations, all characters rather similar to those of *H. jurassica*. The two species differ, however, by: the outline of carapace which is more elongated in *Hebertides*, in particular longer between the cervical groove and the posterior border of carapace; the posterolateral margin being relatively longer in *Hebertides* than *Corystites*; the front with two triangular lobes, separated by a narrow fissure in *Hebertides* compared with two strong, rounded distally lobes, separated by a wide cleft in *Corystites*; the shape of the orbits; the cardiac region unarmed but with two median, granulated elevations in *Corystites*.

The discovery of *C. vicetinus* extended the fossil record of *Corystites* back into the Early Oligocene.

***Hebertides* vs *Gomezinus* Collins in Collins, Lee & Noad, 2003**

The genus *Gomezinus* Collins in Collins, Lee & Noad, 2003, is known only from its type species, *G. tuberculatus* Collins in Collins, Lee & Noad, (Collins *et al.*, 2003: 363, pl. 20, fig. 2), from the Miocene Miri Formation of Sarawak, Indonesia. It differs from *H. jurassica* in its more ovate and more arched carapace, lateral margins armed with nine blunt teeth, and the dorsal surface ornamented with median and paired median-lateral rows of tubercles, characters evoking those of the Recent genus *Jonas*.

These comparisons support the retention of *Hebertides* and *H. jurassica* as valid taxa. Although the specific epithet *jurassica* is a misnomer with the knowledge that the species does not come from the Jurassic, the International Code of Zoological Nomenclature does not make provision for its replacement on these grounds and the name must stand.

Conclusions

The stratigraphical provenance -Bathonian Calcaire de Langrune Fm.- originally stated when *Hebertides jurassica* was described is incorrect. Bryozoans associated with the crab are of Cenozoic, probably Miocene, in age and are not Jurassic. Jurassic bryozoans comprise almost exclusively cyclostomes (Taylor & Ernst, 2008), whereas the bryozoans in the matrix attached to the crab are dominated by characteristically Cenozoic cheilostomes such as *Steginoporella*, *Celleporaria*, *Membraniporella*, and *Schedocleidochasma*. Both the crab and the bryozoans are well matched in their preservational qualities and are evidently contemporaneous. The fine preservation of the crab carapace rules out the possibility that it is a derived Jurassic fossil re-buried with some Cenozoic bryozoans. Furthermore, the complete lack of ooliths in the matrix argues against the specimen actually coming from the oolitic Calcaire de Langrune Fm. Despite the radical revision of the age of the fossil crab from Jurassic to Cenozoic (?Miocene), comparisons with related fossil and extant taxa justify retention of both the genus *Hebertides* and the species *H. jurassica*.

Acknowledgements

We wish to thank Barry Van Bakel, Oertijdmuseum De Groene Poort, Boxtel, The Netherlands, and Bjorn Berning, Upper Austrian State Museum, Austria, for criticism and useful review of the text.

References

- Berning, B., 2006 – The cheilostome bryozoan fauna from the Late Miocene of Niebla (Guadalquivir Basin, SW Spain): environmental and biogeographic implications. *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg*, Hamburg, 90: 7-156.
- Collins J. S. H., Lee C. & Noad J., 2003 – Miocene and Pleistocene crabs (Crustacea, Decapoda) from Sabah and Sarawak. *Journal of Systematic Palaeontology*, 1: 187-226.
- De Angeli A., Garassino A. & Ceccon L., 2010 – New report of the coral-associated decapods from the “Formazione di Castalgomberto” (early Oligocene) (Vicenza, NE Italy). *Atti della Società italiana di Scienze naturali e del Museo civico di Storia naturale in Milano*, Milano, 151 (2): 145-177.
- De Grave S., Pontcheff, N. D., Ahyong S. T., Chan T.-Y., Crandall K. A., Dworschak P. C., Felder D. L., Feldmann R. M., Fransen C. H. J. M., Goulding L. Y. D., Lemaitre R., Low M. E. Y., Martin J. W., Ng P. K. L., Schweitzer C. E., Tan S. H., Tshudy D. & Wetzer R., 2009 – A classification of living and fossil genera of decapod crustaceans. *Raffles Bulletin of Zoology*, Singapore, supplement 21: 1-109.
- Duvergier J., 1923 – Deuxième note sur les Bryozoaires du Néogène de l’Aquitaine. *Actes de la Société Linnéenne de Bordeaux*, Bordeaux, 75 (2): 145-190.
- Feldmann R. M. & Wilson T. M., 1988 – Eocene decapod crustaceans from Antarctica. *Bulletin of the Geological Society of America*, 169: 465-488.
- Fritsch A., 1893 – Studien im Gebiete der Böhmisches Kreideformation. V. Die Priesener Schichten. *Archiv der naturwissenschaftlichen Landesdurchforschung Böhmen*, 9: 1-151.

- Gregory J. W., 1894 – On some Jurassic species of Cheilostomata. *Geological Magazine*, London, 4, 1: 61-64.
- Gregory J. W., 1896 – *Catalogue of the Fossil Bryozoa in the Department of Geology of the British Museum (Natural History). The Jurassic Bryozoa*. British Museum (Natural History), London.
- Gripp K., 1967 – Decapode Krebse tertiären Alters aus Schleswig-Holstein. *Meyniana*, 17: 1-3.
- Guinot D., De Angeli A. & Garassino A., 2007a – Discovery of the oldest eubranchyuran crab from the Middle Jurassic (Bathonian) of Normandy (France). 3rd Symposium on Mesozoic and Cenozoic Decapod Crustaceans - Museo di Storia Naturale di Milano, May 23-25, 2007. *Memorie della Società italiana di Scienze naturali e del Museo civico di Storia naturale di Milano*, Milano, 35 (2): 53-55.
- Guinot D., De Angeli A. & Garassino A., 2007b – *Hebertides jurassica* n. gen., n. sp. (Crustacea, Decapoda, Brachyura) from the Middle Jurassic (Bathonian) of Normandy (France). *Atti della Società italiana di Scienze naturali e del Museo civico di Storia naturale in Milano*, Milano, 14 (2): 241-260.
- Lebrun P., 2010 – Brachiopodes et éponges fossiles de la collection Rebourts-Hébert. *Fossiles*, Saint-Julien-du-Pinet, 4: 41-57.
- Lőrenthey I. & Beurlen K., 1929 – Die fossilen Dekapoden der Länder der Ungarischen Krone. *Geologica Hungarica, Series Palaeontologica*, Budapest, 3: 1-420.
- Michelin H., 1841-1848 – *Iconographie Zoophytologique, description par localités et terrains des polypiers fossiles de France et pays environnants*. viii + 348 pp., 79 pls. Paris.
- Moissette P., 1988 – Faunes de bryozoaires du Messinien d'Algérie occidentale. *Documents des Laboratoires de Géologie de Lyon*, Lyon, 102: 1-351.
- Montag A., 1987 – Obermiozäne Krebse von Sylt. In: Hacht, U. von (ed.), *Fossilien von Sylt II*, 77-87. Inge-Maria von Hacht, Verlag und Verlagsbuchhandlung, Hamburg.
- Moths H., 2005 – Dekapode Krebse aus Geschieben des mittelmiozänen Reinbeker Gesteins, Reinbekium, von Norddeutschland. *Geschiebekunde aktuell*, 21: 81-92.
- Müller P., 1974 – Decapoda (Crustacea) fauna a budapesti miocénböl. 2. *Földtani Közlöny*, Budapest, 104: 275-287.
- Müller P., 1984 – Decapod Crustacea of the Badenian. *Geologica Hungarica, Series Palaeontologica*, Budapest, 42: 1-317.
- Ng P. K. L., Guinot D. & Davie P. J. F., 2008 – Systema Brachyurorum: Part 1. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bulletin of Zoology*, Singapore, Supplement 17: 1-286.
- [updates at <http://rmbn.nus.edu.sg/research/cotw/supplement17.php>]
- Orbigny A. d', 1850 – *Prodrome de Paléontologie stratigraphique Universelle. 1*. Masson, Paris.
- Pouyet S., 1973 – Révision systématique des cellépores (Bryozoa, Cheilostomata) et des espèces européennes. Analyse de quelques populations à cellépores dans le Néogène du Bassin Rhodanien. *Documents des Laboratoires de Géologie de la Faculté des Sciences de Lyon*, Lyon, 55: 1-266.
- Pouyet S., 1997 – Les bryozoaires du Pliocène de Normandie. *Geodiversitas*, Paris, 19: 7-59.

- Pouyet S. & David, L., 1979 – Révision systématique du genre *Steginoporella* Smitt, 1873 (Bryozoa, Cheilostomata). *Geobios*, Lyon, 12: 763-817.
- Rebours T. & Hébert F., 2001 – Ranville... au Jurassique. (Unpublished field guide).
- Rebours T. & Hébert F., 2002 – Le patrimoine géologique de Ranville (Calvados). De la mer à la Pierre... (Unpublished field guide).
- Reuss A. E., 1848 – Die fossilen Polyparien des Wiener Tertiärbeckens. *Haidenger's Naturwissenschaftliche Abhandlungen*, Wien, 2: 1-109.
- Reuss A. E., 1874 – Die fossilen Bryozoen des österreichisch-ungarischen Miocäns. *Denkschriften der Kaiserlichen Akademie der Wissenschaften*, Wien, 33: 141-190.
- Shirk A. M., 2006 – A novel assemblage of decapod Crustacea, from a Tithonian coral reef olistolith, Purcăreni, Romania: systematical arrangement and biogeographical perspective. Unpublished M.Sc. thesis, Kent State University, Department of Geology.
- Schweitzer C. E., Feldmann R. M., Garassino A., Karasawa H. & Schweigert G., 2010 – Systematic list of fossil decapod crustacean species. *Crustaceana Monographs*, Leiden, 10: 1-222.
- Taylor P. D. & Ernst A., 2008 – Bryozoans in transition: the depauperate and patchy Jurassic biota. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 263: 9-23.
- Van Bakel B. W. M., Jagt J. W. M., Fraaije R. H. B. & Wille E. R. H., 2004 – Piacenzian (Pliocene) decapod crustacean faunules from northwest Belgium. *Bulletin of the Mizunami Fossil Museum*, Mizunami, 30: 97-108.
- Van Bakel B. W. M., Fraaije R. H. B. & Jagt J. W. M., 2006 – Synopsis of Cenozoic decapod crustaceans from Belgium. *Revista Mexicana de Ciencias Geológicas*, 23 (3): 370-374.
- Van Bakel B. W. M., Jagt J. W. M., Artal P. & Fraaije R. H. B., 2009 – *Harenacorystes johanjansseni*, a new Pliocene crab (Crustacea, Decapoda) from the Netherlands, and notes on Miocene-Pliocene corystoid crabs from the North Sea Basin. *Bulletin of the Mizunami Fossil Museum*, Mizunami, 35: 79-85.
- Vigneaux M., 1949 – Révision des Bryozoaires néogènes du Bassin d'Aquitaine et essai de classification. *Mémoires de la Société Géologique de France*, Paris, 28 (6): 1-155.
- Voigt E., 1968 – On the Cretaceous age of the so-called Jurassic cheilostomatous Polyzoa (Bryozoa). A contribution to the knowledge of the Polyzoa-fauna of the Maastrichtian in the Cotentin (Manche). *Bulletin of the British Museum (Natural History)*, Geology Series, London, 17: 1-45.
- Walter B., 1970 – Les Bryozoaires Jurassiques en France. *Documents des Laboratoires de Géologie de la Faculté des Sciences de Lyon*, Lyon, 35: 1-328.

Ricevuto: 10 gennaio 2012

Approvato: 29 febbraio 2012