A NOVEL ASSEMBLAGE OF DECAPOD CRUSTACEA, FROM A TITHONIAN CORAL REEF OLISTOLITH, PURCĂRENII, ROMANIA: SYSTEMATICAL ARRANGEMENT AND BIOGEOGRAPHICAL PERSPECTIVE

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to Kent State University in partial fulfillment of the requirements for the degree of Masters of Science

by

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ABSTRACT

A solitary exposure of limestone, in the southwestern section of the Eastern Carpathian Mountains in Romania near Purcâreni, is one of a series of Upper Jurassic limestone blocks contained within Cretaceous-age sediments. These blocks are interpreted to be olistoliths that were emplaced in their present position by gravity movements during the Albian. Movement occurred after underlying Mesozoic units were overthrust upon younger Cretaceous-age flysch deposits. In the area of Purcâreni, the Barremian – Aptian flysch deposits are represented by conglomerates, breccias, sandstones, and marls that make up the “Piscul cu Brazi” Formation. This formation includes several blocks of Tithonian coral reef limestone, the one under consideration having a volume of approximately 320 m³. The limestone is interpreted to be the result of shallow marine deposition during the retreat of the Tethys Sea. The olistolith at Purcâreni is particularly fossiliferous, and the rich coral reef assemblage yields the decapod crustacean families Prosopidae (one species), Pithonotidae (four species), Dynomenidae (seven species), and subfamily Galatheinae (seven species) within the family Galatheidae. The limestone blocks from Purcâreni have previously been studied (Murgeanu, Patrulius, and Contescu, 1959; Patrulius, 1959; 1964); however, the authors only mentioned that this locality has an abundance of fossils, including decapod crustaceans, and did not provide detailed descriptions or identifications of the contained
taxa. Distribution of the fossils within the block seems to be haphazard with the exception of one layer approximately one meter thick that yielded a higher number of decapod crustaceans in association with a large number of brachiopods. Two points of interest include, the dominance of the Dynomenidae upon comparison of similar localities and fact that the crabs are represented only by carapaces and disarticulated appendages. No articulated crabs were found, whereas most of the associated fauna was articulated.
INTRODUCTION

Published information on the decapod crustaceans from the Carpathian Mountains of Romania is sparse. Initial investigations were made in this region to determine if the Mesozoic strata would prove productive for collecting decapod crustaceans that might ultimately elucidate radiation and diversification patterns of crabs in this region, since their first appearance in the early Jurassic. Several field localities proved very productive for examining Jurassic and Cretaceous age decapod crustaceans (see Feldmann et al., in press, and Schweitzer et al., in progress). At the site discussed herein, located on the eastern boundary of the village of Purcăreni, Romania, an abundance of specimens and stratigraphic information was gathered. The purpose of this paper is to describe the systematic placement of the decapod crustaceans and to summarize the ecology and the biogeography of the species within the region. This paper will be the first to provide detailed identifications and descriptions of the crabs from this locality and indeed also of this age in Romania. Previously there has been very little information published on the decapod crustaceans from this site, and no descriptions have been provided (Patrulius 1960; 1966; Murgeanu et al., 1959). There has been a significant amount of stratigraphic work completed on the “Piscul cu Brazi” Formation, which crops out at multiple localities near Purcăreni and from which the decapods were collected (Patrulius 1953; 1954; 1960; 1964; 1969).
The Carpathian Mountain range is a complexly folded tectonic feature that has been divided into three regions based upon the existing geography. The arcuate shape of the mountain belt has been defined by several orogenic events, allowing for easy recognition of the three divisions: West, East, and South (Figure 1). Several sections of the chain had been tectonically active since the early Paleozoic; specifically, the Eastern Carpathians are the result of continual continental collision between the European and African plates commencing in the Albian and progressing into the Pliocene. The Carpathians, although formed by continental collision similar to the Himalayas, do not compare in elevation. The reduced elevation displayed by the Carpathian chain is one characteristic of a retreating subduction boundary, resulting when the rate of subduction is greater than the rate of convergence (Royden, 1993).

The focus for this paper will be on the paleontology of the Tithonian age carbonate rocks from the southwestern portion of the Eastern Carpathians, namely, the Bucegi Mountain range. The site of collection is approximately 15 kilometers east of Brașov, in Purcăreni, Romania. (Figure 2) The formations that crop out on the eastern slope of the Bucegi Mountains comprise, at different levels, Upper Jurassic limestone blocks integrated into Cretaceous age flysch deposits, identified by Patrulius (1960, 1969) as being gravitational olistoliths. These olistoliths are well represented by outcrops visible at many localities throughout the Bucegi Range, and most importantly in terms of this paper, at Purcăreni.
The two main tectonic and paleogeographic units of the Eastern Carpathians are: 
(1) the inner crystalline belt (western in position) known as the Dacids; and (2) the outer 
flysch belt (easterly in position) called the Moldavids (Földvary, 1988). The Marginal 
Dacids include the Bucegi Range and are represented by several geologic structures, one 
of which is the Transylvanian Nappe (Figures 4 and 5). This particular structure is 
composed exclusively of Mesozoic deposits primarily the result of non-marine or shallow 
marine deposition formed during the retreat of the Tethys Sea. The Mesozoic deposits 
that compose the Transylvanian Nappe were emplaced in their present position, by 
gravity movements, in Early Cretaceous times. The underlying units were overthrust 
during the orogenic events of the Late Albian (Figure 5). At the same time, the 
crystalline nappes were thrust eastward over the flysch belt nappes (Földvary, 1988). 
Following the thrusting, the Tithonian units fractured, allowing large blocks of the 
formation to break away. These massive blocks, coupled with the force of gravity, 
initiated movement downslope on the poorly consolidated flysch. In this manner, 
younger Cretaceous age flysch deposits were overlain by older Jurassic limestone blocks. 
In the area of Purcăreni, the Tithonian olistoliths belonging to the Dogger deposits, are 
represented by calcarenites and coral reef limestone units that have undergone a 
significant amount of recrystallization (Murgeanu, Patrulius, Contescu, 1959). 
Furthermore, the Lower Cretaceous (Barremian – Aptian) flysch deposits are represented 
by conglomerates, breccias, sandstones and marls that make up the “Piscul cu Brazi” 
Formation. This formation includes the Upper Jurassic (Tithonian) reef limestone blocks
Figure 1--Image showing geographically distinct units of the Carpathian Mountains, with focus on the Eastern region where collection occurred.
Figure 2--Precise location of collection site, in the southern portion of the Eastern segment of the Carpathian mountains.
belonging to the Dogger deposits (Figure 6). The Bucegi Mountain range contains several exposed olistolith deposits, few of which have been studied. However, those that have been examined contain a very rich reef assemblage including corals, pachiodont bivalves, gastropods, brachiopods, echinoderms, sponges, and galatheid and brachyuran crustaceans.
Figure 3--Geologic map of Romania, showing several structural provinces and the collection site at Purcăreni. Image from the Geological Institute of Romania.
Figure 4--Geological and tectonic map of the Eastern Carpathians, with focus on the Transylvanian Nappe and the locality situated within the Outer (Marginal) Dacids. Image from Földvary, 1988.
Figure 5--Diagram of olistolith formation. Arrows indicate direction of slip of limestone blocks onto Cretaceous deposits. Modified after Patrulius, Bleahu, and Mihailescu (1967).
Figure 6--Panoramic view of the site at Purcăreni, showing the Hauterivian Flysch overlain by the Tithonian Olistolith. Photo by Aubrey Shirk.
NATURE OF COLLECTION

The collection site is the remnant of an abandoned limestone quarry. The olistolith was mined by the villagers of Purcăreni until the late 1950’s with intentions to utilize the limestone for constructive and decorative purposes, consequently diminishing the fossilized reef of its voluminous size to that which can be viewed in Figure 6. The villagers recognized this limestone as being particularly fossiliferous, and in fact, it is acknowledged locally as “coral rock”.

Upon initial prospecting of the olistolith, it was noted that there was apparent bedding within the unit. The bedding planes range in thickness from approximately 30 cm to more than one meter and dip southwest at about 35°. Although dipping, the olistolith is generally upright as evident by corals and brachiopods preserved in living positions. Closer inspection of the site and collection of large amounts of material revealed that there is faunal variation within the horizons. Decapod crustaceans and brachiopods dominate the upper layers of the reef, while they grade downward into a coral-rich facies (Figure 7). Even though the relative abundances of the taxa varies between strata, it is important to note that all species were found distributed throughout the entire olistolith.

Having surveyed and sampled the entire unit, we then concentrated on the layer bearing abundant crab material. The method of extraction was as simple as crushing large blocks of limestone into small fragments and examining them for any evidence
Figure 7--Highlighted boundaries of most prolific layer containing crab and brachiopod material at Purcăreni. Photo by Dr. Rodney Feldmann.
of fossil material. A variety of associated taxa was found in conjunction with the
decapod crustaceans, the most abundant of which were brachiopods and corals,
accompanied by lesser numbers of bivalves, gastropods, sponges, crinoids, ammonites,
echinoderms, and worm burrows (for a complete list refer to Appendix 1). The material
has undergone varying degrees of recrystallization making identifications, particularly of
the corals, extremely difficult.

All of the decapod crustaceans were disarticulated, and are represented by dorsal
carapaces and appendage/claw fragments alone, with absolutely no evidence of ventral
surface segments. As a result, all decapod crustacean identifications have been made
using only the dorsal carapaces. The collected appendages were cleaned and catalogued
for collections: however, the lack of association with the carapaces, quality of
preservation, and underrepresentation of extinct and extant specimens of these species
has made identifications of the appendages impossible. While the crabs were completely
disarticulated, the associated fauna was found largely complete. Brachiopods were found
fully articulated, and corals were primarily still in life position. All other taxa were either
insufficiently present or too fragmented for comparison.

The literature was reviewed for clues to interpreting the unusual preservational
quality and taphonomy of the crabs in comparison to the brachiopods and corals. Müller,
Krobicki, and Wehner (2000) described a comparable preservational scenario for a
similar deposit of prosopid crabs in Oxfordian sponge reefs from Poland. They suggested
that the only means to avoid distintegration of Jurassic prosopid crabs from physical
disturbance, destructive transport, chemical breakdown, and bioturbation was rapid burial of their carapaces after death or moult (Müller et al., 2000) (Figure 8). This concept can explain the degree of preservation at the Purcăreni locality and can be further substantiated by the well-preserved ornamentation on the dorsal carapaces and presence of original cuticle. Furthermore, a soft substrate may have allowed for the unattached, disarticulated crab carapaces and attached, articulated brachiopods to accumulate in small depressions on the sea floor, or in pockets formed from the reef structure (Müller et al., 2000). This would also explain why these organisms were dominant in a particular layer of the olistolith. The attached corals would have formed the framework in which the layer could derive.
Figure 8--Diagram modified from Müller, Krobicki, and Wehner (2000), matching the preservational tendencies of crabs against various taphonomical processes. Preservation typical of Purcăreni is highlighted in gray.
SYSTEMATIC PALEONTOLOGY

Infraorder BRACHYURA Latreille, 1802
Section DROMIACEA de Haan, 1833
Superfamily DROMIOIDEA de Haan, 1833
Family PROSOPIDAE von Meyer, 1860


Diagnosis.--Carapace subcircular, subcylindrical, or triangular, typically elongate and transversalyconvex. Front with bifid, projecting rostrum. Orbits elongate to circular, shallow to deep, well-defined. Lateral margins weak, displaying no finite boundary between dorsal and ventral surfaces. Posterior margin rimmed, generally wide, may be concave. Cervical and branchiocardiac grooves present, deep. Branchiocardiac groove may be better developed than cervical groove. Epigastric regions weakly inflated, mesogastric region distinct. Cardiac, hepatic, and branchial regions typically distinguishable. Carapace ornamentation granulose to strongly tuberculate.
Discussion.--The family Prosopidae has been reviewed in Müller, Krobicki, and Wehner (2000) in which they identified and briefly discussed the above genera as belonging to the Prosopidae, with the exception of Longodromites and Mithracites. Longodromites was erected by Patrulius (1960) within the Pithonotidae (see following section on Pithonotidae for revised systematics of family) to embrace Pithonoton angustum (Reuss, 1858), Prosopon excisum (von Meyer, 1857), and Prosopon (Pithonoton) meyeri (Étallon, 1858). Longodromites bicornutus was later referred to the genus by original designation of Mutiu and Bădăluţă (1971). Evaluation of the collected material of this species, described herein, documents morphologic kinship with the Prosopidae. Therefore, Longodromites has been moved from the Pithonotidae to the family Prosopidae. To better exemplify this reclassification, a modified list of all known genera now considered to be within the Prosopidae has been generated (Appendix 2). All species currently assigned to these genera are included.

Range.--Pliensbachian to Campanian.

Distribution.--Europe, Africa, North America, Australia.
Genus *Longodromites* Patrulius, 1960

*Type species.*--*Prosopon excisum* von Meyer, 1857.

*Included species.*--*Longodromites angustus* (Reuss, 1858) as *Pithonoton*; *Longodromites bicornutus* Mutiu and Bădălău, 1971; *Longodromites excisum* (von Meyer, 1857) as *Prosopon*; *Longodromites meyeri* (Étallon, 1858) as *Prosopon* (*Pithonoton*).

*Diagnosis.*--Carapace rectangular to ovate, elongate, longer than wide. Rostrum bilobed, may be downturned. Orbits deep, round, with outer orbital fissure, bearing denticulation along outer orbital margin. Lateral margins poorly developed, posterior margin narrow, concave, rimmed, entire. Cervical and branchiocardiac grooves present. Epigastric regions raised, cardiac region defined and ornamented with two or three tubercles. Hepatic regions distinct, without bulge on the underlying pterygostomial region. Branchial regions elongate to triangular. Carapace covered in small tubercles, more prominent near anterior margin.

*Discussion.*--*Longodromites* was erected by Patrulius (1960) upon evaluation of *Prosopon angustum* (Reuss 1858) which exhibits characteristics drastically different from the typical *Pithonoton*. *Prosopon (Pithonoton) meyeri* (Étallon, 1858) and *Prosopon excisum* (von Meyer, 1857) were also assigned to *Longodromites* (Patrulius, 1966). Patrulius (1966) noted that these species differed significantly from the typical *Prosopon* and *Pithonoton*. More specifically, the deep, round orbits are one of the most distinctive features of the genus *Longodromites* (Figure 10). This particular structure of
the orbits, accompanied by an elongated carapace with weak lateral margins, makes
*Longodromites* more closely related to the Prosopidae and herein has been moved from
the family Pithonotidae into the family Prosopidae.

*Longodromites bicornutus* Mutiu and Bădălătuă, 1971

Figure 10.

*Longodromites bicornutus* Mutiu and Bădălătuă, 1971, p. 251, fig. 11.

*Diagnosis.*—Carapace longitudinally ovate, longer than wide, W/L ratio approximately
0.75. Widest 0.62 distance from frontal margin, at position of intersection of
branchiocardiaceal groove with lateral margin. Longitudinal axis of carapace straight,
antero region more transversely convex than posterior. Frontal width 0.33 maximum
width. Front bilobed, projecting strongly forward, rostrum blunt. Fronto-orbital width
0.75 maximum width. Orbits deep, round, rimmed, entire, with small medial process and
outer-orbital spine. Lateral margin smooth, poorly defined, lacking spines. Posterior
margin wide, well-rimmed, moderately concave, approximately 0.52 maximum width.
Cervical groove straight, deep, pronounced; branchiocardiaceal groove parallels cervical
groove, also pronounced. Raised epigastric regions forming weak furrow toward front.
Cardiac region slightly vaulted, bearing three tubercles, forming triangular shape.
Hepatic regions well defined; branchial regions moderately defined, large. Carapace
generally smooth where absent of cuticle, showing weak ornamentation near anterior as
transverse row of tubercles behind frontal margin and on epigastric regions. Only dorsal
carapace preserved; appendages and ventral surface not present.

Measurements.--Recorded in mm, in Table 1.

Material examined.--LPBIIIart-053 – LPBIIIart-066.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--Longodromites bicornutus (Mutiu and Bădăluță, 1971) differs from other members in the genus primarily in the nature of the carapace. Longodromites bicornutus is significantly more ovate and does not demonstrate as pronounced a tri-lobed carapace that is common to the others members of the genus. Longodromites excisum (von Meyer, 1857) exhibits a substantially stronger branchiocardiac groove than does Longodromites bicornutus, contributing to the distinction of regions and resulting in the tri-lobed appearance from the intersection with the lateral margins. Longodromites angustus (Reuss, 1858) and Longodromites meyeri (Étallon, 1858) differ by having stronger branchiocardiac grooves resulting in the aforementioned tri-lobed appearance, prominent punctate ornamentation covering the carapace, and smaller W/L ratios. Longodromites bicornutus is unique among the Prosopidae, distinguishing itself by the shape of its orbits. It is the only species to exhibit such deep, circular orbits, thereby permitting confident identification.

The occurrence of Longodromites bicornutus, just southwest of the southern section of the eastern Carpathian Mountains (Mutiu and Bădăluță, 1971) is very similar to that of the Purcăreni locality, also of Tithonian age. Therefore the decapod crustaceans
found in association with *Longodromites bicornutus* as discussed in Mutiu and Bădălăuță (1971) should perhaps be similar to those found at Purcăreni. These include *Longodromites angustus* (Reuss, 1858), *Goniadromites bidentatus* (Reuss, 1858) as *Pithonoton, Pithonoton marginatum* (von Meyer, 1842), *Palaeomunida moesica* (Mutiu and Bădălăuță, 1971) as *Galathea (Palaeomunida), Mesogalathea striata* (Remeș, 1895) as *Galathea (Paragalathea)*, and *Gastrosacus* sp. Thus, three of the four families that are represented at Purcăreni, the Prosopidae, Pithonotidae, and Galatheidae, and two of the same species, *Longodromites bicornutus* and *Pithonoton marginatum*, are found at both sites; the Dynomenidae are known only from Purcăreni. This evidence, coupled with the fact that the non-decapod related material, included in Mutiu and Bădălăuță (1971) embraces sponge spicules, corals, brachiopods, and lamellibranchs, supports the contention that the two units are of similar age and ultimately formed by similar processes.

Measurements of the holotype of *Longodromites bicornutus* were taken from Mutiu and Bădălăuță (1971) and plotted against the measurements of all material collected from Purcăreni (Table 1), as shown in Figure 9. A linear relationship can be observed between the holotype and Purcăreni specimens, supporting the identification as *Longodromites bicornutus*. Interestingly, Figure 9 shows clustering of the specimens: these several clusters are believed to be allometric growth stages within the specimens. Measurements of more individuals will be necessary to confirm this hypothesis.

*Range.*--Tithonian.

*Distribution.*--Romania.
Table 1--Measurements, displayed in mm, of *Longodromites bicornutus* Mutiu and Bădăluta (1971).

<table>
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<tr>
<th>Specimen number</th>
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<th>Fronto-orbital width</th>
<th>Frontal width</th>
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Comparison of measurements of *Longodromites bicornutus*

Figure 9--Measurements of *Longodromites bicornutus* Mutiu and Bădălută, 1971.
Figure 10—*Longodromites bicornutus*. 1, Dorsal carapace with small amount of original cuticle; 2, Anterior view showing orbits and weakly differentiated lateral margins.
Family PITHONOTIDAE Glaessner, 1933

*Included genera.*—*Coelopus* Étallon, 1861; *Eodromites* Patrulius, 1960; *Goniodromites* Reuss, 1858; *Mesodromilites* Woodward, 1900; *Microcorystes* Fritsch, 1893; *Pithonoton* von Meyer, 1842; *Plagiophthalmus* Bell, 1863.

*Diagnosis.*—Carapace subcircular to pentagonal or hexagonal, may be wider than long or longer than wide. Front triangular, straight, downturned. Fronto-orbital margin wide, orbits elongate, with outer-orbital spine. Lateral margins defined, more so anteriorly, losing definition posteriorly, commonly denticulate. Posterior margin narrow and concave. Cervical and branchiocardiac grooves present. Cervical groove may be more pronounced than branchiocardiac groove in some species. Epigastric regions raised, weak to strong, mesogastric region observable. Cardiac region generally distinct, often containing tubercles. Pterygostomial region commonly swollen. Carapace ornamentation smooth to punctate or granulose.

*Discussion.*—The subfamily Pithonotinae originated as a member of the Prosopidae (Glaessner, 1933): Glaessner assigned *Pithonoton, Goniodromites, and Coelopus* to the subfamily, and synonymized *Cycloprosopon* with *Goniodromites*. Later, other species were assigned to the subfamily by original designation, by transfer from another family/subfamily, or by erection of a genus within the Pithonotinae. Extensive analyses and comparison of physical characters of the subfamily Pithonotinae with those of the Prosopinae confirms vast morphological differences between the two. Pithonotinae have a sub-ovate to pentagonally shaped carapace, well-defined lateral margins, a well-
developed cervical groove, a weaker branchiocardiac groove, and elongated orbits, whereas the Prosopinae have a sub-cylindrical to sub-circular carapace, poorly defined lateral margins, a well-developed cervical groove and an even more strongly developed branchiocardiac groove, and slightly elongated to circular orbits. Therefore, the Pithonotinae is established by its independent physical traits and, herein, is elevated to the family level, which makes the Pithonotidae and Prosopidae autonomous families within the superfamily Dromioidea de Haan, 1833 (Appendix 3).

*Range.*--Bajocian to Danian.

*Distribution.*--Europe, North America, Asia, Antarctica.
Genus *Coelopus* Étallon, 1861

*Type species.* --*Coelopus jolyi* Étallon, 1861.

*Included species.* --*Coelopus bigoti* Hée, 1924; *Coelopus ettaloni* Collins and Wierzbowski, 1985; *Coelopus hoheneggeri* (Moericke, 1889) as *Prosopon*; *Coelopus jolyi* Étallon, 1861; *Coelopus pustulosus* (von Meyer, 1860) as *Pithonoton*; *Coelopus tuberculatus* Lörenthey and Beurlen, 1929.

*Diagnosis.* -- Carapace subcircular to ovate, longer than wide. Front narrow, rostrum triangular and downturned. Wide fronto-orbital region; orbits elongate, deep, rimmed, entire. Lateral margins weak, most strongly defined immediately behind orbits. Cervical and branchiocardiac grooves deep, parallel, typically constricted. Mesogastric and cardiac regions distinguishable. Cuticle ornamentation finely punctate to weakly granulose.

*Coelopus hoheneggeri* (Moericke, 1889)

Figure 12

*Prosopon hoheneggeri* Moericke, 1889, p. 65, fig. 18; Blaschke, 1911, p. 186.


*Diagnosis.* -- Carapace ovoid, longer than wide, W/L ratio 0.93. Widest just behind
branchiocardiac groove, one-half the distance from frontal margin. Carapace exhibits stronger transverse convexity posteriorly than anteriorly. Frontal width small, 0.13 of maximum width. Fronto-orbital distance large, 0.79 of maximum width, concave, orbits elongate, deep, weakly rimmed, entire. Orbit terminates in one sharp outer-orbital spine. Anterolateral margin defined, entire, marked only by weak furrows at intersections of cervical and branchiocardiac grooves. Posterolateral margin weak, undefined, smooth. Posterior margin 0.45 of total width, weakly rimmed. Cervical groove deeper than branchiocardiac groove. Distance between cervical and branchiocardiac grooves small, only 0.5 mm equal to 0.12 of total length. Epigastric regions very weakly distinct, mesogastric region raised, narrow anteriorly, widening posteriorly, forming very weak furrow between orbits. Urogastric regions, between cervical and branchiocardiac grooves, narrow and swollen, cardiac region vaulted with three tubercles positioned in equilateral triangle, with apex in posterior direction. Carapace displays very fine punctation, entire. Only dorsal carapace preserved; evidence of appendages and ventral surface not recorded.

Measurements.--Recorded in mm in Table 2.

Material examined.--LPBIIIart-067 – LPBIIIart-069.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--Coelopus hoheneggeri has a very distinct relationship between the cervical and branchiocardiac grooves, which is primarily how it is distinguished from other
species. This feature differentiates *Coelopus hoheneggeri* from *Coelopus bigoti* (Hée, 1924). The development of the cervical groove in *Coelopus bigoti* is more pronounced and highly curved while the branchiocardiac groove is less strongly expressed and lies at varying lengths from the cervical groove. *Coelopus hoheneggeri* has grooves that are very compressed and perfectly parallel to one another. *Coelopus ettaloni* (Collins and Wierzbowski, 1985) drastically differs by possessing an extremely low W/L ratio, about 0.5, while W/L is 0.93 in *Coelopus hoheneggeri*. Also, *Coelopus ettaloni* has a broad separation between the cervical and branchiocardiac grooves, which are at varying lengths from each other. *Coelopus jolyi* (Étallon, 1861) possesses large, dispersed, pustulose ornamentation on the dorsal carapace, while *Coelopus hoheneggeri* has very fine, tightly spaced punctae. *Coelopus pustulosus* (von Meyer, 1860) has a significantly smaller W/L ratio than does *Coelopus hoheneggeri*. It also has a more strongly convex carapace and four tubercles within the cardiac region while *Coelopus hoheneggeri* has only three. *Coelopus tuberculatus* (Lörenthey and Beurlen, 1929) is covered, as its name suggests, by large tubercles. It also has very pronounced outer-orbital spines and has a greater distance between the cervical and branchiocardiac grooves.

Comparative measurements of the holotype of *Coelopus hoheneggeri*, extracted from Moericke (1889), were plotted against the specimens collected at Purcăreni. The results of these plots are reflected in a scatterplot graph (Figure 11). Only two specimens of *Coelopus hoheneggeri* were collected, it is difficult to determine why this is so, it may possibly be a result of its fantastically small size, and our failure to observe it, or true
limited numbers due to environmental parameters. At any rate, comparing the measurements of recorded specimens of *Coelopus hoheneggeri* lends support to the identification. The holotype material is in very close agreement to the Purcăreni samples, indicating that they are the same species. When plotted against other species within the genus, a dramatic offset is revealed between *Coelopus hoheneggeri* and the other specific members.

*Coelopus hoheneggeri* has been reported in previous literature to have occurred in association with the following crabs: *Eodromites grande* (von Meyer, 1857), *Pithonoton marginatum* (von Meyer, 1842), *Cycloprosopon reussi* (Gemmellaro, 1869), *Oxythyreus gibbus* (Reuss, 1858), New genus *etteloni* Gemmellaro, 1869), and *Eomunidopsis navarrensis* (Van Straelen, 1940) (Moericke, 1889; Blaschke, 1911). These are only a few of the associated decapod Crustacea that have been found together at Purcăreni. There are many other crabs accompanying *Coelopus hoheneggeri* at similar localities that have been recorded including: *Eomunidopsis meyeri* (Moericke, 1889), *Paragalathea verrucosa* (Moericke, 1889), *Cyphonotus oxythyreiformis* (Gemmellaro, 1869), *Lecythocaris paradoxum* (von Meyer, 1858), *Prosopon longum* (Moericke, 1889), *Prosopon verrucosum* (Reuss, 1858), *Nodoprosopon ornatum* (von Meyer, 1857), *Nodoprosopon mirum* (Moericke, 1889), *Nodoprosopon ovale* (Moericke, 1889), *Nodoprosopon fraasi* (Moericke, 1889), *Longodromites angustus* (Reuss, 1858), *Longodromites meyeri* (Étallon, 1858), *Coelopus pustulosus* (von Meyer, 1860), *Cycloprosopon latum* (Moericke, 1889), *Cycloprosopon complanatiforme* (Moericke,
1889), *Goniodromites bidentatus* (Reuss, 1858), and *Goniodromites polyodon* (Reuss, 1858) from reports in (Moericke, 1889; Blaschke, 1911; Van Straelen, 1925; Glaessner, 1933; Müller, Krobicki, and Wehner 2000). Many other taxa were also found in association with *Coelopus hoheneggeri* including brachiopods (*Terebratula moravica* Glocker, *Zeilleria lugubris* Suess, and *Terebratulina latirostris* Suess), gastropods (*Neridomus spadae* Gemmellaro and *Phanaeroptyxis staszicyi* Zeusch), and pachyodont bivalves which are represented by the genera *Diceras* and *Plesiodiceras*.

*Range.*—Tithonian.

*Distribution.*—Czech Republic, Romania.
Table 2--Measurements, in mm, of *Coelopus hoheneggeri* (Moericke, 1889).

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Figure 11--Measurements of *Coelopus hoheneggeri* (Moericke, 1889).
Figure 12--Coelopus hoheneggeri. 1,2, Dorsal carapace showing cervical and branchiocardiac grooves and outer orbital spine; 3, Anterior view showing orbits and weak lateral margins; 4, Posterior view displaying inflated cardiac region and branchial lobes.
Genus *Eodromites* Patrulius, 1960

*Type species.*—*Prosopon grande* von Meyer, 1857.

*Included species.*—*Eodromites grande* (von Meyer, 1857) as *Prosopon*.

*Diagnosis.*—Large size for family, equidimensional carapace or length slightly greater than width. Maximum width at front, just behind orbits. Specimen tapers posteriorly to narrow, concave posterior margin. Front bilobed with strongly vaulted epigastric regions. Orbits with small outer-orbital spine. Lateral margins smooth. Cardiac region pentagonal, bearing 3 small nodes, forming equilateral triangle with apex directed posteriorly. Pterygostomial region distinct, swollen. Carapace surface smooth or faintly punctate.

*Eodromites grande* (von Meyer, 1857)

Figure 14

*Prosopon grande* von Meyer, 1857, p. 202, fig. 10-13; Moericke, 1889, p. 67, fig. 21; Remeš, 1895, p. 203, fig. 12., p. 203; Woodward, 1907, p. 79; Blaschke, 1911, p. 186; Beurlen, 1925, p. 469.


*Diagnosis.*—Carapace hexagonal, as wide as long, equidimensional, 18.7 mm. Widest
0.3 distance from frontal margin, beyond orbit. Carapace strongly convex longitudinally, less so transversely. Frontal width small, 1.3 mm of maximum width, 18.7 mm, well-rimmed, entire. Fronto-orbital distance 0.75 maximum width, weakly bilobed, projecting forward and strongly downturned. Orbits elongate, shallow, rimmed, entire, smooth, with small outer-orbital spine. Anterolateral margin well-defined, smooth, reaching branchiocardiac groove, posterolateral margin losing definition, smooth. Posterior margin short, highly concave, approximately 0.33 total width. Cervical and branchiocardiac grooves shallow, cervical groove more pronounced. Epigastric regions highly vaulted, mesogastric region only slightly raised. Cardiac region pentagonal, containing three small nodes, equilaterally positioned with apex directed posteriorly. Pterygostomial region strongly inflated, metabranchial and branchial regions weak. Cuticle exhibits extremely fine punctation, nearly smooth. Only dorsal carapace preserved; no evidence of articulated appendages or ventral portion.

Discussion.—Eodromites grande was originally named Prosopon grande (von Meyer, 1860) during a time when a wide variety of prosopid, pithonotid, and dynomenid crabs were assigned to Prosopon, in spite of exhibiting a very wide array of morphologic characteristics. Patrulius (1960, 1966) recognized the unique characters demonstrated by Prosopon grande and referred it to a new genus, Eodromites. Thus, Prosopon grande is fully removed from the Prosopidae and referred to the Pithonotidae. It is the only species thus far recorded for the genus.

All previously recorded measurements known to exist for Eodromites grande
have been collected and plotted in graph form, along with measurements taken from the material collected at Purcăreni. Specimens extracted from the Purcăreni locality plot perfectly in the middle of the linear trend of values (Figure 13). This graph not only supports placement in the species, but also documents a strong relationship in size ranges within the species, displaying possible growth stages.

Crabs associated with this species at Purcăreni include *Pithonoton marginatum* (von Meyer, 1842), *Cycloprosopon reussi* (Gemmellaro, 1869), *Eomunidopsis eutecta* (Moericke, 1889), *Coelopus hoheneggeri* (Moericke, 1889), and *Oxythyreus gibbus* (Reuss, 1858). Other decapod Crustacea found along with *Eodromites grande*, as taken from the literature, are *Eomunidopsis meyeri* (Moericke, 1889), *Paragalathea verrucosa* (Moericke, 1889), *Cyphonotus oxythyreiformis* (Gemmellaro, 1869), *Lecythocaris paradoxum* (von Meyer, 1858), *Prosopon longum* (Moericke, 1889), *Prosopon verrucosum* (Reuss, 1858), *Nodoprosopon ornatum* (von Meyer, 1857), *Nodoprosopon mirum* (Moericke, 1889), *Nodoprosopon ovale* (Moericke, 1889), *Nodoprosopon fraasi* (Moericke, 1889), *Longodromites angustus* (Reuss, 1858), *Longodromites meyeri* (Étallon, 1858), *Coelopus pustulosus* (von Meyer, 1860), *Cycloprosopon latum* (Moericke, 1889), *Cycloprosopon complanatiforme* (Moericke, 1889), *Goniodromites bidentatus* (Reuss, 1858), and *Goniodromites polyodon* (Reuss, 1858) (Von Meyer, 1860; Moericke, 1889; Woodward, 1907; Blaschke, 1911; Van Straelen, 1925; Beurlen, 1929; Bachmayer, 1947; Withers, 1951; Patrulius, 1966). Very little has been recorded about the occurrence of these species with *Eodromites grande*, and there has been no
documentation of any other associated fauna. *Eodromites grande* was a widespread species, as documented below.

*Measurements.*--Measurements taken from *Eodromites grande* are; maximum carapace length = 18.7 mm; maximum carapace width = 18.7 mm; front to maximum width length = 6.6 mm; front to cervical groove length = 11.2 mm; frontal width = 1.3 mm; fronto-orbital width = 14.2 mm; posterior width = 5.6 mm.

*Material examined.*--LPBIIIart-070.

*Occurrence.*--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

*Range.*--Tithonian.

*Distribution.*--Germany, Czech Republic, Poland, Sicily, England, Romania.
Figure 13--Comparative measurements of *Eodromites grande* (von Meyer, 1857).
Figure 14--Eodromites grande. 1, Dorsal carapace with small amount of original cuticle; 2, Anterior view showing orbits and defined anterolateral margins; 3, Posterior view exhibiting loss of definition on posterolateral margins, and narrow, concave posterior margin.
Genus *Goniodromites* Reuss, 1858

*Type species.*--*Goniodromites bidentatus* Reuss, 1858.

*Included species.*--*Goniodromites bidentatus* Reuss, 1858; *Goniodromites bourgeati* Van Straelen, 1925; *Goniodromites complanatus* Reuss, 1858; *Goniodromites dentatus* Lörenthey and Beurlen, 1929; *Goniodromites gibbosum* (Étallon, 1857) as *Prosopon* (Pithonoton); *Goniodromites globosum* (Remeš, 1895), as *Prosopon*; *Goniodromites incisus* Van Straelen, 1925; *Goniodromites laevis* (Van Straelen, 1940) as *Iberihomola*; *Goniodromites polyodon* Reuss, 1858; *Goniodromites revili* Van Straelen, 1925; *Goniodromites scarabaeus* Wright and Wright, 1950; *Goniodromites serratus* Beurlen, 1929; *Goniodromites* sp. Forms A-C in Feldmann, Lazăr, and Schweitzer, in press.

*Diagnosis.*--Carapace subcircular to pentagonal or hexagonal, width/length ratio, 85 to 105 percent, maximum width at intersection of cervical groove with lateral margin or at outer-orbital spine (Feldmann, Lazăr, and Schweitzer, in press). Front wide, bilobed, orbital margin may be serrate. Lateral margin defined, more so anteriorly, losing definition posteriorly, dentate. Posterior margin rimmed, wide, concave. Cervical and branchiocardiac grooves pronounced, variably incised. Epigastric regions swollen and spherical. Mesogastric region distended from epigastric region to cervical groove. Cardiac region distinct, may contain several small tubercles, branchiocardiac groove and cardiac region define branchial regions. Carapace sculpture forming random punctuation anteriorly, transitioning to aligned or rowed punctuation posteriorly.

*Discussion.*--This genus has recently undergone extensive revision and description in Feldmann, Lazăr, and Schweitzer (in press).
*Goniodromites* n. sp.

**Figure 15**

*Diagnosis.*--Carapace hexagonal, wider than long, W/L ratio approximately 1.04. Widest 0.25 distance from frontal margin. Carapace more convex transversely than longitudinally. Front narrow, weakly bilobed, convex forward with strong furrow between orbits. Fronto-orbital width great, orbits elongate, shallow, rimmed, entire, with outer-orbital spine; margin of orbit sinuous. Anterolateral margin strong, bearing five small, blunt spines decreasing in size posteriorly. First spine located behind outer-orbital spine in advance of intersection of cervical groove with lateral margin; spines two, three, and four between cervical and branchiocardiac grooves, fifth spine posterior to branchiocardiac groove. Posterolateral margin undefined. Posterior margin wide, strongly rimmed, weakly convex, approximately 0.50 maximum width. Cervical and branchiocardiac grooves present and deep, cervical groove more prominent. Epigastric regions raised, mesogastric region well-defined, narrowly swollen anteriorly, broadening posteriorly. Cardiac region triangular, with three small nodes. Branchial regions defined by boundaries of branchiocardiac groove and cardiac region. Carapace exhibits both fine punctuation and large nodes anteriorly, grading to weak transversely aligned ornamentation posteriorly. Only dorsal carapace preserved; appendages and ventral surface not present.

*Measurements.*--Recorded in mm, Table 3.

*Material examined.*--LPBIllart-071 – LPBIllart-075.
Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38′ 14.5″ and E 25° 48′ 14.7″.

Discussion.--*Goniodromites* n. sp. cannot be confused with *Goniodromites bidentatus* (Reuss, 1858) because the former lacks the saw tooth feature along the orbital margin and possesses four spines along the anterolateral margin. Measurements taken from *Goniodromites* n. sp. differ significantly along the frontal and posterior margins from those of *Goniodromites bidentatus*. *Goniodromites* n. sp. differs from *Goniodromites serratus* (Beurlen, 1929) by the new species having a distinctly hexagonal carapace, only three spines between the cervical and branchiocardiac groove, and lacking sharp protuberances behind the branchiocardiac groove. *Goniodromites* n. sp. also lacks the flat, wide medial groove extending to the posterior margin and the very prominent bottle-shaped mesogastric region that defines *Goniodromites serratus* (translations in Feldmann, Lazăr, and Schweitzer, in press). *Goniodromites* n. sp. distinctly differs from *Goniodromites* sp. Form A (Feldmann, Lazăr, and Schweitzer, in press) by having a width greater than length, possessing a smaller frontal ratio, having three additional spines along the lateral margin, and lacking the lateral grooves located in the cardiac region of Form A. *Goniodromites* sp. Form B (Feldmann, Lazăr, and Schweitzer, in press) is longer than wide, has a wider front, and lacks lateral spines. *Goniodromites* n. sp. differs from Form C (Feldmann, Lazăr, and Schweitzer, in press) in that Form C has a larger frontal/maximum width ratio, a saw-toothed orbital margin, and lacks lateral spines. *Goniodromites polyodon* (Reuss, 1858) differs significantly in frontal
width/maximum width ratios as well as being longer than wide and possessing saw-toothed structure on the frontal margin that *Goniodromites* n. sp. lacks. *Goniodromites dentatus* (Lörenthey and Beurlen, 1929) has two prominent spines anterior to the cervical groove and minimally two between the cervical and branchiocardiac grooves. *Goniodromites* n. sp. also has a strong outer-orbital spine and only one smaller spine anterior to the cervical groove with three spines between the cervical and branchiocardiac grooves, with each spine decreasing in size posteriorly, which *Goniodromites polyodon* does not exhibit. *Goniodromites scarabaeus* (Wright and Wright, 1950) is longer than wide, pentagonal, and possesses a wide but short urogastric lobe. *Goniodromites laevis* (Van Straelen, 1940) differs from *Goniodromites* n. sp. by being significantly longer than wide, lacking spines on the lateral margin, and possessing comparatively weak cervical and branchiocardiac grooves. *Goniodromites globosum* (Remeš, 1895) contrasts from *Goniodromites* n. sp. in the former possessing five tubercles distributed along the frontal margin, having a width slightly less than that of the length, and bearing no spination along the lateral margin. *Goniodromites* n. sp. differs from *Goniodromites gibbosum* (Éttalon, 1857) in that the frontal margin is smooth, not bearing the five small spines that *Goniodromites gibbosum* possesses, and having a lower W/L ratio. *Goniodromites complanatus* varies immensely from *Goniodromites* n. sp. in the overall outline of the carapace; in the former, the orbits are not as elongated and the posterolateral margins barely taper resulting in a sub-square appearance. *Goniodromites complanatus* further is distinguished by having smooth margins and large tubercles on the carapace.
*Goniodromites incisus* (Van Straelen, 1925) has a lower W/L ratio, only two tubercles in the cardiac region, and smooth lateral margins. *Goniodromites* n. sp. has a hexagonal carapace shape, in contrast to the sub-rectangular shape possessed by *Goniodromites revili* (Van Straelen, 1925), and also *Goniodromites* n. sp. differs by containing three tubercles in the cardiac region, instead of two, and by having a bifid front.

*Goniodromites* n. sp. has been found only at the Purcăreni locality; therefore, it is associationed only with the included decapod crustaceans and fauna described herein.

*Range.*--Tithonian.

*Distribution.*--Romania.
Table 3--Measurements, in mm, of *Goniodromites* n. sp.

<table>
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<th>Specimen number</th>
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<td>14.0</td>
<td>13.7</td>
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</table>
Figure 15--*Goniodromites* n. sp. 1, Dorsal carapace; 2, Anterior view showing orbits and defined denticulate anterolateral margins; 3, Posterior view exhibiting absence of definition on posterolateral margins, and wide, concave posterior margin.
Genus *Pithonoton* von Meyer, 1842

*Type species.*--*Prosopon marginatum* von Meyer, 1842.

*Included species.*--*Pithonoton aequilatum* (von Meyer, 1857) as *Prosopon; Pithonoton bouvieri* Van Straelen, 1944; *Pithonoton campichei* (Tribolet, 1874) as *Prosopon; Pithonoton cenomanese* Wright and Collins, 1972; *Pithonoton depressum* (von Meyer, 1857) as *Prosopon; Pithonoton elongatum* (von Meyer, 1857) as *Prosopon; Pithonoton hungaricum* Lőrenthey and Beurlen, 1929; *Pithonoton hypocrita* Étallon, 1861; *Pithonoton inflatum* Collins et al., 1993; *Pithonoton insigne* (von Meyer, 1857) as *Prosopon; Pithonoton katholickyi* (Remeš, 1895) as *Nodoprosopon; Pithonoton laevimarginatum* Lőrenthey and Beurlen, 1929; *Pithonoton lingulatum* (von Meyer, 1858) as *Prosopon; Pithonoton marginatum* (von Meyer, 1842) as *Prosopon; Pithonoton moutieri* (Hée, 1924) as *Prosopon; Pithonoton nitidus* (A. Milne-Edwards, 1865) as *Ogydromites; Pithonoton obtusum* (von Meyer, 1857) as *Prosopon; Pithonoton planum* Van Straelen, 1936; *Pithonoton polyphemi* (Gemmellaro, 1869) as *Prosopon; Pithonoton quadratum* (Éttalon, 1858) as *Prosopon; Pithonoton renevieri* (Tribolet, 1876) as *Prosopon; Pithonoton richardsoni* (Woodward, 1907) as *Prosopon; Pithonoton rostratum* (von Meyer, 1840) as *Prosopon; Pithonoton rusticum* Patrulius, 1966; *Pithonoton serratum* (Beurlen, 1929) as *Prosopon; Pithonoton simplex* (von Meyer, 1837) as *Prosopon; Pithonoton sp. in Donovan, 1962; Pithonoton sp. in Wright and Collins, 1972; *Pithonoton sp. in Feldmann et al., in press; Pithonoton sp. in Ruiz de Gaona, 1943.
Diagnosis.--Carapace longer than wide, 75-85 percent maximum width, widest just anterior to intersection of cervical groove with lateral margin, or immediately behind, narrowing posteriorly or maintaining rectangular shape. Carapace convex transversely and longitudinally. Front narrow, bifid, not strongly projecting. Fronto-orbital region wide, orbits elongate, slightly concave, with outer-orbital spine; some with convex orbits that lack outer orbital spine. Lateral margins weak to well-developed. Posterior margin moderately wide, concave. Cervical and branchiocardiac grooves present and equally strong or cervical groove more pronounced, post-cervical groove short and deep. Epigastric regions weakly elevated, mesogastric region swollen, narrow anteriorly, broadening posteriorly to cervical groove. Cardiac region prominent, possessing tubercles, bounded by branchiocardiac groove. Ornamentation on carapace smooth to granular.

Discussion.--A brief synopsis of the genus *Pithonoton* has recently been provided in Feldmann et al. (in press), in which they focused on type material and the original description by von Meyer, 1842.

*Pithonoton marginatum* (von Meyer, 1842)

![Figure 16](image)

*Prosopon (Pithonoton) marginatum* von Meyer, 1842, p. 70, pl. 15, fig. 3;

*Prosopon marginatum* (von Meyer, 1842). von Meyer, 1860, p. 198, pl. 23, fig. 8-9;
Gemmellaro, 1869, p. 11, fig. 48-49; Moericke, 1889, p. 64, fig. 22; Remeš, 1895, p.
202, fig. 13; Remeš, 1905, p. 35; Woodward, 1907, p. 79; Blaschke, 1911, p. 186; Hée, 1924, p. 146; Beurlen, 1925, p. 473.

*Prosopon rostratum* (von Meyer, 1842). Quenstedt, 1858, pl. 95, fig. 42.


*Coelopus tuberculatus* (von Meyer, 1842). Lőrenthey and Beurlen, 1929, p. 94, fig. 1; Glaessner, 1929, p. 123; Glaessner, 1933, p. 181.

*Pithonoton marginatum* (von Meyer, 1842). Reuss, 1859, p. 78; Van Straelen, 1925, p. 393, fig. 167; Glaessner, 1929, p. 322; Lőrenthey and Beurlen, 1929, p. 84, fig. 8; Beurlen, 1929, p. 126; Glaessner, 1933, p. 180; Bachmayer, 1947, p. 40; Withers, 1951, p. 175, fig. 4-6; Patrulius, 1960, p. 253; Houša, 1963, p. 106, fig. 4; Bachmayer, 1964, p. 131; Patrulius, 1966, p. 510, fig. 15-16; Bachmayer, 1969, p. 121, fig. 148; Mutiu and Băduătă, 1970, p. 453, fig. 8; Förster, 1979, p. 25, fig. 5C-6B; Morris, 1980, p. 14; Götzner, 1981, p. 416, fig. 417; Wehner, 1988, p. 79, fig. 23; Collins and Karasawa, 1993, p. 17; Collins, Kanie, and Karasawa, 1993, p. 295; Müller, Krobicki, and Wehner, 2000, p. 54, fig. 12; Garassino, De Angeli, and Schweigert, 2005, p. 71, fig. 2-3; Feldmann, et al., in press.

*Diagnosis.*--Carapace subovate, longer than wide, W/L ratio 0.84, convex transversely and longitudinally, most strongly convex anteriorly. Front 0.16 maximum width, very short and downturned. Fronto-orbital margin wide, 0.91 maximum width. Orbits elongate, shallow, with sinuous, rimmed margins, terminating in weak outer-orbital
spine. Lateral margins weakly defined, without spines. Posterior margin half of maximum width, 0.44, strongly rimmed. Cervical and branchiocardiacoCardiac groove deeper, intersects the lateral margin deeply, postcervical groove appears as two short axially transverse indentations. Epigastric regions slightly swollen, mesogastric region narrows anteriorly, broadening posteriorly to cervical groove, raised. Cardiac region triangular, covered in poorly preserved cuticle concealing any evidence of tubercles. Hepatic regions weakly discernible, most apparent just behind orbit, pterygostomial region weakly inflated. Branchial regions delimited by branchiocardiacoCardiac groove from cardiac region. Ornamentation on carapace granulose, as evident on small patches of original cuticle. Only dorsal carapace preserved; appendages and ventral surface not present.

**Measurements.**--Measurements taken from *Pithonoton marginatum*; maximum carapace length = 12.3 mm; maximum carapace width = 10.3 mm; front to maximum width length = 4.8 mm; front to cervical groove length = 5.7 mm; frontal width = 1.7 mm; fronto-orbital width = 9.4 mm; posterior width = 4.6 mm.

**Material examined.**--LPBIIIart-076.

**Occurrence.**--The specimen was collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

**Discussion.**--Presently, within the genus *Pithonoton*, there are 30 acknowledged species. This number has varied immensely over time, as discussed in Feldmann et al. (in press), where the authors have provided a list of 25 species considered as members of
**Pithonoton.** A detailed review of the literature confirms 23 of these species are the same as the suggested 30 in this paper. The other two, *Pithonoton angustus* and *Pithonoton meyeri*, have been moved to the genus *Longodromites*, and the remaining four are unidentified species of *Pithonoton*, as listed by several authors (refer to Appendix 3).

*Pithonoton marginatum* is the type species of the genus *Pithonoton* and is distinguished as a unique species within this relatively speciose genus by its very distinct morphologic features. Only the species that may be confused with *Pithonoton marginatum* are discussed below; all others species within *Pithonoton* are readily distinct. *Pithonoton marginatum* differs from *Pithonoton aequilatum* (von Meyer, 1857) by having weaker hepatic and branchial regions. The dorsal carapace of the former tapers posteriorly; it does not in *Pithonoton aequilatum*. *Pithonoton elongatum* (von Meyer, 1857) differs from *Pithonoton marginatum* by having a more distinct mesogastric region, a less distinct cardiac region, and very weak post-cervical grooves. *Pithonoton insigne* (von Meyer, 1857) displays a lower W/L ratio than does *Pithonoton marginatum*, and also *Pithonoton insigne* has no outer-orbital spine but displays deep axial mesogastric grooves.

*Pithonoton laevimarginatum* (Lörenthey and Beurlen, 1929) has a better defined lateral margin, a deeper branchiocardiac groove, and pentagonal a cardiac region, whereas *Pithonoton marginatum* has a triangular cardiac region. *Pithonoton nitidus* (A. Milne-Edwards, 1865) differs by its great width and lack of a distinct cardiac region.

*Pithonoton polyphemi* (Gemmellaro, 1869) differs by having a distinctly wide carapace; it is as wide as long. *Pithonoton marginatum* cannot be confused with *Pithonoton*
Richardsoni (Woodward, 1907) because the latter has a very elongate carapace and pentagonal cardiac region with four tubercles. *Pithonoton rusticum* (Patrulius, 1966) is very similar to *Pithonoton marginatum* except for having a less convex front, less profound grooves and a cardiac region. *Pithonoton serratum* (Beurlen, 1929), just as the name suggests, differs from *Pithonoton marginatum* by having serrated lateral margins between the cervical and branchiocardiac grooves.

*Pithonoton marginatum* was a wide ranging species, compared to the others discussed in this paper. It also had a longer geologic range. These factors contribute in making *Pithonoton marginatum* the most commonly associated taxon identified from this assemblage.

*Range.*--Middle Jurassic (Aalenian) to Upper Cretaceous.

*Distribution.*--Sicily, England, Poland, Germany, Czech Republic, Japan, Romania.
Figure 16--*Pithonoton marginatum*. Dorsal carapace showing typical features of the species.
Family DYNOMENIDAE Ortmann, 1892

Included genera.--*Acanthodromia* A. Milne-Edwards, 1880; *Cyamocarcinus* Bittner, 1883; *Cycloprosopon* Lőrenthey and Beurlen, 1929; *Cyclothyreus* Remeš, 1895; *Cyphonotus* Bell, 1863; *Diaulax* Bell, 1863; *Dromiopsis* Reuss, 1859; *Dynomene* Desmarest, 1823; *Gemmellarocarcinus* Checchia-Rispoli, 1905; *Glyptodynomene* Van Straelen, 1944; *Graptocarcinus* Roemer, 1887; *Hirsutodynomene* McLay, 1999; *Maxillothrax* Stebbing, 1921; *Metadynomene* McLay, 1999; *Oxythyreus* Reuss, 1858; *Paradynomene* Sakai, 1963; N. gen. *ettaloni*, this paper.

Diagnosis.--Carapace typically wider than long, rarely longer than wide, W/L ratio 0.9 to 1.4. Frontal margin smooth, triangular, downturned. Lateral margin well-defined, typically dentate or lobulate. Cervical groove always present, branchiocardiac groove absent or weaker than cervical groove. Epigastric, mesogastric, and cardiac regions weakly defined or indistinct. Carapace structure smooth to finely granulose, may bear tubercles.

Discussion.--Among the Dynomenidae, three genera, *Cycloprosopon*, *Oxythyreus*, and a new genus, are of particular interest because they pose problems of placement. *Cycloprosopon* and *Oxythyreus* have been the cause of taxonomic confusion in the past but were found to possess morphologic features linking them with this family (Patrulius, 1966). Therefore, the two genera are assigned to the Dynomenidae. A new genus has been erected to encompass the peculiar species *Goniodromites ettaloni*. This species has been assigned to several families and genera quite often in the literature. Herein, the new
genus and species is placed within the Dynomenidae. All other genera within the Dynomenidae, as discussed in this paper, *Cyclothyreus*, *Cyphonotus*, and *Dynomene*, have been firmly placed within this family since their original designation (Appendix 4).

The Dynomenidae are the most diverse group collected at the Purcăreni, Romania locality, and dominated both the number of species within the family and the number of individuals within species (Figures 14 and 15, respectively). The implications of this abundance is discussed in *Paleocological Settings* below.
N. gen., this paper

_Type species._--*Prosopon ettaloni* Gemmellaro, 1869.

*Included species._--New genus _ettaloni_ (Gemmellaro, 1869).

_Diagnosis._--Carapace octagonal, wider than long, strongly convex anteriorly. Front, including orbits, large and slightly projecting. Lateral margins well defined, dentate. Cervical groove present, branchiocardiac groove absent. Regions poorly defined or not distinguishable.

_Discussion._--A brief synopsis follows of the transitions that have occurred to this species. *Prosopon ettaloni* Gemmellaro, 1869, was subsequently considered a subgenus of *Prosopon* as *Prosopon (Goniodromites) ettaloni* by Van Straelen (1925). Eight years later, Glaessner (1933) elevated *Goniodromites* to the generic level. Later, Patrulius (1966) reassigned the species to *Pithonoton*, and subsequently Feldmann et al. (in press) placed this species within *Goniodromites*. This species has unusual traits, as described below, which are unlike those of *Prosopon, Pithonoton, Goniodromites*, or any of the other genera within the families Prosopidae, Pithonotidae, and Dynomenidae. Although the species cannot be referred to any genus within the Dynomenidae, it does share important morphological characteristics that define the family, such as well-defined, dentate, lateral margins; poorly defined regions; and a weak or obscure branchiocardiac groove. Therefore, this species forms the framework for a new genus placed within the family Dynomenidae.
New genus *ettaloni* (Gemmellaro, 1869) new combination

**Figure 18**

*Prosopon ettaloni* Gemmellaro, 1869, p. 12, fig. 50-51.


*Pithonoton (Goniodromites) ettaloni* (Gemmellaro, 1869).  Van Straelen, 1925, p. 355.

*Pithonoton ettaloni* (Gemmellaro, 1869).  Murgeanu, Patrulius, and Contescu, 1959, p. 16;

Patrulius, 1960, p. 250, fig. 1; Patrulius, 1966, p. 513, fig. 21-24.

*Goniodromites ettaloni* (Gemmellaro, 1869).  Glaessner, 1933, p. 181; Feldmann et al., in press.

**Diagnosis.**—Carapace octagonal, wider than long, W/L ratio approximately 1.17. Widest about 0.50 distance from frontal margin, immediately behind cervical groove. Carapace strongly convex anteriorly, particularly from mesogastric region to front, posterior region less convex. Front 0.20 total width, weakly bilobed, relatively straight. Fronto-orbital distance 0.91 maximum width, projects slightly forward. Orbits elongate, broad, moderately deep. Orbital margin denticulate, bearing several very small spines; single, large outer orbital spine. Anterolateral margin well defined, minimum of three spines, posterolateral margin loses definition, becomes smooth to posterior margin. Posterior margin 0.33 maximum width, weakly rimmed, slightly concave. Cervical groove well defined, less obvious in specimens maintaining original cuticle, branchiocardiaca groove absent, marked only by small, faint furrows on lateral margins.
Regions very poorly defined, very weakly raised epigastric regions, transected by short, subtle furrow. Cuticle very finely porous, where delaminated appears smooth. Dorsal carapace only preserved; evidence of appendages or ventral portion not recorded.

*Measurements.*--Recorded in mm, given in Table 4.

*Material examined.*--LPBIIIart-077 – LPBIIIart-086.

*Occurrence.*--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

*Discussion.*--As discussed above, this species cannot be assigned to any known genus and, therefore, forms the basis for definition of a new genus.

Specimens of New genus *ettaloni* have been collected from Sicily, in the area of Villabate and Milmeri, but recorded literature makes no mention of associated taxa other than decapods or sediment types. However, Gemmellaro (1869) described from the same locality at Villabate and Milmeri, decapod Crustacea *Pithonoton marginatum*, *Cycloprosopon reussi*, *Cycloprosopon tithonium* (Lörenthey and Beurlen, 1929), *Cyphonotus oxythyreiformis* (Gemmellaro, 1869), *Pithonoton polyphemi* (Gemmellaro, 1869), *Oxythyreus gibbus*, *Nodoprosopon fraasi* (Moericke, 1889), *Coelopus hoheneggeri*, *Longodromites angustus* (Reus, 1858), and *Goniodromites bidentatus* (Reuss, 1858) in (Gemmellaro, 1869; Van Straelen, 1925; Patrulius, 1960; Patrulius, 1966; Collins and Wierzbowski, 1985). Four of these species are also found at Purcăreni, showing a strong similarity in the crab taxa association. Associated fauna that has been recorded with New genus *ettaloni* at Purcăreni are brachiopods *(Terebratula moravica*

For comparative purposes, holotype measurements extracted from Gemmellaro’s (1869) original description were plotted against other published measurements for New genus *ettaloni* from Patrulius (1966). These results were then plotted against all measurable specimens from Purcăreni, yielding a very strong linear relationship between the recordings (Figure 17). Figure 17 shows that New genus *ettaloni* from Purcăreni is conspecific with *Prosopon ettaloni* (Gemmellaro, 1869) and *Goniodromites ettaloni* (Patrulius, 1966).

*Range.*--Jurassic (Oxfordian to Tithonian).

*Distribution.*--Sicily, Poland, Romania.
Table 4—Measurements, in mm, of New genus *ettaloni* (Gemmellaro, 1869).

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Figure 17--Comparative measurements of New genus *ettaloni* (Gemmellaro, 1869).
Figure 18--New genus *ettaloni*. 1, Image of dorsal carapace bearing badly preserved cuticle; 2, Dorsal carapace of second specimen, revealing cervical groove and evidence of branchiocardiac groove along posterolateral margins.
Genus *Cycloprosopon* Lőrenthey and Beurlen, 1929

*Type Species.*--Cycloprosopon typicum* Lőrenthey and Beurlen, 1929.

*Included Species.*--Cycloprosopon complanatiforme* (Moericke, 1889) as *Prosopon*; *Cycloprosopon n.* sp. Feldmann et al., in press; *Cycloprosopon latum* (Moericke, 1889) as *Prosopon*; *Cycloprosopon reussi* (Gemmellaro, 1869) as *Prosopon*; *Cycloprosopon rotundum* (Beurlen, 1925) as *Prosopon*; *Cycloprosopon tithonium* (Gemmellaro, 1869) as *Prosopon*; *Cycloprosopon typicum* Lőrenthey and Beurlen, 1929.

*Diagnosis.*--Carapace subcircular to ovate, wider than long. Strongly downturned, bifid front. Orbits elongate and rimmed, joining smooth lateral margins, without outer orbital spine. Lateral and posterior margins distinct. Cervical groove well-defined, may be best defined laterally, branchiocardiac groove weak or absent. Post-cervical groove strong, small, and axially positioned, if present. Epigastric regions weakly raised, all other regions indistinct. Carapace ornamentation smooth to finely pustulose.

*Discussion.*--*Cycloprosopon* has recently been reviewed and revised by Feldmann et al. (in press). They concluded that *Cycloprosopon complanatiforme* (Moericke, 1889), *Cycloprosopon n.* sp., *Cycloprosopon latum* (Moericke, 1889), and *Cycloprosopon typicum* (Lőrenthey and Beurlen, 1929) were found to be *bona fide* species within the genus. *Cycloprosopon reussi* (Gemmellaro, 1869), *Cycloprosopon rotundum* (Beurlen, 1925), and *Cycloprosopon tithonium* (Gemmellaro, 1869) were included in the genus by Lőrenthey and Beurlen (1929) and Glaessner (1929). However, these three species have been considered (Feldmann et al., in press) to be uncertainly placed within
Cycloprosopon based upon lack of detailed descriptions and illustrations. An abundance of specimens collected from Purcăreni, has helped to clarify at least one of these systematically problematical species, and herein, *Cycloprosopon reussi* is confidently placed in the genus, supported by very detailed comparisons of morphologic features to the original description (Gemmellaro, 1869). *Cycloprosopon rotundum* and *Cycloprosopon tithonium* have not been discovered at the Purcăreni locality, so these species will need further examination of literature and/or type material for confirmation of generic placement (Feldmann et al., in press).

*Cycloprosopon reussi* (Gemmellaro, 1869)

Figure 20

*Prosopon reussi* Gemmellaro, 1869, p. 13, fig. 52-54.


*Pithonoton (Cycloprosopon) reussi* (Gemmellaro, 1869). Bachmayer, 1948, p. 265, fig. 4

*Cycloprosopon reussi* (Gemmellaro, 1869). Lörenthey and Beurlen, 1929, p. 2; Feldmann et al., in press.

*Diagnosis.*--Carapace ovate, wider than long, W/L ratio approximately 1.22. Widest approximately 0.50 distance from frontal margin, at position immediately posterior to
intersection of cervical groove with lateral margin. Carapace transversely convex anteriorly and posteriorly. Front very small, 0.04 of maximum width, projects slightly forward, moderately downturned. Fronto-orbital distance 0.50 total width, orbits elongate, deep, rimmed, entire. Outer-orbital margin smooth and indistinct. Lateral margin well-defined, smooth, and sinusoidal. Posterior margin 0.25 maximum width, strongly rimmed, deeply concave. Cervical groove shallow, almost indistinct, weak post-cervical grooves, branchiocardiac groove absent. Faintly raised epigastric regions, other dorsal regions poorly defined, cardiac region very weakly raised. Pterygostomial region slightly swollen. Cuticle finely pustulose, damaged pustules display crater-like central feature, very finely granulose where cuticle delaminated. Only dorsal carapace preserved; appendages and ventral portion not present.

*Measurements.*--Recorded in mm, plotted in Table 5.

*Material examined.*--LPBIIIart-087 – LPBIIIart-090.

*Occurrence.*--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

*Discussion.*--*Cycloprosopon reussi* differs from the all other species of *Cycloprosopon*, primarily by having unique W/L ratios. The specimens collected from Purcăreni are considerably smaller in size than the type material, although they exhibit allometrically consistent W/L ratios for the species (Figure 19). Each species has been thoroughly compared and discussed below. *Cycloprosopon complanatiforme* (Moericke, 1889) is unlike *Cycloprosopon reussi* by having a greater W/L ratio, a broader front, and a
moderately defined branchiocardiac groove. *Cycloprosopon* n. sp. (Feldmann et al., in press) has a smaller W/L ratio and a significantly larger front than does *Cycloprosopon reussi*. *Cycloprosopon* n. sp. also has a well-defined branchiocardiac groove and more clearly defined regions. *Cycloprosopon latum* (Moericke, 1889) differs from *Cycloprosopon reussi* by having a greater W/L ratio and in having its maximum width at the convergence of the cervical groove with the lateral margin, instead of posterior to the cervical groove. *Cycloprosopon latum* also has a distinctly pentagonal cardiac region and a conglomerate of pustule sizes for dorsal carapace ornamentation; these features are not found on *Cycloprosopon reussi*. *Cycloprosopon tithonium* (Gemmellaro, 1869) has carapace shape similar to that of *Cycloprosopon reussi*, although *Cycloprosopon tithonium* is substantially larger in size, has better defined regions, and differing cuticle structure.

Glaessner (1969) considered *Cycloprosopon reussi* to be synonymous with *Cyclothyreus strambergensis*; but comparison of translated, original descriptions of both species shows them to be quite different. Further, *Cycloprosopon reussi* and *Cyclothyreus strambergensis* have been identified from the material collected at Purcăreni, and are identified, described, and illustrated herein as separate species in separate genera within the Dynomenidae.

Holotype material of *Cycloprosopon reussi* was found in Sicily, near the area of Villabate (Gemmellaro, 1869). Associated decapod Crustacea were described from this locality at Villabate, and identified by Gemmellaro (1869), although evidence of any
other accompanying non-decapod fauna was not recorded. These decapod taxa include

*Pithonoton marginatum* (von Meyer, 1842), New genus *ettaloni* (this paper),

*Cycloprosopon tithonium* (Gemmellaro, 1869), *Cyphonotus oxythyreiformis* (Gemmellaro, 1869), *Pithonoton polyphemi* (Gemmellaro, 1869), *Oxythyreus gibbus* (Reuss, 1858), *Nodoprosopon fraasi* Moericke, 1889), *Coelopus hoheneggeri* (Moericke, 1889), *Longodromites meyeri* (Étallon, 1858), and *Goniodromites bidentatus* (Reuss, 1858). In other works, *Cycloprosopon reussi* has been found in association with brachiopods (*Terebratula moravica* Glocker, *Zeilleria lugubris* Suess, and *Terebratulina latirostris* Suess), gastropods (*Neridomus spadae* Gemmellaro and *Phanaeroptyxis staszicyi* Zeusch), and pachyodont bivalves (*Diceras and Plesiodiceras*).

*Range.*--Jurassic (Tithonian).

*Distribution.*--Sicily, Czech Republic, Romania.
Table 5--Measurements, in mm, of *Cycloprosopon reussi* (Gemmellaro, 1869).

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Figure 19--Comparative measurements of *Cycloprosopon reussi* (Gemmellaro, 1869).
Figure 20—Cycloprosopon reussi. 1, Dorsal carapace with small amount of original cuticle; 2, Magnified view of cuticle showing pustulose, crater structures; 3, Anterior view showing very small front, orbits, and strong lateral margins; 4, Posterior view showing strong, sinusoidal lateral margins and narrow, highly convex, posterior margin.
Genus *Cyclothyreus* Remeš, 1895

*Type species.*--*Cyclothyreus strambergensis* Remeš, 1895

*Included species.*--*Cyclothyreus autissiodorensis* Van Straelen, 1936; *Cyclothyreus sergipensis* Beurlen, 1965; *Cyclothyreus strambergensis* Remeš, 1895.

*Diagnosis.*--Carapace subcircular to ovate, wider than long. Front narrow, triangular, downturned. Orbits clearly defined, deep, elongate, with small outer orbital spine, intersecting lateral margins at largely acute angle. Lateral margins well-defined, denticulate, with ten or more extremely small spines. Posterior margin narrow and concave. Cervical groove present and clearly defined, branchiocardiac groove very weak or absent. Epigastric regions weakly inflated, mesogastric region barely observable, pterygostomial regions well-marked, bulbous. Ornamentation on carapace smooth to pustulose.

*Discussion.*--The genus *Cyclothyreus* contains only three species, which are radically different from one another. There have been many assignments of species to this genus, but most have since been found to be referable to related genera in the family Dynomenidae, primarily to *Cycloprosopon* and *Cyphonotus*. *Cyclothyreus sergipensis* (Beurlen, 1965) does not conform well to the diagnosis of the genus and may be better suited within *Cyphonotus*. However, evaluation of the holotype material would be required to make a confident reassignment.
Cyclothyreus strambergensis Remeš, 1895

Diagnosis. -- Carapace sub-rounded, wider than long, W/L ratio approximately 1.27. Widest one-half distance from frontal margin, behind cervical groove junction with lateral margin. Carapace convex transversely, highly convex longitudinally. Front narrow, 0.11 maximum width, weakly bifid, triangular rostrum strongly downturned, straight. Fronto-orbital distance 0.67 maximum width, front projects slightly beyond orbits. Orbits elongate, moderately deep, rimmed, entire, very finely denticulate, outer-orbital margin with very small, blunt tooth. Lateral margin well defined, sinuous, denticulate, approximately 6 minute teeth anterior to cervical groove, 5 or more teeth behind cervical groove. Teeth not readily observed because of extremely small size and poor preservation potential, most apparent where original cuticle is present or as molds. Posterior margin 0.25 maximum width, rimmed, concave. Cervical groove deepest axially, anterior to cardiac region, shallow, barely discernable toward lateral margins. Cervical groove transected axially by short furrow in mesogastric region; mesogastric region weakly raised, delimited. Branchiocardiac groove absent. Weakly raised epigastric regions, mesogastric region distinguishable, cardiac region insignificantly raised, other axial regions poorly definable. Pterygostomial regions inflated, transected...
marginally by cervical groove. Cuticle pustulose, damaged pustules display pock-marked; structure, where cuticle is delaminated, finely granulose. Only dorsal carapace preserved; evidence of appendages or ventral portion not present.

Measurements.--Recorded in mm, displayed in Table 6.

Material examined.--LPBIIIart-091 – LPBIIIart-095.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

Discussion.--Cyclothyreus strambergensis differs from Cyclothyreus autissiodorensis (Van Straelen, 1936) in that the maximum width is located one-half the distance from the frontal margin, and is one-third the distance in Cyclothyreus autissiodorensis. In Cyclothyreus strambergensis the cervical groove is well defined the entire length of the carapace. The post-cervical groove and branchiocardiac groove are present in Cyclothyreus autissiodorensis, but are not at all visible on Cyclothyreus strambergensis. Further, Cyclothyreus autissiodorensis has a distinct cardiac region bearing three large tubercles, and its posterior margin is significantly smaller than that of Cyclothyreus strambergensis. Cyclothyreus sergipensis (Beurlen, 1965) differs from Cyclothyreus strambergensis by the former having a sharp outer-orbital spine and three large, distinct spines along the lateral margin, with a smaller W/L ratio, whereas Cyclothyreus strambergensis has a blunt outer-orbital spine and ten or more extremely small teeth along the lateral margin. Cyclothyreus strambergensis has more distinct dorsal grooves than Cyclothyreus sergipensis, including the cervical groove that is defined clearly over
the entire width of the carapace, merging with the lateral margin very near the orbits, and a branchiocardiacic groove that visibly bounds the cardiac region.


*Range.*--Tithonian.

*Distribution.*--Czech Republic, Romania.
Table 6--Measurements, in mm, of *Cyclothyreus strambergensis* Remeš, 1895.

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Figure 21--Cyclothyreus strambergensis. 1, Dorsal carapace with original cuticle; 2, Magnified view of cuticle showing pustulose, crater-like structures; 3, Dorsal carapace with original cuticle; 4, Magnified view of original cuticle showing pustulose, crater-like structures; 5, Anterior view showing orbits and strong lateral margins; 6, Posterior view showing sinuous lateral margin and narrow, convex posterior margin.
Genus *Cyphonotus* Bell, 1863

*Type species.*—*Palaeodromites incertus* Bell, 1863.

*Included species.*—*Cyphonotus centrosa* (Van Straelen, 1940) as *Distefania*; *Cyphonotus incertus* (Bell, 1863) as *Palaeodromites*; *Cyphonotus integrimarginatus* Wright and Wright, 1950; *Cyphonotus himeraensis* (Checchia-Rispoli, 1917) as *Distefania*; *Cyphonotus octodentatus* (A. Milne-Edwards, 1869) as *Palaeodromites*; *Cyphonotus oxythyreiformis* (Gemmellaro, 1869) as *Prosopon*; *Cyphonotus sicula* (Cheechia-Rispoli, 1917) as *Distefania*; *Cyphonotus transitorius* (Remeš, 1895) as *Oxythyreus*.

*Diagnosis.*—Carapace ovate to pentagonal, subglobulose, wider than long. Front narrow, triangular and downturned, orbits elongate, oblique. Lateral margins well-defined, denticulate to lobulate. Posterior margin narrow and concave. Cervical groove pronounced, branchiocardiac groove present, weaker than cervical groove. Epigastric regions weak, mesogastric region well defined, hepatic regions weakly defined, pterygostomial regions inflated. Ornamentation on carapace granulose to largely pustulose.

*Discussion.*—The genus *Cyphonotus* was determined by Glaessner (1933; 1969) to be the senior synonym of *Distefania* (Checchia-Rispoli, 1917) and *Palaeodromites* (A. Milne-Edwards, 1865).
Cyphonotus centrosa (Van Straelen, 1940)

Figure 22

Distefania centrosa Van Straelen, 1940, p. 4, fig. 6; Ruiz de Gaona, 1943, p. 425; Van Straelen, 1944, p. 11.

Cyphonotus centrosa (Van Straelen, 1940). Glaessner, 1933, p. 584; Wright and Wright, 1950, p. 22.

Diagnosis.--Carapace pentagonal, wider than long, W/L ratio 1.33. Widest 0.65 distance from frontal margin. Carapace exhibits stronger convexity longitudinally than transversely. Frontal width narrow, 0.12 maximum width, rostrum triangular, projects forward, strongly downturned. Fronto-orbital distance 0.60 maximum width, weakly rimmed, entire; orbits elongate, oblique, displays tiny saw-tooth structure (only visible where original cuticle present), terminating in outer-orbital spine. Anterolateral margin well-defined, lobulate, with four segments behind orbital spine. Posterolateral margin well-defined, with four additional segments, successively becoming smaller posteriorly and grading into transverse rows of granulose texture above posterior margin. Posterior margin 0.33 maximum width, concave, rimmed, down-set. Cervical groove shallow, branchiocardiac groove absent, possesses short, axially positioned transverse furrow as post-cervical groove, parallel to cervical groove. Weakly raised epigastric regions, forming faint longitudinal furrow between orbits. Mesogastric region swollen, not joining front, urogastric region raised, narrow between cervical and post-cervical grooves. Cardiac and branchial regions slightly vaulted. Carapace ornamented with
variably-sized pustules, randomly scattered anteriorly, situated in transverse rows posteriorly. Only dorsal carapace preserved; appendages and ventral surface not present.

**Measurements.**--Measurements are in mm, displayed in Table 7.

**Material examined.**--LPBI11art-096 – LPBI11art-102.

**Occurrence.**--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

**Discussion.**--*Cyphonotus centrosa* (Van Straelen, 1940) differs from other species in the genus based upon the four lobes positioned along the anterolateral margin; *Cyphonotus incertus* (Bell, 1863) has five and *Cyphonotus himaraensis* (Checchia-Rispoli, 1917) has nine. *Cyphonotus centrosa* also sets itself apart by the nature of the spines on the posterolateral margin, progressively decreasing in size posteriorly and transitioning parallel to the posterior margin. *Cyphonotus octodentatus* (A. Milne-Edwards, 1869) has the same number of spines on the anterolateral margin as *Cyphonotus centrosa*, but the former lacks the posterolateral spines and possesses a carapace with a lower W/L ratio. *Cyphonotus oxythyreiformis* (Gemelli, 1869) differs from *Cyphonotus centrosa* primarily because the former has a less angular shape of the carapace and lacks lobulate structures along the lateral margins. *Cyphonotus integrimarginatus* (Wright and Wright, 1950) has a significantly lower fronto-orbital/maximum width ratio and does not show evidence of a profound cervical groove as is found in *Cyphonotus centrosa*. *Cyphonotus sicula* (Checchia-Rispoli, 1917) is typically a significant amount larger than *Cyphonotus centrosa* with more abundant lobes along the lateral margin, and a distinct
branchiocardiac groove. *Cyphonotus transitorius* (Remeš, 1895) has a substantially lower W/L ratio than does *Cyphonotus centrosa* and has smooth lateral margins.

Type specimens of *Cyphonotus centrosa* were collected from the Navarre province in Spain and were contained within sediments of Cenomanian age. These holotype specimens were preserved within recrystallized, grayish limestone with veins of calcite (Van Straelen, 1940). Associated decapod crustaceans found at this locality were reported by Van Straelen (1940) to include *Paragalathea ruizi*, *Eomunidopsis navarrensis*, and *Goniodromites laevis*. Later, *Pithonoton bouvieri* (Van Straelen, 1944) joined the list of collected decapod crustaceans described from the same locality.

Additional organisms accompanying the decapod Crustacea are numerous and include most notably crinoids, corals, foraminifera, sponges, bryozoans, echinoderms, ostracodes, and debris from molluscs and brachiopods. This assemblage varies substantially from the Purcăreni assemblage of Tithonian age discussed in this paper, which was dominated by crabs, brachiopods, and corals. There were only trace numbers of crinoids, sponges, echinoderms, and mollusks. This difference in associated taxa is most likely a reflection of difference in age rather than location. Similar decapod crustaceans can be found in various age units at the same geographic locality, but the associated material does change.

*Range.*--Tithonian to Cenomanian.

*Distribution.*--Spain, Romania.
Table 7--Measurements, in mm, of *Cyphonotus centrosa* (Van Straelen, 1940).

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Figure 22--*Cyphonotus centrosa*. Dorsal carapace with small amount of original cuticle showing pustulose structure and lobate margins.
*Cyphonotus himeraensis* (Checchia-Rispoli, 1917)

Figure 23

*Distefania himeraensis* Checchia-Rispoli, 1917, p. 177, fig. 2-3.

*Cyphonotus himeraensis* (Checchia-Rispoli, 1917). Wright and Wright, 1950, p. 22, fig. 11.

*Diagnosis.*--Carapace pentagonal, wider than long, W/L ratio 1.38, widest 0.57 distance from frontal margin. Carapace exhibits strong convexity longitudinally and transversely, most convex near front. Front narrow, 0.13 maximum width, rostrum triangular, strongly downturned. Fronto-orbital width 0.60 maximum width, weakly rimmed, entire; orbits elongate and oblique, margins smooth, terminating in outer-orbital spine. Anterolateral margin well-defined and lobulate, bears four lobes behind orbital spine. Posterolateral margin well-defined, bears five lobes and several small granules, forming transverse rows anterior to posterior margin. Posterior margin 0.30 maximum width, concave, rimmed. Cervical groove shallow, branchiocardiac groove weak, visible only axially. Postcervical groove short, axially positioned, parallel to cervical groove. Weakly raised epigastric regions, forming faint longitudinal furrow between orbits. Mesogastric and urogastric regions slightly swollen. Cardiac region observable, bearing three strong tubercles, forming equilateral triangle with apex positioned posteriorly. Branchial regions barely discernable. Carapace granulose; granules randomly scattered anteriorly, situated transversely posteriorly, damaged granules exhibit crater-like structure. Only dorsal carapace preserved; appendages and ventral surface not present.

*Measurements.*--Measurements are in mm, displayed in Table 8.
Material examined.--LPBIIIart-103 – LPBIIIart-106.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--Cyphonotus himeraensis is unlike Cyphonotus centrosa in having a stronger downturned front, weaker ornamentation on the dorsal carapace, and one additional spine along the lateral margin. Cyphonotus octodentatus (A. Milne-Edwards, 1869) has one less spine along the anterolateral margin than does Cyphonotus himeraensis and lacks the numerous spines on the posterolateral margin. Cyphonotus oxythyreiformis (Gemmellaro, 1869) differs from Cyphonotus himeraensis in that the former exhibits a less angular carapace shape and an absence of lobate structures along the lateral margins. Cyphonotus integrimarginatus (Wright and Wright, 1950) has a significantly lower fronto-orbital/maximum width ratio and does not show evidence of a strong cervical groove, or display the lateral lobulose structures that Cyphonotus himeraensis possesses. Cyphonotus sicula (Chechchia-Rispoli, 1917) is typically significantly larger than Cyphonotus himeraensis with more numerous lobes along the lateral margin and a distinct branchiocardiac groove. Cyphonotus transitorius (Remeš, 1895) has a substantially lower W/L ratio than does Cyphonotus himeraensis and has smooth lateral margins.

Up until the discovery of this locality at Purcăreni, Cyphonotus himeraensis had only been collected in association with Cyphonotus sicula (Chechchia-Rispoli, 1917).

Range.--Tithonian to Cenomanian.

Distribution.--Sicily, Romania.
Table 8--Measurements, in mm, of *Cyphonotus himeraensis* (Checchia-Rispoli, 1917).

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Figure 23--Cyphonotus himeraensis. 1, Dorsal carapace showing grooves and regions; 2, Anterior view showing orbits and well-defined, lobate lateral margins; 3, Posterior view illustrating pustulose ornamentation transition to transverse rows.
Genus *Dynomene* Desmarest, 1822

*Type species.*—*Dynomene hispida* Guérin-Méneville, 1832

*Included species.*—*Dynomene filholi* Bouvier, 1894; *Dynomene hispida* Guérin-Méneville, 1832; *Dynomene pilumnoides* Alcock, 1900; *Dynomene praedator* A. Milne-Edwards, 1879; *Dynomene pugnatrix* de Man, 1889.

*Diagnosis.*—Carapace subcircular, wider than long, moderately convex longitudinally. Fronto-orbital margin broad, triangular, orbits well-defined, elongate, commonly denticulate. Lateral margin well-defined, always denticulate or granulose. Cervical, postcervical, and branchiocardiac grooves typically present at various depths and positions. Mesogastric and cardiac regions usually distinct. Carapace ornamentation smooth or weakly granulose to tuberculate.

*Discussion.*—A detailed revision of the Dynomenidae (McLay, 1999) includes extant species presently recorded within the family. Most importantly, McLay redescribed and discussed the species unique to the genus *Dynomene* (Desmarest, 1822), as represented by modern taxa.

*Dynomene* n. sp.

Figure 24

*Diagnosis.*—Carapace incomplete, unable to determine carapace outline or W/L ratio. Remaining portion of carapace very weakly convex, more so posteriorly. Majority of front not recorded, orbits elongate yet broad, deep, rimmed, with strong outer-orbital
spine. Lateral margin well-defined, bears seven spines. First and largest spine serrate, between outer-orbital margin and cervical groove. Remaining six spines, posterior to cervical groove, decreasing in size posteriorly. Bulk of posterior margin not preserved. Only cervical groove present, straight. Regions cannot be observed. Carapace ornamentation smooth. Remainder of dorsal carapace along with appendages and ventral surface not preserved.

**Measurements.**--Measurements taken from *Dynomene* n. sp.; maximum carapace length = 6.5 mm; maximum carapace width = indeterminate; front to maximum width length = 3.3 mm; front to cervical groove length = 2.7 mm; frontal width = indeterminate; fronto-orbital width = indeterminate; posterior width = indeterminate.

**Material examined.**--LPBIIIart-107.

**Occurrence.**--The specimen was collected from Purcăreni, Romania, WP 147. GPS location of N 45°38’14.5” and E 25°48’14.7”

**Discussion.**--The majority of the dorsal carapace has not been recovered for this species; but, the presence of a very well preserved lateral margin allows for identification of genus and designation of a new species. *Dynomene hispida* (Guérin-Méneville, 1832) differs from *Dynomene* n. sp. by having five spines along the lateral margin, a strongly curving cervical groove and a deep branchiocardiac groove. Also, *Dynomene hispida* possesses a dentate supraorbital margin, lacking in *Dynomene* n. sp. *Dynomene filholi* (Bouvier, 1894) bears several large tubercles above the lateral margins, with four broad teeth, and a cervical groove that becomes less well defined until it becomes indistinct at
the lateral margin. *Dynomene pilumnoides* (Alcock, 1900) has four teeth along the anterolateral margin that are broad-based and equidistant, ending in one small, acute spine (McLay, 1999). The carapace of *Dynomene pilumnoides* also exhibits tubercles that are absent in *Dynomene* n. sp., as well as a curving cervical groove. *Dynomene praedator* (A. Milne-Edwards, 1879) bears only small granules on the lateral margin, with a dentate supraorbital margin, and a weak, curving cervical groove, none of which are displayed by *Dynomene* n. sp. *Dynomene pugnatrix* (de Man, 1889) has only six spines on the lateral margin and granules on the supraorbital margin.

This species of *Dynomene* is readily distinguished from the others in the genus, and forms the basis for a new species based upon the unique combination of features that distinguishes it from the others included in the genus. Most important are the number of spines, seven, along the lateral margin and the nearly straight cervical groove, without evidence of any other grooves.

*Range.*--Tithonian.

*Distribution.*--Romania.
Figure 24--*Dynomene* n. sp. 1, Partially preserved dorsal carapace; 2, Magnified view of dentate lateral margin.
Genus *Oxythyreus* Reuss, 1858

*Type species.*--*Oxythyreus gibbus* Reuss, 1858

*Included species.*--*Oxythyreus gibbus* Reuss, 1858

*Diagnosis.*--Carapace oval, strongly convex, longer than wide, widest two-thirds the distance from frontal margin. Rostrum sharp, projecting, strongly downturned. Orbits elongate, narrow, deep, without outer-orbital spine. Anterolateral margin denticulate, spines decrease in size posteriorly. Posterior margin concave. Cervical and branchiocardiac grooves present. Cardiac region weakly defined, pentagonal, other regions indistinct. Carapace smooth anteriorly, granulose posteriorly.

*Discussion.*--The genus *Oxythyreus*, as originally designated by Reuss (1858), was placed within the Prosopidae. Later taxonomic evaluation of this genus (Glaessner, 1933) placed *Oxythyreus* within the Dynomenidae, based upon characteristics of the anterior and posterior margins as well as the rostrum. Patrulius (1960; 1966) agreed with this designation, maintaining that *Oxythyreus* is a member of the Dynomenidae. However, Glaessner (1969) later referred to *Oxythyreus* as a unique genus without affiliations to any family within the superfamily Dromioidea. Evaluation of this genus herein leads to the conclusion that *Oxythyreus* has morphologic characters similar to genera within the Dynomenidae and therefore it has been placed as a member within this family.
Oxythyreus gibbus Reuss, 1858

Figure 26

Oxythyreus gibbus Reuss, 1858, p. 12; Reuss, 1859, p. 75, fig. 8-9; von Meyer, 1860, p. 218; Gemmellaro, 1869, p. 18, fig. 48-49; Moericke, 1889, p. 56; Remeš, 1895, p. 6, fig. 5-6; Remeš, 1905, p. 3; Blaschke, 1911, p. 185; Van Strahlen, 1925, p. 368; Lőrenthey and Beurlen, 1929, p. 96, fig. 3; Glaessner, 1933, p. 182; Murgeanu, Patrulius, and Contescu, 1959, p. 16; Patrulius, 1960, p 256; Patrulius, 1966, p, 501.

Oxythyreus minor (Reuss, 1858). Remeš, 1895, p. 6, fig. 6.

Diagnosis.--Full extent of carapace margins incompletely preserved. Carapace ovate, longer than wide, widest three-quarters the distance from frontal margin. Dorsal surface extremely convex longitudinally, less so transversely. Front projecting forward, strongly downturned, narrow, 0.16 maximum carapace width. Fronto-orbital width 0.46 maximum width, orbits elongate, deep, set below frontal margin, weakly rimmed, entire, without outer-orbital spine. Lateral margins incomplete, preserved portions defined and denticulate, only four spines visible. Posterior margin convex, 0.40 of maximum carapace width. Cervical and branchiocardiac grooves visible, cervical groove more deeply impressed, branchiocardiac groove most distinct laterally. All regions undefined with exception of pentagonally-shaped cardiac region containing two small nodes. Carapace with smooth region anterior to cervical groove, finely granulose sculpture with intermittent punctation posteriorly. Dorsal carapace only preserved; appendages and ventral portions not recorded.
Measurements.--Two sets of measurements have been taken from *Oxythyreus gibbus* and are displayed in mm in Table 9.

Material examined.--LPBIIIart-108 – LPBIIIart-110.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--*Oxythyreus gibbus* is the sole species in this genus. All others have been found to be more closely associated with other genera or synonymous with previously described species. *Oxythyreus heraldicus* (Moericke, 1889) is now *Glaessneropsis*; *Oxythyreus minor* (Remeš, 1895) is now *Oxythyreus gibbus* Reuss, 1858; *Oxythyreus ornatus* (Blaschke, 1911) is now *Nodoprosopon armatum*; and *Oxythyreus transitorius* (Remeš, 1895) is now *Cyphonotus*.

*Oxythyreus gibbus* was a very common and widespread species throughout Europe during the Tithonian and has been associated with decapod Crustacea such as *Pithonoton marginatum* (von Meyer, 1842), New genus *ettaloni* (this paper), *Cycloprosopon reussi* (Gemmellaro, 1869), *Cyclothyreus strambergensis* (Remeš, 1895), *Coelopus hoheneggeri* (Moericke, 1889), *Eodromites grande* (von Meyer, 1857), *Eomunidopsis eutecta* (Moericke, 1889), *Eomunidopsis meyeri* (Moericke, 1869), *Paragalathea verrucosa* (Moericke, 1889), *Mesogalathea striata* (Remeš, 1895), *Cyphonotus oxythyreiformis* (Gemmellaro, 1869), *Cyphonotus transitorius* (Remeš, 1895), *Lecythocaris paradoxum* (von Meyer, 1858), *Prosopon tuberosum* (von Meyer, 1840), *Prosopon fricii* (Remeš, 1895), *Prosopon longum* (Moericke, 1889).
Nodoproson armatum (Blaschke, 1911), Nodoproson ornatum (von Meyer, 1857), Nodoproson ovale (Moericke, 1889), Nodoproson mirum (Moericke, 1889), Nodoproson fraasi (Moericke, 1889), Longodromites angustus (Reuss, 1858), Coelopus pustulosus (von Meyer, 1860), Cycloproson latum (Moericke, 1889), Cycloproson complanatiforme (Moericke, 1889), Goniodromites complanatus (Reuss, 1858), Goniodromites bidentatus (Reuss, 1858), Goniodromites polyodon (Reuss, 1858), Goniodromites globosum (Remeš, 1895), and Pithonoton katholickyi (Remeš, 1895) in Reuss, 1858; Reuss, 1859; von Meyer, 1860; Gemmellaro, 1869; Remeš, 1895; Moericke, 1889; Blaschke, 1911; Van Straelen, 1925; Lörenthey and Beurlen, 1929; Glaessner, 1933; Patrulius, 1966). Non-decapod associated fauna collected in conjunction with Oxythyreus gibbus are brachiopods (Terebratula moravica Glocker, Zeilleria lugubris Suess, and Terebratulina latirostris Suess), gastropods (Neridomus spadae Gemmellaro and Phanaeroptyxis staszicyi Zeusch), and the pachyodont bivalve genera Diceras and Plesiodiceras.

A graph showing comparative measurements has been constructed to support identification of Oxythyreus gibbus (Figure 25). Measurements were taken from identifications made by Gemmellaro (1869) and Moericke (1889). Unfortunately, the original designator of the genus and species, Reuss (1858), did not record any measurements of Oxythyreus gibbus in his works; therefore, it is difficult to relate this material positively, based upon W/L at least, to holotype material. The specimens Gemmellaro and Moericke declared as Oxythyreus gibbus share a perfectly linear
relationship with those of Purcăreni, fully supporting the identification. Moericke (1889) described his specimen from the Stramberg locality in the Czech Republic, and these specimens were relatively small. The specimens recorded from Purcăreni, Romania are significantly larger, and the specimen described by Gemmellaro (1869) from Sicily has an even larger size. This may be a result of environmental factors influenced by location within the Tethys sea, or they may represent different growth stages of *Oxythyreus gibbus*. Analysis of original material or collection of more material from each locality would be needed to resolve this question.

*Range.*--Tithonian.

*Distribution.*--Sicily, Czech Republic, Poland, Romania.
Table 9—Measurements, in mm, of *Oxythyreus gibbus* (Reuss, 1858).

<table>
<thead>
<tr>
<th>Specimen number</th>
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<th>Frontal width</th>
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Figure 25--Comparative measurements of *Oxythyreus gibbus* Reuss, 1858.
Figure 26--*Oxythyreus gibbus*. 1, Dorsal carapace, badly weathered, showing ovate shape and spinose lateral margins; 2, Dorsal carapace of second specimen, containing original cuticle; 3, Lateral view, showing highly convex carapace.
Infraorder ANOMURA H. Milne Edwards, 1832

Superfamily GALATHEOIDEA Samouelle, 1819

Family GALATHEIDAE Samouelle, 1819

Subfamily GALATHEINAE Samouelle, 1819


*Diagnosis.*—Carapace subrectangular to subovate, longer than wide. Front with projecting rostrum, well-developed, smooth, serrated, or spinose. Lateral margins crenulate to dentate, may be straight or convex. Posterior margin typically rimmed. Cervical and branchiocardiical grooves well developed, cervical groove may be more profound. Regions generally poorly defined, medial ridge may be present. Carapace sculpture heavy, with thick transverse ridges, anterior region typically more ornamented with nodes or spines.

*Discussion.*—The Galatheinae has undergone revisions as recently as Schweitzer and Feldmann (2000) and De Angeli and Garassino (2002). However, its systematic arrangement is still under consideration by Feldmann and Schweitzer (pers. comm.). This paper has compiled a list of all genera and species presently believed to belong to
the Galatheinae (Appendix 5) based upon these sources. In this list there are only two species that are believed not to belong with the included species listed by De Angeli and Garassino (2002) and that do not fall within the definition of the subfamily Galatheinae as defined by Samouelle (1819). These two species are *Eomunidopsis zitteli* (Moericke, 1889) and *Galathea affinis* (Ortmann, 1892). *Eomunidopsis zitteli* was originally named *Galathea zitteli* by Moericke (1889). Later it was found (Balss, 1913) to exhibit morphology unique enough to constitute being a separate species in a separate subfamily. He then created the genus *Galatheites* and designated *Galatheites zitteli* to be the type species. Sometime after this, is was then determined that *Galatheites* was synonymous with *Gastrosacus* von Meyer, 1851, thereby redesignating the species *Gastrosacus zitteli*. *Galathea affinis* was recognized as a homonymous species by Collins (1995). The name had been used for two quite different species, *Galathea affinis* Ristori, 1886 and *Galathea affinis* Ortmann, 1892. As a result, Collins replaced the junior homonym by referring it to *Galathea mauritiana* Bouvier, 1915. In addition to these minor changes, there have been several additions of species to the list provided by De Angeli and Garassino (2002) (Appendix 5).
Genus *Eomunidopsis* Via Boada, 1981

*Type species.*--*Galathea navarrensis* Van Straelen, 1940.

*Included species.*--*Eomunidopsis eminens* (Blaschke, 1911) as *Galatheites*;

*Eomunidopsis eutecta* (Moericke, 1889) as *Galatheites*; *Eomunidopsis kojimai* Karasawa and Hayakawa, 2000; *Eomunidopsis limonitica* (Stenzel, 1945) as *Galathea*;

*Eomunidopsis meerssensis* Collins et al., 1995; *Eomunidopsis meyeri* (Moericke, 1889) as *Galatheites*; *Eomunidopsis navarrensis* (Van Straelen, 1940) as *Galathea*;


*Diagnosis.*--Carapace elongate, longer than wide. Rostrum projecting, triangular, broad, with medial keel, tip smooth and blunt to sharp and spinose, lateral margins of rostrum smooth. Lateral margins of carapace weakly ridged to sharply dentate. Cervical and branchiocardiaco grooves present and deep, bounding regions. With or without medial ridge. Carapace decorated in prominent, transverse ridges.

*Discussion.*--*Eomunidopsis* was erected by Via Boada in 1981 to embrace *Eomunidopsis navarrensis* and *Eomunidopsis orobensis*. Via Boada (1982) added *Eomunidopsis eutecta* (Moericke, 1889), *Eomunidopsis neojurensis* (Patrulius, 1960), and *Eomunidopsis zitteli* (Moericke, 1889) (now *Gastrosacus zitteli*) which were later joined by the remaining species referrable to *Eomunidopsis*. 

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Eomunidopsis eutecta (Moericke, 1889)

Figures 27, 28


Galathea eutecta (Moericke, 1889). Remč, 1895, p. 200, fig. 1-2; Blaschke, 1911, p. 148; Balss, 1913, p. 158; Van Straelen, 1925, p. 304, fig. 138.


Diagnosis. -- Carapace sub-quadrate, longer than wide, W/L ratio 0.76. Maximum width 0.7 distance from frontal margin, located posterior to cervical groove. Dorsal surface flat, only convex anteriorly, from front to tip of rostrum. Frontal width 0.23 maximum width, rostrum extends forward in a broad, blunt triangle and displays approximately nine rows of transverse ridges along outer margins, intersecting in raised, denticulate surface at median axis of rostrum. Fronto-orbital width 0.73 maximum width, weakly rimmed, entire. Orbits concave, shallow, smooth, weakly rimmed, bears small, outer orbital tooth. Lateral margins ribbed, denticulate, defined, approximately 14 strong, small teeth, two of which are present between orbits and cervical groove, four lie between cervical groove and branchiocardiac groove, and eight positioned posterior to branchiocardiac groove. Posterior margin well-rimmed, moderately concave, 0.76 of maximum width. Cervical and branchiocardiac grooves strong, branchiocardiac groove weaker axially, pronounced
along lateral margins. Raised epigastric margin, hepatic region slightly defined. Metagastric region bears eight to ten long, thick transverse ridges, interrupted by denticulate ridges arising from lateral margin. Epibranchial regions defined by cervical and branchiocardiac grooves. Mesogastric region defined, with six rows of transverse ridges interrupted by seven rows from protogastric region. Carapace exhibits very pronounced, interrupted transverse terracing. Only dorsal carapace preserved; appendages and ventral surface not present.

Measurements.--Recorded in mm, displayed in Table 10.

Material examined.--LPBIIIart-111 – LPBIIIart-118.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--These specimens were referred to *Eomunidopsis eutecta* based upon comparison with the translated descriptions of Moericke (1889) and Remeš (1895). The features that this specimen exhibits conform to descriptions and illustrations from those sources. This species differs other species of *Eomunidopsis* in the following ways. *Eomunidopsis eminens* (Blaschke, 1911) as discussed by Blaschke does not include information about the rostrum. Also, comparisons cannot be made using his illustration as the image is very small and ill-defined. Therefore, comparisons must be made using the remaining features on the dorsal carapace. *Eomunidopsis eutecta* cannot be confused with *Eomunidopsis eminens* because *Eomunidopsis eutecta* does not exhibit as low a W/L ratio, does not have highly vaulted regions or tuberous ornamentation. *Eomunidopsis*
kojimai (Karasawa and Hayakawa, 2000) also lacks a rostrum. It differs primarily from *Eomunidopsis eutecta* by possessing spines along the lateral margins and fewer transverse ridges in the mesogastric region. *Eomunidopsis eutecta* has a very broad and obtusely angled rostrum, which is not at all similar to the rostrum exhibited by *Eomunidopsis limonitica* (Stenzel, 1945). The carapace on *Eomunidopsis limonitica* is largely incomplete, although still recognizably different due to the uniquely shaped mesogastric region, the very deep cervical groove, and branchiocardiac grooves. The transverse ridging on the dorsal surface also is not like that of *Eomunidopsis eutecta*.

*Eomunidopsis meerssensis* (Collins et al., 1995) bears two blunt spines at the base of the rostral margins, and the rostral width occupies only 20% of the frontal width, which is not at all similar to the smooth, wide rostrum of *Eomunidopsis eutecta*. *Eomunidopsis meyeri* (Moericke, 1889) also has a narrow, pointed rostrum, and differs as well in the nature of the carapace. The carapace of *Eomunidopsis meyeri* is pustulose rather than striated, and regions are better defined. *Eomunidopsis navarrensis* (Van Straelen, 1940) is defined by Van Straelen by a very brief diagnosis, making comparison difficult; however, Via Boada (1981; 1982) provided better descriptions and illustrations. *Eomunidopsis eutecta* varies from *Eomunidopsis navarrensis* by the latter having a pointed, narrow rostrum and denticulate lateral margins of the dorsal carapace. *Eomunidopsis neojurensis* (Patrulius, 1960) bears three sets of small spines along the margins of the rostrum, which are not present in *Eomunidopsis eutecta*. *Eomunidopsis orobensis* (Ruiz de Gaona, 1943) possesses very finely spinose lateral margins. Finally,
Eomunidopsis portlandica (Fraaye and Collins, 1996) does not bear as thick transverse ridges as Eomunidopsis eutecta and has almost straight lateral margins.

Eomunidopsis eutecta has been found in association with other decapod crustaceans such as Eomunidopsis meyeri (Moericke, 1889), Paragalathea verrucosa (Moericke, 1889), Mesogalathea striata (Remeš, 1895), Cyphonotus oxythyreiformis (Gemmellaro, 1869), Cyphonotus transitorius (Remeš, 1895), Lecythocaris paradoxum (von Meyer, 1858), Prosopon longum (Moericke, 1889), Prosopon tuberosum (von Meyer, 1840), Prosopon fričii (Remeš, 1895), Nodoprosopon ornatum (von Meyer, 1857), Nodoprosopon mirum (Moericke, 1889), Nodoprosopon fraasi (Moericke, 1889), Nodoprosopon heydeni (von Meyer, 1857), Nodoprosopon ovale (Moericke, 1889), Longodromites angustus (Reuss, 1858), Coelopus pustulosus (von Meyer, 1860), Cycloprosopon latum (Moericke, 1889), Cycloprosopon complanatiforme (Moericke, 1889), Goniodromites complanatus (Reuss, 1858), Goniodromites bidentatus (Reuss, 1858), Goniodromites polyodon (Reuss, 1858), Goniodromites globosum (Remeš, 1895), and Pithonoton katholickyi (Remeš, 1895) (Moericke, 1889; Remeš, 1895; Blaschke 1911; Van Straelen, 1925; Bachmayer, 1947; Patrulius, 1960).

Range.--Tithonian.

Distribution.--Czech Republic, Romania.
Table 10--Measurements, in mm, of *Eomunidopsis eutecta* (Moericke, 1889).

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Figure 27--*Eomunidopsis eutecta*. View of dorsal carapace, showing obtusely rounded rostrum and thick transverse ridging.
Figure 28--Line reconstruction of *Eomunidopsis eutecta*, as it would look fully preserved.
Eomunidopsis navarrensis (Van Straelen, 1940)

Figures 29, 30

Galathea navarrensis Van Straelen, 1940, p. 2, fig. 3-4; Ruiz de Gaona, 1943, p. 425; Van Straelen, 1944, p. 3; Bataller, 1945, P. 418-434; Bataller, 1950, p. 421, fig. 1; Via Boada, 1951, p. 155, 178, 179; Via Boada, 1952, p. 73; Ruiz de Gaona, 1952, p. 496, 500; Ruiz de Gaona, 1954, p. 577.


Diagnosis.--Carapace sub-rectangular, longer than wide, W/L ratio cannot be determined from lack of entire rostrum, widest at position just behind branchiocardiaco groove, maximum width can only be estimated. Dorsal surface weakly convex, most convex in anterior region. Frontal width 0.28 maximum width; rostrum extends forward in broad triangle; smooth, non-denticulate margins; dorsal surface of rostrum without sculpture. Fronto-orbital width 0.83 maximum width, weakly rimmed, entire. Orbits concave, smooth, weakly rimmed, with small outer orbital spine. Lateral margins nearly straight, ribbed, denticulate, well-defined, approximately 11 small, strong spines. Of the spines, two lie between orbits and cervical groove, three between cervical groove and branchiocardiaco groove directly on lateral margin, immediately overlain by four spines in epibranchial region, final five lateral spines positioned posterolaterally. Posterior margin 0.73 maximum width, well rimmed. Cervical groove and branchiocardiaco groove
pronounced, branchiocardiac groove weak axially, strongest at lateral margins. Raised epigastric regions, hepatic region slightly defined, distinctly tuberculate. Mesogastric region defined by short, intermittent sections of transverse ridges interrupted by sporadic transverse ridges extending from protogastric region to median ridge. Metagastric region has approximately five short, transverse ridges immediately posterior to cervical groove, interrupted by terraced ridges arising from lateral margins. Epibranchial regions defined by cervical and branchiocardiac grooves, ornamented with several prominent tubercles. Carapace exhibits very pronounced, interrupted transverse terracing, more apparent where original cuticle present. Only dorsal carapace preserved; appendages and ventral surface not present.

**Measurements.**--Recorded in mm, displayed in Table 11.

**Material examined.**--LPBIIIart-119 – LPBIIIart-126.

**Occurrence.**--All specimens were collected from Purcâreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

**Discussion.**--*Eomunidopsis navarrensis* was first described by Van Straelen (1940), whose specimens show much the same quality of preservation as those at Purcâreni. Van Straelen described the holotype from the dorsal carapace alone since the rostrum was not preserved. This is also the condition of the specimens that were collected from Purcâreni. As previously noted, Van Straelen provided only a brief description accompanying the designation and therefore the present identification was facilitated by the descriptions of Via Boada (1981; 1982). With this information, it was then possible to compare and
contrast the physical characters of *Eomunidopsis navarrensis* to the rest of the species in the genus. Blaschke’s 1911 report on *Eomunidopsis eminens* (Blaschke, 1911) does not include information about the rostrum. Also, studies cannot be made using the provided plates because the image is very small and ill-defined. Therefore, comparisons must be made using the remaining features on the dorsal carapace. *Eomunidopsis navarrensis* cannot be confused with *Eomunidopsis eminens* because the former bears dentition along the lateral margins of the dorsal carapace and does not have observably vaulted regions or tuberous ornamentation. *Eomunidopsis eutecta* (Moericke, 1889) varies quite obviously from *Eomunidopsis navarrensis* by the convex and smooth lateral margins and by the broad, non-denticulate triangular rostrum on *Eomunidopsis eutecta*. *Eomunidopsis kojimai* (Karasawa and Hayakawa, 2000) also lacks a rostrum. It is similar to *Eomunidopsis navarrensis* in possessing spines along the lateral margins, although *Eomunidopsis navarrensis* has eleven instead of the eight that *Eomunidopsis kojimai* bears. *Eomunidopsis navarrensis* also differs by demonstrating fewer transverse spines in the mesogastric region; a weaker and less sinuous cervical groove; and weaker ridging on the dorsal regions. *Eomunidopsis limonitica* (Stenzel, 1945) exhibits a larger W/L ratio, a distinct mesogastric region with about nine transverse ridges, and more pronounced dorsal grooves than *Eomunidopsis navarrensis*. *Eomunidopsis meerssensis* (Collins et al., 1995) bears two blunt spines at the base of the rostral margins (not seen in *Eomunidopsis navarrensis*) and a non-dentate lateral margin. *Eomunidopsis meyeri* (Moericke, 1889) differs primarily in the nature of the carapace. The carapace of
*Eomunidopsis meyeri* is covered in many pustules rather than being striated, and the regions are better defined. Also, it has smooth lateral margins. *Eomunidopsis neojurensis* (Patrulius, 1960) was defined only upon a rostrum, whereas the collected specimens of *Eomunidopsis navarrensis* are identified by only dorsal carapaces. This presents a problem for comparison of the two species. To resolve the problem, descriptions were used from Via Boada (1982). *Eomunidopsis neojurensis* varies by exhibiting numerous, fine, transverse ridges that converge with the lateral border, apparently not producing dentition. *Eomunidopsis orobensis* (Ruiz de Gaona, 1943) has fewer spines on the lateral margins and a cardiac region that is separated into two parts. Finally, *Eomunidopsis portlandica* (Fraaye and Collins, 1996) does not bear any dentition along the lateral margins.

The presence of *Eomunidopsis navarrensis* at Purcăreni not only extends the range of the species into the Late Jurassic, but also expands the geographic range. If this is now considered to be the earliest appearance of *Eomunidopsis navarrensis*, it must have migrated toward the west in the Cretaceous as the Tethys was closing up in the east due to the collision of North Africa with the European plate.

Relatively few decapod crustaceans have been collected with *Eomunidopsis navarrensis*. They include *Eomunidopsis orobensis* (Ruiz de Gaona, 1943), *Paragalathea ruizi* (Van Straelen, 1940), *Paragalathea straeleni* (Ruiz de Gaona, 1943), and *Paragalathea multisquamata* (Via Boada, 1981). Via Boada (1982) noted the following non-decapod organisms as associated with *Eomunidopsis navarrensis*: 115
macroforaminifera, sponges, bryozoans, brachiopods, corals, bivalves, and fragments of ostracodes, and echinoderms, including crinoidal material found in a detrital limestone.

**Range.**--Tithonian to Cenomanian.

**Distribution.**--Spain, Romania.
Table 11--Measurements, in mm, of *Eomundopsis navarrensis* (Van Straelen, 1940).

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Figure 29--*Eomunidopsis navarrensis*. View of dorsal carapace, showing dentate lateral margins.
Figure 30--Line reconstruction of *Eomunidopsis navarrensis*; rostrum not preserved.
Genus *Palaeomunida* Lörenthey, 1902

*Type species.*—*Palaeomunida defecta* Lörenthey, 1902.

*Included species.*—*Palaeomunida defecta* Lörenthey, 1902; *Palaeomunida moesica* (Mutiu and Bădăluță, 1971) as *Galathea* (*Palaeomunida*); *Palaeomunida multicristata* De Angeli and Garassino, 2002; *Palaeomunida n.* sp. (Patrulius, 1966) as *Galathea* (*Palaeomunida*); *Palaeomunida* sp. (Mutiu and Bădăluță, 1971) as *Galathea* (*Palaeomunida*); 2 new species described herein.

*Diagnosis.*—Carapace longer than wide, most convex transversely in the posterior region and longitudinally in the anterior region. Rostrum comparatively wide, always spinose, with three or more large teeth; bears subtle medial carina, clearly defined to base, always with medial ridge. Lateral margins weakly dentate, more so anteriorly. Cervical and branchiocardiac grooves present and deep; regions bounded by grooves. Carapace ornamentation consists of long to short interlocking transverse terracing.

*Discussion.*—*Palaeomunida* was considered to be a subgenus of *Galathea*, until Schweitzer and Feldmann (2000) elevated it to the level of genus in the subfamily Galatheinae based upon physical characters, most specifically by having a carinate rostrum (De Angeli and Garassino, 2002).
**Palaeomunida** n. sp. 1

Figures 31, 32

*Diagnosis.*--Carapace sub-quadrate, longer than wide, W/L ratio cannot be determined due to lack of preserved posterior margins. Widest posterolaterally, just posterior to branchiocardiaceal groove. Dorsal surface flat, convex from anterior margin to rostral tip. Frontal width one-quarter maximum width, rostrum extends forward in broad, pointed triangle, bears seven spines along lateral margins; proximal four spines large, sharp, equal in size; distal two reduced in size, sharp, final spine is apex of rostrum; rostral surface weakly ornamented. Fronto-orbital width three-quarters maximum width, weakly rimmed, entire. Orbits with concave margins, smooth, weakly rimmed; orbits terminate in small outer orbital spines. Lateral margins ribbed, denticulate, well defined; approximately 13 strong, small lateral teeth, two present between orbits and cervical groove, four between cervical groove and branchiocardiaceal groove, and seven or more posterolaterally. Posterior margin absent. Cervical groove and branchiocardiaceal groove pronounced, branchiocardiaceal groove weaker axially, strongest at lateral margins. Raised epigastric margin, hepatic region weakly defined. Mesogastric region with five rows of transverse ridges interrupted by five rows ornamenting protogastric region to median ridge, two ridges from median ridge to epigastric region. Metagastric region with seven or more long, thick transverse ridges, cannot be accurately determined from lack of posterior margins, interrupted by terraced ridges arising from lateral margin. Epibranchial regions defined by cervical and branchiocardiaceal grooves. Carapace exhibits
thick, interrupted transverse terracing. Only dorsal carapace preserved; appendages and ventral surface not present.

*Measurements.*--Recorded in mm, displayed in Table 12.

*Material examined.*--LPBIIart-127 – LPBIIart-130.

*Occurrence.*--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

*Discussion.*--Presently, there are five recognized species of *Palaeomunida*, including one that is a new, as yet unnamed, species (Patrulius, 1966) and one that is unidentified (Mutiu and Bădăluta, 1971). This specimen was referred to *Palaeomunida* based upon comparisons with all the included species. *Palaeomunida* n. sp. 1 differs from *Palaeomunida defecta* (Lörenthey, 1902) by lacking spines along the anterolateral margin, having more spines on the rostral margin, lacking a median pustulose carina on the rostrum, and being wider than recorded specimens of *Palaeomunida defecta*.

*Palaeomunida moesica* (Mutiu and Bădăluta, 1971) has a more convex carapace, a less profound median ridge, and a differing number of transverse ridges on the dorsal surface than does *Palaeomunida* n. sp. 1. *Palaeomunida multicristata* (De Angeli and Garassino, 2002) has only three spines along the lateral margins of the rostrum, exhibits a rostrum that is ornamented with larger granules, and bears spines on the lateral margins of the carapace that *Palaeomunida* n. sp. 1 does not show. *Palaeomunida* n. sp. (Patrulius, 1966) was noted, although a description was not given; only one hand-drawn illustration of the rostrum was published. From this illustration, *Palaeomunida* n. sp. 1 differs by
having more spines along the lateral margins, and they are positioned at different lengths
and degrees. The illustration also shows a median carina on the rostrum that

*Palaeomunida* n. sp. 1 lacks.

*Range.*--Tithonian.

*Distribution.*--Romania.
Table 12—Measurements, in mm, of *Paleomunida* n. sp. 1.

<table>
<thead>
<tr>
<th>Specimen number</th>
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<th>Maximum width</th>
<th>Fronto-orbital width</th>
<th>Frontal width</th>
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<td>3.8</td>
<td>-</td>
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</table>
Figure 31—*Palaeomunida* n sp. 1. View of dorsal carapace, showing spinose rostrum.
Figure 32--Line reconstruction of *Palaeomunida* n sp. 1, as it would appear if fully preserved.
Palaeomunida n. sp. 2

Figures 33, 34

Diagnosis.--Carapace longer than wide, W/L ratio cannot be determined because posterolateral and posterior margins are not preserved; only anterior region, including front and rostrum, preserved. Rostrum extends forward as broad triangle terminating in sharp spine, bears five additional spines along lateral margins, spines decreasing in size posteriorly to frontal margin. Rostral surface smooth with median carina. Orbits concave, smooth, weakly rimmed; orbits terminate in small outer orbital spines. Anterolateral margins well defined and dentate, with seven small, strong spines. One spine present between outer-orbital spine and cervical groove, five between cervical groove and branchiocardiac groove, only one spine visible posterior to branchiocardiac groove, but posterolateral margin incomplete. Posterior margin absent. Cervical groove and branchiocardiac groove pronounced, branchiocardiac groove weaker axially, strongest at lateral margins. Raised epigastric margin, delimiting rostrum, hepatic and epigastric regions defined, bearing several small spines. Mesogastric region defined, with five rows of transverse ridges interrupted by five rows ornamenting protogastric region to medial ridge, one transverse band from medial ridge to epigastric region. Carapace posterior to branchiocardiac groove not preserved. Observable portions of carapace exhibit thick, interrupted transverse terracing. Only anterior region of dorsal carapace preserved; posterior region, appendages, and ventral surface not present.

Measurements.--Measurements taken on Palaeomunida n. sp. 2; maximum carapace
length = indeterminate; maximum carapace width = indeterminate; front to maximum width length = indeterminate; front to cervical groove length = 2.9 mm; frontal width = 0.9 mm; fronto-orbital width = 2.4 mm; posterior width = indeterminate.

Material examined.--LPBIIIart-131 – LPBIIIart-133.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”

Discussion.--Presently, there are five recognized species belonging to Palaeomunida, including one that is a new, yet unnamed, species (Patrulius, 1966) and one that is unidentified (Mutiu and Bădlăută, 1971). Palaeomunida n. sp. 2 differs from Palaeomunida defecta (Lörenthey, 1902) by lacking spines along the anterolateral margin, having more spines on the rostral margin, and lacking a median pustulose carina on the rostrum. Palaeomunida moesica (Mutiu and Bădlăută, 1971) has a more convex carapace and less well developed median ridge than does Palaeomunida n. sp. 2. Palaeomunida multicristata (De Angeli and Garassino, 2002) has only three spines along the lateral margins of the rostrum, a rostrum that is ornamented with granules, and spines on the lateral margins of carapace. Palaeomunida n. sp. 2 does not share these features. Patrulius (1966) noted Palaeomunida n. sp., although he did not provide a description of the species, only publishing one hand-drawn illustration of the rostrum. This makes comparisons of the two species difficult. However, Palaeomunida n. sp. 2 only partially resembles the illustration in Patrulius (1966). Both species share spines along the lateral margins of the rostrum, and although they differ in the number, the illustration also shows
a median carina on the rostrum which *Palaeomunida* n. sp. 2 does not have.

*Palaeomunida* sp. (Mutiu and Bădălută, 1971) is only represented by a dorsal carapace, which was not preserved on *Palaeomunida* n. sp. 2, again making comparisons difficult. Specimens of *Palaeomunida* sp. would have to be examined or collected in order to give detailed descriptions of differences. *Palaeomunida* n. sp. 2 differs from *Palaeomunida* n. sp. 1 by possessing fewer spines along the rostral margins, than the latter, and also bearing small tubercles in the anterolateral region.

*Range.*--Tithonian.

*Distribution.*--Romania.
Figure 33—*Palaeomunida* n. sp. 1. View of dorsal carapace, showing spinose rostrum; 2. Dorsal carapace, showing spinose rostrum on a second specimen.
Figure 34--Line reconstruction of *Paragalathea* n. sp. 2; only frontal margin and rostrum preserved.
Genus *Paragalathea* Patrulius, 1960

Type species.--*Galatheites verrucosa* Moericke, 1889.

Included species.--*Paragalathea miyakoensis* Takeda and Fujiyama, 1983; *Paragalathea multisquamata* Via Boada, 1981; *Paragalathea neocomiensis* (Van Straelen, 1936) as *Galatheites*; *Paragalathea ornatissima* (Patrulius, 1966) as *Galathea* (*Paragalathea*); *Paragalathea ruizi* (Van Straelen, 1940) as *Galathea*; *Paragalathea straeleni* (Ruiz de Gaona, 1943) as *Galatheites*; *Paragalathea substriata* (Blaschke, 1911) as *Galathea*; *Paragalathea ubaghsi* (Pelseneer, 1886) as *Galathea*; *Paragalathea verrucosa* (Moericke, 1889) as *Galatheites*; 2 new species herein.

Diagnosis.--Carapace longer than wide, strongly convex transversely. Rostrum projecting, wide, may be slightly downturned, bears one to three distal spines, smooth lateral margins, not bounded at base. Lateral margins well-defined, smooth to dentate. Regions generally undefined. Ornamentation on carapace granulose to interlocking transverse ridges.

Discussion.--Patrulius (1960) designated *Paragalathea* as a subgenus of *Galathea* based upon affinities that the two shared. He designated *Paragalathea verrucosa* (Moericke, 1889) as the type species. Later (1966), he added the species *Paragalathea striata* (now *Mesogalathea striata*) (Remeš, 1895) and *Paragalathea ornatissima* (Patrulius, 1966). It wasn’t until 1981 that Via Boada elevated *Paragalathea* to the generic level and included the species *Paragalathea ruizi* (Van Straelen, 1940), *Paragalathea straeleni* (Ruiz de Gaona, 1943), and *Paragalathea multisquamata* (Via Boada, 1981). Subsequently, the
remaining species were either transferred into the genus or originally designated by
various authors.

*Paragalathea* n. sp. 1

Figures 35, 36

*Diagnosis.*--Carapace sub-rectangular, longer than wide, W/L ratio 0.70, widest 0.68
distance from frontal margin. Maximum width only slightly distinguishable, posterior to
cervical groove. Carapace convex transversely, flat longitudinally, with exception of
convex anterior margin. Frontal width 0.40 maximum width, rostrum extends forward in
broad and blunt triangle, tip of rostrum not complete, smooth lateral margins. Orbits with
concave margins, smooth; no evidence of outer orbital spine. Fronto-orbital width 0.81
maximum width, weakly rimmed, entire. Lateral margins defined, weakly ridged, non-
denticulate, approximately 13 fine and faint ridges. Posterior margin strongly rimmed,
moderately concave, 0.67 maximum width. Cervical groove present, strongest axially,
weakening toward lateral margins; branchiocardiac groove weak, very shallow.

Epibranchial regions defined by cervical and branchiocardiac grooves. Mesogastric
region bounded by weakly raised epigastric regions; medial ridge absent; hepatic region
weakly defined. Carapace generally smooth, with very fine transverse terracing, more
prominent along lateral margins and where carapace is devoid of cuticle. Only dorsal
carapace preserved; appendages and ventral surface not present.

*Measurements.*--Recorded in mm, displayed in Table 13.
Material examined.--LPBIIIart-134 – LPBIIIart-140.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

Discussion.--Paragalathea n. sp. 1 has been deemed a new species at this time: its morphology is unique among other species in Paragalathea. The feature forming the most prominent distinction for this new species is the very weak ornamentation on the dorsal carapace; it is nearly smooth, showing weak striations along the lateral margins. Paragalathea miyakoensis (Takeda and Fujiyama, 1983) is represented by a very incomplete specimen, although, from the description given of the sections preserved on the dorsal carapace, the two are different. Paragalathea n. sp. 1 has very weak dorsal ornamentation or transverse ridging. The carapace is only weakly convex but is quite strongly convex in Paragalathea miyakoensis, and regions are not distinct in the former. Paragalathea n. sp. 1 cannot be mistaken for Paragalathea multisquamata (Via Boada, 1981) simply by the degree of ornamentation on the carapace. Paragalathea multisquamata is covered in large, raised pustules, and short ridges, whereas Paragalathea n. sp. 1 shows no evidence now, or before cuticle delamination, of possessing this ornamentation. Also, the shape of the carapace and the posterior margins are dissimilar between the two species. Paragalathea ornatissima (Patrulius, 1966) is highly ornamented by small granules over the entire surface of the dorsal carapace, unlike the very weak transverse striations that are barely discernible on Paragalathea n. sp. 1. Paragalathea ruizi (Van Straelen, 1940) has a tridentate rostrum and dorsal carapace that
is highly convex, unlike the nearly flat dorsal carapace in *Paragalathea* n. sp. 1.

*Paragalathea straeleni* (Ruiz de Gaona, 1943) shows distinct regions, lacks a branchiocardiatic groove, and is ornamented on the dorsal carapace by granules and transverse ridging. *Paragalathea* n. sp. 1 has weakly distinguishable regions, a weak branchiocardiatic groove, and subtle carapace ornamentation. *Paragalathea* n. sp. 1 differs from *Paragalathea substriata* (Blaschke, 1911) by not exhibiting the median carina on the rostrum and having a highly ornate dorsal carapace. *Paragalathea ubaghsi* (Pelseneer, 1886) differs primarily by having dentate anterolateral margins and serrate posterolateral margins. *Paragalathea verrucosa* (Moericke, 1889) has a pointed rostrum and greater W/L ratio than does *Paragalathea* n. sp. 1. The former also bears prominent transverse ridging on the dorsal carapace.

*Range.*--Tithonian.

*Distribution.*--Romania.
Table 13--Measurements, in mm, of *Paragalathea* n. sp. 1.

<table>
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<th>Specimen number</th>
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<td>3.0</td>
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</table>
Figure 35--*Paragalathea* n. sp. 1. View of dorsal carapace, showing weak ornamentation and smooth, yet incomplete rostrum.
Figure 36--Line reconstruction of *Paragalathea* n. sp. 1; tip of rostrum incomplete, carapace weakly ornamented.
**Paragalathea** n. sp. 2

Figures 37, 38

*Diagnosis.*--Carapace sub-rectangular, longer than wide, W/L ratio 0.69. Maximum width 0.82 distance from frontal margin, located posterior to cervical groove, only slightly distinguishable. Dorsal surface transversely convex, showing weak convexity longitudinally, from anterior margin through rostrum. Frontal width one-quarter maximum width, rostrum highly elongated, very narrow, comparatively for genus, tip of rostrum not preserved, no ornamentation along margins or dorsal surface. Fronto-orbital width 0.76 maximum width, weakly rimmed, entire. Orbits with concave margins, shallow, smooth, weakly rimmed; orbits display blunt outer orbital tooth. Lateral margins ribbed, denticulate, well-defined, approximately 12 small, strong spines, and nine spines immediately overlying spines along lateral margin. Of spines on lateral margin, one present between outer-orbital spine and cervical groove, four lie between cervical groove and branchiocardiac groove, with four spines immediately above in epibranchial region. Seven spines positioned from branchiocardiac groove to posterior margin, with row of five tubercles above. Posterior margin strongly rimmed, moderately concave, 0.73 maximum width. Cervical groove and branchiocardiac groove strong, branchiocardiac groove weaker axially, most prominent at lateral margins. Raised epigastric margin; hepatic region defined. Mesogastric region distinguishable, with six rows of transverse ridges interrupted by ridges from protogastric region. Metagastric region merging into cardiac region with four transverse ridges, interrupted by transverse
ridges arising from branchial regions. Epibranchial regions defined by cervical and
branchiocardiac grooves, tuberculate. Carapace exhibits very pronounced, interrupted
transverse terracing. Only dorsal carapace preserved; appendages and ventral surface not
present.

*Measurements.*--Recorded in mm, displayed in Table 14.

*Material examined.*--LPBIIIart-141 – LPBIIIart-145.

*Occurrence.*--All specimens were collected from Purcăreni, Romania, WP 147. GPS
location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

*Discussion.*--*Paragalathea* n. sp. 2 has been deemed a new species because its
morphology is distinct from that of other species in *Paragalathea*. The most distinctive
features for this new species are the very elongated rostrum and the dentate lateral
margins. *Paragalathea miyakoensis* (Takeda and Fujiyama, 1983) differs from
*Paragalathea* n. sp. 2 because the latter has strong dorsal ornamentation, or transverse
ridging. The carapace is only weakly convex but is quite strong in *Paragalathea
miyakoensis*. *Paragalathea* n. sp. 2 has dentate lateral margins that *Paragalathea
miyakoensis* lacks. *Paragalathea* n. sp. 2 cannot be mistaken for *Paragalathea
multisquamata* (Via Boada, 1981) simply by its carapace ornamentation: *Paragalathea
multisquamata* is covered in large, raised pustules, and short ridges, whereas
*Paragalathea* n. sp. 2 exhibits interrupted, thick transverse ridging. Also, the carapace
tapers posteriorly in *Paragalathea multisquamata*, the rostrum is broad, and the lateral
margins of the carapace show no evidence of spines. *Paragalathea ornatissima*
(Patrulius, 1966) is highly ornamented by small granules over the entire surface of the dorsal carapace, quite unlike the very strong transverse ridges that are visible on *Paragalathea* n. sp. 2. *Paragalathea ornatissima* shows no indication of dentition along the lateral margins, or of extreme length and narrow width of the rostrum as seen on *Paragalathea* n. sp. 2. *Paragalathea ruizi* (Van Straelen, 1940) has a short, wide, tridentate rostrum, and dorsal carapace that is highly convex, unlike the weakly convex dorsal carapace in *Paragalathea* n. sp. 2. *Paragalathea straeleni* (Ruiz de Gaona, 1943) shows distinguishable regions and lacks a branchiocardiatic groove, and has smooth lateral margins. *Paragalathea* n. sp. 2 also has distinguishable regions, but with a defined branchiocardiatic groove and spinose lateral margins. *Paragalathea* n. sp. 2 differs from *Paragalathea substriata* (Blaschke, 1911) by not exhibiting a median carina on the rostrum and an elongated as opposed to rounded rostrum. *Paragalathea ubaghsi* (Pelseneer, 1886) differs by the posterior widening of the carapace, and the difference in the number of spines along the lateral margins: it possesses ten spines as opposed to the twelve on *Paragalathea* n sp. 2. *Paragalathea verrucosa* (Moericke, 1889) has a short, pointed rostrum and much greater W/L ratio than does *Paragalathea* n. sp. 2, and it also lacks spines along the lateral margins of its carapace. *Paragalathea* n. sp. 2 varies from *Paragalathea* n. sp. 1, in that the former possesses a significantly more ornamentated carapace and a pointed rostrum.

*Range.*--Tithonian.

*Distribution.*--Romania.
Table 14--Measurements, in mm, of *Paragalathea* n. sp. 2.

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<th>Specimen number</th>
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Figure 37--*Paragalathea* n. sp. 2. View of dorsal carapace, showing elongate rostrum and dentate lateral margins.
Figure 38--Line reconstruction of Paragalathea n sp. 2, showing elongate rostrum and dentate lateral margins.
Paragalathea ruizi (Van Straelen, 1940)

Figures 39, 40

Galathea ruizi Van Straelen, 1940, p. 1, fig. 1-2; Ruiz de Gaona, 1943, p. 425; Van Straelen, 1944, p. 5; Bataller, 1945, p. 418, fig. 48; Bataller, 1950, p. 423, fig. 1; Via Boada, 1951, p. 155, 178-179; Via Boada, 1952, p. 73, fig. 1; Ruiz de Gaona, 1952, p. 500; Ruiz de Gaona, 1954, p. 577.


Paragalathea ruizi (Van Straelen, 1940). Via Boada, 1981, p. 249, fig. 1; Via Boada, 1982, p. 4, fig. 1; De Angeli and Garassino, 2002, p. 27.

Diagnosis.--Carapace sub-quadrate, longer than wide, W/L ratio 0.73. Maximum width 0.70 distance from frontal margin, located posterior to cervical groove. Dorsal surface highly convex transversely and longitudinally, highest degree of convexity through rostrum. Frontal width 0.11 maximum width. Rostrum triangular, extends broadly forward, terminating in three small spines, medial spine largest, lateral spines slightly smaller, no ornamentation along margins or on dorsal surface, smooth transition between rostrum and frontal margin. Fronto-orbital width approximately 0.50 maximum width, weakly rimmed, entire. Orbits with concave margins, shallow, smooth, weakly rimmed, without outer-orbital tooth. Lateral margins weakly ribbed, lacking dentition, well-defined. Posterior margin strongly rimmed, moderately concave, 0.46 maximum width. Cervical groove and branchiocardiac groove strong, cervical groove strongest axially, weaker at lateral margins, branchiocardiac groove weaker axially, most prominent at
lateral margins. Weakly raised epigastric regions; hepatic region defined. Mesogastric and protogastric regions distinguishable. Metagastric region merging into cardiac region with four weak transverse ridges, interrupted by weak transverse ridges arising from branchial regions. Epibranial regions defined by cervical and branchiocardiac grooves. Carapace exhibits very weak, interrupted transverse terracing. Only dorsal carapace preserved; appendages and ventral surface not present.

Measurements.--Measurements have been taken on Paragalathea ruizi and are displayed in mm in Table 15.

Material examined.--LPBIIIart-146 – LPBIIIart-147.

Occurrence.--All specimens were collected from Purcăreni, Romania, WP 147. GPS location of N 45° 38’ 14.5” and E 25° 48’ 14.7”.

Discussion.--Paragalathea ruizi differs from Paragalathea miyakoensis (Takeda and Fujiyama, 1983) by having distinctly transverse ridges, unlike the scaly and granulated striae exhibited by Paragalathea miyakoensis, by lacking the depressions anterior and posterior to the cardiac region, and by having very convex lateral margins than Paragalathea miyakoensis. Paragalathea ruizi cannot be mistaken for Paragalathea multisquamata (Via Boada, 1981) simply by the nature of ornamentation on the carapace. Paragalathea multisquamata is covered in large, raised pustules, and short ridges; Paragalathea ruizi shows interrupted, thin transverse ridging. Also, the carapace widens posteriorly in Paragalathea multisquamata, and the rostrum is broad. Paragalathea ornatissima (Patrulius, 1966) is highly ornamented by small granules over the entire
surface of the dorsal carapace, dissimilar to the very fine transverse ridges that are visible on *Paragalathea ruizi*. *Paragalathea ornatissima* also has granulose ornamentation over the surface of the rostrum, whereas *Paragalathea ruizi* has a smooth rostrum.

*Paragalathea straeleni* (Ruiz de Gaona, 1943) exhibits distinct regions but lacks a branchiocardiac groove; *Paragalathea ruizi* also has distinguishable regions, but bears a defined branchiocardiac groove. *Paragalathea ruizi* differs from *Paragalathea substriata* (Blaschke, 1911) by not exhibiting a median carina on the rostrum, which is tridentate as opposed to rounded. *Paragalathea ubaghsi* (Pelseneer, 1886) differs by the posterior widening of the carapace and the presence of spines along the lateral margins.

*Paragalathea verrucosa* (Moericke, 1889) has a short, pointed rostrum, with only one spine and a much greater W/L ratio than does *Paragalathea ruizi*. *Paragalathea ruizi* is very much unlike *Paragalathea* n. sp. 1 by having prominent convex lateral margins and transverse ridging on the dorsal carapace. *Paragalathea ruizi* also differs from *Paragalathea* n. sp. 2 by the amount of decoration on the dorsal carapace; the latter has a higher degree of ornamentation and a longer, more narrow rostrum.

Decapod fauna associated with *Paragalathea ruizi* includes; *Paragalathea straeleni* (Ruiz de Gaona, 1943), *Paragalathea multisquamata* (Via Boada, 1981), and *Eomunidopsis orobensis* (Ruiz de Gaona, 1943). *Paragalathea ruizi* has also been found in association with such taxa (Via Boada, 1982) as macroforaminifera, sponges, bryozoans, brachiopods, corals, bivalves, and fragments of ostracodes, and echinoderms found in a detrital limestone.
The discovery of *Paragalathea ruizi* at Purcăreni, extends the range of the species from the Late Cretaceous to the Latest Jurassic. It also extends its geographic range to cover Eastern Europe.

*Range.*--Tithonian to Coniacian.

*Distribution.*--Romania, Sicily, Spain.
Table 15--Measurements, in mm, of *Paragalathea ruizi* (Van Straelen, 1940).

<table>
<thead>
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<th>Specimen number</th>
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Figure 39--*Paragalathea ruizi*. 1, Dorsal carapace, with convex lateral margins; 2, Rostrum with trident tip.
Figure 40--Line reconstruction of *Paragalathea ruizi*, showing tridentate rostrum and convex carapace.
PALEOECOLOGIC INTERPRETATIONS

During the Tithonian (151-145 m.y.), central Romania was covered by the warm, shallow Tethys Sea. The locality at Purcăreni was situated on a carbonate platform in the northern section of the sea within a coral reef framework. This environment would have been similar to the patch-reef environment (Müller, 2004) found in the modern day Bahamas. It would have been located near to shore, in 3-15 m of clear water, spanning one hundred or more meters, with a soft to slightly rocky-bottomed substrate. Reef complexes, in general, are typically populated by decapod crustaceans of small size, due to the many cracks and crevices that act as protective refuges (further discussed in Müller, Krobicki, and Wehner, 2000; Müller, 2004; Feldmann et al., in press). However, a patch-reef, specifically, would allow for the integrity of the crab carapaces to be preserved due to its proximity to shore accompanied by higher energy and, therefore, rapid sedimentation rates. This is in line with the taphonomical processes as suggested in a previous section. The crabs are found with their benthic comrades (corals, brachiopods, bivalves, gastropods, sponges, and echinoderms) and together they constitute a typical reef community. Reefs characteristically show high diversity, caused by extreme variability of the reef surface, currents, a multitude of nutrients (Müller, 2004), and many other parameters, all of which can be contributing factors to the presence of the many decapod crustaceans and associated fauna that have been discussed herein.
It has been suggested that the depositional setting represented by this assemblage is the same as that of several Tithonian fossiliferous localities, from around Europe (Schweitzer, pers. comm.), namely, in Poland, Italy, Austria, Spain, Germany, and the Czech Republic. Upon inspection of the literature, recorded fauna, and brief sediment descriptions, Purcăreni does appear to be similar to these other locations. This, then, extends the known range of this facies farther east to include central Romania. Figure 41 depicts the position of the continents and Tethys Sea during the Tithonian and shows the approximate location of Romania on the northern shelf. Also distinguishable from this image are the boundaries of western and northern Europe, showing that the positions of the other reef localities are also submerged shallowly along the northern margin of the Tethys. Although these locations share similar environmental and ecological conditions, the dominant species appears to vary between them. The literature documents that the Czech Republic, Germany, and Italy contain mostly species belonging to the Pithonotidae, whereas Poland is dominated by the Prosopidae and Galatheidae (Reuss, 1859; von Meyer, 1860; Gemmellaro, 1869; Remeš, 1895; Moericke, 1889; Collins and Wierzbowski, 1985; Müller, Krobicki, and Wehner, 2000; De Angeli and Garassino, 2002; Garassino and Krobicki, 2002; Müller, 2004; Garassino, De Angeli, and Schweigert, 2005). The Purcăreni locality in Romania contains primarily species belonging to the Dynomenidae and Galatheidae. The number of individuals found within the four families at Purcăreni have been plotted against one another (Figure 42) to show that the highest number of individuals at Purcăreni belong to the Dynomenidae, followed closely by the Galatheidae. The transition in the decapod Crustacea across this facies is
possibly attributed to minor fluctuations in water depth, salinity, substrate surface
variations, the structure of the reef itself, any of the previously mentioned environmental
parameters, or collection bias. To pinpoint the primary cause(s) for the change in
dominant taxa across the facies, a thorough analysis of sediment types would be required
for each locality.

A more local comparison of taxon abundance was made at two very similar sites
from Romania (Figure 43), both of the same age (Tithonian) and both (Sinaia/Moroeni
and Purcăreni) olistolith deposits. This figure shows the number of families and species
collected from each site. Purcăreni is represented by four families, the four discussed
herein (Prosopidae, Pithonotidae, Dynomenidae, and Galatheidae) with a total of 26
species. The number of species listed for Purcăreni includes the 19 described in this
paper and ten listed from Patrulius (1966), three of which were found to be the
conspecific; therefore only seven additional taxa recognized by Patrulius were not
collected in this study. The number of species represented by each family can be seen in
Figure 44, which shows that the most common family collected from Purcăreni is the
Dynomenidae, followed closely by Galatheinae and Pithonotidae. The Sinaia/Moroeni
localities (always grouped together in the literature by convention) were the focus of
Patrulius’s work (Patrulius, 1960; 1966) and have the highest number of families and
species. This includes the four families discussed in this paper and two others not
recorded elsewhere from Romania (thus far), the Homolidae and Axiidae. Patrulius
identified 28 species from Sinaia/Moroeni, with the largest number belonging to the
Galatheidae and the least from the Dynomenidae (this analysis is with focus on the four families discussed in this paper and excluding the Homolidae and Axiidae) (Figure 44). Finally, Mutiu and Bădălătă (1971) identified three families from the Ghergeasa locality, the Prosopidae, Pithonotidae, and Galatheidae, having found no evidence of the Dynomenidae. That fauna is represented by only seven species (Figure 44). The comparisons show that, even locally, Purcăreni was a unique environment, thriving in such a unique way that attracted a family of crabs, the Dynomenidae, which had not been previously recorded to prevail over other decapod crustacea from the Tithonian.
Figure 41--Paleogeographic map of the Tithonian with proposed position of Romania on northern shelf of the Tethys Sea.
Figure 42--Individual abundances within the four represented families at Purcăreni.
Figure 43--Local sites in Romania, of Tithonian age, as collected and recorded by Patrulius (1960 and 1966) (Sinaia/Moroeni localities) Mutiu and Bădălătu (1971) (Ghergheasa locality), and this work (Purcăreni locality).
Figure 44--Species abundance within the four represented families at Purcăreni and surrounding locations.
SUMMARY

Late Jurassic decapod crustaceans have shown a significant amount of radiation and diversification since their first appearance in the Early Jurassic. All of the crabs range from central Europe to central Romania, likely by dispersal through the northern Tethys Sea in the Tithonian. Also, they diversified at the species level, in the Late Jurassic more than at higher taxonomic levels, illustrated locally in Purcăreni by the introduction of six new species.

This paper has reviewed and revised the systematic arrangement of early members of the Brachyura, according to the morphologic characters displayed by each. Four very distinct families of decapod crustaceans, embracing a total of nineteen species, have been identified and described.
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Appendix 1.--List of non-decapod fauna associated with the decapods at Purcăreni. Arranged in order of decreasing abundance within each phylum or class. Corals identified by Dr. Rosemarie Baron-Szabo; brachiopods and molluscs by Dr. Iuliana Lazăr.

<table>
<thead>
<tr>
<th>ASSOCIATED FAUNA</th>
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<tbody>
<tr>
<td><strong>Brachiopoda</strong></td>
</tr>
<tr>
<td>Acanthorhynchia sp.</td>
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<tr>
<td>Terebratulina latirostris Suess</td>
</tr>
<tr>
<td>Terebratula moravica Glocker</td>
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<tr>
<td>Zeillerina sp.</td>
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<tr>
<td>Zeilleria lugubris (Suess)</td>
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<tr>
<td><strong>Cnidaria</strong></td>
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<tr>
<td>Aplosmilia sp.</td>
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<tr>
<td>Calamophylliopsis sp.</td>
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<tr>
<td>Clausastrea sp.</td>
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<tr>
<td>Gyrodendron sp.</td>
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<tr>
<td>Placophyllia sp.</td>
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<tr>
<td>Stylinia sp.</td>
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<tr>
<td>Unidentified colonial microsolenid</td>
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<tr>
<td><strong>Bivalvia</strong></td>
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<tr>
<td>Chlamys sp.</td>
</tr>
<tr>
<td>Diceras sp.</td>
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<tr>
<td>Placunopsis sp.</td>
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<tr>
<td>Plesiodiceras sp.</td>
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<tr>
<td><strong>Gastropoda</strong></td>
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<tr>
<td>Neridomus spadae (Gemmellaro)</td>
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<tr>
<td>Phanaerophyxis staszicyi (Zeusch)</td>
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<tr>
<td><strong>Indeterminate Fragments</strong></td>
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<tr>
<td>Ammonites</td>
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<tr>
<td>Crinoids</td>
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<tr>
<td>Echinoderms</td>
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<tr>
<td>Sponges</td>
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<tr>
<td>Traces</td>
</tr>
</tbody>
</table>
Appendix 2.--Systematic arrangement of the genera within the Prosopidae, as revised in this paper.

Family Prosopidae von Meyer, 1860

Genus *Ekalakia* Bishop, 1976  
*Ekalakia lamberti* Bishop, 1976 **type**

Genus *Eoprosopon* Förster, 1986  
*Eoprosopon klugi* Förster, 1986 **type**

Genus *Foersteria* Wehner, 1988  
*Foersteria biburgensis* Wehner, 1988 **type**

Genus *Lecythocaris* von Meyer, 1860  
*Lecythocaris paradoxum* (von Meyer, 1858) as *Prosopon* **type**  
*Lecythocaris paradoxum strambergensis* Patrulius, 1966

Genus *Longodromites* Patrulius, 1960  
*Longodromites angustus* (Reuss, 1858) as *Pithonoton*  
*Longodromites bicornutus* Mutiu and Badalută, 1971  
*Longodromites excisum* (von Meyer, 1857) as *Prosopon* **type**  
*Longodromites meyeri* (Étallon, 1858) as *Prosopon* (*Pithonoton*)

Genus *Mithracites* Gould, 1859  
*Mithracites vectensis* Gould, 1859 **type**

Genus *Nodoprosopon* Beurlen, 1928  
*Nodoprosopon aequum* (von Meyer, 1857) as *Prosopon*  
*Nodoprosopon armatus* (Blaschke, 1911) as *Oxythyreus*  
*Nodoprosopon cincinatum* Collins and Wierzbowski, 1985  
*Nodoprosopon echinorum* Collins and Wierzbowski, 1985  
*Nodoprosopon fraasi* Moericke, 1889  
*Nodoprosopon heydeni* (von Meyer, 1857) as *Prosopon*  
*Nodoprosopon jocosum* Étallon, 1861  
*Nodoprosopon mirum* (Moericke, 1889) as *Prosopon*  
*Nodoprosopon ordinatum* Collins and Wierzbowski, 1985  
*Nodoprosopon ornatum* (von Meyer, 1857) as *Prosopon* **type**  
*Nodoprosopon ornatum carpaticum* Patrulius, 1966  
*Nodoprosopon ovale* (Moericke, 1889) as *Prosopon*  
*Nodoprosopon personatum* Quenstedt, 1867  
*Nodoprosopon spinosum* (von Meyer, 1842) as *Prosopon*  
*Nodoprosopon torosum* (von Meyer, 1857) as *Prosopon*  
*Nodoprosopon vilsensis* (Stolley, 1914) as *Prosopon*  

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Genus *Oonoton* Glaessner, 1980
  *Oonoton woodsi* Glaessner, 1980 *type*

Genus *Prosopon* von Meyer, 1835
  *Prosopon aculeatum* von Meyer, 1857
  *Prosopon auduini* Deslongchamps, 1835
  *Prosopon depressum* von Meyer, 1857
  *Prosopon etheridgei* Woodward, 1892
  *Prosopon fricii* Remeš, 1895
  *Prosopon gignouxi* Van Straelen, 1928
  *Prosopon hebes* von Meyer, 1835
  *Prosopon icaunensis* Van Straelen, 1936
  *Prosopon langrunensis* (Hée, 1924) as *Pithonoton*
  *Prosopon longum* Moericke, 1889
  *Prosopon lugobaensis* Förster, 1985
  *Prosopon major* Hée, 1924
  *Prosopon mammillatum* Woodward, 1868
  *Prosopon oviformis* Tribollet, 1876
  *Prosopon schneideri* Stolley, 1924
  *Prosopon sculptum* Quenstedt, 1858
  *Prosopon spiniger* Van Straelen, 1925
  *Prosopon stotzingense* (von Meyer, 1856) as *Nodoprosopon*
  *Prosopon tuberosum* von Meyer, 1840 *type*
  *Prosopon verrucosum* Reuss, 1858
  *Prosopon villersensis* Hée 1924

Genus *Rathbunopon* Stenzel, 1945
  *Rathbunopon polyakron* Stenzel, 1945 *type*
  *Rathbunopon woodsi* Withers, 1951

Genus *Vectis* Withers, 1946
  *Vectis wrighti* Withers, 1946 *type*

Genus *Wilmingtonia* Wright & Collins, 1972
  *Wilmingtonia satyrica* Wright & Collins, 1972 *type*
Appendix 3.--Systematic arrangement of the genera within the Pithonotidae, as revised in this paper.

Family Pithonotidae Glaessner, 1933

Genus *Coelopus* Étallon, 1861
- *Coelopus bigoti* Hée, 1924
- *Coelopus etalloni* Collins and Wierzbowski, 1985
- *Coelopus hoheneggeri* (Moericke, 1889) as *Prosopon*
- *Coelopus jolyi* Étallon, 1861 \textit{type}
- *Coelopus pustulosus* (von Meyer, 1860) as *Pithonoton*
- *Coelopus tuberculatus* Lőrenthey and Beurlen, 1929

Genus *Eodromites* Patrulius, 1960
- *Eodromites grande* (von Meyer, 1857) as *Prosopon* \textit{type}

Genus *Goniodromites* Reuss, 1858
- *Goniodromites bidentatus* Reuss, 1858 \textit{type}
- *Goniodromites bourgeati* Van Straelen, 1925
- *Goniodromites complanatus* Reuss, 1858
- *Goniodromites dentatus* Lőrenthey and Beurlen, 1929
- *Goniodromites gibbosum* (Étallon, 1857) as *Prosopon* (*Pithonoton*)
- *Goniodromites globosum* (Remeš, 1895) as *Prosopon*
- *Goniodromites incisus* Van Straelen, 1925
- *Goniodromites laevis* (Van Straelen, 1940) as *Iberihomola*
- *Goniodromites polyodon* Reuss, 1858
- *Goniodromites revili* Van Straelen, 1925
- *Goniodromites scarabaeus* Wright and Wright, 1950
- *Goniodromites serratus* Beurlen, 1929
- *Goniodromites* sp. Feldmann et al., in press
- *Goniodromites* sp. Feldmann et al., in press
- *Goniodromites* sp. Feldmann et al., in press

Genus *Mesodromilites* Woodward, 1900
- *Mesodromilites birleyae* Woodward, 1900 \textit{type}

Genus *Microcorystes* Fritsch, 1893
- *Microcorystes parvulus* Fritsch, 1893 \textit{type}

Genus *Pithonoton* von Meyer, 1842
- *Pithonoton aequilatum* (von Meyer, 1857) as *Prosopon*
- *Pithonoton bouvieri* Van Straelen, 1944
- *Pithonoton campichei* (Tribolet, 1874) as *Prosopon*
- *Pithonoton cenomanense* Wright and Collins, 1972
Pithonoton depressum (von Meyer, 1857) as Prosopon
Pithonoton elongatum (von Meyer, 1857) as Prosopon
Pithonoton hungaricum Lörenthey and Beurlen, 1929
Pithonoton hypocrita Étallon, 1861
Pithonoton inflatum Collins et al., 1993
Pithonoton insigne (von Meyer, 1857) as Prosopon
Pithonoton katholickyi (Remeš, 1895) as Nodoprosopon
Pithonoton laevimarginatum Lörenthey and Beurlen, 1929
Pithonoton lingulatum (von Meyer, 1858) as Prosopon
Pithonoton marginatum (von Meyer, 1842) as Prosopon type
Pithonoton moutieri (Hée, 1924) as Prosopon
Pithonoton nitidus (A. Milne Edwards, 1865) as Ogydromites
Pithonoton obtusum (von Meyer, 1857) as Prosopon
Pithonoton planum Van Straelen, 1936
Pithonoton polyphemi (Gemmellaro, 1869) as Prosopon
Pithonoton quadratum (Étallon, 1858) as Prosopon
Pithonoton renevieri (Tribolet, 1876) as Prosopon
Pithonoton richardsoni (Woodward, 1907) as Prosopon
Pithonoton rostratum (von Meyer, 1840) as Prosopon
Pithonoton rusticum Patrulius, 1966
Pithonoton serratum (Beurlen, 1929) as Prosopon
Pithonoton simplex (von Meyer, 1837) as Prosopon
Pithonoton sp. Donovan, 1962
Pithonoton sp. Wright and Collins, 1972
Pithonoton sp. Feldmann et al., in press
Pithonoton sp. Ruiz de Gaona, 1943

Genus Plagiophthalmus Bell, 1863
Plagiophthalmus nitonensis Wright and Wright, 1950
Plagiophthalmus oviformis Bell, 1863 type
Plagiophthalmus pentagonalis Segerberg, 1900
Appendix 4.—Systematic arrangement of the genera within the Dynomenidae, as revised in this paper.

Family Dynomenidae Ortmann, 1892

<table>
<thead>
<tr>
<th>Genus</th>
<th>Author</th>
<th>Year</th>
<th>Type</th>
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<tbody>
<tr>
<td>Acanthodromia</td>
<td>A. Milne Edwards</td>
<td>1880</td>
<td>Acanthodromia erinacea A. Milne Edwards, 1880 type</td>
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<td>Acanthodromia margarita Alcock, 1899</td>
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<td>Acanthodialux</td>
<td>Schweitzer et al.</td>
<td>2003</td>
<td>Acanthodialux mclayi Schweitzer et al, 2003</td>
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<td>Cyamocarcinus</td>
<td>Bittner</td>
<td>1883</td>
<td>Cyamocarcinus angustifrons Bittner, 1883 type</td>
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<tr>
<td>Cycloprosopon</td>
<td>Lörenthey and Beurlen</td>
<td>1929</td>
<td>Cycloprosopon complanatifor (Moericke, 1889) as Prosopon</td>
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<td>Cycloprosopon dobrogea Feldmann et al., in press</td>
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<td>Cycloprosopon latum (Moericke, 1889) as Prosopon</td>
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<td>Cycloprosopon reussi (Gemmellaro, 1869) as Prosopon</td>
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<td>Cycloprosopon rotundum (Beurlen, 1925) as Prosopon</td>
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<td>Cycloprosopon tithonium (Gemmellaro, 1869) as Prosopon</td>
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<td>Cycloprosopon typicum Lörenthey and Beurlen, 1929 type</td>
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<td>Cyclothyreus sergipensis Beurlen, 1965</td>
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<td>Cyclothyreus strambergensis Remeš, 1895 type</td>
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<td>Bell, 1863</td>
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<td>Cyphonotus centrosa (Van Straelen, 1940) as Distefania</td>
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<td>Cyphonotus incertus (Bell, 1863) as Palaeodromites type</td>
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<td>Cyphonotus integrimarginatus Wright and Wright, 1950</td>
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<td>Cyphonotus himeraensis (Checchia-Rispoli, 1917) as Distefania</td>
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<td>Cyphonotus octodentatus (Milne-Edwards, 1869) as Palaeodromites</td>
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<td>Cyphonotus oxythyreiformis (Gemmellaro, 1869) as Prosopon</td>
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<td>Cyphonotus sicula (Checchia-Rispoli, 1917) as Distefania</td>
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<td>Cyphonotus transitorius (Remeš, 1895) as Oxythyreus</td>
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<td>Bell, 1863</td>
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<td>Diaulax oweni Bell, 1863</td>
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<tr>
<td>Dromiopsis</td>
<td>Reuss, 1859</td>
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</table>

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Dromiopsis birleyae Woodward, 1901
Dromiopsis coplandae Woodward, 1901
Dromiopsis depressa Segerberg, 1900
Dromiopsis elegans Reuss, 1859
Dromiopsis gibbosa Schlüter, 1879
Dromiopsis gigas Forir, 1887
Dromiopsis laevior Fischer-Benzon, 1866
Dromiopsis minor (Fischer-Benzon, 1866) as Dromia
Dromiopsis rugosa (Schlotheim, 1820) as Brachyurites type
Dromiopsis rugosa Schlotheim var. minor Fischer-Benzon, 1866
Dromiopsis ubaghsi Forir, 1889

Genus Dynomene Desmarest, 1823
Dynomene filholi Bouvier, 1894
Dynomene hispida Guérin-Méneville, 1832 type
Dynomene pilumnoides Alcock, 1900
Dynomene praedator Milne Edwards, 1879
Dynomene pugnatrix de Man, 1889

Genus Gemmellarocarcinus Checchia-Rispoli, 1905
Gemmellarocarcinus lőerentheyi Checchia-Rispoli, 1905 type

Genus Glyptodynomenae Van Straelen, 1944
Glyptodynomenae alsasuensis Van Straelen, 1944 type

Genus Graptocarcinus Roemer, 1887
Graptocarcinus texanus Roemer, 1887 type

Genus Hirsutodynomenae McLay, 1999
Hirsutodynomenae spinosa Rathbun, 1911 type
Hirsutodynomenae ursula Stimpson, 1860

Genus Maxillothrax Stebbing, 1921
Maxillothrax actaeformis Stebbing, 1921 type

Genus Metadynomene McLay, 1999
Metadynomene crosnier McLay, 1999
Metadynomene devaneyi Takeda, 1977 type
Metadynomene tanensis Yokoya, 1933

Genus Oxythyreus Reuss, 1858
Oxythyreus gibbus Reuss, 1858 type

Genus Paradynomene Sakai, 1963
Paradynomene tuburculata Sakai, 1963 *type*

New genus this paper

New genus *ettaloni* (Gemmellaro, 1869) as *Prosopon* *type*
Appendix 5.—Systematic arrangement of the genera within the Galatheinae, as revised in this paper.

Family Galatheidae Samouelle, 1819

*Acanthogalathea parva* (Müller and Collins, 1991) as Galathea *type*
*Acanthogalathea feldmanni* De Angeli and Garassino, 2002

Genus *Austromunida* Schweitzer and Feldmann, 2000
*Austromunida casadioi* Schweitzer and Feldmann, 2000 *type*

Genus *Eomunidopsis* Via Boada, 1981
*Eomunidopsis eminens* (Blaschke, 1911) as Galatheites
*Eomunidopsis eutecta* (Moericke, 1889) as Galatheites
*Eomunidopsis kojimai* Karasawa and Hayakawa, 2000
*Eomunidopsis limonitica* (Stenzel, 1945) as Galathea
*Eomunidopsis meerssensis* Collins et al., 1995
*Eomunidopsis meyeri* (Moericke, 1889) as Galatheites
*Eomunidopsis navarrensis* (Van Straelen, 1940) as Galathea *type*
*Eomunidopsis neojurensis* (Patrulius, 1960) as Galathea
*Eomunidopsis orobensis* (Ruiz de Gaona, 1943) as Galathea
*Eomunidopsis portlandica* Fraaye and Collins, 1996

Genus *Galathea* Fabricius, 1793
*Galathea berica* De Angeli and Garassino, 2002
*Galathea keiji* Karasawa, 1993
*Galathea mauritiana* Bouvier, 1915
*Galathea spitzbergica* Gripp, 1927
*Galathea squamifera* Leach, 1815
*Galathea strigifera* Fischer-Benizon, 1866
*Galathea strigosus* Linné, 1761 *type*
*Galathea valmaranensis* De Angeli and Garassino, 2002
*Galathea weinfurteri* Bachmayer, 1950
*Galathea* sp. Beschin et al., 2000
*Galathea* sp. Fabiani, 1910
*Galathea* sp. Feldmann, 1992
*Galathea* sp. Karasawa, 2000
*Galathea* sp. Moissette and Müller, 1990
*Galathea* sp. Solé and Via Boada, 1989

Genus *Lessinigalathaea* De Angeli and Garassino, 2002
*Lessinigalathaea regale* De Angeli and Garassino, 2002 *type*
Genus *Luisogalathea* Karasawa and Hayakawa, 2000
  *Luisogalathea cobbani* (Bishop, 1985) as *Galathea*
  *Luisogalathea cretacea* (Stenzel, 1945) as *Galathea*
  *Luisogalathea tomitai* Karasawa and Hayakawa, 2000 *type*

Genus *Mesogalathea* Houša, 1963
  *Mesogalathea striata* (Remeš, 1895) as *Galathea* *type*

Genus *Munida* Leach, 1820
  *Munida konara* Schweitzer and Feldmann, 2000
  *Munida primaeva* Segerberg, 1900
  *Munida quadroblonga* Schweitzer and Feldmann, 2000
  *Munida rugosus* (Fabricius, 1775) as *Pagurus* *type*
  *Munida* sp. Kato, 2001
  *Munida* sp. Takeda and Yamoaka, 1986

Genus *Palaeomunida* Lörenthey, 1902
  *Palaeomunida defecta* Lörenthey, 1902 *type*
  *Palaeomunida moesica* (Mutiu and Bădălătuă, 1971) as *Galathea* (*Palaeomunida*)
  *Palaeomunida multicristata* De Angeli and Garassino, 2002
  *Palaeomunida* n. sp. (Patrulius, 1966) as *Galathea* (*Palaeomunida*)
  *Palaeomunida* sp. (Mutiu and Bădălătuă, 1971) as *Galathea* (*Palaeomunida*)

Genus *Paragalathea* Patrulius, 1960
  *Paragalathea miyakoensis* Takeda and Fujiyama, 1983
  *Paragalathea multisquamata* Via Boada, 1981
  *Paragalathea neocomiensis* (Van Straelen, 1936) as *Galatheites*
  *Paragalathea ornatissima* (Patrulius, 1966) as *Galathea* (*Paragalathea*)
  *Paragalathea ruizi* (Van Straelen, 1940) as *Galathea*
  *Paragalathea straeleni* (Ruiz de Gaona, 1943) as *Galatheites*
  *Paragalathea substriata* (Blaschke, 1911) as *Galathea*
  *Paragalathea ubaghsi* (Pelseneer, 1886) as *Galathea*
  *Paragalathea verrucosa* (Moericke, 1889) as *Galatheites* *type*

Genus *Protomunida* Beurlen, 1930
  *Protomunida muninoides* (Segerberg, 1900) as *Galathea* *type*
  *Protomunida pentacantha* Müller and Collins, 1991

Genus *Spathagalathea* De Angeli and Garassino, 2002
  *Spathagalathea minuta* De Angeli and Garassino, 2002 *type*