New galatheid anomuran (Crustacea, Decapoda) coprolites from the Rhetian of Provence, southern France.

by

P. Brönnimann [1], J.-P. Caron [2] and L. Zaninetti [3]

Anschriften:

1) Laboratoire de Paléontologie, 13, rue des Maraîchers, Genève.
2) Laboratoire de Paléontologie, 13, rue des Maraîchers, Genève.
3) Laboratoire de Paléontologie, 13, rue des Maraîchers, Genève.

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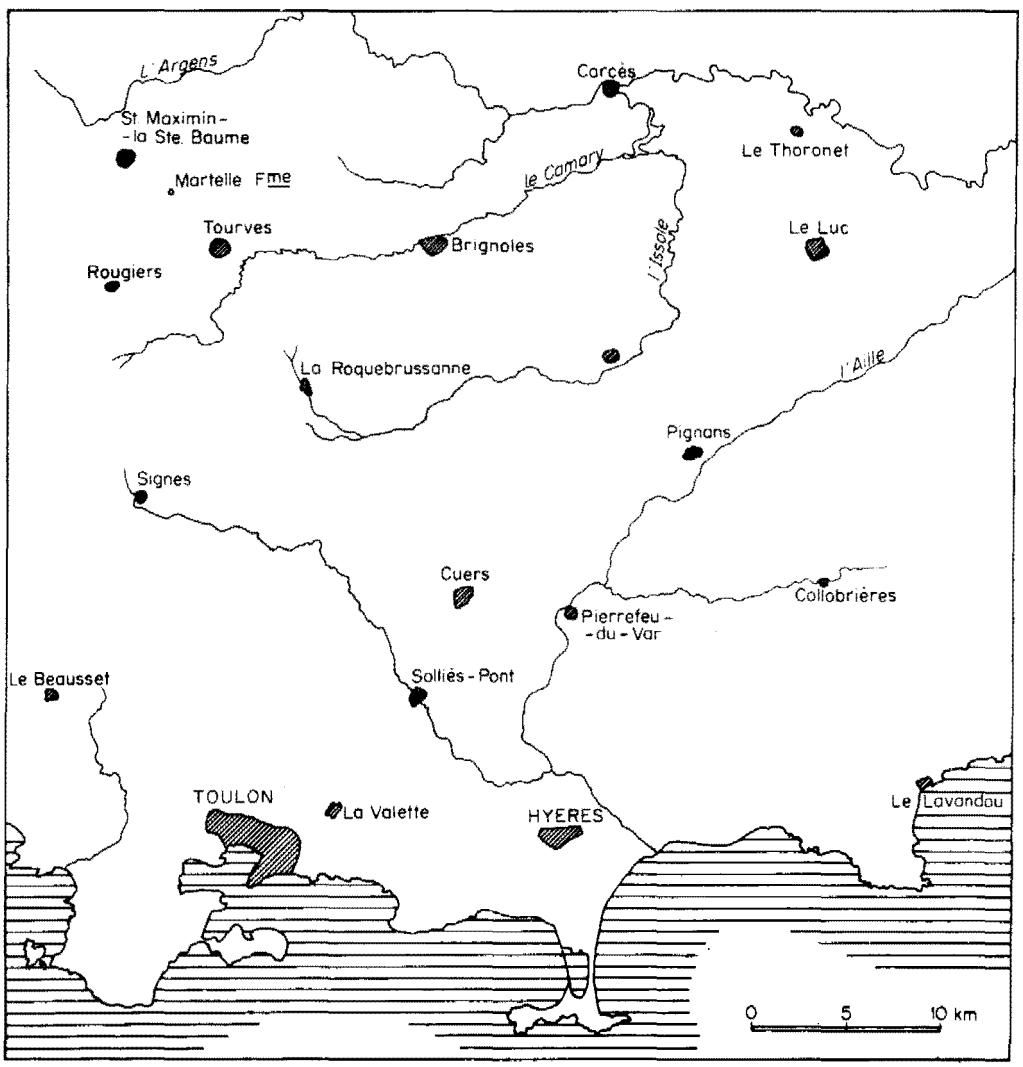


Text-figure 1

Map showing the geographic situation of Le Thoronet.

Summary

The new galatheid anomuran coprolite form-genus *Thoronetia* BRÖNNIMANN, CARON and ZANINETTI with 3 form-species *Th. quinaria,* n. sp., *Th. alata*, n. sp. and *Th. didymos,* n. sp., are described. These coprolites occur in Rhetian limestones of Provence, southern France, where they are associated with *Parafavreina thoronetensis* BRÖNNIMANN, CARON and ZANINETTI, 1972. They are distinguished from thalassinid coprolites by the presence of a ventral cap of densely packed fine-grained material.

BRÖNNIMANN, CARON and ZANINETTI (1972) described in a previous note the thalassinid fecal pellet *Parafavreina thoronetensis* from Rhetian limestones outcropping in a quarry at Thoronet, about 59 km NNE of Toulon, France (text-fig. 1). The autors noticed in the thin sections besides the predominant *P. thoronetensis* characterized by longitudinal canals of isosceles triangular cross sections and rare *Glomospirella* aff. *friedli* Kristan-Tollmann (pl. 2, fig. 6) several different and new fecal pellets with a dark ventral band and longitudinal canals of rounded cross section. According to MOORE (1932) fecal pellets of the anomuran tribes Galatheidea and Thalassinidea are pierced by longitudinal canals, but only the Galatheidea carry a longitudinal band in the ventral portion of the normally rod-like pellet. This so-called ventral cap is formed by finer-grained material issued from the ventral tract of the stomach. In cross sections of fossil pellets it shows up ventrally as a thin strip of denser texture and is therefore normally darker than the rest of the cross section. Thalassinid pellets, on the other hand, are devoid of such a ventral cap hence of the same consistency throughout. The coprolites described in this note belong all to the Galatheidea and represent a new form-genus for which the name *Thoronetia* BRÖNNIMANN, CARON and ZANINETTI is proposed.

The finer-grained and apparently denser packed material of the ventral cap seems to be more resistant to abrasion than the central and dorsal portion of the coprolite. These parts of the pellet are therefore more often worn away than the ventral cap. This naturally affects also the dorsally situated longitudinal canals which are more often destroyed through friction than the ventrally situated ones protected by the ventral cap (text-fig. 2 D, 3 F, G, L, M, 4 D, E, F, G). In the galatheid peletts dorsal and ventral sides are defined in the cross sections by the position of the ventral cap. In the thalassinid forms these terms are used with reservation. But it was noticed that also in the texturally homogeneous thalassinid pellets the „dorsal" side is more often worn than the „ventral" side (BRÖNNIMANN, CARON and ZANINETTI, 1972).

Order Decapoda (Anomura)
Tribe Galatheidea
Genus *Thoronetia*
Brönnimann, Caron and Zaninetti, n. gen.

Genotype:

Thoronetia quinaria BRÖNNIMANN, CARON and ZANINETTI, n. sp.

Definition:

The galatheid coprolite form-genus *Thoronetia*, n.gen., is represented by rod-shaped bodies carrying a „ventral cap" of denser texture than the rest of the coprolite. These fecal pellets are pierced by longitudinal canals of subcircular to tear-shaped cross section.

Remarks:

Thoronetia, n. gen., is distinguished from *Favreina* BRÖNNIMANN, 1955, by the presence of a ventral cap of variable form and size.

Stratigraphic occurrence:

Rhetian.

Thoronetia quinaria BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Pl. 1, Fig. 1–5, 7–10. Text-fig. 2 A–M.

Synonymy:

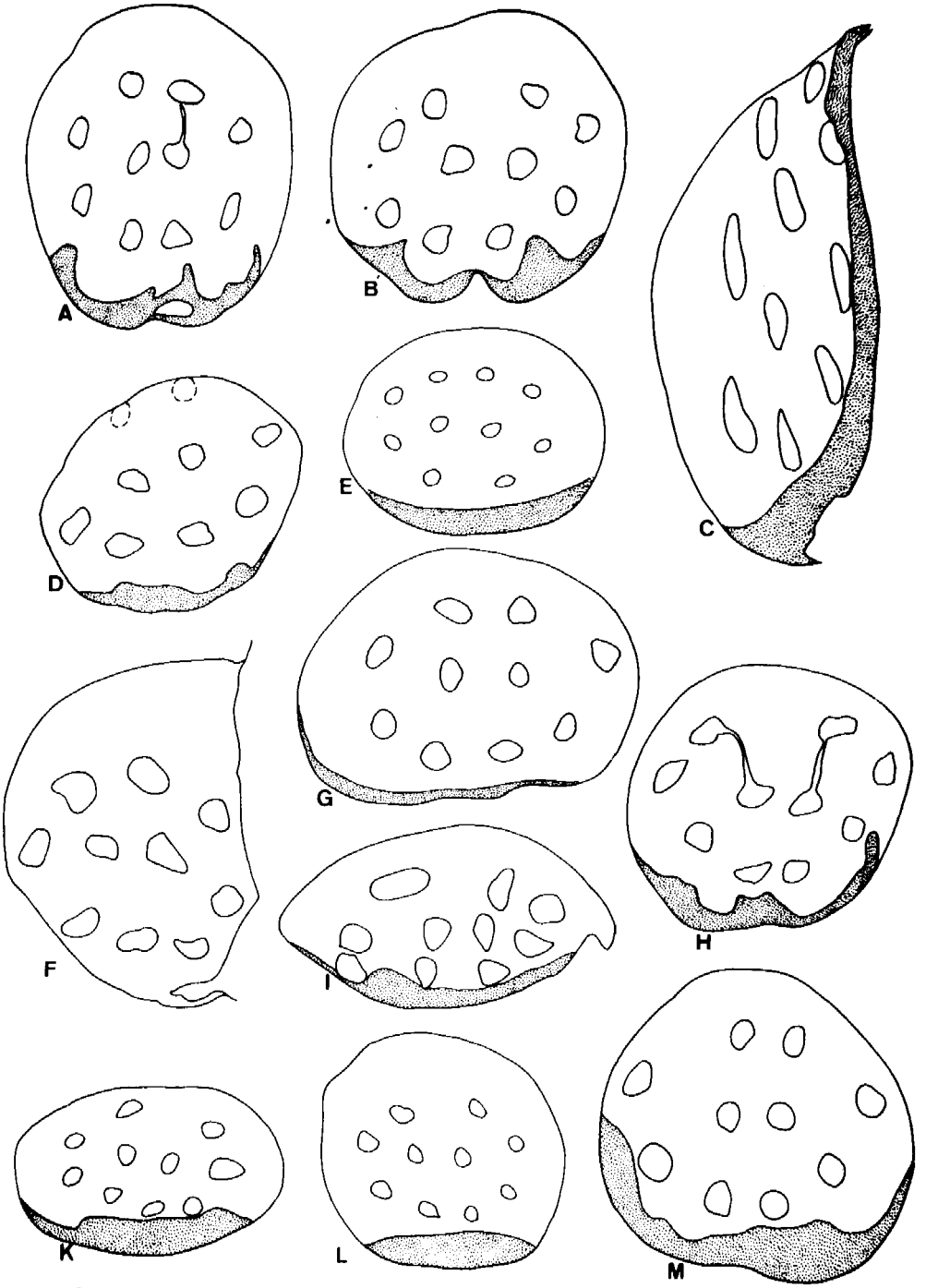
1972. *Thoronetia quinaria* BRÖNNIMANN, CARON and ZANINETTI, p. 101, text-fig. 1(5).

Description of holotype:

We designate as holotype of *Thoronetia quinaria*, n.sp., the transverse section of the coprolite illustrated by pl. 1, fig. 1, and by text fig. 2 H. It is from Caron sample R9H-12.34, Rhetian limestones outcropping in the quarry at Thoronet, Provence, southern France.

The maximum height of the cross section in the plane of bilateral symmetry is about 305μ and its maximum width about 320μ. It shows ventrally a dark fine-grained band, the ventral cap, with an irregular limit toward the center of the coprolite. This irregular boundary may be either the result of differential recrystallization or it may represent the original boundary between ventral cap and the rest of the coprolite. The overall outline of the cross section is subcircular, convex dorsally and flat to faintly centrally grooved on the ventral side.

The longitudinal canals are arranged in 2 bilaterally symmetric groups each with 5 canals of irregularly rounded cross section. Patch-like recrystallization of the lumina of the longitudinal canals are frequently masking the original subcircular cross sections of the canals. The longitudinal canals are disposed in each group in an inner series of 3 canals



Text-figure 2

Thoronetia quinaria BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. A, C, E, G, H, I, K, L Caron sample R9H-12.34
Fig. B, D, F, M Caron sample R9H-12.30
All figures appr. 160 x.
Holotype: Fig. H.

aligned somewhat obliquely in respect to the plane of symmetry, and an outer series of 2 canals. The central and the dorsal canal of the inner series of both groups are interconnected by a fissural space. The diameters of the canals are from about 20 to 30μ and they seem to be all more or less equal in diameter.

Stratigraphic occurrence:

Rhetian.

Remarks :

The photographs of pl. 1, fig. 1–5 and 7–10, and the drawings of text-fig. 2, convey a good idea of the variability of *Thoronetia quinaria*, n. sp. The distribution of the longitudinal canals and their cross sections are throughout similar to the holotype. Also in deformed coprolites („microboudinage-effect"), number and disposition of longitudinal canals are preserved. The ventral cap is throughout present and in some instances has a lenticular shape as in the specimens illustrated by pl. 1, fig. 2 and 8. The ventral cap can also be discerned in the deformed cross sections shown in pl. 1, fig. 4, 5 and 9 and in text-fig. 2 C, I. The ventral side of the cross sections is centrally occasionally grooved (pl. 1, fig. 7; text-fig. 2 A, B) and it seems that this feature is at least in this species taxonomically not significant. It has further been noticed, that interconnection of longitudinal canals through fissural spaces is restricted to the central and dorsal canals of the inner series as observed in the holotype (text-fig. 2 A).

Palik (1965, p. 100; pl. 1, fig. 6 and pl. 2, fig. 8) described from the Lower Cretaceous of Hungary under the name of *Favreina dispentochetarius* a new coprolite form-species of subcircular cross section of 200 to 250μ maximum diameter with 2 bilaterally symmetric groups of 5 longitudinal canals each. The cross sections of the canals are subcircular and of unequal diameter. *F. dispentochetarius* differs from *Thoronetia quinaria* not only in this feature but also in respect to the somewhat unequal disposition of the canals in each group. Palik' specimens do not exhibit traces of a ventral cap and appear to be strongly recrystallized hence their attribution to *Favreina* is only accepted with reservation.

Much closer in cross section and disposition of the longitudinal canals to *Thoronetia quinaria*, n. sp., is the specimen of a coprolite illustrated by ELLIOTT (1962, pl. 3, fig. 5 center) from the Lower Miocene Lower Serikagni formation, Injanah well no. 5, Diyala Liwa, Iraq, and erroneously assigned to *Favreina asmarica* Elliott, 1962. ELLIOTT (1962, p. 36) did not define a holotype of *Favreina asmarica* but based his description on syntypes illustrated by his pl. 4, fig. 1 and 2 from the Middle Miocene Upper Asmari formation, Asmari Mountain, Masjid-i-Sulaiman, Iran. According to ELLIOTT's definition *F. asmarica* possesses 16 longitudinal canals of favreine cross section disposed in 2 bilaterally symmetric groups of 8 canals which again may be grouped in 2 subgroups of 4 canals each. We select herewith from the syntypic series of specimens shown in ELLIOTT's pl. 4, fig. 1, as a lectotype of *Favreina asmarica* the transverse section of the pellet illustrated in the center left of fig. 1. The cross sections and oblique sections of pl. 4, fig. 1 and 2 do not exhibit a ventral cap and the assignment of these pellets to the thalassinid form-genus *Favreina* seems to be justified.

Favreina asmarica as herewith being lectotypified shows clear-cut differences in the number and arrangement of the longitudinal canals of favreine type with the specimen figured by ELLIOTT (1962) in the center of pl. 1, fig. 5 from Iraq. It is devoid of a ventral cap and characterized by 2 bilaterally symmetric groups of longitudinal canals with 5 canals in each group disposed essentially as in *Thoronetia quinaria*, n. sp., hence specifically different from *Favreina asmarica*. It cannot be placed in *Thoronetia* because it seems to lack the ventral cap. It most probably represents a new species of the thalassinid form-genus *Favreina* BRÖNNIMANN. As in all coprolite form-species a new species name should only be introduced on the basis of a numerous material. Should the re-examination of ELLIOTT's original material from the Lower Serikagni formation show that this pellet possesses a ventral cap then it would have to be placed in *Thoronetia* and possibly in synonymy with *Th. quinaria*, n.sp. The pellets of *Th. quinaria* are often deformed and worn. The dorsal portion of the pellet is more often abraded hence made of softer material than the ventral cap. A cross section showing dorsal and lateral wear whereby longitudinal canals have been destroyed is illustrated by text-fig. 2 D. *Thoronetia quinaria*, n. sp., is associated with *Parafavreina thoronetensis* BRÖNNIMANN, CARON and ZANINETTI, *Thoronetia alata*, n. sp. and *Thoronetia didymos*, n. sp. The galatheid species are not as common as *P. thoronetensis*. A single specimen of *Glomospirella* aff. *friedli* KRISTAN-TOLLMANN has been found in a thin section containing *Th. quinaria*. *Thoronetia quinaria*, n. sp. differs from *Th. didymos*, n. sp., and *Th. alata*, n. sp., by the overall shape of the cross section of the pellet and by the different disposition and number of the longitudinal canals.

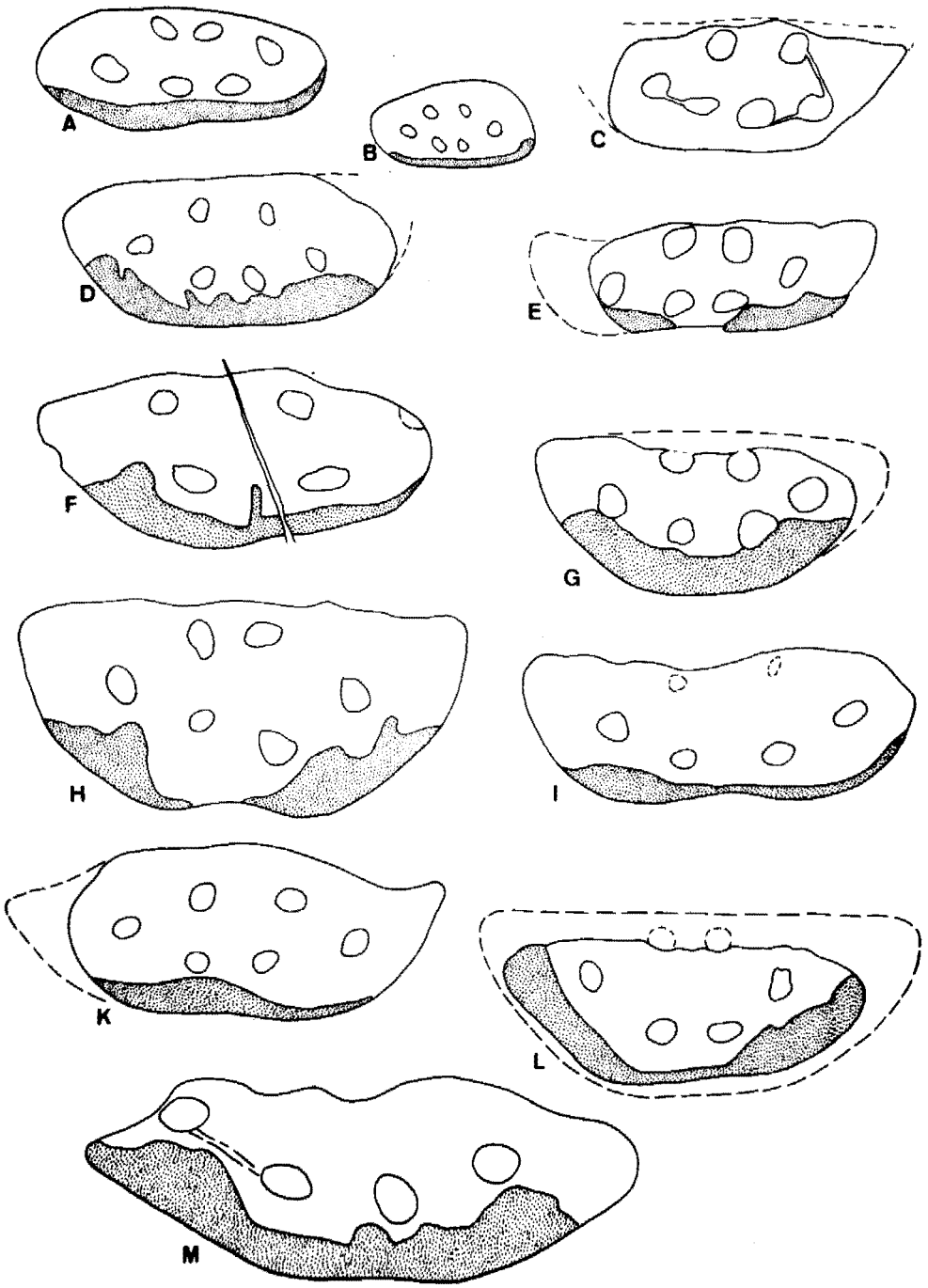
Stratigraphic occurrence:

Rhetian.

Thoronetia alata BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Pl. 2, Fig. 1–7, 10, Text-fig. 3 A–M; 4 A–G.

Description of holotype:

We designate as holotype of *Thoronetia alata*, n. sp., the cross section of the specimen illustrated by pl. 2, fig. 1, and by text-fig. 2 D. It is from sample R9H-12.34 collected by Caron from Rhetian limestones outcropping at Thoronet, Provence, southern France. The specimen is slightly worn, in particular the alar extensions are incomplete, peripherally rounded. The cross section is dorso-ventrally strongly compressed. The tips of the alar extensions are dorsally directed. The convex ventral side is flat over its middle portion. The dorsal side is weakly convex and exhibits an irregular outline which is the result of abrasion. The height of the coprolite in the plane of bilateral symmetry is about 160μ and its width about 360μ. The 6 longitudinal canals with maximum diameters of about 40μ are in 2 bilaterally symmetric groups of 3 canals each. Each group is composed of 2 canals aligned in an inner series parallel to the plane of symmetry and a single central canal about half way between the inner series of canals and the tip of the alar extension. There are in the holotype no interconnecting fissural spaces between longitudinal canals. The lumina of the canals are recrystallized. The ventral cap of finer and dense material is well developed and shows an irregular limit toward the rest of the coprolite which is more



Text-figure 3

Thoronetia alata BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. A Caron sample R9H-12.40.

Fig. B, D, H Caron sample R9H-12.34.
Fig. C, E, F, G, I, K, L, M Caron sample R9H-12.30.
All figures about 160 x.
Holotype: Fig. D.

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coarsely textured. This irregular line between fine grained cap and coarse grained body of the coprolite is either a normal boundary or it is the result of differential recrystallization.

Remarks:

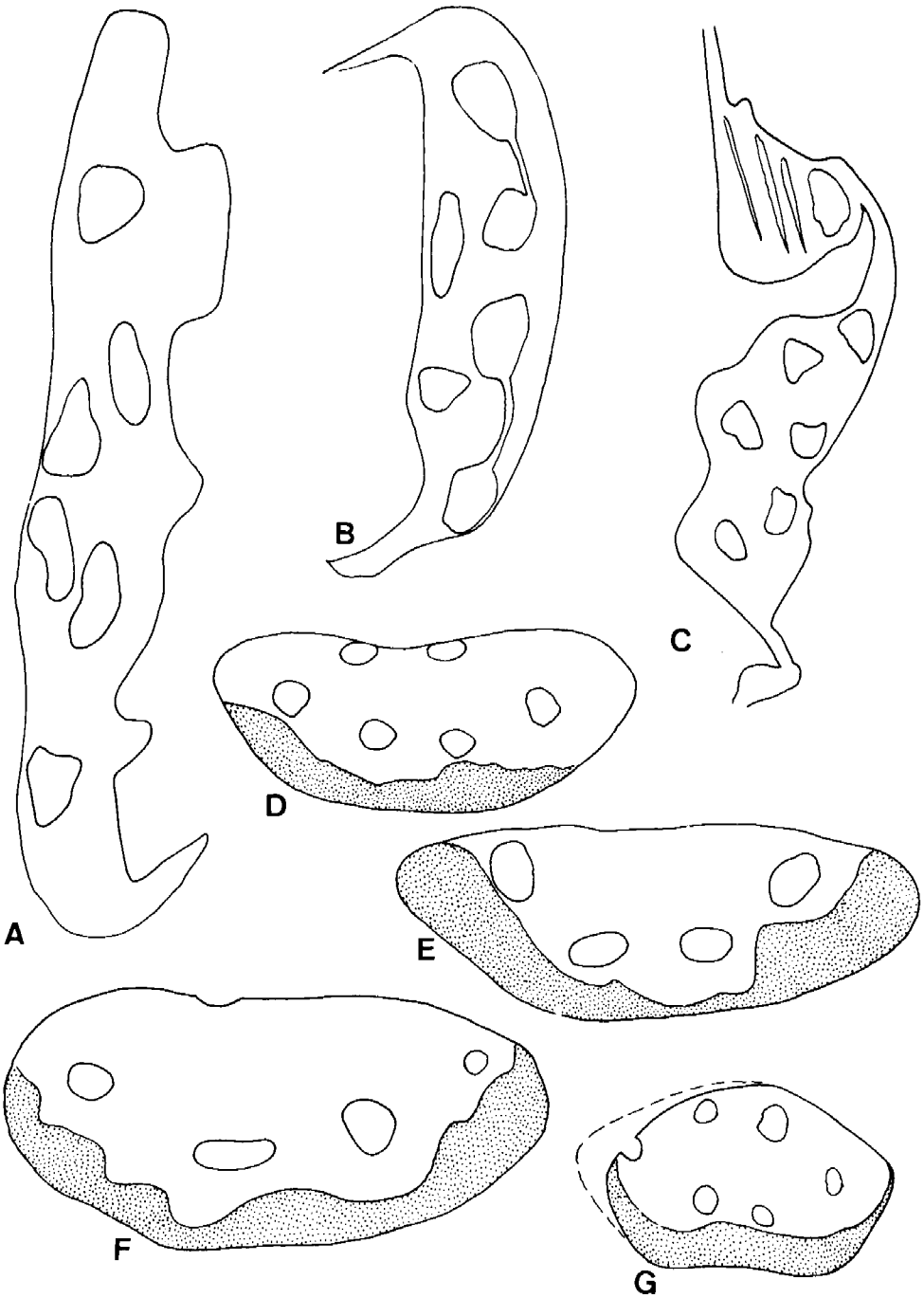
The dimensions of the cross section of *Thoronetia alata*, n. sp., may vary considerably. The holotype is representative of the average dimension of this form-species. Larger specimens are illustrated by text-fig. 3 H and M. They are up to 250μ in height and up to 600μ in width. A small but strongly abraded specimen without alar prolongations text-fig. 3 B, is about 80μ in width and 100μ in height. In contrast to the thalassinid *Parafavreina thoronetensis* BRÖNNIMANN, CARON and ZANINETTI, the number of the longitudinal canals is invariably 6 in the smallest and largest individuals.

Also in *Th. alata*, n. sp., the ventral cap with its firmer material protects the ventral side of the pellet against abrasion. Alar projections and dorsal portion being of softer material than the ventral cap they are more readily attacked and abraded so that many oval cross sections occur as the ones shown by text-fig. 3 B and cross sections without the dorsal canals as those illustrated by pl. 2, fig. 5, 6 and by text-fig. 3 L, M, and 4 E, F. Occasionally the coprolite is more or less strongly abraded on one side only as illustrated by pl. 2, fig. 3 and by text-fig. 3 C, E and F. The longitudinal canals of the specimen illustrated by pl. 2, fig. 4 and text-fig. 3 C are interconnected by fissural spaces in such a way that the dorsal and ventral canals of the inner series connect with the single central canal situated midway toward the alar extension. „Microboudinage" type deformation occurs quite commonly in our material (pl. 2, fig. 7,9, text-fig. 4 A, B, C.). Even under extreme deformation the number and the disposition of the canals remain intact. The ventral cap is also in deformed specimens normally preserved and stands out by its darker and denser material. In some rare cross sections, such as the one illustrated by pl. 2, fig. 4, recrystallization has obliterated the ventral cap.

Thoronetia alata n. sp., is associated with rare *Th. didymos*, n. sp., *Th. quinaria*, n. sp., and with common *Parafavreina thoronetensis*. It differs from the also dorso-ventrally compressed alate *Th. didymos*, n. sp., by the number and arrangement of the longitudinal canals and from *Th. quinaria*, n. sp., by the different overall outline of the coprolite in cross section and by the different number and arrangement of the longitudinal canals.

Stratigraphic occurrence:

Rhetian.



Text-figure 4

Thoronetia alata BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. A, B, E, F, G Caron and sample R9H-12.30.
Fig. C, D Caron sample R9H-12.34.
Fig. A, B and C: specimens secondarily deformed.
All figures appr. 160 x.

Thoronetia didymos BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Pl. 2, Fig. 8a. Text-fig. 5 A–L.

Description of holotype:

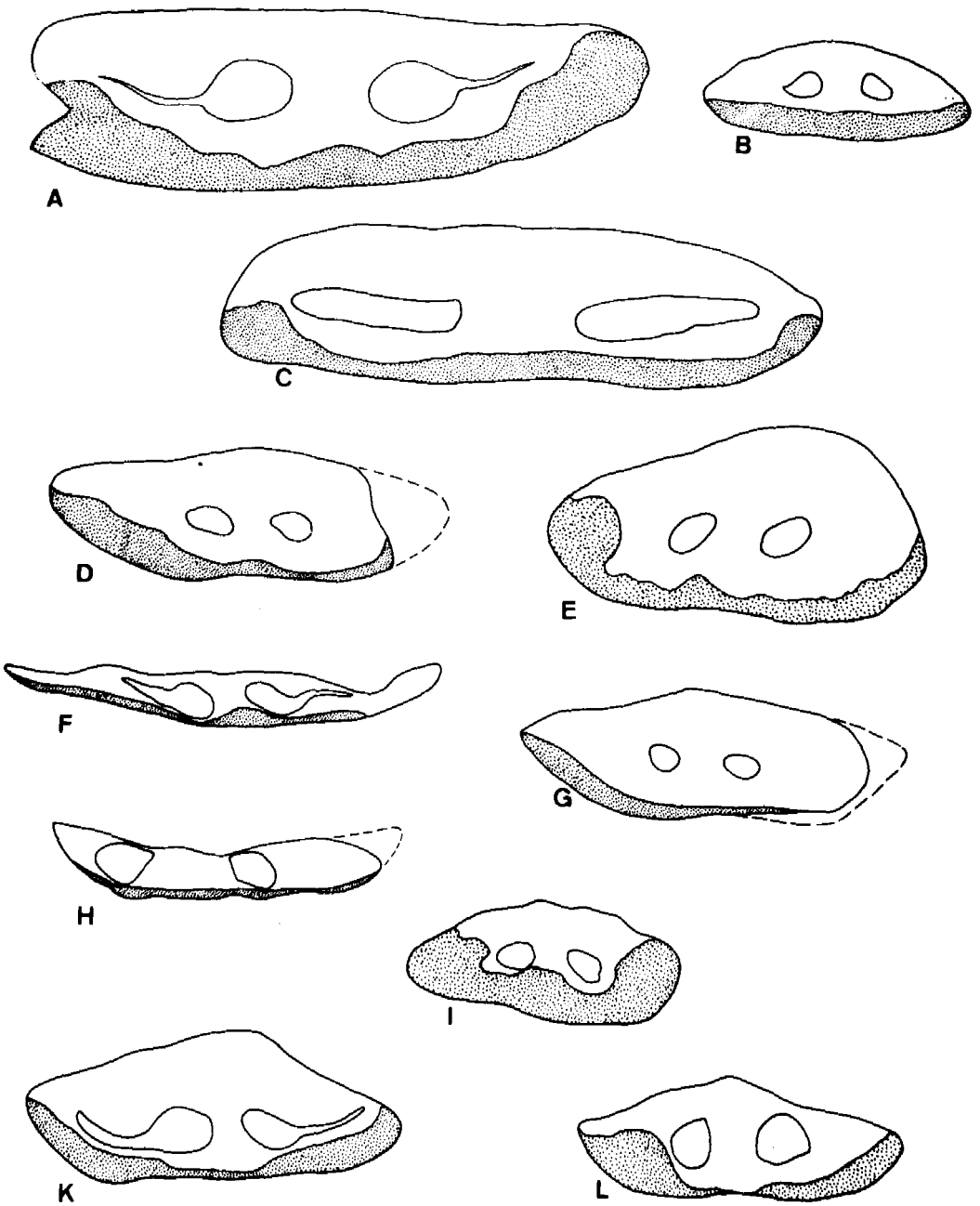
We select as holotype of *Thoronetia didymos*, n. sp., the cross section of the pellet illustrated by pl. 2, fig. 8 and by text-fig. 5 A. It is from CARON sample R9H-12.34, Rhetian limestones outcropping in the quarry at Thoronet, Provence, southern France. The large-sized specimen is incomplete. The left alar extension is missing. The transverse cut is dorso-ventrally strongly compressed, flat dorsally and convex ventrally. Its height in the plane of symmetry is about 185μ and its width about 600μ +. The coprolite is pierced by 2 bilaterally symmetric large sized longitudinal canals of subcircular cross section which toward the alar portions extend thin lines representing fissural spaces. The canals are rather close to the plane of bilateral symmetry and their lumina are strongly recrystallized. The maximum diameter of the canals is about 80μ. The ventral cap is finer-textured than the main body of the coprolite. The boundary between ventral cap and main body of the coprolite is irregular possibly due to recrystallization.

Remarks:

As in the case of *Th. alata*, n. sp., also *Th. didymos*, n. sp., varies widely in dimension. An average-sized specimen is illustrated by text-fig. 5 K. It is about 145μ in height and 344μ in width. A small laterally apparently strongly worn specimen is illustrated by text-fig. 5 D. It is about 100μ in height and 290μ in width. The number of longitudinal canals however remains constant independent of the size of the coprolite. The ventral cap is present throughout. „Microboudinage"-type deformation is quite common (text-fig. 5 F, H). Abraded specimens are frequent. They show the effect of wear essentially on the dorsal side and on the alar extension. *Th. didymos*, n. sp., differs from *Th. quinaria*, n. sp., and *Th. alata*, n. sp., by the number and disposition of the longitudinal canals. It differs from *Th. quinaria* also by the dorso-ventrally compressed elongate alate cross section. *Th. didymos*, n. sp., is in our material from Thoronet associated with rare *Th. alata*, n. sp., and *Th. quinaria*, n. sp., and abundant *Parafavreina thoronetensis* BRÖNNIMANN, CARON and ZANINETTI, 1972.

Stratigraphic occurrence:

Rhetian.



Text-figure 5

Thoronetia didymos BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. A, H Caron sample R9H-12.34.

Fig. B, C, D, E, G, I, L Caron sample R9H-12.30.
Fig. F, K Charollais sample 103.
Holotype: Fig. A.
Fig. F. H: specimens secondarily deformed.
All figures appr. 160 x.

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Explanation of the plates

Plate 1 Fig. 1–5, 7–10 *Thoronetia quinaria* BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. 1–4, 7, 9 approx. 150 x.
Fig. 5, 10 approx. 60 x.
Holotype: Fig. 1
Fig. 1, 2, 3, 4, 5, 8, 10 Caron sample R9H-12.34.
Fig. 7 Caron sample R9H-12.30.
In fig. 2 is on the left a specimen of *Parafavreina thoronetensis* BRÖNNIMANN, CARON and ZANINETTI, and in fig. 10 in the center a specimen of *Thoronetia alata*, n. sp. The specimens of *Thoronetia quinaria*, fig. 5 and 6 are strongly deformed but show number and disposition of the longitudinal canals typical of this form-species.
Fig. 6 *Glomospirella* aff. *friedli* KRISTAN-TOLLMANN (small specimen) Approx. 150 x. Caron sample R9H-12.34.

Plate 2 Fig. 1–7, 10 *Thoronetia alata,* BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. 1, 2, 4–7, 10 approx. 150 x.
Fig. 3 approx. 120 x.
Holotype: Fig. 1. BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Fig. 3, 4, 5, 6, 10 Caron sample R9H-12.30
The specimens illustrated by fig. 7, 10 show the „microboudinage"-type of deformation. Number and disposition of the longitudinal canals are preserved. The lumina of the canals however are strongly recrystallized and somewhat obliquely cut.
Fig. 8, 9 *Thoronatia didymos* BRÖNNIMANN, CARON and ZANINETTI, n. sp.
Holotype: Fig. 8
Caron sample R0H-12.34.
Approx. 150 x.
Fig. 9 Charollais sample 103, from the same locality as Caron sample R9H-12.34.
Approx. 120 x.

Plate 1

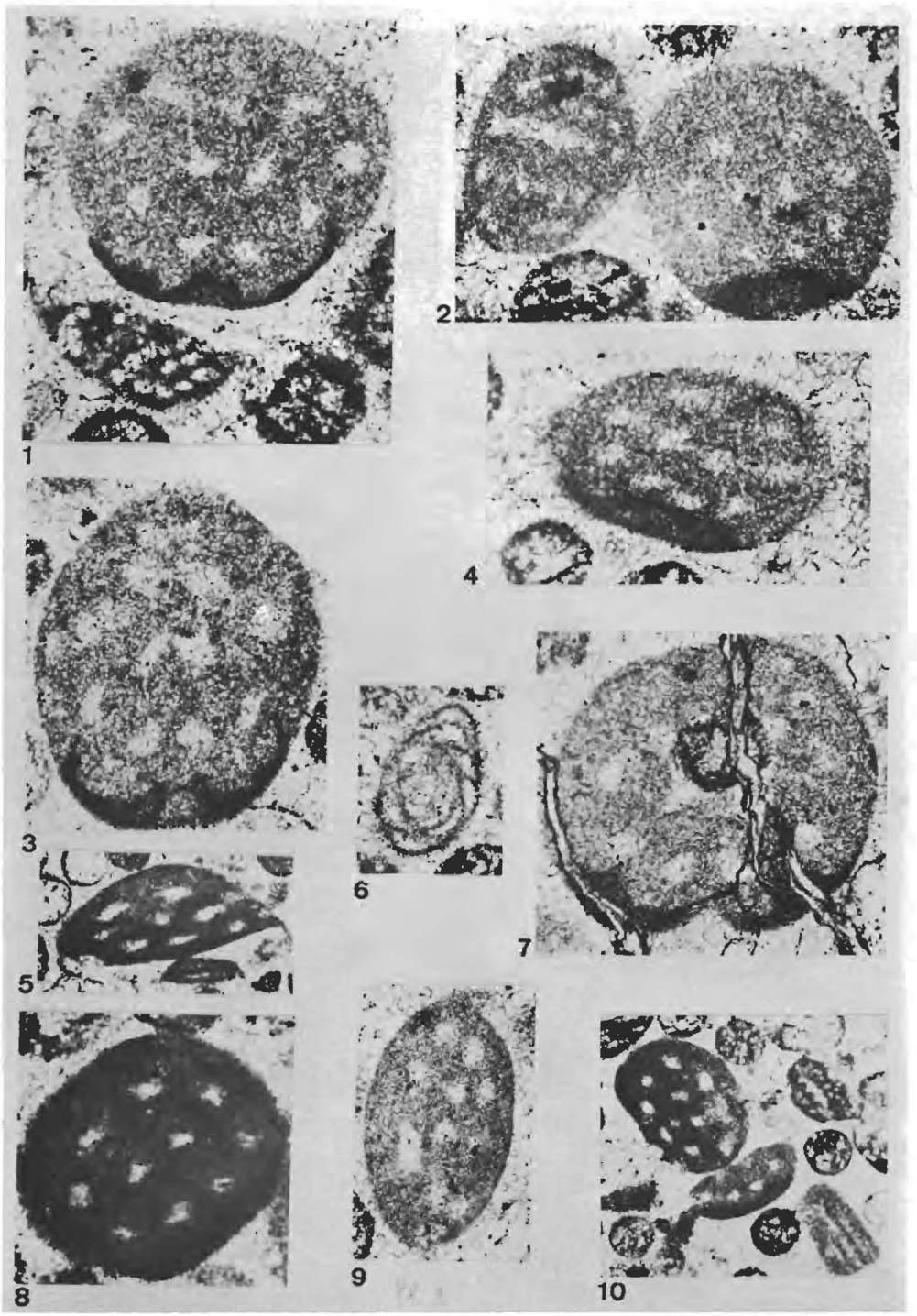

Plate 2