

# Determination tables for the small gastropods from the Paris Basin Eocene

## XI - The family MARGINELLIDAE

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**ANALYTICAL SUMMARY** - The 35 species of Marginellidae from the Eocene of the Parisian Basin are divided into their genera and subgenera; they are subject of dichotomical determination tables, with systematic figures and critical taxonomic comments. The localities and stratigraphical distribution of each species are stated. A new species, Marginella (Stazzania) pseudovolvarina, and a new subspecies, Marginella (Volvarina) bouryi supraeocaenica, are described and illustrated. One variety is raised to the rank of species, Gibberula spirata, and another to the rank of subspecies, Marginella (Stazzania) eburnea pentaptycta. The Species Marginella (Glabella) allixi is reported in the Parisian Basin for the first time.

### I - INTRODUCTION

The family Marginellidae (Neogastropoda) consist of shells with a siphonal canal. Its representatives from the Paris Basin Eocene are usually small, not exceeding 15 mm in height (average height 4-10 mm, while the recent tropical species are larger, to a few centimeters). The last whorl is generally very large in proportion to the spire. The suture is shallow and often inconspicuous, filled by inductura (glossy enamel covering all of the shell exterior). There is never spiral ornamentation, nor, except in one species, axial ornamentation. The siphonal canal is very short, and, a family characteristic, at least 4 columellar folds are always present.

Present malacologists divide the recent species into a rather great number of genera and subgenera, sometimes founded not only on the shell morphology but also in the characteristics such as radula, sexual organs and other anatomical parts. Our table of determination for the genera and subgenera has been founded through conchological characteristics, for it is not possible to accede to soft parts in Paleontology. There are only few generic taxa in the Parisian Eocene, and we can divide the 35 species into: two genera, Gibberula (9 species) and Persicula (4 species); and 3 subgenera of Marginella, i.e. Stazzania (16 species), Volvarina (3 species) and Glabella (3 species). Each of these taxa is subject of a separate determination table. Of the 35 studied species (of wick none is of the genus Marginella sensu stricto), 31 species are illustrated in the "Iconographie complète" of Cossmann & Pissarro; 2 species were described from the Basin of Nantes, Persicula deutzenbergi and Marginella allixi, but we found them also in the Paris Basin; one species, Marginella morelletorum, has been described and illustrated previously (Gougerot & Brailon, 1968 : 196); and a new species, Marginella pseudovolvarina, is described herein.

Several species, in particular within Stazzania and Gibberula are difficult to differentiate, because they differ only by the shape of their outline. Above all, inbetween the extreme morphotypes, exist transitional specimens of dubious classification, wick may lead to doubt the validity of some so called species. However, we have kept these morphotypes separate

in the tables, pointing out the eventual existence of transitional forms.

Some specimens, in particular from Villiers-Saint-Frédéric, still show remains of their original colour pattern, which seems to be constant for each species. The colours disappear quickly by the presence of light.

We have found sinistral specimens in 4 species; this indicates a relatively high degree of occurrence of this particularity.

As in the preceding notes of the series, we will now indicate the most important localities from which comes our Marginellidae material; the names of the departments shall not be repeated in the article.

- CUISIAN: Cuise-la-Motte (Oise); Hérouval (near Montjavoult, Oise); Liencourt-Saint-Pierre (Oise).
- LUTETIAN: Chaussy (Val-d'Oise); Damery (Marne); Fercourt (near Mouchy-le-Chatel, Oise); Ferme-de-l'Orme (Yvelines); Fontenay-Saint-Père (Val-d'Oise); Frileuse (near Beynes, Yvelines); les Groux (near Liencourt-Saint-Pierre, Oise); Montchauvet (Yvelines); Montmirail (Marne); Parnes (Oise); Réquiécourt (Near Cahaignes, Eure); Saint-Lubin-de-la-Haye (Eure-et-Loir); Thionville-sur-Opton (Yvelines); Vaudancourt (Oise); Villiers-Saint-Frédéric (Yvelines).
- UPPER LUTETIAN (= "BIARRITZIAN"): Le Bois Gouët (Loire-Atlantique).
- AUVERSIAN (= LOWER BARTONIAN): Attainville (Val d'Oise); Auvers-sur-Oise (Val d'Oise); Barisseuse (Oise); Baron (Oise). Ermenonville (Val-d'Oise); Le Guépelle (near Saint-Witz, Val d'Oise); Ronquerolles (Val d'Oise); Ver-sur-Launette (Val d'Oise).
- MARINESIAN (= UPPER BARTONIAN): Chars (Val d'Oise); Chavençon (Val d'Oise); Monneville (Val d'Oise).

II DETERMINATION TABLE FOR THE GENERA AND SURGENERA OF MARGINELLIDAE

- 1 (2) Spire completely covered by a callus starting from the top of the outer lip; outer lip internally crenulated. (These characteristics apply only to adult specimens; juveniles can have an incompletely covered spire, but the calus, although sometimes incomplete, is always present) .....G. Persicula Schumacher
- 2 (1) Spire not covered by a callus; the first whorls are always visible, even when the spire is only slightly elevated.....3 (6)
- 3 (6) Presence of a more or less developed fasciole, i.e. "a callous like spiral band, starting from the 2<sup>nd</sup> or 3<sup>rd</sup> columellar fold, and winding round the siphonal canal, thus ending at the margin of the outer lip, on the backside" (from Cossmann, defining the french word "limbe"). Oval egg-shaped form, with a slightly or very slightly elevated spire.....4 (5)
- 4 (5) Fairly broad and sharply bordered fasciole. Presence of a curvature (notch) at the end of the siphonal canal. Adult specimens with the edge of the outer lip thickened and lirate (or crenulate) 1)a).....G. Gibberula Swainson
- 5 (4) Only a weak narrow fasciole present. Total absence of curvature

a) For the text-notes is referred to page 40 and 41

at the end of the siphonal canal. Outer lip margin thickened, interiorly smooth, neither crenulate nor lirate.....  
.....G. Marginella Lmk., subg. Glabella Swainson

6 (3) No fasciole at all. Outer lip interior never crenulate nor lirate.  
No curvature present in the siphonal canal.....7 (8)

7 (8) Almost biconical, with a clearly elevated spire (sometimes fairly blunt). Outer lip interior edge thickened and pronounced by a denticle like protrusion. The 2 posterior columellar folds are not or slightly oblique. With 3 exceptions, the proportion of the aperture height to the total height is smaller or equal to 2/3  
.....G. Marginella Lmk., subg. Stazzania Sacco

8 (7) Last whorl cylindrical, spire short; aperture very high (more than 3/4 of total height). Sides of aperture parallel. Thickening of the outer lip weak or null. All the columellar folds narrow, sharp and oblique.....G. Marginella Lmk., subg. Volvarina Hinds

COMENTS ON GENERIC DIVISIONS - The above determination table shows the difficulty to separate the different genera. Let us therefor specify 2 examples.

1) Thiele made Gibberula a subgenus of Persicula because of the likeness of the radula. Cossmann made it a subgenus of Cryptospira because of the presence of a fasciole. He regarded Cryptospira as a genus; while Thiele (again considering the radula), made Cryptospira a subgenus of Marginella. In the Paris Basin, we consider Gibberula as a genus, well characterised conchologically.

2) We have included Marginella entomella Cossmann into the subgenus Stazzania (species considered by Cossmann as a Marginella s.s.), because the differences do not seem sufficient to us: its anterior columellar folds are only less oblique than in other Stazzania (thus, to our meaning, there does not exist any Marginella sensu stricto in the Paris Basin Eocene).

III - DETERMINATION TABLE FOR THE GENUS PERSICULA (Fig. 1-4).

1 (6) Fairly large (adult specimens of 7 mm and over). Protracted or oval outline. Outer lip edge oblique, not elevated above the spire.....2 (5)

2 (5) Spire not or slightly elevated, covered by a flattened callus 3 (4)

3 (4) Outline protracted, almost cylindrical with most specimens. 5-6 columellar folds on the anterior half of the columella. Outer lip interior with fine and closely spaced lirae (fig. 1).....  
.....208ter- 1 P. angustoma (Desh.)  
LUFETIAN: All classical localities; especially Parnes, Chaussy, Réquiécourt, common; Villiers-Saint-Frédéric, fairly common; fairly rare.

4 (3) Outline less protracted, more egg-shaped. 7-9 columellar folds, stretched to the posterior of the columella. Outer lip interiorly coarsely crenulate (fig. 2).....P. dautzenbergi (Cossm.)

AUVERSIAN: Barisseuse, Baron, very rare (1 specimen from each locality). It is a species described from the Nantes Basin, fairly common from Le bois-Gouët.

5 (2) Spire covered by a callus tipping in an elevated knob. Outline egg-shaped, fore contracted (fig. 4)..208ter-2 P. goossensi (Cossm.) LUTETIAN: Chaumont-en-Vexin (Holotype of Cossmann), Parnes (fide Cossmann), very rare. Comment: We have never actually found this species with certainty; some specimens from Parnes have a protruding callus, but their evenly contracted form is very much like that of Persicula ancyrtoma there are thus intermediate forms.

6 (1) Small size (height of adult specimens smaller than 4 mm). Outline subtrigonal, because of the sloping extension of the outer lip; short and flattened spire, above which the edge of the outer lip sometimes protrudes (fig. 3),..208ter-3 P. pseudampulla nom. nov. LUTETIAN: Chaussy, Péquiécourt, very rare. (A little less rare in the Basin of Nantes in Le Pois-Gouët).

REMARKS ABOUT THE SPECIFIC LIMITS - We name P. pseudampulla the specimens attributed to M. ampulla Deshayes by Cossmann. As Deshayes pointed out in his second work, his species was an Eratol, without real columellar folds (in his first work, Deshayes had not classified the Marginellidae because he had not differentiated between them and Eratol. But the shells studied by Cossmann are true Persicula, having real columellar folds. So it is necessary, as Pezant had suggested, to give them a new specific name.

One must be carefull with juveniles of P. ancyrtoma, which can have a stouter form than the adults; but they do not have the elevated outer lip of P. pseudampulla.

Lastly, we must make a diagnosis between P. pseudampulla and Marginella (Glabella) allixi (Cossmann), species from the Nantes Basin, also reported herein from the Parisian Basin (more specifically from Chaussy), which has exactly the same trigonal form with extension of the posterior part of the outer lip edge, but of smaller size and above all with a spire not covered by a callus.

IV - DETERMINATION TABLE FOR THE GENUS GIBBERULA (Fig. 5-13).

- 1 (2) Columellar folds very numerous (11-12), not oblique (transverse); the posterior ones slightly weaker than the centrally placed. Large size; protracted and cylindrical outline. Spire ending by an elevated embryonic knob (fig. 5).....208bis-3 Gibberula frederici (Cossm.) LUTETIAN: Chaumont-en-Vexin (Oise), very rare (fide Cossmann).
- 2 (1) Less abundant columellar folds (number smaller than 8, normally 4-6).....3 (4)
- 3 (4) Small adult size (height smaller than 3 mm). Spire flattened, almost without elevation. Outer lip everted, giving an almost trigonal shape; 5 columellar folds (fig. 6) .....208bis-5 Gibberula cossmanni (Morlet)

LUTETIAN: Chaussy, Réquiécourt, fairly common; Ferme-de-l'Orme, rare. And may other classical localities (fide Cossmann).  
MARINESIAN: Le Ruel (fide Morlet).

4 (3) Oval or egg-shaped outline (not trigonal). Spire elevated, even if short.....5 (8)

5 (8) Only 4 columellar folds.....6 (7)

6 (7) Stout egg-shaped outline; 2<sup>nd</sup> columellar fold (starting from the base of columella) very thin and sickel form; profile of the outer lip convex, not everted, joining the suture very obliquely (fig. 7) .....208bis-10 Gibberula godini (Cossm.)  
CUISIAN: Hérouval, only the type specimen.

7 (6) Outline protracted, oliva like, almost cylindrical. The upper part of the outer lip spreads away from the spire (see fig. 8, back view), and then joins the suture almost normally, surrounding a broad and shallow posterior canal. The foremost 2 columellar folds are thick, strong, very oblique, and extend outside on the fasciole. The 2 posterior folds are weaker, deeper and more transverse. Spire typically short (fig. 8).208bis-7 Gibberula vittata (Edwards)  
LUTETIAN: Fairly common in all the classical localities. Very common in Villiers-Saint-Frédéric and Ferme-de-l'Orme.  
AUVERSIAN: Acy-en-Multien (fide Cossmann)  
MARINESIAN: Le Ruel (fide Cossmann).

Comment: G. vittata is a very variable species (specimens with more than 4 columellar folds will be found further). The typical form has crenulations on the outer lip edge dominating the interior thickening and hardly extending into the aperture. The variety  $\alpha$  (nobis) has long crenulations, extending far into the interior of the aperture (such as G. ovulata, vide infra). The variety  $\beta$  (nobis) has a more elevated spire, the lateral expansion of the outer lip less pronounced, the same columellar folds as the variety  $\alpha$  (through these 3 characteristics, it makes a passage to G. spirata, vide infra), but the 4 columellar folds are typical. Morphological intermediates exist between these different varieties

8 (5) More than 4 columellar folds (usually 5-6, seldom more).....9 (10)

9(10) The foremost 4 columellar folds have the same aspect as those of G. vittata (see 7), but there exist 1 or 2 supernumerary folds, very deep. The outer lip has the same characteristics as the typical G. vittata one ....Gibberula vittata (Edwards), var.  $\gamma$  and  $\delta$   
LUTETIAN: Damery, Montmirail, rare (var.  $\gamma$ ). Les Groux, fairly common; Parnes, Ferme-de-l'Orme, fairly rare; Vaudancourt, Villiers-Saint-Frédéric, rare (var.  $\delta$ ).  
AUVERSIAN: Le Guépelle, very rare (var.  $\delta$ ). Barisseuse, very rare (var.  $\delta$ ).

Comment: The variety  $\gamma$  has a cylindrically protracted outline, a very short spire and 2 supernumerary folds<sup>3</sup>). The variety  $\delta$  has a slightly shorter outline form, the spire slightly more elongated than the typical form; usually one supernumerary columellar fold only (seldom a second, very weak).

10(9) The aperture joins the suture without lateral expansion (sometimes

- with a small, very narrow notch before the joint).....11 (16)
- 11(16) Spire short or very short, smaller than 1/6 of the total height  
.....12 (15)
- 12(15) Outline egg-shaped, somewhat stout; spire very short.....13 (14)
- 13(14) Small (adult specimens not higher than 5 mm). Maximum convexity somewhat at the anterior side (almost 1/2 or 3/5 anterior). 5-6 columellar folds, very uneven; the first 2 fairly thin, but prominent, fairly widely spaced (the former very oblique, the latter more transverse), the 2 following clearly transverse, the last 2 weak and very deep in the interior (last one can be absent)<sup>4</sup>) Crenulations of the outer lip generally limited to the thickening of the aperture interior, seldom extended into the aperture opening (fig. 9).....208bis-4 Gibberula pusilla (Edwards)  
AUVERSIAN: All classical localities, fairly common. In particular, Auvers-sur-Oise, Ver-sur-Launette, Le Guépelle, Barisseuse.  
MARINESIAN: Le Ruel, Chars, rare.
- 14(13) Size of the adults clearly larger (10-12 mm). Maximum convexity very much at the anterior (4/5). Columellar folds oblique, strong and regularly lessening from anterior to posterior; 5 in the typical form and 2-3 more posterior folds in the variety polyptycta (Cossmann). Crenulations in the aperture always extended, starting fairly far from the edge of the outer lip, and extending into the aperture. Spire extremely short (fig. 10).....  
.....208bis-1 Gibberula ovulata (Lamarck)  
LUTETIAN: All classical localities, common (the variety more common than the typical form).  
AUVERSIAN: Auvers-sur-Oise, Ver-sur-Launette, fairly rare.  
MARINESIAN: Le Quoniam, fairly rare.
- 15(12) Outline protracted, oliva like, almost cylindrical; spire slightly longer. Typically 7-8 columellar folds, of which only the first 5, very oblique, are constantly present; the others are transverse and deep in the interior. Crenulations of the outer lip is strong, starting from the thickening of the outer lip and extending towards the interior (fig. 11).....208bis-8 Gibberula suboliva (Cossm.)  
AUVERSIAN: Acy-en-Multien, Le Guépelle (fide Cossmann).  
MARINESIAN: Le Ruel (fide Cossmann).  
Comment: We have never with certainty come across this species in the Parisian Basin. The illustration in the "Iconographie" represents a badly eroded specimen, which is in contradiction to the original illustration. (Catal. Illustré, IV, pl.VII fig. 14), and to the illustration in ("Loire Inférieure", I, pl.VII fig. 7-8). We have found this species in Bois-Gouët (where it is rare); with the lack of a Parisian specimen, we have illustrated one specimen from the Nantes Basin.
- 16(11) Spire fairly protracted, 1/6 of the total height and more, conical, pointed.....17 (18)
- 17(18) Margin of the outer lip thin along whole length; the internal crenulations are distant from the edge of outer lip and extend into the interior (such as with G. ovulata, fig. 11) (fig. 12)...

.....208bis-1" and 2 *Gibberula spirata* (Cossm.)  
CUISIAN: Liancourt-Saint-Pierre, fairly rare; Hérouval, rare;  
Cuise, Saint Gobain (fide Cossmann).

LUTETIAN: All classical localities, fairly rare.

Comment: Cossmann has differentiated the Lutetian specimens under the name *G. ovulata* var. *spirata* Cossmann, from the Cuisian specimens, under the preoccupied name *elevata* Cossmann (non Emmons) changed to *praenominata* Cossm. But not any criterion mentioned by Cossmann to differentiate the Cuisian specimens (i.e. the maximum convexity more at the anterior part, outer lip more slanting, folds more transverse) seems to us to be constant, when comparing specimens from the Cuisian (Liancourt-Saint-Pierre) and from the Lutetian. That is why, as the Lutetian specimens differ notably from *G. ovulata* through their outline and their longer spire, it seems logical to us to raise the variety 208bis-1" to the rank of species, and to add to it 208bis-2 *praenominata* (regarded as a junior synonym).

- 18(17) Margin of the outer lip interiorly thickened in its mid section, becoming thinner at the anterior and posterior part; fairly coarse crenulations, which can extend to the interior of the aperture. Spire higher, regularly conical in the typical form, with a slightly concave profile in the variety *subconcava* Cossmann (fig. 13).....208bis-6 *Gibberula acutispira* (Cossm.)  
LUTETIAN: Chaussy (typical form, and var. *subconcava*), fairly rare; Villiers-Saint-Frédéric, Vaudancourt, Parnes, Réquiécourt, Les Groux, rare.

V - DETERMINATION TABLE FOR THE GENUS *MARGINELLA*, SUBGENUS *GLABELLA* (Fig. 14-16) (=Egouena Jousseau).

Because of their egg-shaped outline, their siphonal canal without notch, and their uncrenulated aperture interior, we group 3 species under the name *Glabella*, though these species were named under different genera by Cossmann.

This author (Catal. Illustré, IV, p.207) first classified *Glabella nitidula* as *Egouena* (synonym of *Glabella*), but in the Essais and the Iconographie he classified it *Marginella sensu stricto*. The great likeness with *M. amygdala* Kiener (the Egouen of Adanson), a recent species from West Africa, makes us prefer the first classification by Cossmann.

Concerning the 2 other small species, *Gl. allixi* and *Gl. chevallieri*, remembering how we judged *Gibberula cossmanni* (cf. note 2), it seems logical to us to classify them here rather than in *Gibberula* (where Cossmann had placed them, notwithstanding the lack of notch at the end of the siphonal canal).

- 1 (2) Large size (for Parisian Eocene); height more than 10 mm. Shell thin (compared to the size). 4 columellar folds, very thin and narrow, widely spaced, the anterior 2 oblique, and the next 2 transverse (fig. 14).....208-16 M. (*Glabella*) *nitidula* Desh.  
LUTETIAN: Parnes, very rare; Grignon (fide Deshayes); Réquiécourt (fide Glibert).
- 2 (1) Dimension very small: adult height smaller than or equal to 2.5 mm

- Fasciole very weak. 5-7 columellar folds.....3 (4)
- 3 (4) Outer lip elevated and protruding above the very flattened spire (fig. 15).....*M. (Glabella) allixi* (Cossm.)  
LUTETIAN: Species described from the Nantes Basin (Bois-Gouët, fairly rare); but we found it in the Paris Basin, in Chaussy, fairly rare.
- 4 (3) Outer lip not overreaching the spire, only slightly laterally extended (fig. 16).....*M. (Glabella) chevallieri* (Cossm.)  
LUTETIAN: Chaussy, Réquiécourt, fairly common; Parnes, Villiers-Saint-Frédéric, Saint-Lubin-de-la-Haye, rare.

VI - DETERMINATION TABLE FOR THE GENUS *MARGINELLA*, SUBGENUS *STAZZANIA*  
(Fig. 17-33).

- 1(12) Mid columellar folds clearly bifurcate at their end; their diverging ends sometimes join together from one fold to the other.....2 (5)
- 2 (5) Last whorl angular or sub-angular, with 4 columellar folds.....3 (4)
- 3 (4) The shoulder of the last whorl forms a sharp keel, well characterised; sometimes small longitudinal striae. Some rare specimens have only a very weak bifurcation of the columellar folds (fig. 17).....  
.....208-10 *M. (Stazzania) acutangula* Desh.  
LUTETIAN: Les Groux, Parnes, common; Réquiécourt, fairly common; Fontenay-Saint-Père, Montmirail, Damery, Gomerfontaine, rare.
- 4 (3) The shoulder of the last whorl is rounded although angular, not really keeled. Thickening of the outer lip edge more protruding. (There are intermediary forms with the previous species, where the keel is very blunt) (fig. 18).....  
.....208-11 *M. (Stazzania) contabulata* Desh.  
LUTETIAN: Fercourt, Montmirail, Ferme-de-l'Orme, fairly common; Grignon, Villiers-Saint-Frédéric, Parnes, fairly rare.
- 5 (2) Profile of the last whorl rounded, not sub-angular; 4-5 columellar folds; if present, the 5<sup>th</sup> fold is not bifurcate and deeply placed (one must seek it in the deepest part of the aperture).....6 (7)
- 6 (7) Very narrow outline (proportion of total height to diameter larger than 2/1), practically cylindrical. Spire short (height of the aperture more than 2/3 of total height), 4 columellar folds. Outer lip thickening thin interiorly. Very small size, 2 mm (fig. 19).....  
.....*M. (Stazzania) pseudovolvarina* nova species  
LUTETIAN: Thionville-sur-Opton, very rare: 4 syntypes (see description here after).
- 7 (6) Foregoing characteristics not applicable; outline clearly biconical (proportion total height/diameter smaller than 2/1); if the spire is short, the outline is more stout, 4-5 columellar folds..8 (11)
- 8(11) Always 5 columellar folds; form on the whole stout.....9 (10)



- 9 (10) Very short spire (proportion height of aperture/total height more than or equal to  $3/4$ )<sup>5)</sup>. Outer lip with a very thin thickening, which does not narrow the aperture. The columellar folds can be slightly bifurcate; in that case, the fore branch is longer than the aft one (fig. 20).....  
.....208-14 M. (*Stazzania*) *fragilis* Desh.  
LUTETIAN: Ferme-de-l'Orme, Chaussy, Requiécourt, very rare;  
Grignon, Parnes (fide Deshayes), Fav-sous-Pois (fide Cossmann).
- 10 (9) Gibbous stout form; always small size (less than 3 mm). Spire relatively high (height of aperture/ total height inbetween  $3/5$  and  $2/3$ ); outer lip thickening very thick interiorly, reducing the aperture to a narrow slit (fig. 21).....  
.....208-13 M. (*Stazzania*) *abnormis* Morlet  
AUVERSIAN: Ermenonville (Bois de Perthes), very rare.  
MARTINESIAN: All classical localities, very common.
- 11 (8) Normally 4 columellar folds, but a 5<sup>th</sup> fold, weak and very deep in the interior, can occur. Outline variable with age; clearly biconical with adult specimens (aperture height  $3/5$  to  $2/3$  of total height) : relative height of the spire shorter with juveniles<sup>5)</sup>. Outer lip thickened, especially exteriorly; less narrowed aperture than in the previous species. Adult size small, 4-5 mm (fig. 22).....  
.....208-12 M. (*Stazzania*) *bifidoplicata* Charlesw. in Fdw.  
LUTETIAN: All classical localities, common or very common.  
AUVERSIAN: All classical localities, fairly common.  
MARTINESIAN: All classical localities, fairly common.  
Comment: A polymorph species, variable in shape and dimensions. There are intermediate morphs with the previous species, and with *M. (St.) contabulata* (see entry 4) when the last whorl is slightly sub-angular. Cossmann differentiated 2 varieties (beside the specimens with 5 columellar folds, of which he made no special variety); i.e. var. *columbellina* Deshayes, only Lutetian, of larger size, more protracted and with a longer spire than the typical form (which is especially Bartonian); and var. *acvensis* Cossmann, particular of the Bartonian locality Acy-en-Multien, having a flattened thickening along the front of the margin. Pezant described another variety: *suffusa*, Bartonian, of fairly large size, with a longer spire, and with slightly bifurcate columellar folds (not very different from *columbellina*, according to Cossmann).
- 12 (1) Simple columellar folds, not bifurcate (sometimes slightly notched at their end, but without a real bifurcation).....13 (14)
- 13(14) Upper part of whorls (shoulder) with axial rib/etc., which crenulate the suture under the glossy enamel. Profile of whorls well rounded, never sub-angular<sup>6)</sup> (fig. 23).....  
.....208-9 M. (*Stazzania*) *crenulata* Desh.  
LUTETIAN: Houdan (type specimen), Parnes (fide Cossmann);  
Ferme-de-l'Orme, Villiers-Saint-Frédéric, rare.
- 14(13) No longitudinal striae on the suture.....15 (18)
- 15(18) Columellar folds thick, squarely cut out or slightly notched

- (without a real bifurcation) at their outer end:.....16 (17)
- 16(17) Form somewhat protracted (proportion of the diameter to the total height; in side view, about 0.35 tot 0.40). Last whorl generally sub-angular or angular (without keel) <sup>7</sup>. Aperture of 3/5 of the total height (fig. 24)...208-2M. (Stazzania) crassula Desh.  
LUTETIAN: Almost all classical localities, common.  
AUVERSIAN: Ver, Le Guépelle, Baron, fairly common; Barisseuse, Attainville; rare.  
MARINESIAN: Monnéville, fairly rare.
- 17(16) Stout (proportion of diameter to total height = 0.5). Last whorl rounded, never sub-angular. Aperture not so high, between 1/2 and 3/5 of total height (fig. 25).....  
.....208-3 M. (Stazzania) chastaingi Cossm.  
LUTETIAN: Villiers-Saint-Frédéric, Ferme-de-l'Orme, Chaussy (fide Cossm.).  
Comment: We have not found with certainty this species, which is probably a strong variety of M. crassula. Only one specimen from Grignon, illustrated here, answers the diagnosis by Cossmann and the figure in the Iconographie; 2 more dubious specimens make a transition to crassula.
- 18(15) Columellar folds thin or very thin, widely spaced.....19 (24)
- 19(24) Height of aperture greater than 2/3 of total height.....20 (23)
- 20(23) Only 4 columellar folds.....21 (22)
- 21(22) Columellar folds very thin, lamellar, very widely spaced, the anterior 2 only slightly oblique. Height of aperture greater than 2/3 of total height (typically 3/4). Outer lip thin, curved to the top through a small notch (fig. 26).....  
.....208-17 M. (Stazzania) entomella Cossm.  
LUTETIAN: Villiers-Saint-Frédéric, Frileuse (Beynes), Ferme-de-l'Orme, Chaussy, very rare; Parnes (fide Cossmann).
- 22(21) Columellar folds thin, but not very thin, the anterior 2 very oblique. Aperture equal to or greater than 2/3 of total height (fig. 27).....208-1 M. (Stazzania) eburnea Lmk.  
LUTETIAN: All classical localities; fairly common or common.  
Comment: The adults of the typical form are large in size, and slender (protracted); their aperture reaches 2/3 of total height. The outer lip thickening is thin. Cossmann differentiates (apart from the var.  $\beta$  = pentaptycta, discussed here after):  
-the variety  $\alpha$ , broader than the typical form, with aperture very high (greater than 2/3 total height);  
-the variety  $\delta$ , smaller in size, with a broader outer lip thickening with a denticular posterior protrusion; it differs from M. hordeola (see entry 32) through a higher aperture.
- 23(20) 5 columellar folds (the 5<sup>th</sup> posterior is often little protruding). Aperture very high, reaching 3/4 of total height (fig. 28)....  
.....208-1 M. (Stazzania) eburnea pentaptycta Cossm.  
LUTETIAN: All classical localities, fairly common. Cossmann considers them as an ordinary variety of M. eburnea (var.  $\beta$ , in

- the Catal. Illustré); it seems to us to be worthy of subspecies rank.
- 24(19) Aperture smaller than  $2/3$  of total height.....25 (30)
- 25(30) Aperture greater than  $1/2$  of total height.....26 (29)
- 26(29) Columellar folds very thin; outer lip very little thickened; aperture equal to  $3/5$  of total height.....27 (28)
- 27(28) First whorls flat, not convex. In principle (according to Cossmann), the aperture is widened to the anterior, but this characteristic does not seem constant, nor the little spiral thickening bordering the suture (which can occur with other species) (fig. 29).....  
.....208-4 M. (Stazzania) edwardsi Desh.  
LUTETIAN: We confer to this species a few specimens from Montmirail, Montchauvet and Saint-Lubin-de-la-Haye.  
AUVERSIAN: All classical localities, fairly rare.  
MARINESIAN: All classical localities, fairly rare.
- 28(27) First whorls clearly convex: columella and outer lip parallel; no small thickening bordering the suture (fig. 30).....  
.....M. (Stazzania) morelletorum Goug. & Brailion  
AUVERSIAN: Barisseuse, Ronquerolles, very rare. (It is the new species signaled by L. & J. Morellet from Barisseuse, and that we have already described; of Gougerot & Brailion, 1968: 196).
- 29(26) Thin (but not very thin) columellar folds, situated in a broad shallow gutter (like a fossula) on the columella, which is hence bordered by a blunt ridge and not evenly convex as with other species. Outer lip thickening broad and flattened, narrowing the aperture, and without any denticulation. Fairly narrow form; aperture height variable, from  $2/3$  and less to  $1/2$  and more of total height. The verticalness of the aperture (on which Deshayes has stressed) is encountered with other species also (fig. 31).....  
.....208-5 M. (Stazzania) dissimilis Desh.  
LUTETIAN: Almost all classical localities, fairly rare; common in Ferme-de-l'Orme.
- 30(25) Aperture equal to half total height. Typical and sharp denticle on the upper part of outer lip (sometimes only weak): Section Dentimargo Cossmann.....31 (32)
- 31(32) Outer lip thickening thin interiorly and exteriorly. Narrow or very narrow form (fig. 32)..208-7 M. (Stazzania) dentifera Lmk.  
LUTETIAN: All classical localities, fairly common.  
AUVERSIAN: Le Fayel (fide Cossmann); Ronquerolles, very rare.  
MARINESIAN: Le Quoniam, very rare.
- 32(31) Outer lip thickening thick interiorly and exteriorly; less slender form. Aperture somewhat higher. Columellar folds a bit thicker. Outer lip denticle sometimes only vaguely visible (fig. 33)....  
.....208-8 M. (Stazzania) hordeola Desh.  
LUTETIAN: Almost all classical localities, fairly rare.

VII - DETERMINATION TABLE FOR THE GENUS MARGINELLA, SUBGENUS VOLVARINA  
(Fig. 34-37).

- 1 (2) 5 columellar folds; outer lip thickening broad, flat and winding round the siphonal canal (fig. 34),.....  
.....208-18 M. (Volvarina) eurychilus Cossm.  
CUISIAN: Liancourt-Saint-Pierre, very rare.
- 2 (1) 4 columellar folds; outer lip with a thin margin, slightly curled in the aperture.....3 (4)
- 3 (4) Fairly large size (6-7 mm high). Form protracted, olivia like, with an almost cylindrical last whorl; the characteristic, pointed out by Deshaves, of the spreading of the outer lip on the spire, which bends the suture upwards near the aperture, is unconstant (fig. 35).....208-6 M. (Volvarina) cylindracea Desh.  
LUTETIAN: Grignon, Chaussy, Ferme-de-l'Orme (fide Cossmann); Thionville-sur-Opton, very rare.  
AUVERSIAN: Le Fayel (fide Deshaves); Le Guépelle (fide Cossmann); Ronquerolles, very rare.  
MARINESIAN: Chavençon, very rare.
- 4 (3) Very small size (2-3 mm high). Much stouter form <sup>10</sup>; narrow aperture; post. columellar fold weak (fig. 36).....  
.....208-15 M. (Volvarina) bourvi Cossm.  
LUTETIAN: Neauphlette (Yvelines), Chambors (Oise) (fide Cossmann); Fercourt, very rare; Ferme-de-l'Orme, rare.  
MARINESIAN: Two specimens from Le Quoniam differ clearly from the typical Lutetian form through:  
-their larger size;  
-their 4<sup>th</sup> columellar fold so deep and so weak in the aperture, that it seems that only 3 folds exist;  
-their very short spire, with a completely flattened top.  
These differences seem to us enough to characterize a distinct subspecies (fig. 37).....  
.....M. (Volvarina) bourvi supraeocaenica nova subsp.

VIII - DESCRIPTION OF NEW TAXA.

1 - Marginella (Stazzania) pseudovolvarina nova species (fig. 19).

Derivatio nominis: It has the form of Volvarina and columellar folds of Stazzania.

Stratum typicum: Middle Lutetian, zone III after Abrard.

Locus typicus: Thionville-sur-Opton (Yvelines); 4 syntype specimens.

DESCRIPTION: (fig. 19): Very small shell (height 2 mm; max. diameter 0.8 mm), consisting of 3 whorls, the last very large, taking up nearly the whole shell, of narrow and almost cylindrical form. The first whorls are slightly convex. The aperture is very long, 2/3 of total height and more, with parallel columella and outer lip. Outer lip thin along its contour, with a fairly broad but flattened thickening on its back, without any denticular protrusion interiorly. Columellar edge straight, with 4 very thin folds in the anterior half. The foremost is very oblique; the last

3 are more transverse and of lessening obliqueness, and chiefly bifurcated towards their end; the 2 branches of the fork are long, thin widely diverging; each fold joins the other successively. Siphonal canal broad, clearly notched below.

Discussion: The cylindrical form and the aperture with parallel sides are those of Volvarina, but this sub-genus does not correspond at all with a species which has its columellar folds bifurcated such as a Stazzania. Not any Stazzania with bifurcated folds has the same form, being from the Parisian or the Nantes Basins, from the Cotentin or from England (cf. Edwards); we do not think that the particular form fits the young stage of one of these shells (in spite of their small dimensions, the 4 syntypes seem adult); particularly, with M. bifidoplicata, the young ones show a shortened spire, giving them a stouter form than the adult one.

2 - Marginella (Volvarina) bouryi Cossmann surraeocaenica nova subspecies (fig. 37).

Derivatio nominis: Stratigraphical subspecies from the upper Eocene.

Stratum typicum: Upper Bartonian (Marinesian).

Locus typicus: Le Quoniam (Val d'Oise): 2 syntype specimens.

Description: (fig. 37): Very small shell (height 2.6 mm; max. diameter 1.6 mm), consisting of 3 whorls, the last one very large, practically taking up the total height of the shell. Form egg-shaped cylindrical. The spire is extremely short and flattened. Aperture very high, very narrow in its upper part and a little widened ant.. The outer lip has a thin edge, without internal crenulations, slightly curled inward; it joins the columella by a regular curve, without any siphonal notch. The anterior part of the columella bears 3 very oblique marked folds; a wrinkle, corresponding to a 4<sup>th</sup> very weak fold, is difficult to see in the deep part of the aperture.

Discussion: The shape of the aperture, and the first 3 columellar folds, are exactly those of Marginella (Volvarina) bouryi Cossmann; this is why we consider this form a stratigraphical subspecies, which differs from the nominal Lutetian subspecies through its still shorter spire, its almost absent 4<sup>th</sup> fold and its slightly larger size. The characteristics of the aperture and columellar folds are such that, even although a flattened top is present, it can be neither a Gibberula nor a Glabella.

#### Notes

(1) One must pay attention to very young specimens, which lack crenulations in the interior of their outer lip. An English species from Barton, Gibberula simplex (Edwards), is characterised, among others, by its smooth outer lip interior. We have not come across G. simplex with certainty in the Parisian Basin; we have hesitated to confer to it a few presumably adult specimens, which are more probably damaged shells or specimens in a growing stage of other species.

(2) The apertural lirae of G. cossmanni are often difficult to see, especially with juveniles (one should look for them with great care), and the anterior siphonal curvature is often very faint. It is thus an intermediate species, of still unsure generic location; it may be delicate to distinguish from Marginella (Glabella) chevalleri.

(3) Gibberula suboliva Cossmann (see entry 15) has the outer lip more slanting, the spire more elongated, the crenulations in the aperture coarser.

(4) In comparison with Gibberula vittata var.  $\delta$ , the anterior folds are narrower, the second less oblique. The outlines also differ.

(5) Because of this, juvenile specimens of M. (St.) fragilis and of M. (St.) bifidoplicata may be difficult to differentiate. The best differential characteristic is the thickening of the outer lip, thin with fragilis and thick with bifidoplicata.

(6) M. (St.) acutangula (see entry 3) can sometimes have small longitudinal striae, but its sharp keel makes misidentification impossible.

(7) Because of this angularity and of the notched end of folds, this species must be compared to M. contabulata (see entry 4); the latter have however strongly bifurcate and clearly less thick folds. But some intermediate morphotypes exist, which are difficult to determine.

(8) There exist intermediary forms with M. crassula (entry 16), with thick columellar folds, with hardly guttered columella, but where the protracted form of the last whorl is not angular and the outer lip thickening is that of dissimilis: Montmirail (Lutetian), Barisseuse (Auversian).

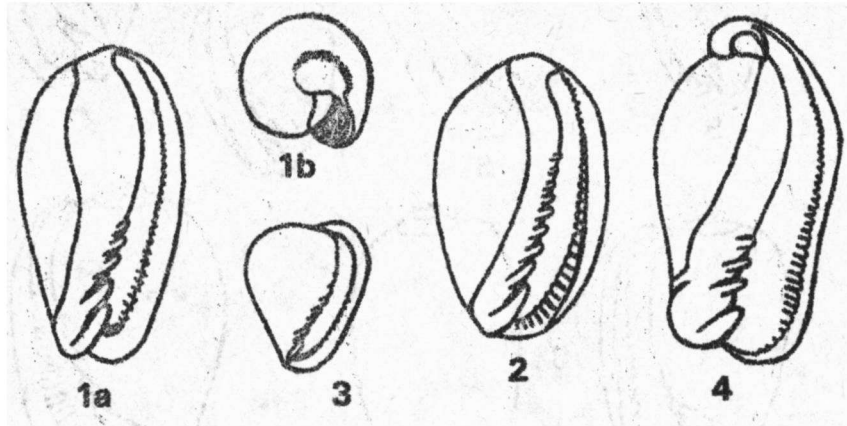
(9) The original description by Deshayes, the illustration in his first work and the comment in his second work, do not mention the posterior denticle on the outer lip. It is Cossmann, in the 'Catalogue Illustré' and the 'Iconographie', who classified it as Dentimargo, next to M. dentifera; meanwhile, in his work on the 'Loire inférieure', the denticle is not again mentioned. It is thus the form without denticle that has to be regarded as the typical form, and the denticulated form as a variety.

(10) Hence it looks like a Gibberula; but it has no fasciole, nor crenulations on the outer lip. The diagnosis is made on the thin and very oblique columellar folds, of which the 4<sup>th</sup> is very weak (this can lead to the observation of only 3 folds).

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**FIG. 1-4 EOCENE PERSICULA**

- Fig. 1a and 1b: *P. angystoma* (Desh.), ex. from Parnes, x5.  
Fig. 2: *P. dautzenbergi* (Cossm.), ex. from Barisseuse, x7.  
Fig. 3: *P. pseudampulla* nomen novum, ex. from Chaussy, x8.  
Fig. 4: *P. goossensi* (Cossm.), holotype from Chaumont-en-Vexin,  
after Cossm., x5.



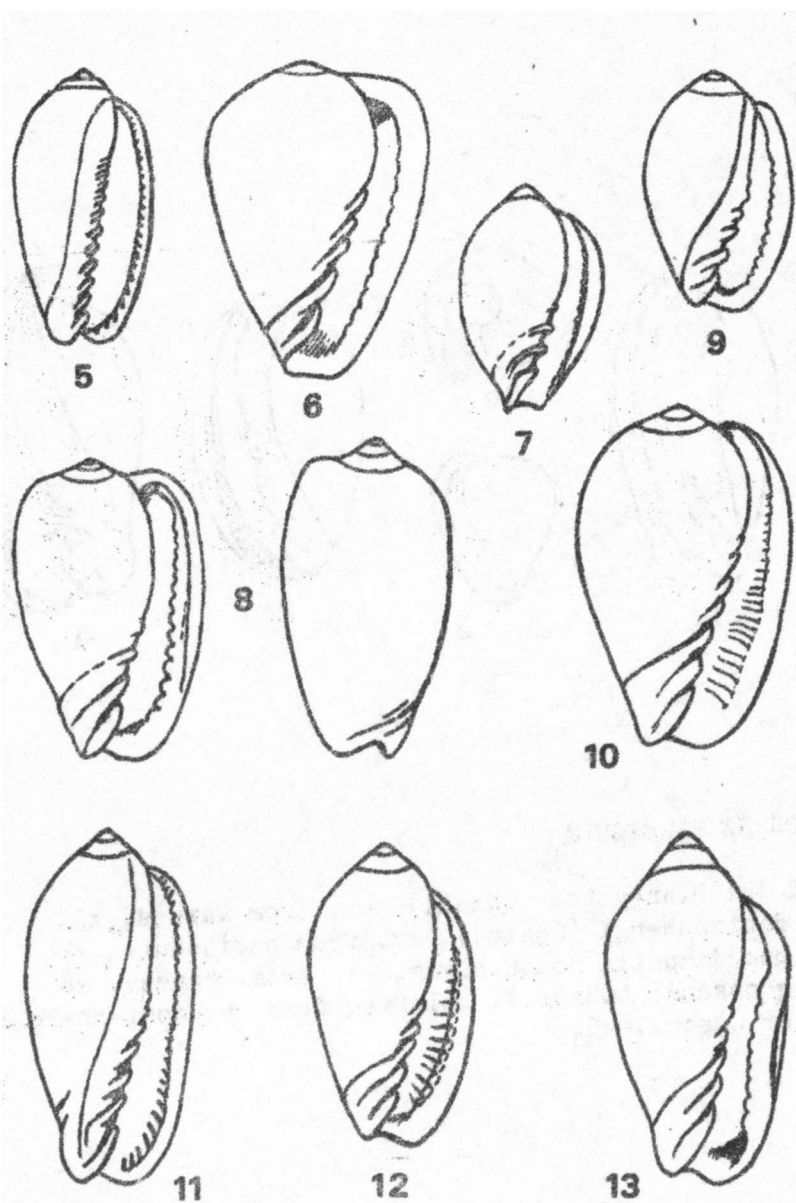


FIG. 5-13 EOCENE GIBBERULA

- Fig. 5: *G. frederici* (Cossm.), after Cossmann, x3
- Fig. 6: *G. cossmanni* (Morlet), ex. from réquiécourt, x15
- Fig. 7: *G. godini* (Cossm.), after Cossmann, x7
- Fig. 8: *G. vittata* (Edwards), ex. from Ferme-de-l'Orme, x7
- Fig. 9: *G. pusilla* (Edwards), ex. from Barisseuse, x7
- Fig. 10: *G. ovulata polyptycta* (Cossm.), ex. from Chaussy, x5
- Fig. 11: *G. suboliva* (Cossm.), ex. from Bois-Gouët, x7
- Fig. 12: *G. spirata* (Cossm.), ex. from Ferme-de-l'Orme, x7
- Fig. 13: *G. acutispira* (Cossm.), ex. from Les Groux, x7.

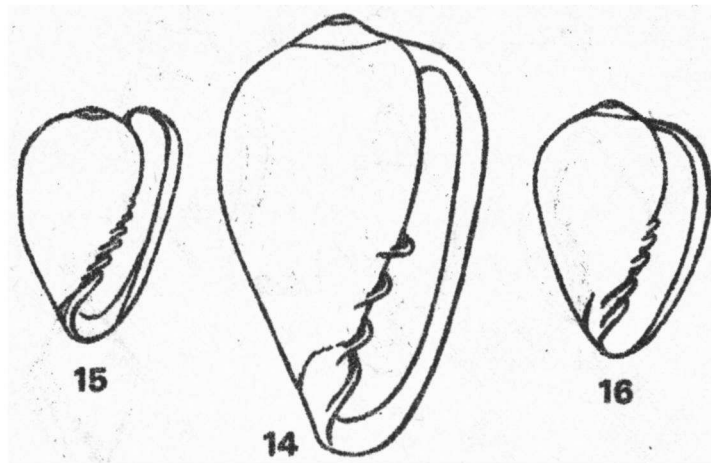


FIG. 14-16 EOCENE MARGINELLA (GLABELLA)

Fig. 14: *M. (G.) nitidula* Desh., ex. from Parnes, x5

Fig. 15: *M. (G.) allixi* (Cossm.), ex. from Chaussy, x15

Fig. 16: *M. (G.) chevallieri* (Cossm.), ex. from Chaussy, x15

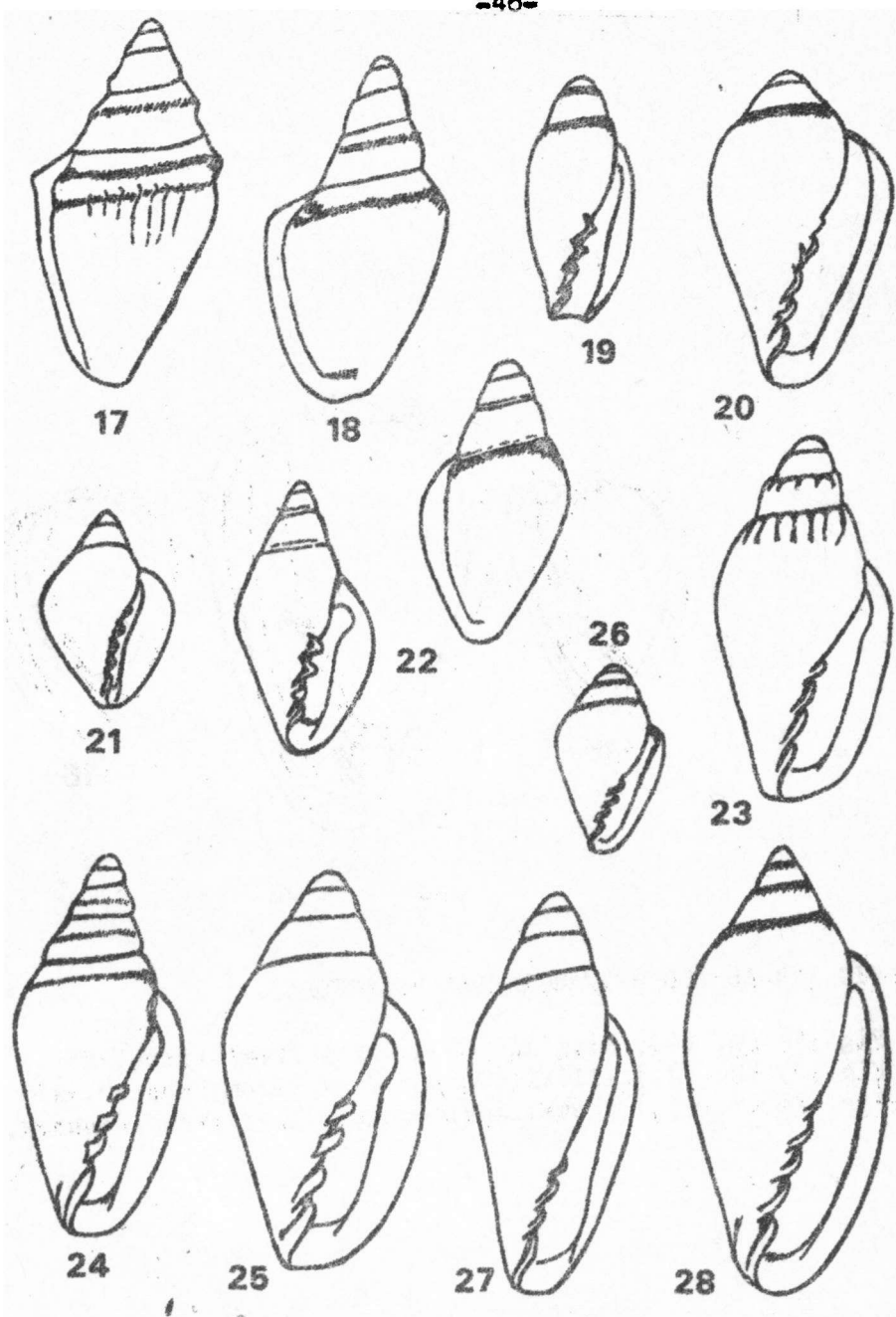
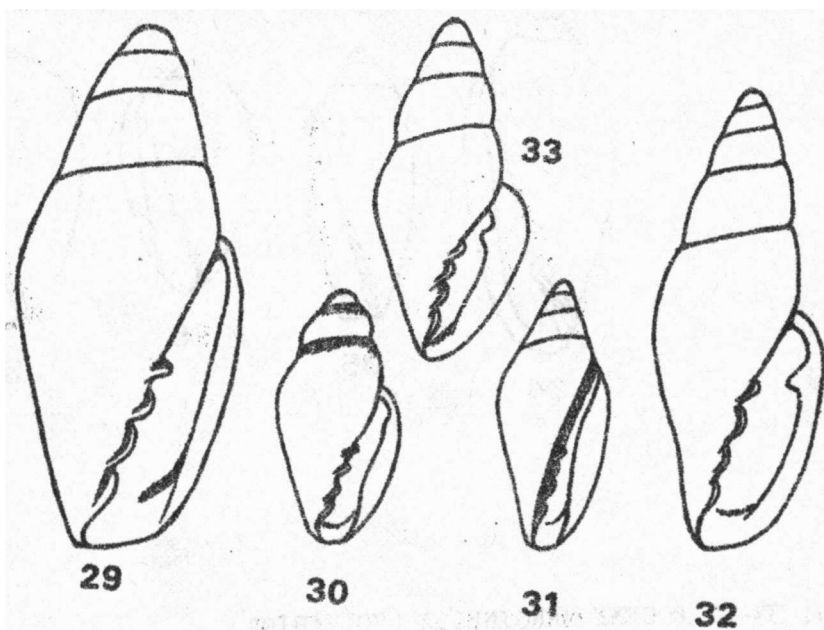


FIG. 17-28 EOCENE MARGINELLA (STAZZANIA)

- Fig. 17: *M. (S.) acutangula* Desh., ex. from Les Groux, x8
- Fig. 18: *M. (S.) contabulata* Desh., ex. from Ferme-de-l'Orme, x8
- Fig. 19: *M. (S.) pseudovolvarina* nova species, syntype from Thionville-sur-Opton, x15
- Fig. 20: *M. (S.) fragilis* Desh., ex. from Ferme-de-l'Orme, x8
- Fig. 21: *M. (S.) abnormis* Morlet, ex. from Chavençon, x8
- Fig. 22: *M. (S.) bifidoplicata* Edwards, ex. from Villiers, x8
- Fig. 23: *M. (S.) crenulata* Desh., ex. from Villiers, x8
- Fig. 24: *M. (S.) crassula* Desh., ex. from Villiers, x5
- Fig. 25: *M. (S.) chastaingi* Cossm., ex. from Grignon, x7
- Fig. 26: *M. (S.) entomella* Cossm., ex. from Chaussy, x8
- Fig. 27: *M. (S.) eburnea* Lamk., ex. from Grignon, x5
- Fig. 28: *M. (S.) eburnea pentaptycta* Cossm., ex. from Villiers, x5



**FIG. 29-33 EOCENE MARGINELLA (STAZZANIA)**

- Fig. 29: *M. (S.) edwardsi* Desh., ex. from Barisseuse, x8  
Fig. 30: *M. (S.) morelletorum* Goug. & Brail., holotype from Barisseuse, x8  
Fig. 31: *M. (S.) dissimilis* Desh., ex. from Frileuse, x8  
Fig. 32: *M. (S.) dentifera* Lamk., ex. from Villiers, x8  
Fig. 33: *M. (S.) hordeola* Desh., ex. from Réquiécourt, x8.

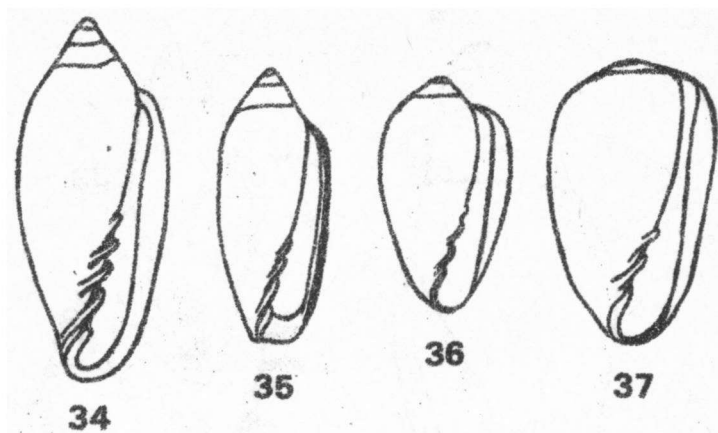


FIG. 34-37 EOCENE MARGINELLA (VOLVARINA)

- Fig. 34: *M. (V.) eurychilus* Cossm., ex. from Liancourt-Saint-Pierre, x7  
Fig. 35: *M. (V.) cylindracea* Desh., ex. from Thionville-sur-Opton, x7  
Fig. 36: *M. (V.) bouryi bouryi* Cossm., ex. from Ferme-de-l'Orme, x15  
Fig. 37: *M. (V.) bouryi supraeocaenica* nova subspecies, syntype from  
Le Quoniam, x15.