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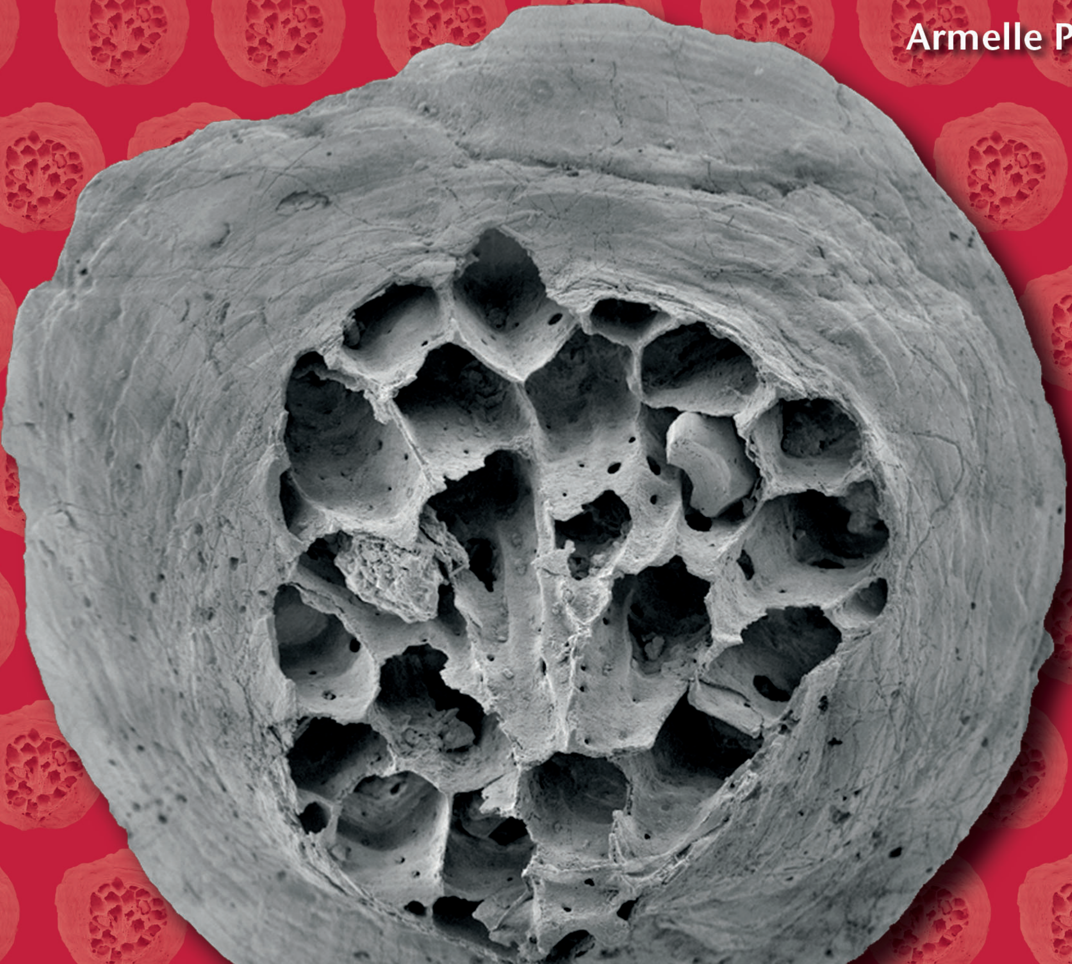
Armelle POIGNANT



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Presence of the foraminifer *Chapmanina gassinensis* Silvestri, 1931, in the Eocene (Lutetian) of the Grignon "falunière" (Yvelines, Paris Basin). The genus *Chapmanina*, its species and world distribution

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Foraminifer,
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ABSTRACT

Chapmanina gassinensis (foraminifer) has been observed as it seems for the first time in the Lutetian of the "falunière" of Grignon (Yvelines, southwestern Paris Basin). It is widespread in the Eocene of western Europe, also present in the Tethysian domain *l.s.* and even across the Atlantic. In the Oligocene, it becomes very rare and has been only found in some places of Mediterranean Europe and disappears in the Miocene. The Paris Basin seems to be its northernmost occurrence.

MOTS CLÉS
Foraminifère,
Éocène,
Oligocène,
Bassin de Paris,
distribution paléobiogéographique.

RÉSUMÉ

Présence du foraminifère Chapmanina gassinensis *Silvestri, 1931, dans l'Éocène (Lutétien) de la falunière de Grignon (Yvelines, Bassin Parisien). Le genre* Chapmanina*, ses espèces et sa répartition mondiale.*
Chapmanina gassinensis (foraminifère) a été observée pour la première fois, semble-t-il, dans le Lutétien de la falunière de Grignon (Yvelines, sud-ouest du Bassin de Paris). Elle est largement répandue dans l'Éocène de l'Europe occidentale, présente aussi dans le domaine téthysien *l.s.* et jusque dans le continent américain. À l'Oligocène, elle ne s'observe que dans quelques points de l'Europe méditerranéenne et disparaît ensuite. Le Bassin de Paris apparaît comme sa localisation la plus septentrionale.

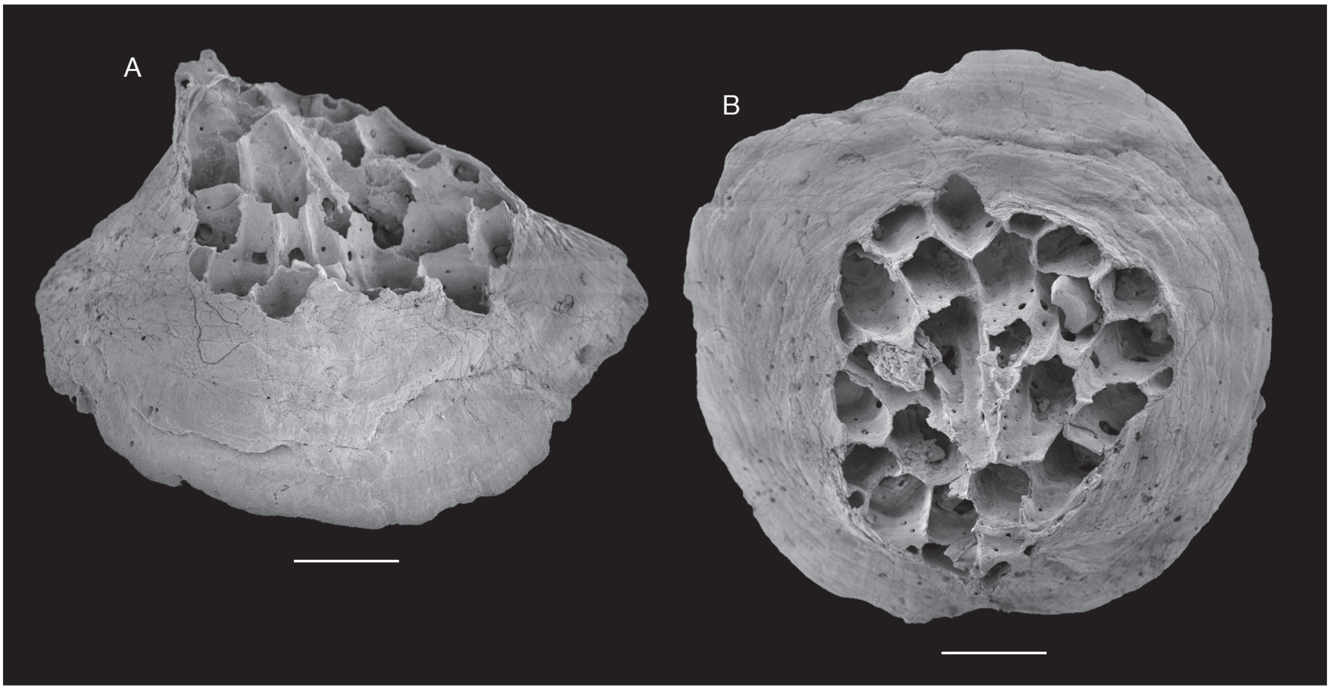

Fig. 1. — *Chapmanina gassinensis* Silvestri, 1931 (Lutetian, Grignon falunière, Yvelines), in lateral (**A**) and apical (**B**) views (MNHN.F.F62410). Scale bars: 200 µm.

INTRODUCTION

Several samples of the Lutetian marl-pit of Grignon (western Paris Basin) have been examined for a research of miliolids. In one of these samples (probably from unit 4, see Fig. 2), I found two specimens of *Chapmanina gassinensis* Silvestri, 1931 (MNHN.F.F62410; Figs 1, 2). This foraminifer is easy to identify and can't be confused with any other one. It is well known in the Eocene of France (Aquitaine Basin) and also observed in the Eocene of various Tethysian European countries and of the Tethysian domain *l.s.* It is only pointed out in the Oligocene in France and a few European countries. Until now, *Ch. gassinensis* had never been mentionned in the Paris Basin.

Sometimes called *Chapmanina* sp. or cf. *gassinensis*, it is very probably *Chapmanina gassinensis* because of the typical associated microfauna. A new species of *Chapmanina* Silvestri, 1931 has been described in the Paleocene of Australia (Quilty & Packham 2006), it will be treated further.

Before studying the genus and its species, it is useful to give some precisions: one of the aims of this work is to show the wide Tethyan distribution of *Chapmanina gassinensis*, but it is probably not an extensive recense of all the localities where this species has been found; in the same way, all the references concerning the localities of its presence in a particular country have not been reported, when they are too many, such as is the case of the Aquitaine in France or of Turkey.

Moreover, it is important to remark that *Chapmanina gassinensis* has not always been considered as larger foraminifera, and so, it has probably been omitted several times in the literature dealing with large benthic assemblages containing for example: *Nummulites*, *Alveolina, Discocyclina, Pellatispira, Fabiania cassis* (Oppenheim, 1896) with which it is frequently associated can be up to 4 mm in diameter, *Chapmanina gassinensis* can't exceed 1 mm. According Smout (1954) opinion: "*Chapmanina* has a very small test compared to most complex species".

THE GENUS *CHAPMANINA* AND ITS SPECIES

According Loeblich & Tappan systematics (1987), the genus *Chapmanina* belongs to the family Chapmaninidae Thalmann, 1938, superfamily Rotaliacea Ehrenberg, 1839 and its type species is *Chapmanina gassinensis,* because pointed out at Gassino, in Torino area (Silvestri 1905a). The genus *Chapmanina* first appears with the name *Chapmania* described by Silvestri & Prever (*in* Silvestri 1904). In 1931, Silvestri changed this name in *Chapmanina*, two species having been described with the name *Chapmania*:

Chapmania galea Silvestri, 1923, type species of the genus *Preverina* Frizzell, 1949, considered by Loeblich & Tappan (1987) as a synonymous of *Chapmanina*, species of the italian Tortonian (surroundings of Reggio d'Emilia), represented only by an axial section, but the holotype in unknown (Cita & Scipolo 1961), as well as the topotypes.

Chapmania sertata Silvestri, 1929, from the Lutetian of Ancona, Italia, illustrated by a bad section (Frizzell [1949] did not think it is a *Chapmanina*).

Quilty & Packham (2006) described *Chapmanina conjuncta*, in the Australian Paleocene (see further).

In 1918, Halkyard described *Patellina conica* which is in fact *Chapmanina gassinensis*.

Loeblich & Tappan (1987: pl. 775, figs 1-9), reported the genus *Chapmanina* from the Lutetian until the mid-

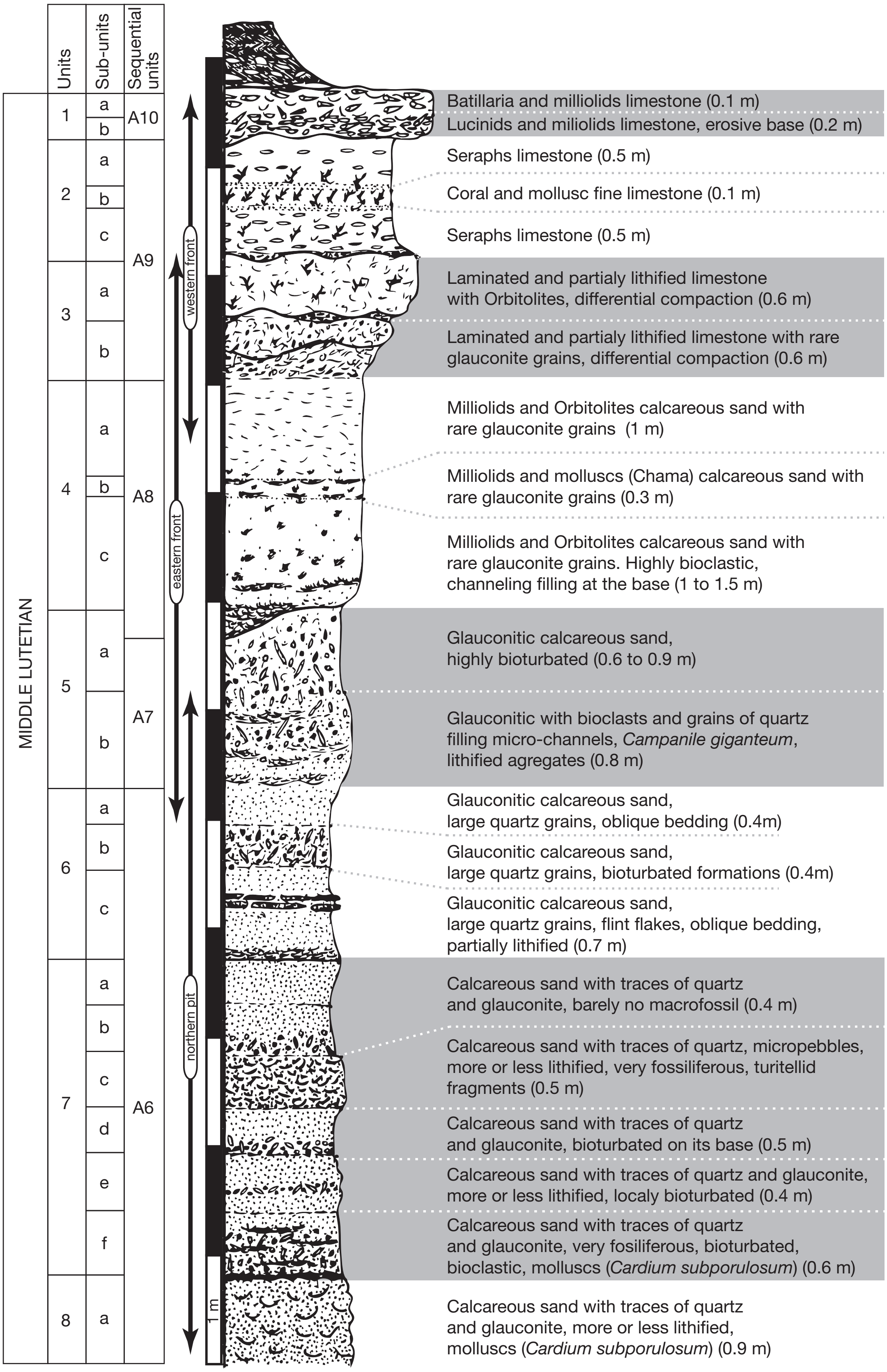

Fig. 2. — The "Falunière" of Grignon section, after Guernet *et al.* (2012) for the section profile, lithologic units and sub-units and descriptions, Gély (1996) for the sequential units and Huyghe *et al.* (2012) for the correlation of sequential and lithologic units. Section profile modified from Sanders *et al.* 2015.

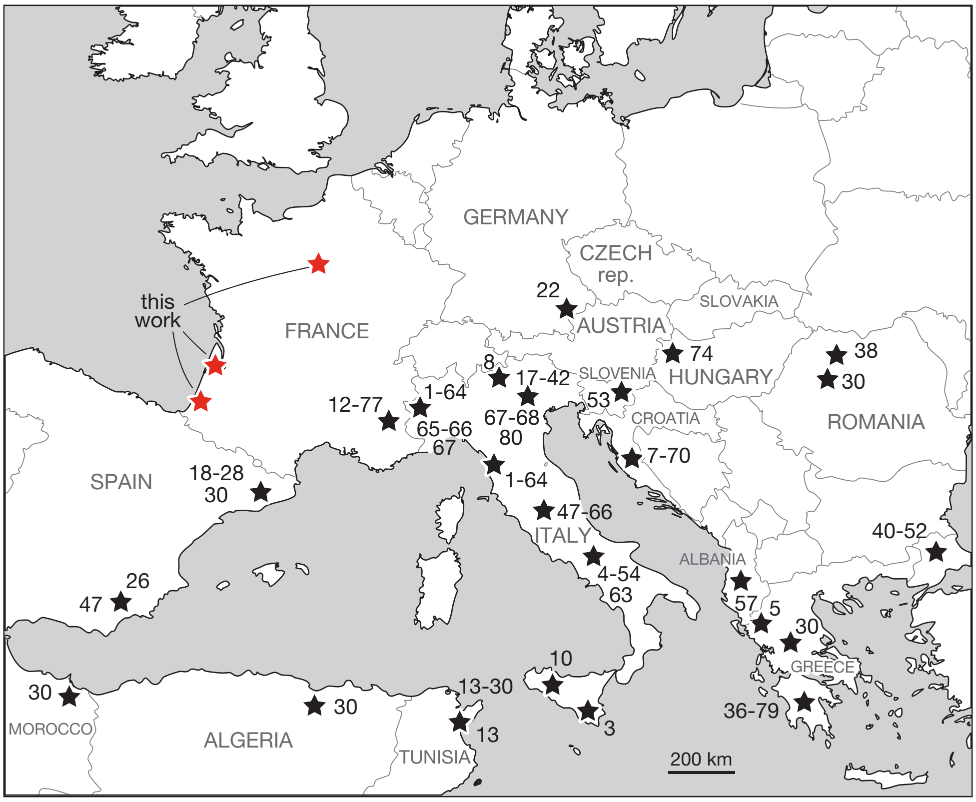

FIG. 3. — Distribution of *Chapmanina gassinensis* Silvestri, 1931 in the Eocene of Europe and North Africa. The numbers correspond to the references indicated in the Appendix 1.

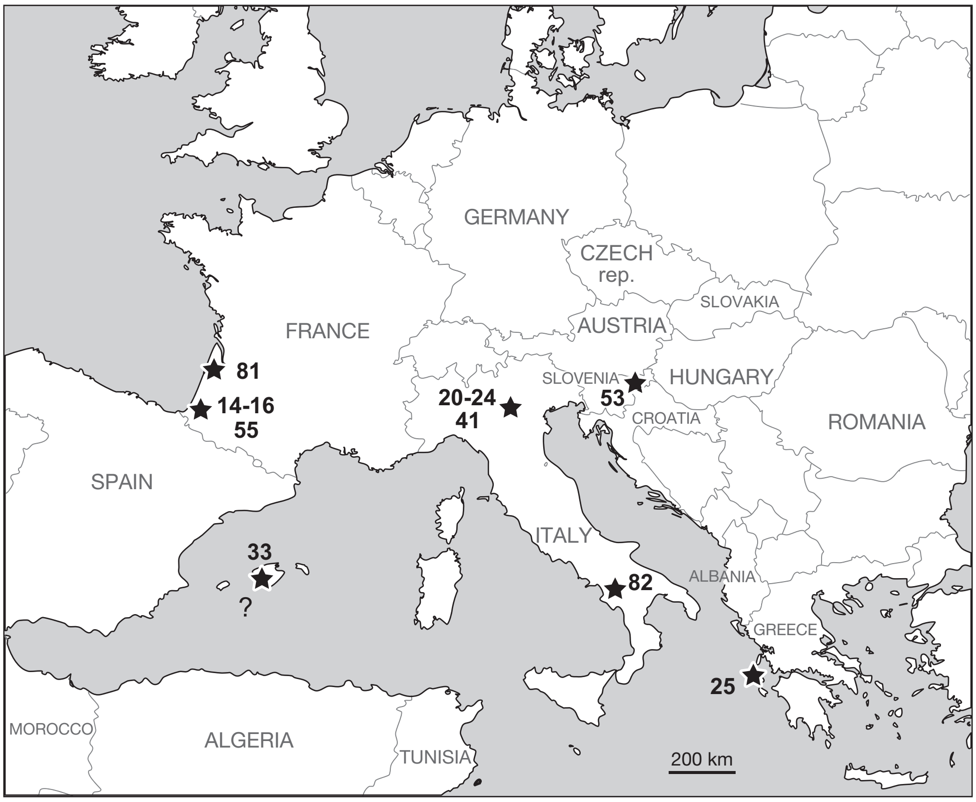

FIG. 4. — Distribution of *Chapmanina gassinensis* Silvestri, 1931 in the Oligocene of Europe. The numbers correspond to the references indicated in the Appendix 1.

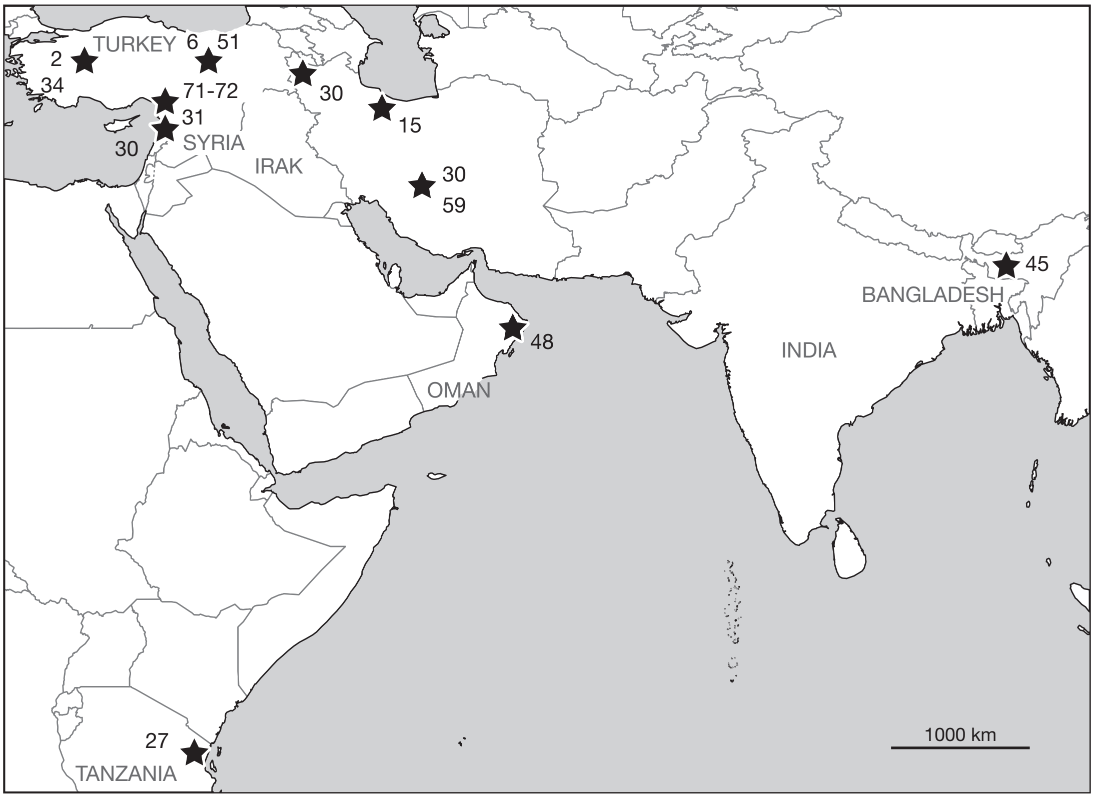

Fig. 5. — Distribution of *Chapmanina* Silvestri, 1931 in the Eocene of Asia. The numbers correspond to the references indicated in the Appendix 1.

dle Miocene in Italia, France, Spain, Greece, Romania. But, I haven't found any available mentions concerning the Miocene, the species *galea* Silvestri, 1923, being quite dubious (see earlier).

Chapmanina gassinensis was emended by Frizzell in 1949 and well studied by Fuchs (1969). Barbin & Decrouez (1987) work is of greatest interest, because they described in detail the complex structure of the species and gave numerous references concerning its distribution. *Chapmanina gassinensis* has been found in the Eocene and the Oligocene associated with a typic fauna of Nummulites and other larger foraminifera: *Nummulites fabianii*, *N. aturicus*, *N. vascus*, *Discocyclina*, *Asterodiscus*, *Assilina*, *Linderina*, *Halkyardia*, *Fabiania, Pellatispira*, etc. in Eocene (Fleury *et al.* 1985; Sztrákos & du Fornel 2003); *Nummulites vascus*, *N. intermedius*, *Neorotalia*, *Amphistegina*, etc. in Oligocene (see Boulanger 1968; Cahuzac & Poignant 2002).

The species of the Grignon "Falunière" (Yvelines, South-Western Paris Basin)

The lutetian exposure of Grignon called "falunière" is well known in the Paris Basin because of its abundance in various well-preserved organisms (Guernet *et al.* 2012; Sanders *et al.* 2015; Fig. 2). The two found specimens don't allow any doubt about their systematical attribution as their illustrations show (Fig. 1). They have been observed only in one level without any precise localisation, although many samples have been studied. Le Calvez (1970) did not report it among the numerous listed species, but as it is very rare, it is not surprising. Along my numerous examinations of Grignon sediment, I also met one *Hantkenina* and *Robertina declivis* (Reuss, 1863) which was only reported from the Oligocene.

It is interesting to link the presence of *Chapmanina gassinensis* in the Paris Basin with the one of *Fabiania cassis*. *Fabiania cassis* is mentionned by Bignot (1968) in the upper Lutetian of Mantes (western Paris Basin), then by Le Calvez (1970) in the Lutetian of Paris Basin (Le Tillet drilling), where she saw only a few specimens (cf. also Curry *in* Le Calvez 1970). Bignot (1968) remarked that *F.* cassis, peri-mediterranean species (Neumann & Boulanger 1955) went rather far to the North during the Eocene. It is the same for *Chapmanina gassinensis*, rather uncommon species, only observed at Grignon until now.

Other citations of *Chapmanina gassinensis* in France

Eocene (Fig. 3)

Aquitaine. The Eocene is well represented and has been largely studied. *Ch. gassinensis* has been reported by many authors in numerous localities in the Lutetian, Bartonian, Priabonian. For example: Halkyard (1918: pl. 8, fig. 7): Eocene, blue marl of the "Côte des Basques", Biarritz (Pyrénées-Atlantiques), named *Patellina* (see above); Cuvillier (1951): Bartonian, *Chapmanina* sp. in Abatilles drilling (Arcachon, south of Bordeaux) and upper Eocene of Biarritz; Sacal & Debourle (1957: pl. 19, fig. 9): middle to upper Eocene of Pontonx (Landes); Magné & Malmoustier (1964): northern Aquitaine Paleogene; Veillon (1964): lower and middle Eocene of Arcachon; Boulanger (1968: pl. 32, fig. 64; pl. 33, fig. 66): Bartonian, Biarritz and Saint-Cricq-du-Gave (Landes); Deloffre & Hamaoui (1973: pl. 11, fig. 8): upper Eocene of Labatut (Landes); Poignant (1991): upper Eocene of Lac Mouriscot (near Biarritz); Mathelin & Sztrákos (1993): *Truncatulinoides rohri* zone and lower zone of Bartonian age; Sztrákos *et al.* (1998): Bartonian of Listrac Marls in northern Aquitaine; Sztrákos (2000: pl. 17, fig. 15): Bartonian-Priabonian of Adour valley; Sztrákos *et al.* (2010): very abundant in the upper Eocene of the "Acacias drilling", near Arcachon.

South-eastern France. Blondeau *et al.* (1968): *Ch. gassinensis* would be abundant in the Alpes-Maritimes, in a transition zone between Lutetian and Upper Eocene; Sztrákos & du Fornel (2003): Bartonian-Priabonian of Alpes-Maritimes and Provence.

Oligocene (Fig. 4)

Aquitaine. *Ch. gassinensis* is rather rarely mentioned in the Oligocene: Veillon (1964): "Les Acacias" drilling; Boulanger (1968): Lower Oligocene, bottom of "Villa Belza" cliff, in Biarritz; Poignant (1972, erroneously attributed to Priabonian), Cahuzac & Poignant (2002): Orx pond, Saint-André-de-Seignanx (Landes).

Cavelier *et al.* (1981), in a publication on the Eocene-Oligocene limit, thought that *Chapmanina gassinensis* disappeared exactly at the Eocene-Oligocene limit. They said: "At the Eocene/Oligocene boundary there was a general drop of temperature accompanied by a period of great drought which was associated with the disappearance or regression of most of the tropical species, for example: *Discocyclina*, *Asterocyclina*, *Lockhartia*, *Fabiania*, *Chapmanina gassinensis*, etc." (Cavelier *et al.* 1981: 226, 228). This work invalidates this opinion as far as *Chapmanina gassinensis* is concerned.

CITATIONS OF *CHAPMANINA GASSINENSIS* OR CF. *GASSINENSIS* OR *CHAPMANINA* SP. IN EOCENE OF EUROPE (Fig. 3)

Chapmanina gassinensis has been pointed out in many European countries: Albania, Croatia, Germany, Greece, Hungaria, Italy, Spain, Thrace. Frequently named cf. *gassinensis* or *Chapmanina* sp. (for instance: Di Carlo *et al.* (2010), it is without any doubt *gassinensis*, because of the associated microfauna which is the same as in France. Silvestri cited the genus in Toscania (Silvestri 1904), then in Piemonte region (Silvestri 1905a; Gassino, see earlier), in Umbria (Silvestri 1905b) and in Veneto (Silvestri 1923), Romania (Kovacs & Arnaud-Vanneau 2004), Spain (Molina *et al.* 1986) thought that it would be characteristic of the Upper Eocene in Italy and Spain), Thrace (Less *et al.* 2011).

CITATIONS OF *CHAPMANINA GASSINENSIS* OR CF. *GASSINENSIS* OR *CHAPMANINA* SP. IN OLIGOCENE OF EUROPE (Fig. 4)

Chapmanina gassinensis is reported by Gauthier (1971), in a drilling, in Lluchmajor, in Palma de Mallorca Island; it is frequent and associated with Lepidocyclinas and Miogypsinas. But this suggests a reworking, since *Chapmanina* has never been observed in the Miocene and B. Cahuzac (pers. comm.) told me that reworking is frequent in Mallorca.

In Italy, Cita & Scipolo (1961) observed *Chapmanina gassinensis* in the Oligocene of Monte Baldo (North-Western Italy), and these authors suggested a reworking; but later on *Chapmanina gassinensis* was found also in the Oligocene of south Apennine and of Vicenza province (Zanfra 1965; de Zanche 1967) suggesting that the occurrence range of this species spans the Eocene to the Oligocene.

Di Carlo *et al.* (2010) mentioned *Chapmanina* sp. in the Rupelian of Zakinthos Island. In Slovenia, Pavlovec *et al.* (1986) found *Chapmanina* sp. in the Oligocene at Bohring and Nova Stifta.

CITATIONS IN TETHYS (MEDITERRANEAN DOMAIN AND EASTERN TETHYS; Fig. 5)

Chapmanines and above all *Chapmanina gassinensis*, sometimes *Chapmanina* sp. have been frequently cited out of Europa, in the Eocene of the Mediterranean domain or further towards East (e.g. in Morocco, Algeria, Tunisia, Syria, Turkey, Oman, Qatar, Tanzania, Iran). In North-eastern India, North of Bangladesh (Matsumaru & Sarma, 2010): *Chapmanina* spp., and *Nummulites atacicus*, *N. globulus*, *N. burdigalensis* and *Fabiania cassis* are found in Bartonian. The section figured (Matsumaru & Sarma 2010: pl. 3, fig. 12) does not allow to assert if it is really a *Chapmanina*, but the associated microfauna is of a Bartonian age. The presence of a tethysian microfauna in the East of India corresponds to the persistence of the Tethys ocean which will close at the end of Burdigalian-Ottnangien (Rögl 1999). We can also remark the existence of aquitanian faunas (*Miogypsina*, *Lepidocyclina*) in the Qom Basin in Iran (Rahaghi 1973). The rotation of Africa and Arabia meeting the anatolian platform will separate the Mediterranean sea from the Indian Ocean (Rögl 1999).

In Australia, in Adelaïde region, Murray Lindsay & McGowran, 1986, described an Eocene tethysian fauna, with *Halkyardia*, *Linderina*, but they did not mention any *Chapmanina* which could be associated to these species.

In Australia too (off southern New South Wales), Quilty & Packham (2006), described *Chapmanina conjuncta,* in the Paleocene and they saw a clear tethysian influence (see earlier, Murray Lindsay & McGowran 1986). At that period, Tethys was widely opened towards the Indian Ocean. This new species has been observed in a micritic limestone, found at a depth of 1750 m. The specimens are observed in thin sections: "Material: seven thin sections". Planktonic foraminifera species are very badly preserved and are not easily identifiable as well as calcareous nannoplancton. No *Nummulites* is identified. According to Quilty & Packham (2006), *Chapmanina conjuncta* will differ from *Chapmanina gassinensis* by a larger marginal zone, but their illustration is not conclusive, specimens being known only in thin section. Moreover, the authors say (Quilty & Packham 2006: 331): "In some respects the species found here seems intermediate between *Cymbalopora* van Hagenow, 1851, and *Chapmanina*". Consequently, it seems difficult to have a reliable opinion. The authors give a Late Paleocene-Early Eocene age to this fauna.

OTHER CITATIONS

Barbin & Decrouez (1987), according to a A. Blondeau (pers. comm.), reported the presence of *Chapmanina gassinensis* in the Eocene of Mexico, this is not very surprising since Salmerón (1986) has reported the occurrence of *Fabiania cassis,* often associated with *C. gassinensis*, in the Upper Eocene of Mexico. In the "Foz dos Amazonas Basin", Central Brasil, de Mello e Souza *et al.* (2003), observed *Fabiania cassis* in the Eocene, associated with american microfaunas. *Chapmanina gassinensis* could also be present. Besides, Fleury *et al.* (1985: fig. 12), have pointed out a current of *Fabiania* coming from Europa and going to America. At last, we can note that the genus *Chapmanina* is present in the Eocene of New-Caledonia (Paris 1981 *in* Barbin & Decrouez 1987).

CONCLUSION

Chapmanina gassinensis is above all a tethysian affinity species since widespread in the whole Tethys, as well as *Fabiania cassis* to which it appears very often associated. Its distribution is even worldwide since pointed out in the american continent (Upper Eocene of Mexico, see earlier).

We must notice that the extension of *Chapmanina gassinensis* towards the North does not seem to exceed some latitude. The Paris Basin could be its northernest distribution during the Eocene. It had not citated by Kaasschieter (1961) in his important work on the Eocene of Belgium. Bavaria, where it has been found (Darga 1990) is at a lower latitude.

Very abundant during the Eocene, it becomes rare at the Oligocene, wh ere Greece seems to be its easternest localisation. It does not occur in the Miocene.

It would be interesting to study the Eocene specimens of *Chapmanina gassinensis* from India since associated to a Mediterranean microfauna: *Nummulites*, *Fabiania*. The presence of the species on the american continent would ask for a work of geographical and stratigraphical distribution, as also the specimen found in New-Caledonia.

The new australian species, supposed Paleocene, would also require further studies to confirm its age and its taxonomical attribution.

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Appendix 1. — Numbers mentionned in Figures 1 to 3 attributed to the references of this article.

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