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Giant gastropods of the genus *Campanile* from the Caribbean Eocene

By PETER JUNG[1])

Dedicated to the memory of Dr. Hans G. Kugler

Introduction

The famous *Cerithium giganteum* from middle Eocene deposits of the Paris Basin is known for almost two centuries (LAMARCK 1804). Its best illustrations have been published by early authors such as LAMARCK (1806, Pl. 14, Fig. 1), DESHAYES (1837, Pl. 42, Figs. 1, 2), and COSSMANN (1906, Pl. 1, Figs. 1, 2, Pl. 2, Fig. 1). *Cerithium giganteum* is the type species of *Campanile* (subsequent designation by SACCO 1895, p. 37), but there has been some controversy concerning the type species of this genus, which has recently been commented on by HOUBRICK (1981, pp. 280–281).

The stratigraphic distribution of species of *Campanile* has been summarized by COSSMANN (1906, p. 73), and additional occurrences are listed in WRIGLEY (1940, pp. 110–111). The peak of diversity and distribution of species of *Campanile* was reached in Europe during middle Eocene times (COSSMANN 1906, p. 73; BOUSSAC 1912; WRIGLEY 1940; DELPEY 1941, p. 23). *Campanile giganteum* is the largest species of the genus; according to HOUBRICK (1981, p. 264; 1984, p. 232) specimens may reach a height of one meter.

After middle Eocene times there was a sharp decrease in species diversity. In fact there are no records of *Campanile* from beds of Miocene age. The next younger record is *C. gigas* (MARTIN) (1881, p. 117, Pl. 6, Fig. 4, Pl. 7, Figs. 1, 2) from Pliocene deposits of Java. In other words: the genus *Campanile* disappeared from Eurasia after Oligocene times and retreated to the east-southeast. The only surviving species is *C. symbolicum* IREDALE (1917, p. 326), which lives along the southwestern coast of Australia (HOUBRICK 1981, Fig. 9). *C. symbolicum* is also recorded from Pleistocene beds of Australia by LUDBROOK (1971, p. 33). According to that author two additional species of *Campanile* are known from deposits of late Pliocene age of Australia, and a third, unnamed species from an early Miocene limestone of Western Australia.

In the Western Hemisphere the genus is known from a number of species, none of which, however, reaches the dimensions of the species dealt with below.

WHITE (1887, p. 142, Pl. 14, Figs. 8–12) described *Nerinaea buarquiana,* which appears to be a species of *Campanile,* from Maria Farinha, Province of Pernambuco, Brazil. According to WOODRING (1966, p. 431) the Maria Farinha Formation is of Paleocene age.

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Another Paleocene species is *C. claytonense* (Aldrich) from the Midway Group of Alabama (HARRIS 1896, p. 105, Pl. 10, Figs. 10, 11; CARTER, 1984, Table). A third species from the Paleocene Martinez Group of California is *C. greenellum* HANNA & HERTLEIN (1939, p. 101, Fig. 1).

Two species have been described from Puerto Rico: *Campanile (Portoricia) laricum* MAURY (1920, p. 55, Pl. 8, Figs. 1, 2) from the Lares limestone and *C. collazum* (HUBBARD) (1920, p. 143, Pl. 23, Figs. 1, 2) from the San Sebastian shale and the Lares limestone. The beds that yielded these species are of Oligocene to early Miocene age (BOLD 1972, Tabl. 4; BOLD 1975, Fig. 2; MOUSSA & SEIGLIE 1975, p. 165). *C. laricum* is based on internal molds, which are unsuitable to serve as type material of a species. In addition MAURY used the same material for the description of the subgenus *Portoricia*.

The early Micene Anguilla Formation has yielded *Cerithium herculeanum* COOKE (1919, p. 116, Pl. 1, Fig. 7), which was described from Crocus Bay, Anguilla. *C. herculeanum* most probably is a species of *Campanile*.

WEISBORD (1962, p. 174, Pl. 16, Figs. 15–17) described *Portoricia salinensis* from beds of probably Pliocene age of La Salina, west of Puerto Cabello, State of Carabobo, Venezuela. This species is based on a single, small fragment (height 2 mm); it cannot seriously be taken into consideration.

Caribbean Eocene occurrences

Exactly 160 years ago giant gastropods obviously belonging to some species of *Campanile* have been recorded for the first time from the Caribbean Eocene. DE LA BECHE (1827, pp. 169–171, Pl. 21) had collected them from limestones in the Chapelton area of Jamaica. This finding led De la Beche to believe that the Jamaican limestones were of the same age as the Calcaire Grossier of the Paris Basin.

Much later COOKE (1919, p. 117) reported on casts of a large *Cerithium* from the northwest side of St. Jean Bay and from a point between Anse Ecaille (= Anse des Cayes) and Anse Lézard on the island of St. Bartholomew, Lesser Antilles. He assigned a late Eocene age to the beds, in which these casts occurred.

The aim of the present paper is to give additional information on the occurrences of Eocene species of *Campanile* in Jamaica and St. Bartholomew. Concerning the systematic arrangement the present writer is following HOUBRICK (1981, p. 280), who considers *Campanile* as the type genus of the family Campanilidae within the superfamily Cerithiacea.

Jamaica

Two species of *Campanile* are recognised in Eocene deposits of Jamaica: *Campanile* sp. A from the Chapelton Formation of the Yellow Limestone Group and *Campanile* sp. B from the Claremont Formation of the White Limestone Group. Both species are known only as internal molds, and a positive identification is therefore not possible. It is furthermore highly uncertain, whether the internal mold figured by DE LA BECHE (1827, Pl. 21), which was probably collected from the Chapelton Formation, is the same as *Campanile* sp. A. De la Beche's specimen has two spiral rows of pits on its last preserved whorl and one spiral row of pits at about the middle of the height of the whorl on the two

preceeding whorls. The question, whether there are three species of *Campanile* in the Eocene of Jamaica, has therefore to remain unanswered.

Campanile sp. A

Pl. 1, Fig. 1

This is the species referred to by TRECHMANN (1923, p. 353, Pl. 17, Fig. 1) as *Campanile* cf. *giganteum*. As stated by Trechmann the species is fairly common. In our collections there is a total of 88 specimens, all of which are incomplete, internal molds. The largest specimen, which is figured here (Pl. 1, Fig. 1), is somewhat deformed and reaches a restored height of about 50 cm, i.e. a size which is equal or inferior to that of fully grown specimens of *C. giganteum* from the Paris Basin (see Pl. 3, Fig. 1). The specimen figured by DESHAYES (1837, Pl. 42, Fig. 1) has a height of 60 cm.

The localities, from which *Campanile* sp. A has been collected, are listed below; all of them are plotted on maps at the scale of 1:50 000 and 1:12 500, and the letter (or number) of the relevant sheet is indicated. All the localities are situated in the Chapelton Formation, which is of early middle or possibly also of late early Eocene age according to ROBINSON (1968, Fig. 1) and Robinson (1969). The numbers listed below are NMB (= Naturhistorisches Museum Basel) localities.

10883 PJ 516 = ER 507. Between Derry and Pembroke Hall, St. Mary. Just south of junction. Ham Walk limestone. 1:50 000/K, 1:12 500/71; 2 fragments.

10885 PJ 518. One mile northwest of Guys Hill: Decoy. Road cut in bend. Ham Walk limestone. 1.50 000/K, 1:12 500/90; 2 fragments.

10947 PJ 580. Ham Walk, 3 miles southeast of Guys Hill. Ham Walk limestone. 1:50 000/K, 1:12 500/90; 9 fragments.

10948 PJ 581. Ham Walk, 3 miles southeast of Guys Hill. About 100 m north of 10947. Ham Walk limestone. 1:50 000/K, 1:12 500/90; 5 fragments.

10961 PJ 594 = ER 947. Spice Grove, west of Mandeville. At head of spring. 1:50 000/ D, 1:12 500/164; 10 fragments.

10967 PJ 600 = ER 973. Wait A Bit – Pike road, Trelawny. Wait A Bit cave, about 600 m south of Wait A Bit. 1:50 000/D, 1:12 500/83; 3 fragments.

11046 PJ 679 = ER 983. Spring Mount, St. James; 150 feet southeast of Police Station. 1:50 000/C, 1:12 500/24; 4 fragments.

11047 PJ 680 = ER 984. Spring Mount, St. James. 1:50 000/C, 1:12 500/24; 5 fragments.

11065 PJ 698 (= PJ 600). Wait A Bit, Trelawny. 1:50 000/D, 1:12 500/83; 1 fragment.

11066 PJ 699 (= PJ 680). Track above village of Spring Mount, St. James. 1:50 000/C, 1:12 500/24; 7 fragments.

11067 PJ 700. Spring Mount – Springfield road, St. James. Roadcuts. 1:50 000/C, 1:12 500/24; 5 fragments.

11068 PJ 701. Kensington above Spring Mount, St. James. 1:50 000/C, 1:12 500/42; 4 fragments.

11070 PJ 703,. Flamestead – Point road, St. James. About 1 km north of Flamstead. 1:50 000/C, 1:12 500/42; 4 fragments.

11080 PJ 713. Seven Rivers, north of Cambridge, St. James. Roadcuts. 1:50 000/C, 1:12 500/41; 4 fragments.

11086 PJ 719. Jerusalem Mountain – Grange road, Hanover. Roadcut. 1:50 000/A, 1:12 500/37; 2 fragments, one of them figured (pl. 1, fig. 1).

11090 PJ 723. Spring Mount, St. James; 100 m south-southeast of Police Station. 1:50 000/C, 1:12 500/24; 10 fragments.

11163 PJ 924. Point – Flamstead road, St. James. Near Tangle River, about 100 m west of road. 1:50 000/C, 1:12 500/42; 4 fragments.

11168 PJ 929 (= PJ 600 = PJ 698). Wait A Bit cave, Trelawny. 1:50 000/D, 1:12 500/83; 7 fragments.

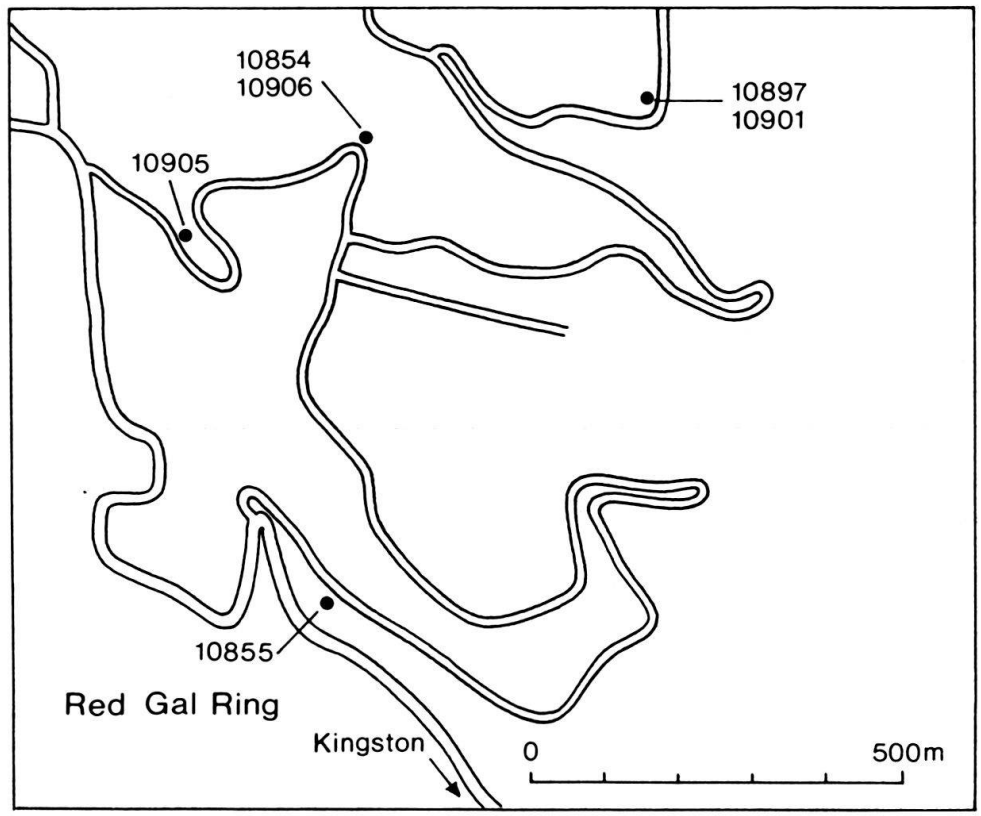


Fig. 1. Map of the Red Gal Ring area between Kingston and Stony Hill, Jamaica, showing location of NMB localities.

Campanile sp. B

Pl. 1, Fig. 2

This species is obviously different from *Campanile* sp. A, not only because it is much smaller, but also because most specimens have a spiral row of pits below the periphery of their last preserved whorl. In addition the height of the whorls is smaller proportionately and the apical angle larger.

This is the first record of a species of *Campanile* from the White Limestone Group in general and from the Claremont Formation in particular. Only 16 specimens of *Campanile* sp. B are at hand, and all of them have been collected from a few localities, which are situated within a small area near Red Gal Ring between Kingston and Stony Hill (Fig. 1). As already mentioned all the specimens have been collected from the Claremont Formation, which is of middle Eocene age according to ROBINSON (1974, Text-fig. 2).

St. Bartholomew

One species of *Campanile* of unusually large dimensions has been found on the small island of St. Bartholomew. Although the state of preservation of the known specimens is not good, the species is identified by means of open nomenclature as

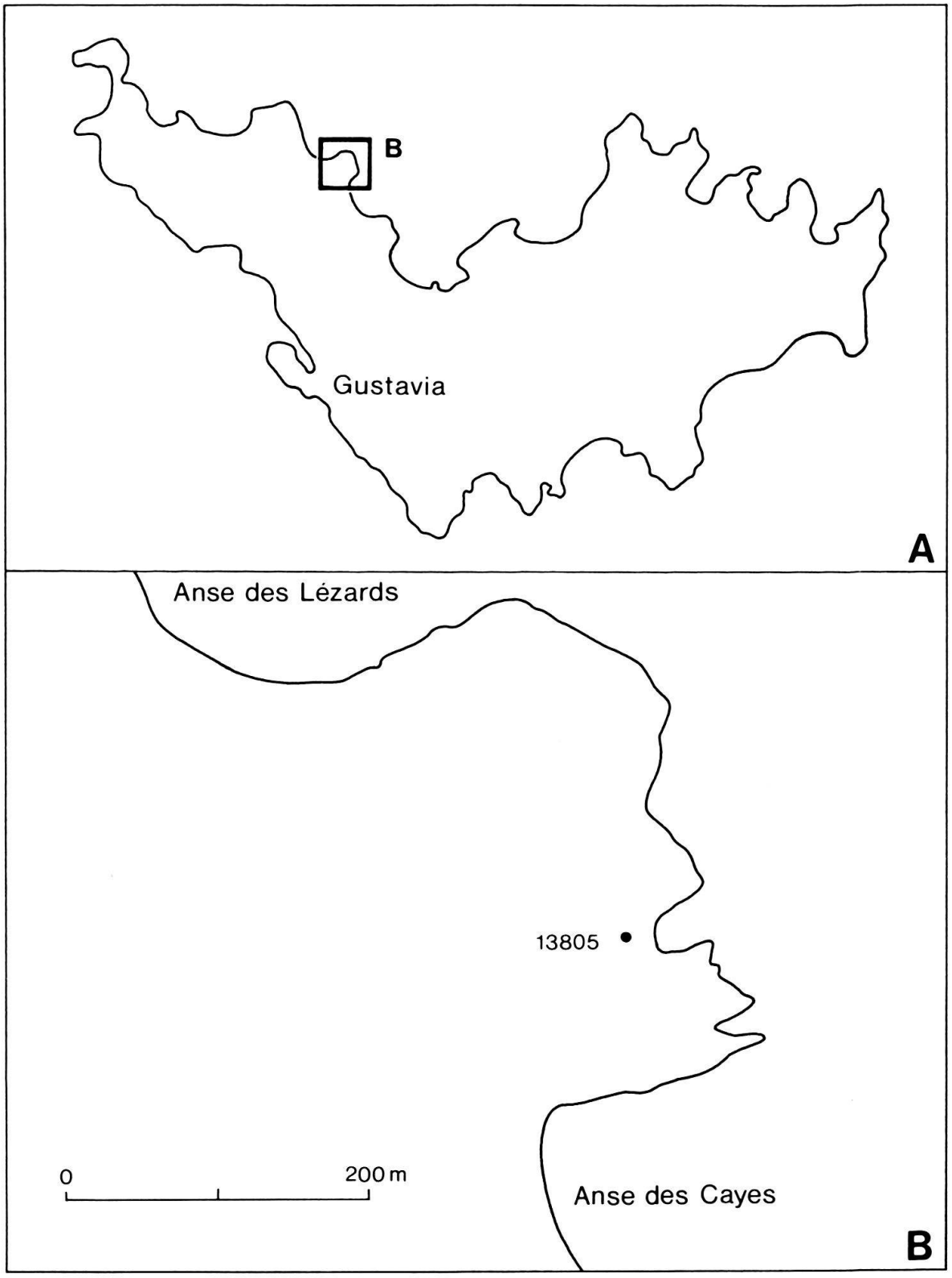


Fig. 2. Map of St. Bartholomew, Lesser Antilles (A) showing position of promontory between Anse des Lézards and Anse des Cayes and location of NMB locality 13805 (B).

Campanile cf. *giganteum* (LAMARCK 1804)

Pl. 2, Figs. 1–2

This is almost certainly the same species as the "casts of a large *Cerithium*" referred to by COOKE (1919, p. 117), which "were obtained by Vaughan on the northwest side of St. Jean Bay, St. Bartholomew, at stations 6905 and 6925". Cooke continues that "a smaller species retaining the silicified shell, which shows imperfectly the original sculpture, was collected at station 6897, a point between Anse Ecaille and Anse Lézard". Whether this "smaller species" represents a different species or early whorls of the same species, cannot be decided at the moment.

Only three specimens of *C.* cf. *giganteum* are at hand. They are all incomplete and were collected by the writer and Mr. René Panchaud on March 17, 1973, at NMB (Naturhistorisches Museum Basel) locality 13805: Anse des Lézards; Lézard limestone Member of St. Bartholomew Formation. They were taken from a transition zone between well bedded, greyish, tuffaceous sandstones below and an overlying bed of strongly cross bedded, yellowish, conglomeratic tuffs, about 35 m above sea level (Fig. 2). Two of them are figured here (Pl. 2, Figs. 1–2) and in order to demonstrate the extraordinary dimensions of the species, they are arranged on the plate as if they represented fragments of one individual. This 'individual' would have a total height of about 90 cm.

All three specimens have a large part of the original shell material preserved. Certain areas of the surface are characterised by numerous small borings, which have probably been made by boring sponges. I am not referring here to the finely pitted surface discussed by WRIGLEY (1940, p. 99) and DELPEY (1941, p. 18), which is not visible on the material from St. Bartholomew, but only on the specimens from the Paris Basin.

Two specimens of *C. giganteum* from the Lutetian of Damery near Epernay, Paris Basin, are illustrated for comparison with the material from St. Bartholomew (Pl. 3, Figs. 1–2). The larger specimen shows borings probably caused by boring sponges similar to those seen on the specimens from St. Bartholomew. The smaller specimen is figured to show the sculpture of the early whorls. Some of the early whorls of both specimens (but visible only in the illustration of the larger specimen) are polished on one side of the shell leaving no sculpture recognizable. As pointed out by WRIGLEY (1940, p. 102) and DELPEY (1941, p. 16) this feature probably developed, because the animal was constantly dragging its heavy shell on the sea floor.

The St. Bartholomew Formation has variously been considered to be of middle or late Eocene age. The discussion as to the age has been summarized up to their time by SENN (1940, p. 1593) and CHRISTMAN (1953, p. 71). WOODRING (1966, p. 431) and JUNG (1976, p. 749) are in favour of a middle Eocene age.

Conclusion

The occurrence of giant species of the genus *Campanile* in the Caribbean Eocene confirms the presence of genera with Tethyan affinities in the Western Hemisphere during that time interval. PALMER (1957, 1967) as well as KOJUMDGIEVA & DE LA TORRE (1986) listed a number of molluscan genera, which are widespread in Eocene sediments both of the Tethys and the Western Hemisphere. JUNG (1974) added information concerning the distribution of the Tethyan gastropod genera *Seraphs* and *Paraseraphs*.

The only survivor of the family Campanilidae, *C. symbolicum* IREDALE 1917, from southwestern Australia, usually occurs subtidally. According to HOUBRICK (1981, p. 279; 1984, p. 233) large populations may be found on sandy patches between rocks in depths of one to four meters. The animals are algal feeders. Additional ecological information concerning this species is provided by HOUBRICK (1981, 1984) including the implication that the fossil representatives of the Capanilidae were also algal feeders and lived in very shallow water like the only survivor.

In comparison with the only survivor of modest dimensions the diversity of large to giant middle Eocene species makes an impressive contrast. The reason for the sharp decrease in species diversity after Eocene times is not known. HOUBRICK (1981, p. 287) argued that the Campanilidae as algal feeders occupied the same trophic niche as do large living species of the family Strombidae. He concluded that "competition with this trophically similar group of large snails probably led to the diminution in species of the Campanilidae". Although this explanation sounds logical, it appears to be too simple, because an assemblage in a particular tropical marine niche is usually quite diverse and represents an equilibrium of complex interactions and interdependences.

HOUBRICK (1984, p. 234) considered the Messinian salinity crisis as an important factor for the virtual extinction of the Campanilidae. This geologically important event, however, had little to do with the disappearance of the Campanilidae in the Mediterranean area. As mentioned in the introduction the genus *Campanile* had disappeared from Eurasia after Oligocene times, whereas the Messinian salinity crisis occurred 6 to 5.5 million years ago (RÖGL & STEININGER 1983, p. 151, Pl. 13). In other words: the Campanilidae had retreated from the Mediterranean area about 17 million years before the Messinian salinity crisis.

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Plate 1

Campanile from Jamaica, natural size

Fig. 1 *Campanile* sp. A.
NMB H 17287. Rear view of deformed internal mold from NMB locality 11086: Jerusalem Mountain-Grange road, Hanover, Jamaica. Chapelton Formation (middle Eocene).

Fig. 2 *Campanile* sp. B.
NMB H 17288. Front view of slightly deformed internal mold from NMB locality 10905: Gibson Road near Stony Hill above Kingston, Jamaica. Claremont Formation (middle Eocene). Note pit below periphery of last preserved whorl.

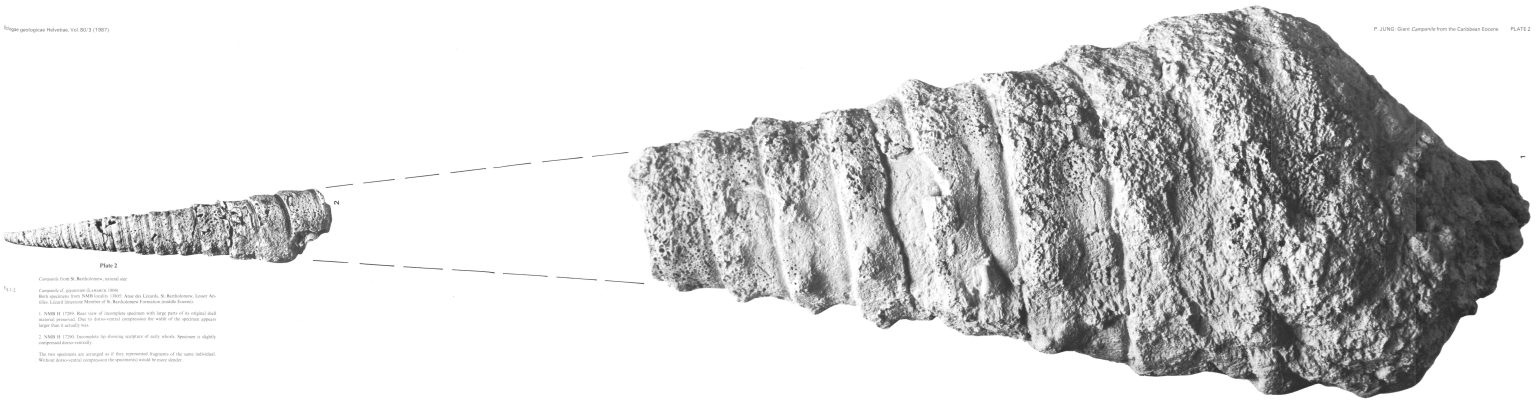


Plate 2

Camparile from St. Barthélemy, natural size

Camparile cf. *aquitanica* (Leymerie, 1846)
Rock specimens from NMB Geolib. 17695. Anse des Lézards, St. Barthélemy, Lesser Antilles. Lézard limestone Member of St. Barthélemy Formation (middle Eocene).

1. **NMB H** 17299. Rear view of incomplete spaciman with large parts of its original shell material preserved. One to dorso-ventral compression the width of the specimen appears larger than it actually was.

2. **NMB H** 17295. Incomplete rip showing sculpture of stalky whorls. Specimen is slightly compressed dorso-ventrally.

The two specimens are arranged as if they represented fragments of the same individual. Without dorso-ventral compression the specimen would be more slender.

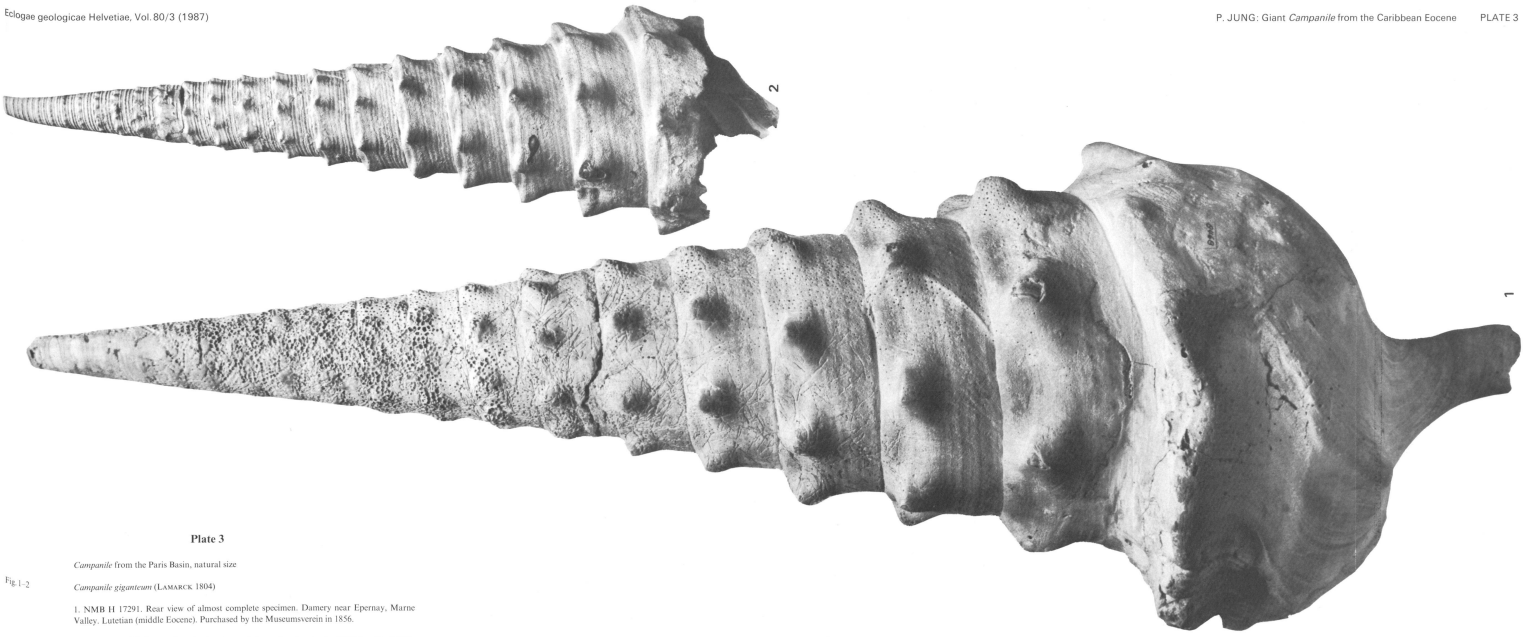


Plate 3

Campanile from the Paris Basin, natural size

Fig. 1–2 *Campanile giganteum* (LAMARCK 1804)

1. NMB H 17291. Rear view of almost complete specimen. Damery near Epernay, Marne Valley. Lutetian (middle Eocene). Purchased by the Museumsverein in 1856.

2. NMB H 17292. Incomplete tip showing sculpture of early whorls. NMB locality 14631: Damery near Epernay, Marne Valley. Lutetian (middle Eocene).