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Autor: Jung, Peter
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Two rare gastropod genera from the Pliocene of Venezuela

By PETER JUNG[1])

ABSTRACT

The records of the cancellarid *Trigonostoma (Extractrix) hoerlei* OLSSON and of an unidentified species of the turrid genus *Thatcheria* from the Early Pliocene Punta Gavilán Formation of Venezuela result in an unusual distributional pattern for the two groups. *Extractrix* was hitherto known from the Late (?) Miocene of Rumania, the Middle Pliocene of southern Florida and Recent from the Pacific coast of Costa Rica. *Thatcheria* is known from its Recent type species, *T. mirabilis* ANGAS, which lives in Japanese waters, and from a few Neogene records from the western Pacific area.

ZUSAMMENFASSUNG

Das Vorkommen des Cancellariiden *Trigonostoma (Extractrix) hoerlei* OLSSON und einer vorläufig nicht bestimmbaren Art der Turriden-Gattung *Thatcheria* in der unterpliozänen Punta Gavilán Formation von Venezuela wirft ein besonderes Licht auf die Verbreitungsgebiete der beiden Gruppen. *Extractrix* war bis jetzt bekannt aus dem oberen (?) Miozän von Rumänien, dem mittleren Pliozän von Süd-Florida und lebend von der pazifischen Küste von Costa Rica. *Thatcheria* ist bekannt durch die Typusart *T. mirabilis* ANGAS, die in japanischen Gewässern lebt, und einigen neogenen Vorkommen im Gebiet des westlichen Pazifik.

Introduction

The material dealt with in this paper was collected from the type locality of the Punta Gavilán Formation. The beds cropping out along the coast of Punta Gavilán, State of Falcón, Venezuela, contain a rich, marine mollusk fauna. The locality had been discovered by H.G. Kugler in 1928 and was exploited by him and his co-workers during the subsequent years. Apart from mollusks, which form the dominant element of the total assemblage, the fauna of this locality includes echinoids, Foraminifera, bryozoans and balanids. In a first paper on mollusks from Punta Gavilán RUTSCH (1930) dealt with two species of gastropods. In 1921 and 1924 L. Vonderschmitt and C. Wiedenmayer made fossil collections from beds of the same age in the same general area. Based on this material JEANNET (1928) reported on the echinoids describing a number of new species.

It was not until 1934 that RUTSCH described the beds cropping out at Punta Gavilán and designated them as the type locality of the Punta Gavilán Beds, which SENN (1935) called the Punta Gavilán Formation. RUTSCH (1934) gave a detailed account of the gastropods from this locality, although he did not include the small gastropod species, of which there are quite a number. All the bivalves still await description.

[1]) Naturhistorisches Museum, Augustinergasse 2, CH-4051 Basel, Switzerland.

For many years no additional collections of macrofossils were made at Punta Gavilán. Only during the last 15 years the locality was revisited several times by O. Macsotay, J. Gibson-Smith and the writer. The additional material thus obtained includes a considerable number of species not hitherto known from Punta Gavilán. With the exception of one paper (GIBSON-SMITH & GIBSON-SMITH 1974) nothing has been published about this additional material. The two gastropod genera dealt with below are part of this new material. The specimens were collected by O. Macsotay in 1964 and 1965.

Age of the Punta Gavilán fauna

Based on the comparison with other Caribbean faunas and the range of certain species RUTSCH (1934, p. 144) assigned a Late Miocene age to the Punta Gavilán fauna. He did not, however, exclude an Early Pliocene age. SENN (1935, p. 84) on the other hand considered it to be Pliocene, whereas WOODRING (1966, p. 431) put it in the Late Miocene again. All these authors based their age assignments on molluscan evidence.

DÍAZ DE GAMERO (1970), who studied the Foraminifera of the Punta Gavilán Formation, assigned the fauna to the *Globorotalia margaritae*-Zone. This assignment was confirmed by V. Hunter (written communication 1973) on the base of samples collected by Hunter and the writer in 1971. The Punta Gavilán fauna, therefore, has to be considered Early Pliocene in age (BOLLI & PREMOLI SILVA 1973).

Trigonostoma (Extractrix)

BOETTGER (1907, p. 138) described a loosely coiled gastropod from Kostej (Rumania) under the name of *Discohelix (Pseudomalaxis) extractrix*. He assigned the beds, in which it occurs, to the Middle Miocene. His description was based on 3 small specimens (height less than 6 mm). He described it as having 4½ whorls, 2½ of which make up the protoconch, but he did not figure a shell. BOETTGER was convinced that his placement of the species in the Architectonicidae was correct, although he himself stressed the fact that species of *Pseudomalaxis* have a squarish to rhomboidal aperture, whereas in *D. extractrix* it is trigonal.

The type specimens of *D. extractrix*, which were deposited in the Senckenberg Museum in Frankfurt, were sent to Cossmann in Paris, who published two good figures of one of the specimens (COSSMANN 1915, p. 143, Pl. 12, Fig. 25, 26) under the name of *Pseudomalaxis extractrix* BOETTGER. COSSMANN considered the beds of Kostej to be of Tortonian age.

KOROBKOV (1955, p. 138) designated the loosely coiled, cork-screw shaped *P. extractrix* as the type species of his new subgenus *Extractrix*, which he considered to be a subgenus of the architectonicid genus *Pseudomalaxis*. KOROBKOV was obviously not aware of the paper by BURCH (1949), who had described *Trigonostoma milleri* from the Pacific coast of Costa Rica; this species would be placed in *Extractrix*. Both OLSSON (1967, p. 23) and KEEN (1971, p. 656) consider *Extractrix* as a subgenus of the cancellarid genus *Trigonostoma*. OLSSON (1967, p. 24), however, stated that "this is largely a form genus and as such, there may be doubt whether the type species from Rumania is a cancellarid as its figure suggests".

Trigonostoma (Extractrix) hoerlei OLSSON

Fig. 1, 2

1967 *Trigonostoma (Extractrix) hoerlei* OLSSON, *Some Tertiary Mollusks from South Florida and the Caribbean.* - Paleont. Research Institution, Ithaca, N.Y., p. 24, Pl. 8, Fig. 6, 6a. Middle Pliocene, Florida.

Shell of small to medium size. Protoconch consists of about two whorls. The first half of the following whorl is tightly coiled like the protoconch, but the two subsequent whorls are loosely coiled. Sculpture consists of fine axials and spirals. Spirals obscure in late stages. Whorls trigonal in cross section. The inner, "sutural" edge is fairly sharp, but not sculptured. The two outer edges are sharply carinated and carry occasional, short spines. Columellar folds not visible.

Holotype. - USNM 645162.

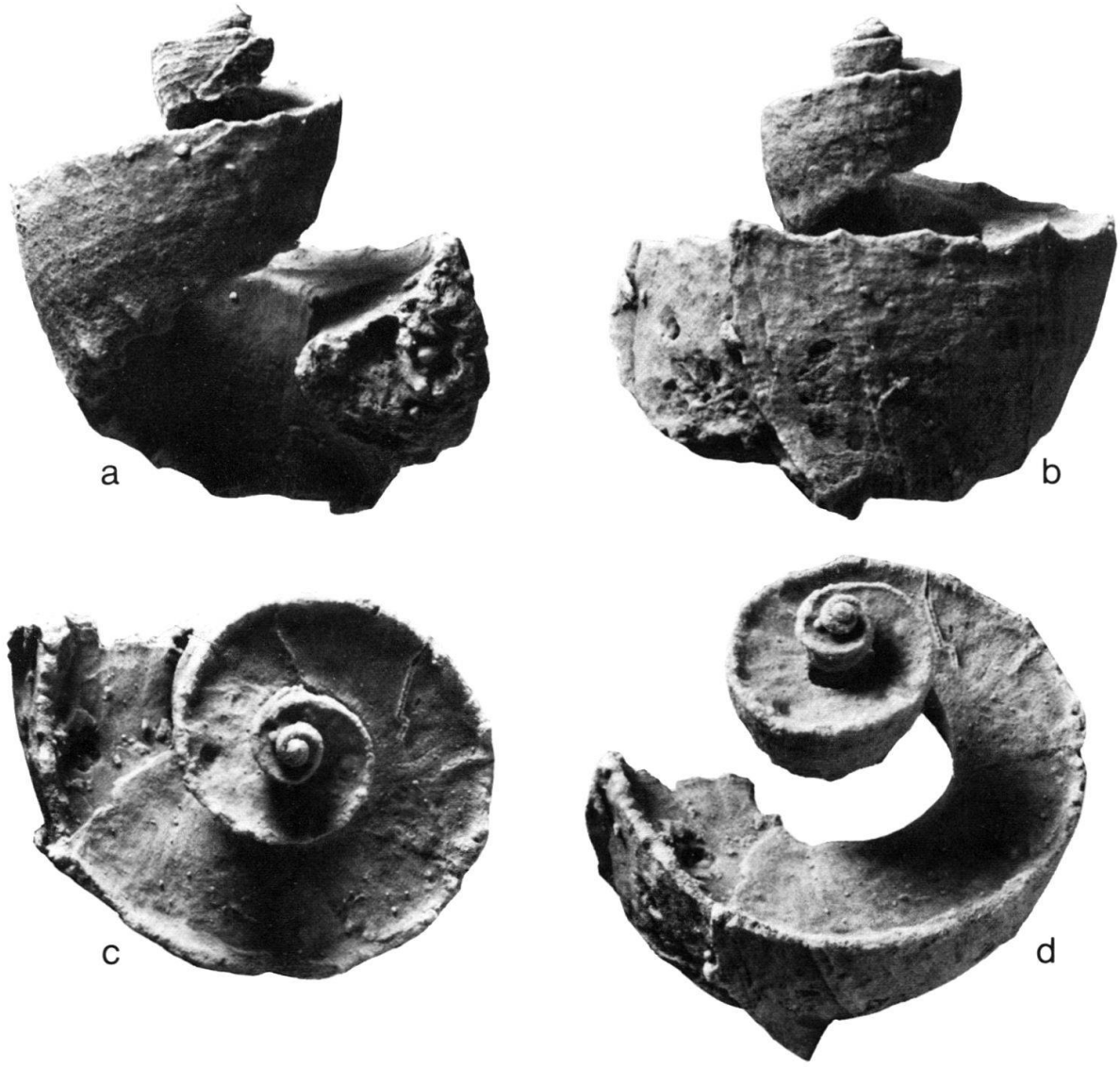

Fig. 1. *Trigonostoma (Extractrix) hoerlei* OLSSON. From NMB locality 13895: Punta Gavilán, Falcón. Punta Gavilán Formation (early Pliocene). All figures ×3. NMB No. H 16963. Height 20.1 mm; width 19.2 mm. a = front view; b = rear view; c = top view; d = oblique view.

Type locality. – Kissimmee, southern Florida. Pinecrest beds (Middle Pliocene).

OLSSON based his *T. hoerlei* on four specimens. The material from the Punta Gavilán Formation includes one fairly complete and two fragmentary specimens. They were all found in the type section of the formation by O. Macsotay in 1965. The Venezuelan shells have the same type of sculpture as those from Florida and differ only by their larger size. The holotype of *T. hoerlei* measures 13 mm in height and 11.4 mm in diameter, whereas the largest specimen from Punta Gavilán is 20.1 mm high and 19.2 mm across.

T. milleri BURCH (1949, p. 3) is known from about 50 specimens collected on the beach at Tambor near Puntarenas, Pacific coast of Costa Rica. This species has dimensions similar to those of the specimens from Venezuela, but different proportions. *T. milleri* has a smaller apical angle than *T. hoerlei.* Its whorls, therefore, seem even more loosely coiled than those of *T. hoerlei.* The original figures of *T. milleri* are unsatisfactory and details not recognizable. A better figure was given by KEEN (1971, p. 656, Fig. 1480).

T. extractrix (BOETTGER) (1907, p. 138) is a very small species. It is known from three specimens, the largest of which does not reach 6 mm in height. The species was later figured by COSSMANN (1915, p. 143, Pl. 12, Fig. 25, 26), and these figures were reproduced by KOROBKOV (1955, Pl. 13, Fig. 16a, 16b). As far as the writer is aware *T. extractrix* has never again been figured or dealt with.

Distribution of the subgenus *Extractrix*

As mentioned above, the type species of *Extractrix*, *T. extractrix* (BOETTGER), was described from Middle or Late Miocene beds of Kostej, Rumania. As far as the writer is aware this is the only occurrence of the species not only in Rumania, but in the whole of Europe. It is also the only species of the subgenus known from Europe.

The geographic and stratigraphic range of *Extractrix* was greatly extended when BURCH (1949) described *T. milleri* from the Pacific coast of Costa Rica. The gap in

Fig. 2. *Trigonostoma (Extractrix) hoerlei* OLSSON. From NMB locality 13895: Punta Gavilán, Falcón. Punta Gavilán Formation (Early Pliocene). Both figures ×3. NMB No. H 16964. Height 16.0 mm; width 17.2 mm. a = front view; b = rear view.

time as well as in space of the occurrence of *Extractrix* thus became considerable and hard to explain. This gap was narrowed when OLSSON (1967, p. 24) described *T. hoerlei* from the Pinecrest Beds of southern Florida. According to AKERS (1974) the Pinecrest Beds are of Middle Pliocene age (Zone N. 20). The report in this paper of the same species from the Early Pliocene Punta Gavilán Formation of Venezuela (*G. margaritae* Zone) provides a further infill.

The morphological and stratigraphic documentation of *Extractrix* is thus much better in the New World than in the Old World. It is in fact surprising that there are no additional European records.

The geographic distribution of *Extractrix* in the Tertiary Caribbean faunal province is shown in Figure 3. *Extractrix* proves to be another paciphile subgenus (WOODRING 1966). Its stratigraphic range extends from Middle or Late Miocene to Recent.

Thatcheria

A hundred years ago ANGAS (1877, p. 529) described the genus *Thatcheria* together with its type species *T. mirabilis* ANGAS. He had what he believed to be a unique specimen, which had been collected from the "Seas of Japan". ANGAS considered his species to belong to the subfamily Fusinae (of the family Fusinidae as it is called today). Modern systematists place *Thatcheria* in the Thatcheriinae, a subfamily of the Turridae. In the past the systematic assignment of the genus varied

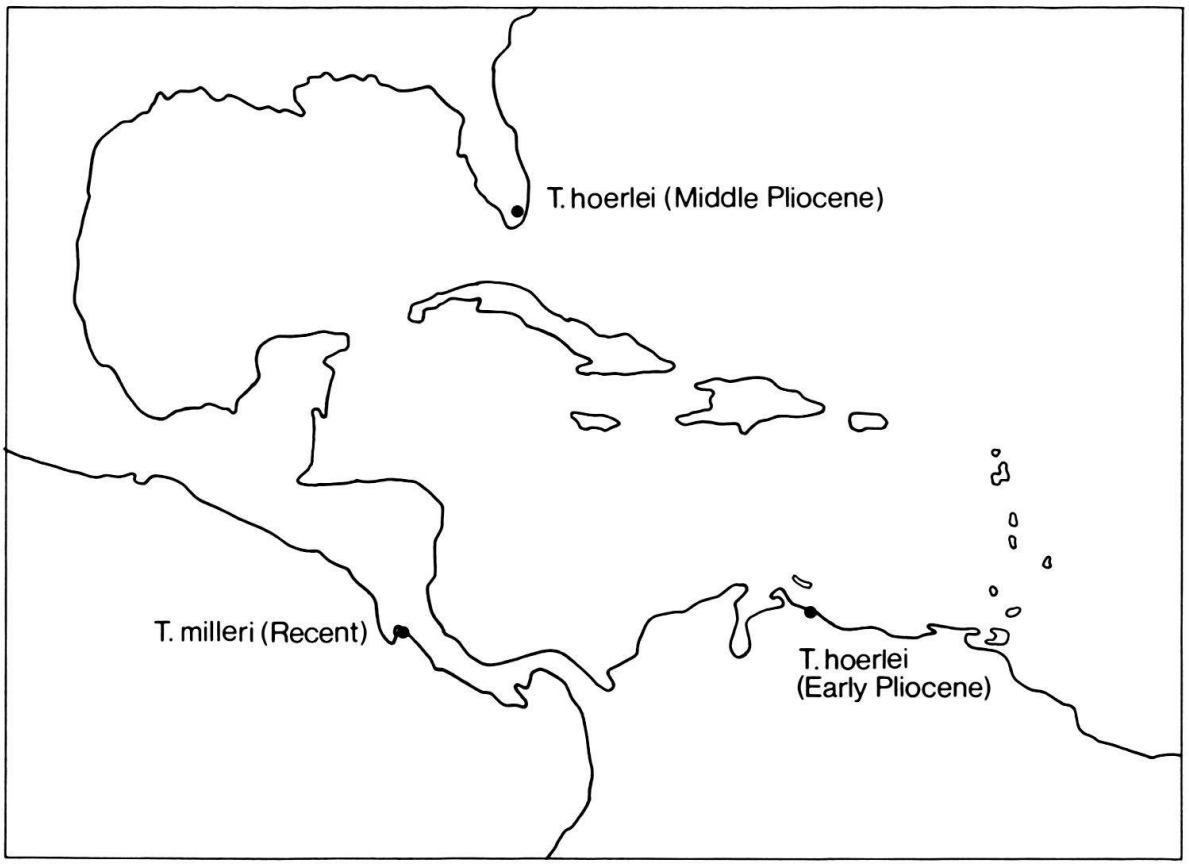

Fig. 3. Map showing distribution of species of the subgenus *Extractrix* in space and time.

greatly from author to author (e.g. YOKOYAMA 1928, 1930; EALES 1938; POWELL 1942; BEETS 1943; MACNEIL 1960). A detailed account on the discussion of this question was given by CHARIG (1963, p. 258-268).

T. mirabilis is the only Recent species of the genus. Its distribution is restricted to parts of the Japanese waters. It has been found off the Pacific coasts of Honshu and Shikoku, and according to KIRA (1967, p. 102) it lives at depths of 80 to 100 fathoms.

Thatcheria sp.

Fig. 4

This form is represented in the Punta Gavilán Formation by two incomplete specimens, which were collected by O. Macsotay in October 1964. In both of them the protoconch is missing. The smaller specimen consists of five early whorls; it is not well preserved and is unsuitable for description.

The larger specimen has a height of 31 mm and measures 22 mm in diameter. It consists of a little more than six whorls. The sharp, unsculptured carina is situated nearer to the abapical suture. The shoulder or ramp is sculptured by growth lines only, which show the form of the deep posterior sinus. The surface below the carina is sculptured by faint spiral threads. The anterior part of the siphonal canal is broken. The preserved part of the inner lip shows that there was a thin callus.

The two Venezuelan specimens are too incomplete and not preserved well enough to be identified specifically. Comparisons with the species recorded from the Neogene of the western Pacific area (see CHARIG 1963; POWELL 1966) are not useful, because some of the described forms are not well figured, and because more and better material is needed from the Punta Gavilán Formation. The Venezuelan form is recorded here in order to show the extraordinary distributional pattern of the species of *Thatcheria*.

Distribution of *Thatcheria*

As mentioned above *T. mirabilis* ANGAS, the only Recent species of the genus, has a limited distribution in parts of the Japanese waters. Fossil occurrences have been reported from various parts of the western Pacific area. YOKOYAMA (1928, p. 338, Pl. 66, Fig. 3, 4) reported *T. gradata* (YOKOYAMA) (see YOKOYAMA 1930) from Pliocene beds of Hyuga, east coast of Kyushu, Japan; MACNEIL (1960, p. 121, Pl. 15, Fig. 11, 12) *T.* cf. *gradata* from beds of questionable Miocene and Pliocene age of Okinawa. BEETS (1951, p. 15, Pl. 1, Fig. 6) figured a small, incomplete specimen from the Pliocene of eastern Borneo under the name of *Thatcheria* spec. nov., and MARTIN (1933, p. 18, Pl. 2, Fig. 11, 11a) figured *T. carinata* from the asphalt deposits of Buton, southeast Celebes, which were originally considered to be of Late Oligocene or Early Miocene age, but which were later assigned to the Late Miocene (BEETS 1953, p. 239). *T. vitiensis* was described from beds of probably Early Pliocene age in Fiji (CHARIG 1963, p. 292, Pl. 47, Fig. 4-6), and POWELL (1942, p. 168-169) recorded *T. pagodula* (Late Miocene or Early Pliocene), *T.* aff. *pagodula* (Early Pliocene), and *T. liratula* (Early Pliocene) from New Zealand. All these occurrences together cover a fairly normal distributional area (see Fig. 5).

Fig. 4. *Thatcheria* sp. From NMB locality 13892: Punta Gavilán, Falcón. Punta Gavilán Formation (Early Pliocene). All figures ×3. NMB No. H 16966. Height 31 mm; width 22 mm. a = top view; b = front view; c = rear view.

The record of *Thatcheria* sp. from the Early Pliocene of northern Venezuela changes the distributional pattern altogether: it now looks disjunct. This fact is difficult to explain, but it should be borne in mind that all the fossil occurrences are documented only by very few specimens. Additional material from different

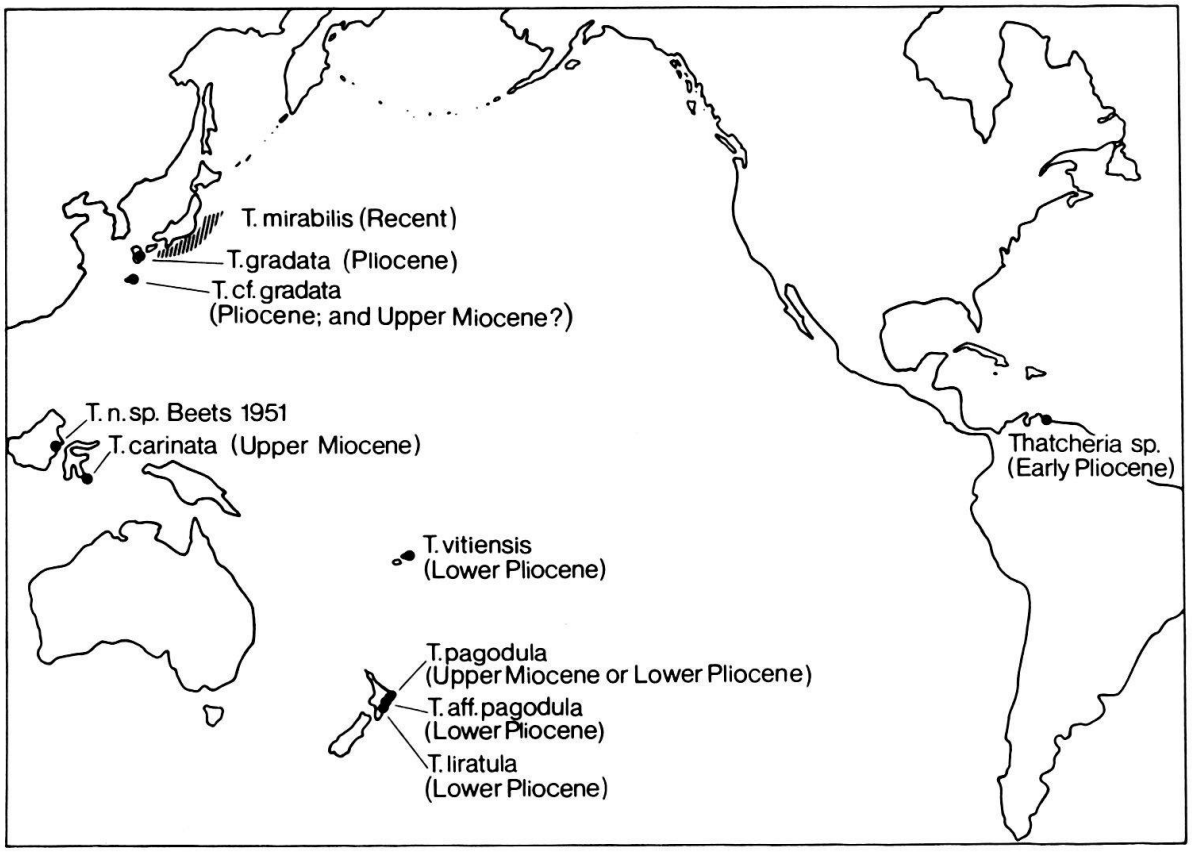

Fig. 5. Map showing distribution of species of the genus *Thatcheria* in space and time. Note disjunct distributional pattern.

localities may be found in the future, which may contribute towards a reasonable explanation of this distributional pattern.

Thus OLSSON (1964, p. 113, Pl. 11, Fig. 8-8b) described *Thatcheria ecuadoriana* from the Esmeraldas Formation of northwestern Ecuador, topotypic material of which is at hand. OLSSON considered the Esmeraldas Formation to be of Late Neogene age. Samples collected at the type locality of *T. ecuadoriana* by F. Stumm and the writer in 1971 were sent to F. Rögl, who assigned them to the *G. margaritae* Zone (Early Pliocene). *T. ecuadoriana* is the type species of OLSSON's subgenus *Conicheria*, which is characterized mainly by its tightly coiled whorls. Other morphological features such as sculpture and form of anal sinus are very similar to those of *Thatcheria*. If the consideration of *Conicheria* as a subgenus of *Thatcheria* proves to be correct, there is the indication that during Early Pliocene times a sparse population of related forms lived in northern South America - far away from the distributional area of other species of *Thatcheria*.

It is most probable that transport of larvae by currents is the most important factor in explaining this unusual distribution. It is an established fact that a number of gastropod larvae live long enough to be transported over large distances by ocean currents. But as long as virtually nothing is known about the biology of *T. mirabilis* this assumption is a mere speculation.

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