Two new species of *Phenacophragma* from the Paleogene of Trinidad and Poland

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ABSTRACT: Two new species of the lituolid genus *Phenacophragma,* characterized by intracameral hemiseptae, are described from "flysch-type" agglutinated foraminiferal faunas. *Phenacophragma beckmanni,* n. sp. occurs in the Paleocene Lizard Springs Formation of Trinidad and in Paleocene to middle Eocene sediments of the Polish Carpathians. *Phenacophragma elegans,* n. sp. has been observed only in Trinidad.

INTRODUCTION

The genus *Phenacophragma* Applin, Loeblich and Tappan (1950) was originally created to include *Ammobaculites*-like lituolid foraminifera possessing short hemiseptal projections that extend into the chamber from the sutures or periphery of the test. Loeblich and Tappan (1985) confirmed the imperforate wall structure of this hitherto monotypic genus and placed it in the family Mayncinidae Loeblich and Tappan 1985, which is distinguished by its compressed planispiral or uncoiling test with numerous chambers, interiomarginal aperture and imperforate wall.

Taxonomic work on "flysch-type" agglutinated foraminifera from the Lizard Springs Formation of Trinidad (Kaminski and others, in press) and Paleogene sediments of the Silesian and Subsilesian units of the Polish Carpathians has revealed two curious new species that we place here in *Phenacophragma.* The first, *Phenacophragma beckmanni,* n. sp., has been previously reported from Trinidad and Poland under open nomenclature. The second, *P. elegans,* n. sp., has been found only in Trinidad. We have not found these forms in core material from the North Sea or Labrador Sea.

SYSTEMATIC DESCRIPTIONS

Superfamily LITUOLACEA de Blainville 1827
Family MAYNCINIDAE Loeblich and Tappan 1985

Phenacophragma beckmanni Kaminski and Geroch, **n. sp.**
Text-figures 1–4; plate 1, figures 1–7

Ammomarginulina sp. A.—BECKMANN 1960, fig. 2.

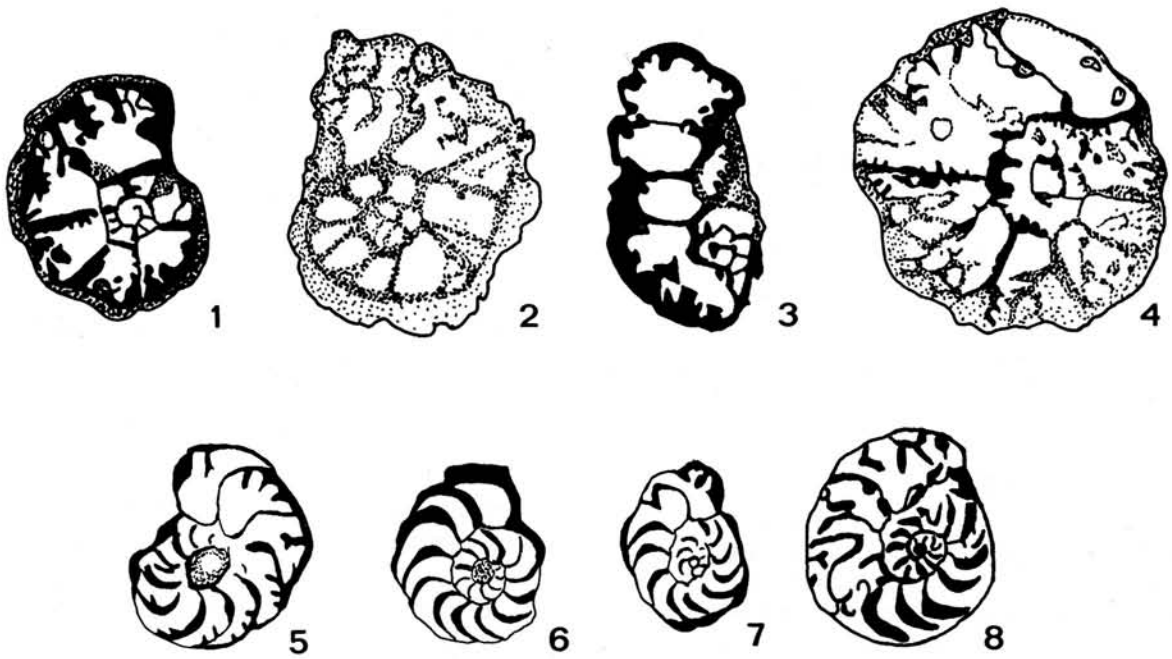
Description: Test free, large, discoidal, ovate or slightly elongate, much compressed, initially planispiral, evolute, with earlier whorl visible in umbilical region, with later chambers displaying a slight tendency to uncoil. Spiral part consists of 2 to 2½ whorls, with 7½ to 9 chambers in the last whorl. Sutures in planispiral part are straight. Septae are of two types: normal intercameral septae; and in later chambers, short hemiseptae, which project only slightly from the periphery and intercameral sutures into the chamber interior. Chambers are flat or slightly excavate and increase rapidly in height with ontogeny. Chamber interior simple, not labyrinthic. Aperture usually indistinct, interiomarginal in the planispiral part and terminal in the uncoiled uniserial part. Periphery acute, often displaying a ragged keel. Wall relatively coarse, imperforate, comprised mainly of fine angular quartz grains with little cement.

Dimensions (in mm): Holotype: maximum diameter 0.70, minimum diameter 0.53, thickness 0.14. Paratypes range from 0.51 to 0.77 maximum diameter and 0.28 to 0.53 minimum diameter. Measurements of types are given in table 1.

Types and occurrence: Holotype (text-fig. 2; pl. 1, figs. 1a, b; USNM 404597) and figured paratypes (text-figs. 1, 3, 4; pl. 1, figs. 2–5; USNM 404598, 404599, 404600, 404607) are from the Danian (Zone P 1c) of the Lizard Springs Formation, TEXACO Trinidad well Guayaguayare-287, core sample at 3355 ft; Guayaguayare Field, near Lizard Springs, Trinidad. Additional, unfigured paratypes are housed in the paleontological collections of the Woods Hole Oceanographic Institution, the Bedford Institute of Oceanography, the Jagiellonian University, Krakow, Poland, and in the authors' collections.

Remarks: This species displays considerable variation both in the size and composition of agglutinated particles comprising the test, and in the degree of secondary deformation. Best preserved individuals are from distal fine-grained turbidites of the Lizard Springs Formation. These are colored white and are comprised of silt-sized quartz grains, giving the test a translucent appearance. Individuals from more proximal turbidites are larger, coarser and yellowish brown. These specimens often contain large, rounded quartz grains and mafic grains incorporated in the test and are laterally compressed. A specimen of *Phenacophragma beckmanni* was found in the Cushman Collection in a slide labeled "*Ammobaculites coprolithiformis* (Schwager)??" (C.C. 9667) from a sample collected by P. W. Jarvis from Trinidad Central Oilfields well #1, 720 ft.

In the Polish Carpathians, very rare specimens of this species have been encountered in Paleocene claystones of the Subsilesian Unit in the Żywiec Tectonic Window in southwestern Poland. Specimens from middle Eocene flysch sediments of the Hieroglyphic Beds in the Silesian Unit (profile Karas stream, sample 53) are more abundant and display better preservation. They are slightly coarser and thicker than specimens from Lizard Springs and are comprised solely of quartz grains. These specimens till now have been tentatively referred to as *Ammobaculites* sp. cf. *A. americanus* Cushman.



TEXT-FIGURES 1–8
1–4, *Phenacophragma beckmanni* Kaminski and Geroch, n. sp., × 50. Camera lucida drawings. From the Danian of the Lizard Springs Formation of Trinidad. 2, holotype; 1, 3, 4, paratypes.
5–8, *Phenacophragma elegans* Kaminski, n. sp., × 50. 5, holotype; 6–8, paratypes.

In Trinidad, *Phenacophragma beckmanni,* n. sp. ranges from Zone P 1 to P 4. In Poland it has been found in Paleocene and middle Eocene sediments.

This species differs from *Ammobaculites stephensoni* Cushman originally described from the Taylor Formation in its thinner and more evolute test and from *Alveolophragmium planum* Bykova in its simple wall and thinner, carinate test. *Ammobaculites khargensis* Nakkady and Talaat differs in its larger size, more numerous chambers, and coarser wall. *Ammoscalaria incultus* Ehremeeva differs in its thicker test, lobate periphery, and in possessing sponge spicules incorporated in the wall. Paratypes of *Phenacophragma assurgens* Applin, Loeblich and Tappan (USNM 106227) differ in possessing more chambers, finer agglutinated material, and in lacking a keel.

Phenacophragma elegans Kaminski, **n. sp.**
Text-figures 5–8; plate 1, figures 8–14b

Description: Test free, small, discoidal, thin and finely agglutinated, consisting of an evolute spiral part of up to three whorls, followed by a short uniserial part of up to three chambers, when present. The spiral part contains 10.5 to 15 chambers in the last whorl. Sutures are curved, thickened in the middle portion but not raised, and in later chambers possess short secondary septae extending back into the previous chamber. Short hemiseptae may also extend from the periphery. Intercameral sutures are flush with the surface of the test, spiral suture is depressed. Chambers increase slowly in size, and are flat, with a simple interior. Aperture basal in planispiral portion, later indistinct. Wall is finely agglutinated, imperforate, usually white, with much cement.

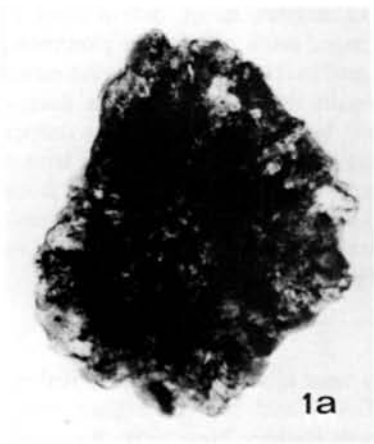
Dimensions (in mm): Holotype: Maximum diameter 0.47, minimum diameter 0.32, thickness 0.11. Paratypes range from 0.36 to 0.56 maximum diameter and from 0.28 to 0.42 minimum diameter. Dimensions of types are listed in table 1.

Types and occurrence: Holotype (text-fig. 5; pl. 1, fig. 8; USNM 404601) and figured paratypes (text-figs. 6, 7, 8; pl. 1, figs. 9–14b; USNM 404602, 404603, 404604) are from the Danian (Zone P 1c) of the Lizard Springs Formation, TEXACO Trinidad well Guayaguayare-287, core sample at 3276 ft;

PLATE 1

1a–7 *Phenacophragma beckmanni* Kaminski and Geroch, n. sp.
1a–3, 5–7, × 80; 4, × 110. 1a, holotype (transmitted light); 1b, holotype (cross polarized light). 2–5, paratypes from the Danian of the Lizard Springs Formation of Trinidad. 6–7, specimens from the middle Eocene Hieroglyphic Beds of the Polish Carpathians.

8–14b *Phenacophragma elegans* Kaminski, n. sp.
From the Danian of the Lizard Springs Formation of Trinidad. 8–13, × 85; 14a–b, × 120. 8, holotype; 9–14b, paratypes.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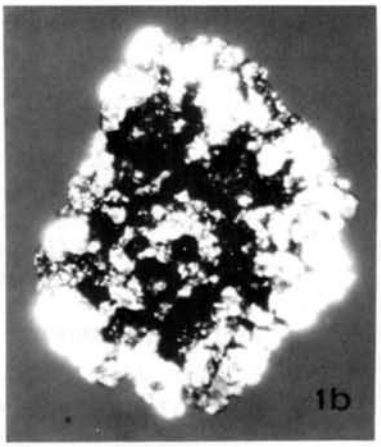
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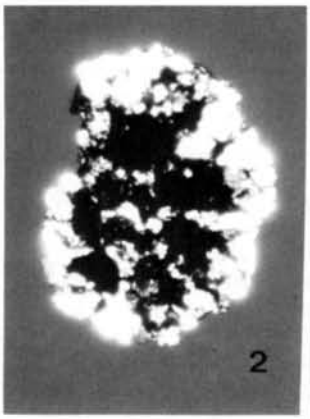
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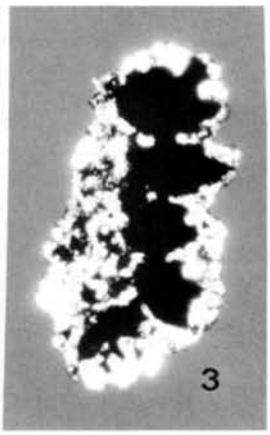
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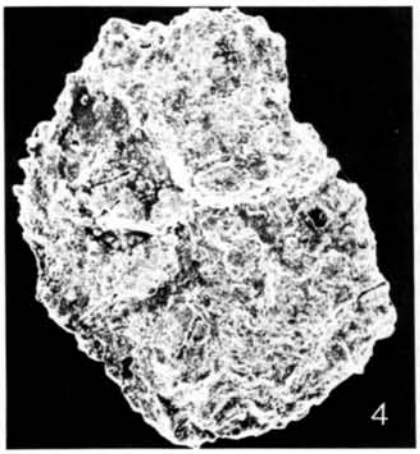
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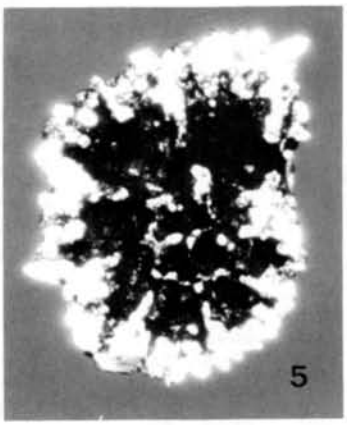
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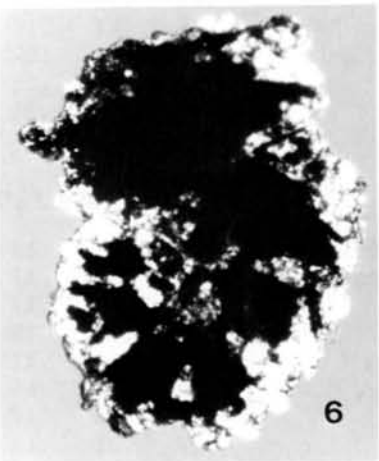
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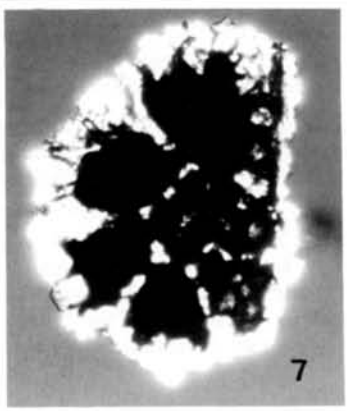
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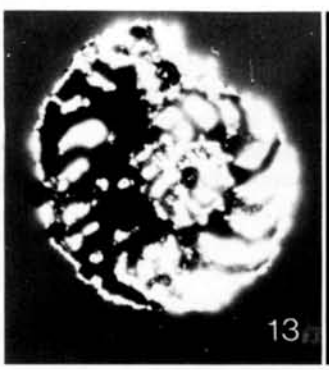
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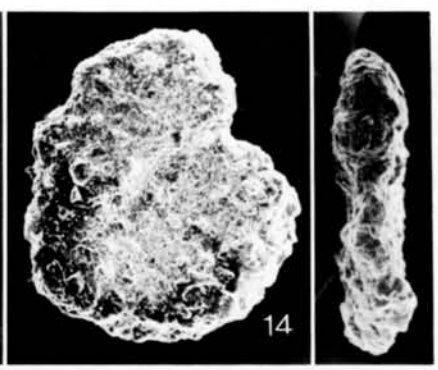
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TABLE 1
Dimensions of type specimens (in mm).

Parameter:	X_1	X_2	X_3	X_4	X_5	X_6
Phenacophragma beckmanni, n.sp.						
Holotype:	.70	.53	.26	.14	8	15
Paratypes:	.78	.64	.47	.14	8.5	16
	.56	.39	.22	.10	6	10
	.67	.27	.17	.13	7	12
	.51	.40	.21	.18	9	17
	.67	.47	.27	.16	7.5	12
	.53	.44	.19	.12	7.5	15
	.69	.51	.25	.13	7.5	14
	.56	.47	.19	.14	7	13
	.57	.42	.24	.13	8.5	15
	.76	.43	.25	.11	7	12
	.53	.36	.21	.13	6	?
Phenacophragma elegans, n.sp.						
Holotype:	.47	.32	.15	.11	10.5	
Paratypes:	.42	.33	.17	.08	11.5	24
	.36	.28	.12	.09	10.5	20+
	.50	.42	.18	.12	15	30
	.56	.42	.21	.13	11.5	30
	.42	.37	.15	.10	11.5	24
	.51	.44	.17	.10	15	26
	.37	.31	.12	.08	10.5	19
	.40	.31	.17	.07	11	23
	.39	.29	.11	.10	?	?
	.50	.28	.18	.09	11	18+
	.54	.37	.15	.11	?	?
	.47	.37	.15	.10	10.5	26

Note: X_1 = Maximum diameter. X_2 = Minimum diameter. X_3 = Height of last chamber. X_4 = Maximum thickness. X_5 = Number of chambers in the last whorl. X_6 = Total number of chambers.

Guayaguayare Field, near Lizard Springs, Trinidad. Additional unfigured paratypes are housed in the paleontological collections of the Woods Hole Oceanographic Institution, the Bedford Institute of Oceanography, the Jagiellonian University, Krakow, Poland, and in the authors' collections.

Remarks: *Phenacophragma elegans*, n. sp. differs from *P. beckmanni* in its smaller size, more numerous chambers, curved, thickened sutures, and in its more finely agglutinated test. *Phenacophragma elegans* may also possess a deeper paleobathymetric preference, being more abundant in deeper facies of the Lizard Springs Formation. Individuals with a distinct uniserial portion are rare. This species ranges from the lower Maastrichtian *Globotruncana lapparenti tricarinata* Zone of the Guayaguayare Formation to Zone P 4 in the lower Lizard Springs Formation of Trinidad.

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