

The Georgian heteromorph ammonite genera *Kutatissites* and *Pseudoaustraliceras* in Northwest Southamerica

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RESUMEN

Se describen dos especímenes de *Kutatissites* KAKABADZE (1970), los cuales provienen: 1) de las arcillolitas con concreciones de la parte superior de la Formación La Paja, (Aptiano superior); 2) de las arcillolitas de la Formación Socotá (Aptiano). "*Ancyloceras Columbiae* BASSE, 1928", que también procede de la Formación La Paja, es colocada taxonómicamente en el género *Pseudoaustraliceras* KAKABADZE (1981). Estos géneros habían sido descritos previamente sólo del Viejo Mundo. Se propone que se explore la idea de la dispersión de estos grupos de cefalópodos, por transporte pasivo de "seudolarvas" vía paleocorrientes cálidas del mar de Tetis, con base en el estudio de sus primeros estadios ontogenéticos.

ABSTRACT

Two specimens of the ammonite genus *Kutatissites* KAKABADZE (1970) are described from concretionary shales of Upper Aptian Age in Central Colombia. "*A. Columbiae* BASE, 1928", with similar occurrence is placed in *Pseudoaustraliceras* KAKABADZE (1981). This extends the observed geographical and temporal ranges of both genera which hitherto had only been recorded in the Old World. Dispersal of individuals of both genera is interpreted as due to "pseudolarval" drift rather than to necroplanctonic drift.

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INTRODUCTION

Heteromorph ammonoids are frequently found in cretaceous deposits of Colombia, but they have been only sporadically reported on. It is interesting to note, however, that a better interpretation of cretaceous tethyan biostratigraphy and biogeography is now hampered by our lack of knowledge of the occurrence of heteromorph ammonoids in such regions as Northern South America. It is the purpose of this paper to re-describe and re-illustrate the ontogenetic development of "*Ancylloceras Columblae* BASSE, 1928", to support the placement of BASSE's species in *Pseudoaustraliceras*. In addition, two ammonite specimens referred to as the Georgian genus *Kutatissites* are described for the first time from Colombia. Materials were collected from well known exposures of the La Paja Formation in Mesa de Los Santos, Santander Department, and Villa de Leiva, Boyacá Department. It is a widespread Formation comprising shales with calcareous concretions and thin algal limestones. An additional specimen of *Kutatissites* also comes from concretionary shales which outcrop near Apulo, Cundinamarca Department. The shales belong to the Socotá Formation as described by Etayo-Serna (1979).

SYSTEMATIC PALEONTOLOGY

Genus *Kutatissites* KAKABADZE

Kutatissites KAKABADZE, 1970: 734.

(*Simionescites*, AVRAM, 1976: 77).

Type species. *Kutatissites bifurcatus* KAKABADZE, original designation.

Horizon. Barremian - Aptian.

Kutatissites was proposed by KAKABADZE for a group of Georgian heteromorph ammonoids characterized by initial dextrogyrate or levogyrate helicoid whorls with simple, oblique, trituberculate ribs attenuated on the siphonal band. Then follows planospiral crioceratitic coiling with development of one or two non-tuberculate intercalatory ribs between each pair of tuberculate costae. After the end of the helicoid stage, midlateral and ventro-lateral tubercles may disappear to reappear on the body-chamber. On the inner side all the ribs become thin and bend towards the aperture.

Discussion. *Kutatissites* was compared to *Helycancylus* (GABB, 1869, emend. ANDERSON, 1938), but according to ANDERSON (1938: 222, pl. 79, figs. 4,5) on the latter genus ribs do not interrupt on the venter and helicoid loose coiling occurs almost on the symmetry plane. The genus *Simionescites* was proposed by AVRAM (1976: 77) for heteromorphs of Romania with a diagnosis and comparison to *Helycancylus* similar to that given previously for *Kutatissites* by KAKABADZE. *Simionescites* is thus regarded as a junior subjective synonym of *Kutatissites* (cf. THIEULOY, 1976: 103; KAKABADZE, 1978, XXXIV. 4; 1981: 125).

Stratigraphical and geographical distribution. In France *Kutatissites* appeared in the Late Barremian (THIEULOY, 1976: 102), in Romania and Georgia it occurred in Early Aptian, and in Colombia it occurred in Late Aptian.

Kutatissites boteroi n. sp.
Figs. 1a, 1b, 1c.

Holotype. And only specimen studied, a dextrogyrate adult steinkern, IGM 183230.

Type Locality. Eastern base of El Copial Hill, near Apulo (Cundinamarca Department).

Horizon. Aptian.

Repository. INGEOMINAS, Bogotá.

Coiling excentric, with body-chamber almost in contact with last helicoid whorl. On the last helicoid whorl all ribs are of equal strength, convex and oblique, they join in pairs at a periumbilical tubercle on the left of the phragmocone; on the right of the whorl section periumbilical tubercles are not noticed. On the tuberculate costae an almost imperceptible node develops near mid-flank; costae are interrupted on siphon and develop distinct ventral, bump-like tubercles; on the internal side ribs draw a tenuous adoral arch. Section depressed, elliptical (cf. fig. 1c).

With growth (planospiral coiling) the ornament increases its strength, and the adoral rib of the two that join the left periumbilical tubercle becomes prominent. On the body-chamber which represents one third of a volution, after the last suture, two intercalatory ribs separate adja-

FIG. 1. *Kutatissites boteroi* n. sp.

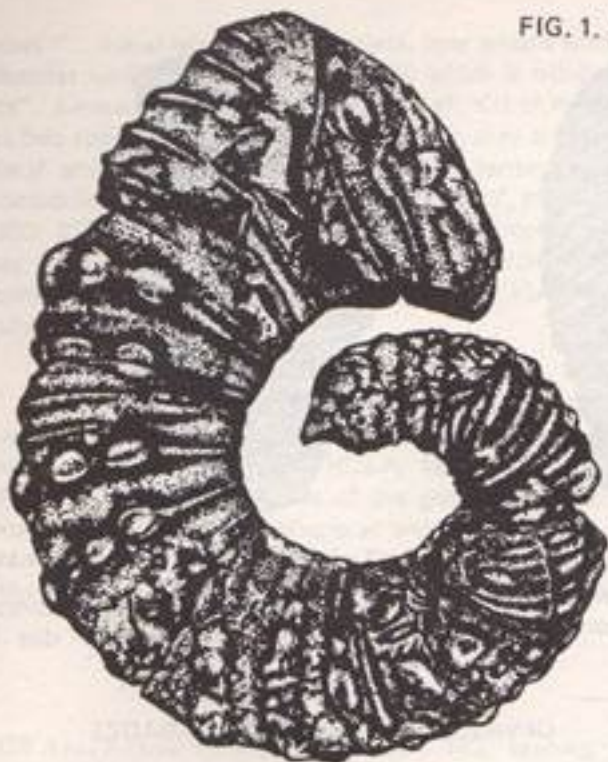


FIG. 1a. Lateral view of the holotype (x 1)



FIG. 1c. Whorl section, D: 80 mm (x 1)



FIG. 1b. Oral view of holotype (x 1)

cent trituberculate costae, and attenuates the asymmetry of the ornament. All ribs are rounded; major ribs bifurcate in two riblets on the internal side where they bend adaper-turally.

Remarks. The specimen described was found together with a "*Pseudohaploceras* sp. ind." in an argillaceous concretion. Like *Kutatissites princeps* (AVRAM), (1976: 78), but with widely separated tuberculate primaries and only one or two inconspicuous intercalatory non-tuberculate ribs.

The new species is dedicated to Professor Gerardo Botero A., Medellín (Colombia).

Kutatissites sp. ind.
Figs. 2a, 2b, 2c

Hypotype. A levogyrate therathological specimen, IGM 183231.

Locality. Mesa de Los Santos, Santander Department.

Horizon. Upper Aptian. La Paja Formation.



FIG. 2. *Kutatissites* sp.; IGM 183231

FIG. 2a. Lateral view of the phragmocone.

FIG. 2c. Dorsal view showing contraction of phragmocone due to injury. (x 1)

FIG. 2b. Dorsal view showing contraction of phragmocone due to injury. (x 1)

Repository. INGEOMINAS, Bogotá.

Most helicoid whorls were broken to pieces while removing the specimen out of a concretion. The preserved portion of the last helicoid whorl has single, heavy ribs interrupted on venter, they bear three rounded tubercles, those on the venter being larger; between the tubercles the ribs tend to be sulcate (cf. fig. 2a).

At the transition to the planospiral coiling, the phragmocone contracts-by injury- and ribs become altered, crossing the venter with a twist, without interruption but weakened between the reduced ventrolateral tubercles (cf. fig. 2b).

On the last preserved third of volution tuberculation becomes accentuatedly asymmetric, with the left side of whorl almost without tubercles, but with strong periumbilical tubercles on the right side, to which up to three ribs may join (cf. fig. 2c). All ribs are equal, rounded, with a steep adoral side, separated by narrow rounded interspaces. Ribs cross the inner side, narrow down and describe an adoral arch.

Remarks. This specimen was found with species of the *Dufrenoyia sanctorum* - *Stoyanowiceras treffryanus* Assemblage Zone.

Genus *Pseudoaustraliceras* KAKABADZE

Pseudoaustraliceras KAKABADZE, 1981: 114.

Type species. *Crioceras ramososeptatum* ANTHULA, 1899, original designation.

In his monographic work on the Ancyloceratids of southern U.S.S.R., KAKABADZE (1981: 114) separates from *Australiceras* a group of Georgian species of ammonites that share a common ontogenetic development: early whorls show single, equal non-tuberculate ribs; next, ribs develop ventrolateral tubercles followed by the appearance of lateral and periumbilical tubercles; with growth, tubercles increase in size from periumbilical to ventro-lateral, and finally they may almost all disappear simultaneously while the periumbilicals may persist; ribbing continues. One to three simple ribs separate consecutive trituberculate costae. On the internal side all ribs become narrow and bend adorally. The whorl section is thicker than high in early ontogeny but higher than thick during late ontogeny. The first volution are not in contact; the body-chamber is in contact with the phragmocone.

Discussion: Species now included in *Pseudoaustraliceras* have been referred to different genera (cf. KAKABADZE, 1981: 115). *Australiceras* (WHITE HOUSE, 1926: 208)

shows "... initial whorls trituberculate, later whorls without tubercles until the adult body-chamber which is trituberculate". *Ammonitoceras* (DUMAS, 1876; cf. KILIAN, 1910) has two rows of tubercles instead of three, they are centro-lateral and periumbilical; ribs cross the venter without interruption. In *Tropaeum* (J. de C. SOWERBY, cf. CASEY, 1960: 23), the dense ribbing of the phragmocone, which may bear umbilical and ventrolateral tubercles in the young, changes to distantly spaced heavy ribs on the body-chamber.

Stratigraphical and geographical distribution. *Pseudoaustraliceras* is a Tethyan genus whose type species was first described from Georgia (ANTHULA, 1899); according to KAKABADZE (1981) species of the genus have been recorded from Georgia, Madagascar and Angola; now the genus is recognized in Colombia. The horizon of the genus is the Aptian.

Pseudoaustraliceras columbiae (BASSE)
Figs. 3a, 3b, 3c, 3d; 4a, 4b, 4c, 4d.

1928 *Ancyloceras Columbiae* BASSE: 142, text-fig. 20, pl. 8, figs. 6, 7a, 7b.

1936 *Ancyloceras Colombiae* E. BASS, BOTERO: 24

1964 *Ancyloceras Columbiae* BASSE, ETAYO-SERNA: 104

1968 *Australiceras columbiae* (BASSE), ETAYO-SERNA: 28

1968 *Australiceras columbiae* (BASSE), ETAYO-SERNA, Table 1.

Lectotype. The specimen shown by BASSE on her plate 8, as figures 7a, 7b; here designated (cf. figs. 3b, 3c).

Type Locality. SW of Villa de Leiva, Boyacá Department,

Horizon. The species is common in Upper Aptian beds, segment E of the "arcillolitas abigarradas member" of La Paja Formation. This species has been found with species of the *Dufrenoyia sanctorum-Stoyanowiceras treffryanus* Assemblage Zone.

The diagnostic characteristics of *P. columbiae* (BASSE) are: 1) the early ontogenetic stage with single non-tuberculate ribs which widens towards the venter, and coiling elliptical in one more or less inclined plane-illustrated here for the first time (cf. fig. 3a); 2) In the juvenile stage its strong, frequently looping, club-shaped, trituberculate ribs are separated by narrow interspaces in which one or rarely two, simple ribs may develop (cf. fig. 3a); 3) In middle age the intercalatory may associate with the umbilical tubercle of the preceding rib and one short secondary rib forks from the ventro-lateral tubercle and crosses the venter to the opposing or succeeding ventro-lateral tubercle. (cf. fig. 3b-c; Plate 1). On the venter all ribs are in uniform relief, slightly depressed along the siphonal line. Tubercles represent hollow, septate spines (cf. fig. 3a) reproduced on the internal mould as bluntly rounded bosses. Between the tubercles the ribs tend to be sulcate or even distinctly looped (cf. fig. 3a). On the internal side the intercalatory ribs and ribs springing in pairs from the umbilical tubercle become narrow and bend adorally; 4) On the adult stage uniform ribs typically bifurcate at the lateral tubercle in a Y-fashion and tubercles start losing their strength (cf. fig. 3d and plates 1, 2). Suture line with a narrow, deep, and acute first lateral lobe (cf. plate 1); 5) In mature age the intercostal space triplicates its width and becomes slightly concave, costae decrease in number but the "Y" bifurcation at lateral vanished tubercles persists. (cf. plates 1, 2).

Comments. BASSE's (1928: 142) diagnosis of the species was based on middle aged and adult specimens (cf. figs. 3b, c, d), but now several well preserved topotypical specimens that show overlapping growth stages have been found, which allow the ontogeny to be determined (cf. fig. 3a and plate 1). *P. columbiae* (BASSE) differs from *P. paulowi* (VASILIEVSKII) (1908: 46, pl. 3 figs. 1, 1b, 1c) in its longer non-tuberculate early ontogenetic stage and its larger size and conspicuous Y-shaped adult ribs. The type species of the genus *P. ramososeptatum* (ANTHULA) (1899: 127, pl. 4, figs. 4a, 4b, 4c), loses its tubercles at a diameter at which BASSE's species shows the conspicuous Y-shaped ribs. None of the species to which BASSE compared her species seems congeneric with *Pseudoaustraliceras*.

MEASUREMENTS

Specimens (hypotypes)	Diameter	Single non-tuberculate	Single bituberculate ribs	H	W
X	11.4 mm	20*			
VL-13-3	47.5		17	14.1	15.0
C-13656	19.2	21*			
SEH-1	107.0		21	32.2	31.0
EST. 14	83.6		18	27.7	29.5

*Half a whorl. At about a D. of 130 mm Y-ribbing starts and periventral tubercles attenuate.

FIG. 3. *Pseudoaustraliceras columbiae* (BASSE)



FIG. 3a. Specimen ICNMHN, C-13856 from "Loma Monsalve", Villa de Leiva. (x 1)



FIG. 3c. Lectotype (x 1). Redrawn from BASSE, 1928, pl. 8, fig. 7b.



FIG. 3b. Lectotype (x 1). Redrawn from BASSE, 1928, pl. 8, fig. 7a.

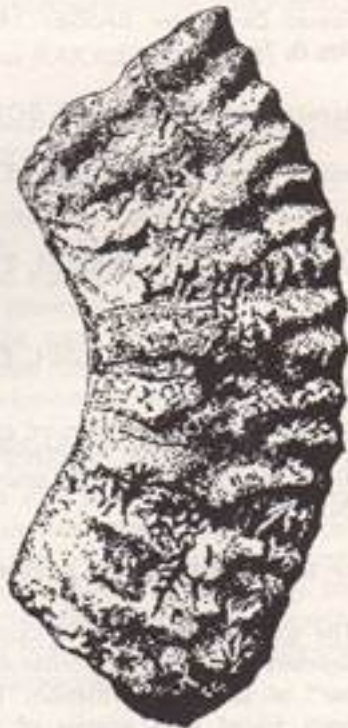


FIG. 3d. Syntype (x 1). Redrawn from BASSE, 1928, pl. 8, fig. 6.

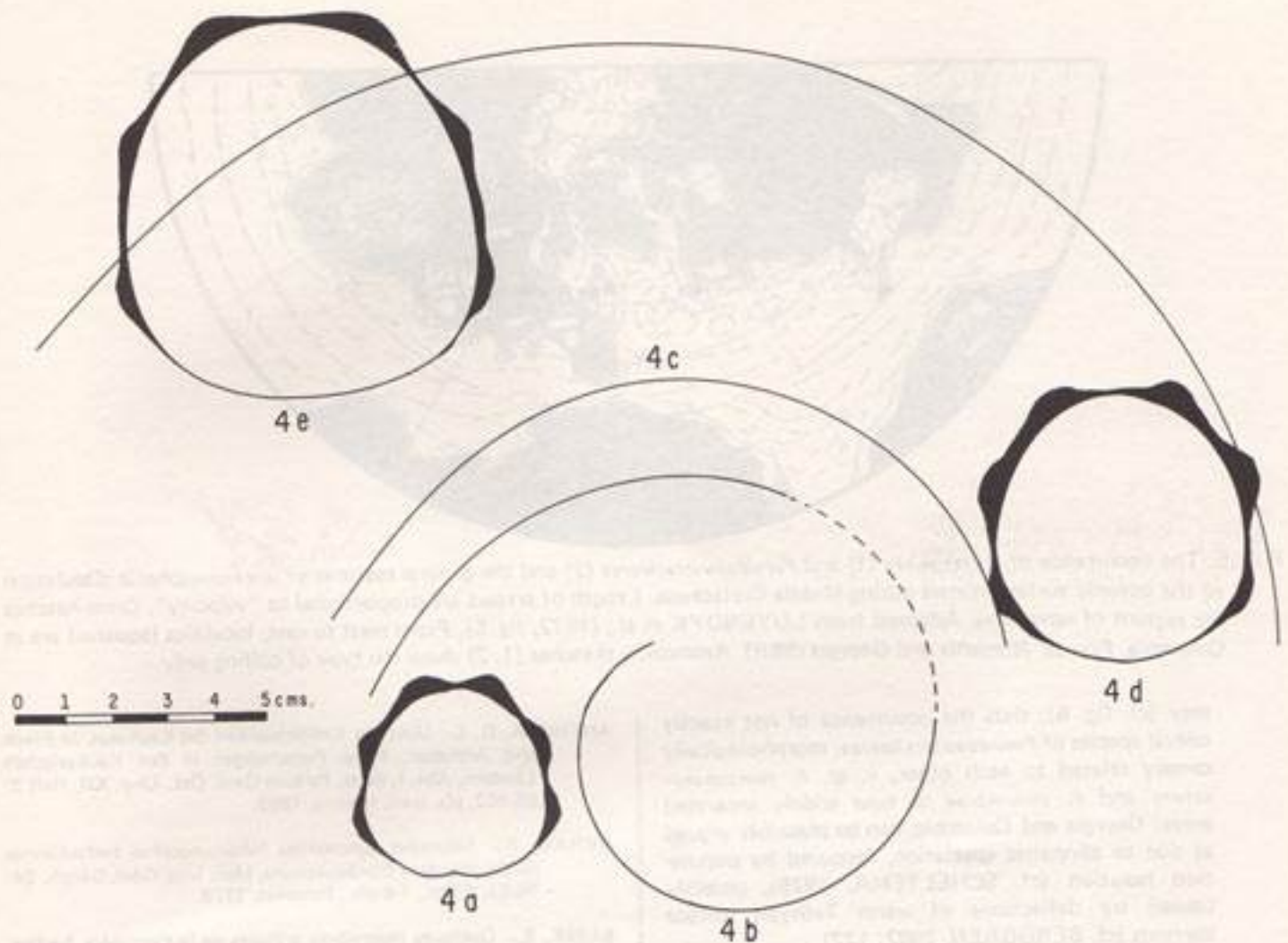


FIG. 4a, Whorl - section of *P. columbiae* (BASSE). Redrawn from BASSE, 1928, fig. 20. - FIG. 4b, The middle line of the venter in specimen SEH-1 (Villa de Leiva). - FIG. 4c, Ibidem. Specimen C.S. 205 (Villa de Leiva). - FIG. 4d, 4e, Whorl - section of specimen C.S. 205 (Villa de Leiva) H, d: 54 mm; H, e: 75 mm.

"Pseudolarval" dispersal of heteromorph ammonite species during the Cretaceous period by ocean currents: a working hypothesis. On the assumption that ammonites passed through a "pseudolarval" stage (cf. KULICKI, 1979; = "ammonitella" of DRUCZIC & KHIAMI, 1970), and assuming that the analogy with modern cephalopod embryonic development is valid (cf. BOLETZKY, 1974), evidence from the ontogeny and the distribution of both *Kutatissites* and *Pseudoaustraliceras* is relevant to two speculations about the dispersal ability of ammonites and their evolution.

- 1) The ontogenetic variation in the coiling and ornament of both genera, which may coincide with a major change in mode of life such as from planctonic to benthonic, suggests that individuals of species of both genera were dispersed as "pseudolarvae" (cf. SCHELTEMA, 1979).
- 2) The geographical occurrence of both heteromorph ammonite genera is also suggestive of a distribution pattern marginal to the main trends of the oceanic surface waters of the Middle Cretaceous Tethys sea-



FIG. 5. The occurrence of *Kutatissites* (1) and *Pseudoaustraliceras* (2) and the general features of the hemispheric circulation of the oceanic surface waters during Middle Cretaceous. Length of arrows are proportional to "velocity". Cross-hatches are regions of upwelling. Adapted from LUYENDYK et al., (1972, fig. 5). From west to east, localities (squares) are in Colombia, France, Romania and Georgia (SSR). Ammonite sketches (1, 2) show the type of coiling only.

way (cf. fig. 5); thus the occurrence of not exactly coeval species of *Pseudoaustraliceras*, morphologically closely related to each other, v. gr. *P. ramososeptatum* and *P. columbiae* in now widely separated areas: Georgia and Colombia, can be plausibly argued as due to allopatric speciation, favoured by population isolation (cf. SCHELTEMA, 1978), possibly caused by deflections of warm Tethyan surface currents (cf. BERGGREN, 1982: 122).

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PLATE I. *Pseudoaustraliceras columbiae* (BASSE), Mature Specimen. On last whorl, before the body-chamber, there are 72 ventral ribs. From "La Paja Formation", vereda Butaregua (Barichara, Santander Department). Repository, Museo Casa de la Cultura, Barichara. This specimen shows an injury at level of lateral tubercle. D. 56 cm (x 0,3). Photo R. Vargas.

PLATE II, *Pseudoaustralicera columbiae* (BASSE), Enlarged photo to show details of ornamentation in specimen figured on Plate I. Notice the body-chamber in contact with the phragmocone. (x 0.36). Photo R. Vargas.

