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Giant ammonites of the subgenus *Anapuzosia* Matsumoto, 1954, from the Upper Albian of Crimea, Soviet Union

ABSTRACT: Two new ammonite species, *Puzosia (Anapuzosia) naidini* sp. n. and *P. (A.) grandis* sp. n., are described from the Upper Albian deposits of SW Crimea Highland. The newly described species are markedly larger in size than any previously known species of the subgenus *Anapuzosia* Matsumoto. The investigated ammonites are suggested to be macroconchs.

INTRODUCTION

The Upper Albian deposits of SW Crimea Highland contain a rich ammonite assemblage (cf. Marcinowski & Naidin, 1976) including two giant species, *Puzosia (Anapuzosia) naidini* sp. n. and *P. (A.) grandis* sp. n. The investigated ammonites were found by Professor Dimitr P. Naidin, University of Moscow, in the calcareous, glauconitic sandstones of the beds with *Mortoniceras* of Marcinowski & Naidin (1976, Tables 1 and 4). All the specimens are preserved as sandstone moulds. The holotypes are housed at the Museum of the Crimea Field Station of the University of Moscow.

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SYSTEMATIC DESCRIPTION

All dimensions of the investigated specimens are given in millimeters. The symbols used are as follows: *D* — diameter; *Wh* — whorl height; *Wb* — whorl width; and *U* — umbilicus width.

Superfamily **Desmocerataceae** Zittel, 1895
 Family **Desmoceratidae** Zittel, 1895
 Subfamily **Puzosiinae** Spath, 1922
 Genus **PUZOSIA** Bayle, 1878
 Subgenus **ANAPUZOSIA** Matsumoto, 1954

Remarks: When erecting this subgenus, Matsumoto (1954, p. 71—73) designated *Puzosia buenaventura* Anderson (cf. Anderson 1938, Pl. 41, Figs 1—2) as the type species. In contrast with the nominative subgenus *Puzosia* Bayle, 1878 (cf. Matsumoto 1954, 1959; Wright 1957; Collignon 1961; Renz 1972), the adult body chamber of Anderson's specimen is ornamented by single, strong, and almost straight ribs which continue on the ventral. Such a rib continuity is rather indistinct in the giant "*Puzosia mayoriana*" (d'Orbigny) illustrated by Jacob (1908, Pl. 6, Fig. 2), the assignment of which to the subgenus *Anapuzosia* may be nomenclatorially contestable (Matsumoto 1954, p. 71); nevertheless, according to Renz (1972, p. 704) and the present author this form belongs to the discussed subgenus. However, the other fragments of the body chamber of Jacob's "*P. mayoriana*" (Jacob 1908, Pl. 6, Figs 3—4) display also distinct ribs on the ventral side.

In *Puzosia (Anapuzosia) naidini* sp. n. and *P. (A.) grandis* sp. n. the single, rectiradiate, strong ribs do not come on the ventral side of body chamber but they end in swells at the latero-ventral edge (cf. Pl. 1). However, the only specimen of *P. (A.) naidini* sp. n. is preserved together with a fragment of an internal whorl. The internal whorl shows (cf. Text-fig. 2) the ribs beginning near the umbilicus and thickening upwards, and periodic, slightly sigmoidal constrictions associated with prominent ribs; that is the ornamentation of *Anapuzosia* type (cf. Matsumoto 1954; Wright 1957; Renz 1972). Because of this ornamentation of internal whorls and the peculiar ribbing on adult body chamber, the giant puzosids described below are assigned to the subgenus *Anapuzosia* Matsumoto, 1954; they differ from the previously known representatives of this subgenus in their dimensions (cf. biometry) and the lack of ribs on the ventral side of adult body chamber (cf. Matsumoto 1954; Renz 1972, and the forms cited). This reduction or even decline of ornamentation on the ventral side of adult body chamber may be related to the giant dimensions of the investigated specimens; just as it is in some giant specimens of the genus *Pachydesmocerases* (cf. Popovici-Hatzeg 1899, Pl. 1; Renz 1976, Pl. 1a), and the Upper Jurassic *Perisphinctes* s.s. Waagen, 1869.

Puzosia (Anapuzosia) naidini sp. n.
 (Pl. 1 and Text-figs 1—2)

Holotype: the specimen (No. 6000) presented in Pl. 1 and Text-figs 1—2.

Type horizon: Upper Albian; the beds with *Mortoniceras* of Marcinowski & Naidin (1976).

Type locality: Shara' ravine, Crimea, Soviet Union.

Derivation of the name: in honour of Professor Dimitr P. Naidin, University of Moscow.

Diagnosis: Large-dimensioned shell with phragmocone ending at the shell diameter exceeding 400 mm. Phragmocone whorls oval and very high. Adult body chamber displays a significant and rapid increase in whorl width; cross-section becomes subrectangular with maximum width near the latero-ventral edge. Ventral side wide and flat. Adult body chamber is ornamented by 10 single, rectiradiate, strong ribs ending in swells at the latero-ventral edge. Aperture provided with a ventral lappet.

Material: One complete, relatively well-preserved specimen (No. 6000).

Biometry:	<i>D</i>	<i>Wh</i>	<i>Wb</i>	<i>Wb/Wh</i>	<i>U</i>
Specimen No. 6000					
(Pl. 1, Text-figs 1—2)	625	215	150	0.70	245
Ratio to <i>D</i>		0.34	0.24		0.39
Phragmocone end	435	185	85	0.46	150
		0.42	0.19		0.34

Description. — The shell is large-dimensional. The adult body chamber represents 0.6 of the last whorl. The phragmocone whorls are oval, very high, and slender (at the phragmocone end $Wb/Wh = 0.46$). The maximum whorl width occurs a little below its mid-height. The ventral side is narrow, rounded, and high-arched (Text-fig. 1a). The internal part of phragmocone is ornamented by slightly sigmoidal ribs beginning near the umbilical edge and thickening upwards. There are also typical periodic constrictions, gently sigmoidal and associated with prominent ribs (Text-fig. 2). On the phragmocone the umbilical edge is indistinct (rounded) and the umbilical wall falls steeply. Near the adult body chamber the suture lines are more dense than on the internal parts of the phragmocone.

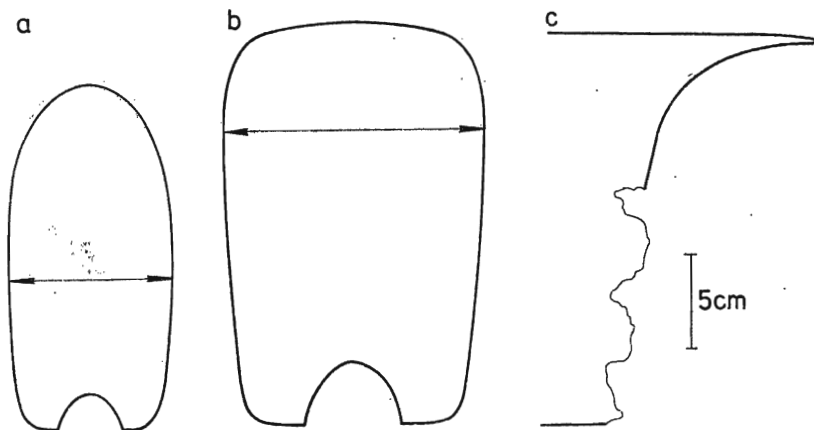


Fig. 1. *Puzosia (Anapuzosia) naidini* sp. n. (specimen No. 6000 — holotype); a whorl cross-section at the end of the phragmocone, b whorl cross-section near the aperture, c aperture with a ventral lappet (cf. Pl. 1a)

The adult body chamber displays a rapid and significant increase in whorl width (near the aperture $Wb/Wh = 0.70$). The cross-section of whorl becomes subrectangular and its maximum width occurs near the rounded latero-ventral edge (Text-fig. 1b). The ventral side is relatively flat and very wide. On the body chamber the umbilical wall is almost vertical, and the umbilical edge is more distinct than on the phragmocone (cf. Text-fig. 1a—b). The body chamber is ornamented by 10 single, retriradiate, and strong ribs (owing to poor preservation state of the investigated specimen its ornamentation is weakly discernible; cf. Pl. 1); they begin near the umbilical edge where they are thin and inconspicuous. They become thicker upwards, and they end in swells at the latero-ventral edge. At the beginning of the body chamber the ribs are fairly indistinct but they become more and more prominent towards the aperture. The aperture is provided with a ventral lappet (cf. Pl. 1a and Text-fig. 1c).

Remarks. — In the investigated specimen the preserved fragment of the internal part of phragmocone lacks its ventral side and adjacent part of the lateral side of whorl (cf. Text-fig. 2). Therefore, one cannot see the single ribs branching, which normally occur near or below the latero-ventral edge in the subgenus *Anapuzosia* (cf. Anderson 1938, Pl. 41, Fig. 1; Collignon 1963, Pl. 266, Fig. 1157; Renz 1972).

The ornamentation type of adult body chamber and especially the occurrence of more and more prominent ribs towards the aperture make *Puzosia (Anapuzosia) naidini* sp. n. similar to "*P. mayoriana*" (d'Orbigny) discussed and illustrated by

Jacob (1908, p. 39—40, Pl. 6, Fig. 2). However, it differs from the latter form in the cross-section of the whorl, larger dimensions, and lack of prominent tubercles on the single, strong ribs. Despite these differences the Jacob's specimen is more closely related to *P. (A.) naidini* sp. n. than to any other species of the subgenus *Anapuzosia* Matsumoto, 1954.

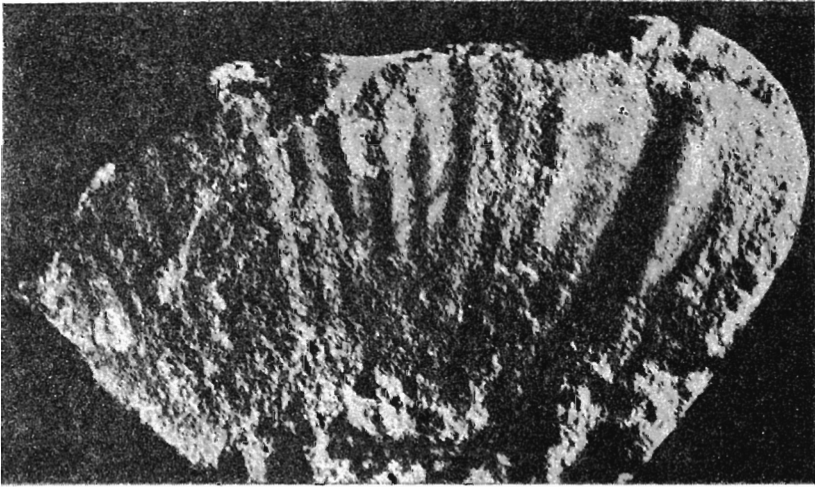


Fig. 2. *Puzosia (Anapuzosia) naidini* sp. n. (specimen presented in Text-fig. 1); whorl fragment of the internal part of the phragmocone

Occurrence. — The right edge of the Shara ravine, upper part of the beds with *Mortoniceras*; Upper Albian, probably Stoliczkaia dispar Zone (cf. Marcinowski & Naidin 1976, profile No. 4 in Text-fig. 3 and Table 4).

Puzosia (Anapuzosia) grandis sp. n.
(Pl. 2 and Text-fig. 3)

Holotype: the specimen (No. 6001) presented in Pl. 2 and Text-fig. 3.

Type horizon: Upper Albian; the beds with *Mortoniceras* of Marcinowski & Naidin (1976).

Type locality: Shara ravine, Crimea, Soviet Union.

Derivation of the name: from Latin *grandis* — large.

Diagnosis: Large-dimensioned shell with phragmocone ending at the shell diameter of some 400 mm or more. Phragmocone whorls oval and high. The increase of whorl width on adult body chamber gradual. Cross-section of body chamber subrectangular with maximum width in 2/3 of whorl height. Ventral side wide, relatively convex and rounded. Adult body chamber ornamented by 10 single, rectiradiate, and strong ribs ending in swells near the latero-ventral edge.

Material: Two specimens. One is almost completely preserved, except of the apertural part (No. 6001 — holotype); the other one (No. 6002) represents more than a half of the last whorl, that is almost complete adult body chamber and a part of the phragmocone.

<i>Biometry:</i>	<i>D</i>	<i>Wh</i>	<i>Wb</i>	<i>Wb/Wh</i>	<i>U</i>
Holotype, specimen					
No. 6001 (Pl. 2, Text-fig. 3)	590	210	?150	?0.71	170
Ratio to <i>D</i>		0.35	?0.25		0.29
	555	200	130	0.65	165
		0.36	0.23		0.30
Phragmocone end	460	180	110	0.61	145
		0.39	0.24		0.31
Specimen No. 6002	600	210	160	0.76	210
		0.35	0.27		0.35
Phragmocone end	400	160	100	0.62	—
		0.40	0.25		—

Description. — The shell is large-dimensioned. The body chamber represents about half a whorl. At the phragmocone end the whorl is high and oval; its maximum width occurs in 1/3 of the whorl height (Text-fig. 3a). The ventral side is narrow and high-arched. The umbilicus is shallow and its edge is rounded. Near the adult body chamber the suture lines are more dense than on the internal parts of the phragmocone.

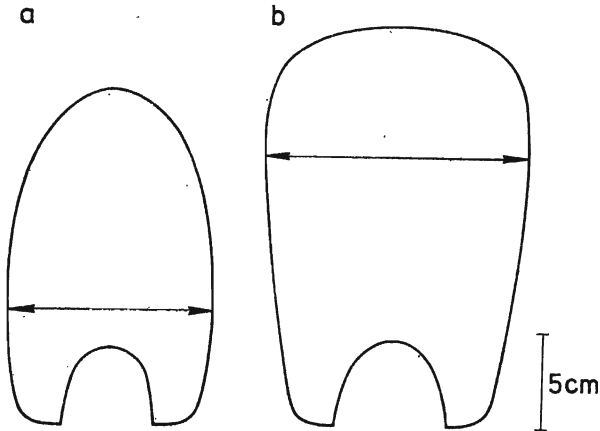


Fig. 3. *Puzosia* (*Anapuzosia*) *grandis* sp. n. (specimen No. 6001 — holotype): a whorl cross-section at the end of the phragmocone, b whorl cross-section near the end of the adult body chamber

On the adult body chamber the ventral side becomes more and more wide and flat; the whorl width gradually increases. Near the aperture the cross-section of whorl is subrectangular and its maximum width occurs in 2/3 of the whorl height. The latero-ventral edge is rounded and indistinct (Text-fig. 3b). On the body chamber the umbilical edge is steeper than on the phragmocone; it falls almost vertically. There are a few indistinct swells on the body chamber; they are most easily seen near the latero-ventral edge. These are traces of the strong ribs blurred due to the poor preservation state. In the specimen No. 6002 the ornamentation on the body chamber is more apparent. It consists of 10 single, rectiradial, and strong ribs. These ribs are most prominent near the latero-ventral edge where they end; they do not come on the ventral side.

Remarks. — In general, *Puzosia* (*Anapuzosia*) *grandis* sp. n. resembles *P. (A.) naidini* sp. n. to which it is related; it differs from the latter species in the following characters:

(i) It lacks rapid and significant increase in whorl width on the adult body chamber. In fact, in *P. (A.) naidini* the difference between ratios W_b/W_h as measured at the end of the phragmocone and at the aperture, is 0.24; while in *P. (A.) grandis* this difference does not exceed the value of 0.14 (cf. biometry).

(ii) It displays more convex, narrow, and rounded ventral side on the adult body chamber; and the lateral sides of whorl are more convergent towards the umbilicus (cf. Text-figs 1b and 3b).

(iii) It differs from *P. (A.) naidini* in the whorl cross-section at both the end of the phragmocone and the adult body chamber; it differs also in the place where the maximum whorl width realizes (cf. Text-figs 1a–b and 3a–b).

(iv) It is more involute; and the involuteness decreases in the more internal parts of the shell (cf. biometry).

Occurrence. — Upper Albian, the beds with *Mortoniceras* of Marcinowski & Naidin (1976). The specimen No. 6001 (holotype) was found near the Shara ravine; the specimen No. 6002 comes from the same horizon but its precise derivation place is unknown.

FINAL REMARKS

A general shape and large dimensions of the investigated species, *Puzosia* (*Anapuzosia*) *naidini* sp. n. and *P.* (*A.*) *grandis* sp. n., make them somewhat similar to *Pachydesmoceras* aff. *denisonianum* (Stoliczka) described from the Lower Cenomanian of the Swiss Jura (cf. Renz 1976, Pl. 1). The latter however, the same as other representatives of the genus *Pachydesmoceras* Spath, 1922, display evident differences in the ornamentation of the inner whorls. The both new species lack of short intercalar ribs between the primary ones on the body chamber; their whorl height is larger, and the sides of the outer whorls are more flattened (cf. Kossmat 1898, Pl. 15, Fig. 5; Popovici-Hatzeg 1899, Pl. 1; Boule, Lemoine & Thevenin 1906—1907, Pl. 5, Figs 3—5; Zimmermann 1914, Pl. 26; Matsumoto 1954, Pl. 9, Fig. 2; Wright 1957, p. 365; Collignon 1961, Pls 8—12; Renz 1976, pp. 759—761 and Pl. 1).

Fragments of giant puzosids, at least a part of which may belong to one of the described species, occur fairly frequently in the beds with *Mortoniceras* of SW Crimea Highland. However, complete specimens are very rare. Other representatives of the subfamily Puzosiinae Spath, 1922, do also occur in the same horizon, namely *Puzosia* (*Puzosia*) *sharpei* Spath and *P.* (*P.*) cf. *communis* Spath (cf. Marcinowski & Naidin 1976).

The species *Puzosia* (*Anapuzosia*) *naidini* sp. n. and *P.* (*A.*) *grandis* sp. n. attain similar dimensions (590—625 mm) and their adult body chambers begin at similar shell diameters (400—460 mm). This constancy of biometrical characters, the increasing density of suture lines in the terminal parts of the phragmocone, the change in ornamentation on the body chamber, and in a single case also the occurrence of the aperture (cf. Pl. 1 and Text-fig. 1c) indicate that the described giant forms were adult and did not attain much larger size. Their dimensions considerably exceed those of the hitherto known species of the subgenus *Anapuzosia* Matsumoto, 1954. It is to be noted that in this subgenus the true adults significantly differ in their sizes; for example the type species *Puzosia* (*Anapuzosia*) *buenaventura* Anderson (cf. Anderson 1938, Pl. 41, Figs 1—2) attains the diameter of 160 mm; while the Jacob's "*P. mayoriana*" (vide remarks on the subgenus) attains the diameter of 360 mm although only a part of the adult body chamber is preserved (cf. Jacob 1908, p. 40, Pl. 6, Fig. 2) In general, such a differentiation in size and changes in ornamentation on the adult body chamber should

be interpreted as sexual dimorphism (cf. Makowski 1962a, b). The two new species *Puzosia* (*Anapuzosia*) *naidini* sp. n. and *P.* (*A.*) *grandis* sp. n. can therefore be regarded as macroconchs. Further finds of large, well-preserved specimens, and more precise studies on the hitherto known species of the subgenus *Anapuzosia* Matsumoto, 1954, may allow the recognition of dimorphic counterparts, i.e. microconchs, of the species described in this paper.

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R. MARCINOWSKI

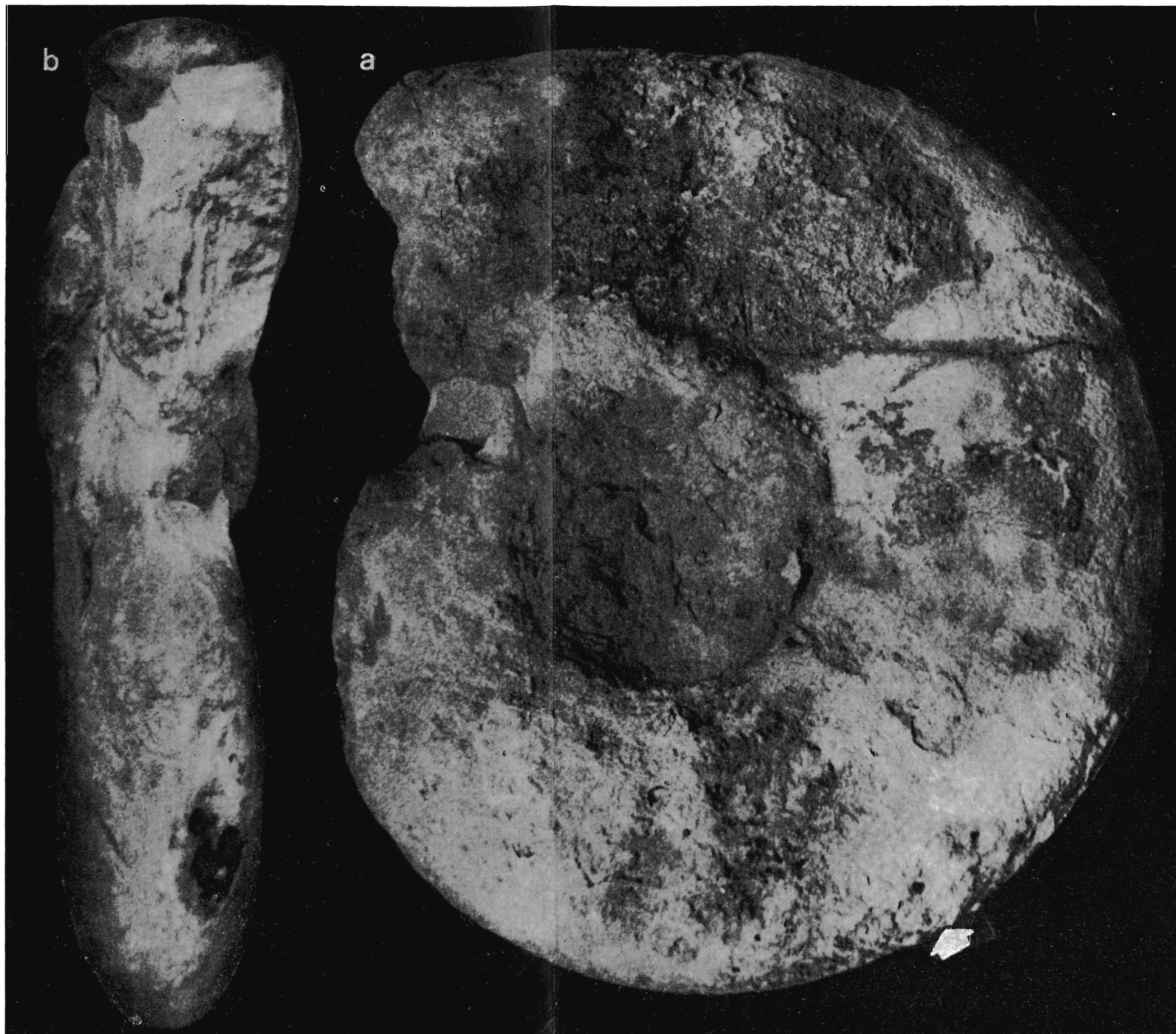
**WIELKIE AMONITY Z PODRODZAJU ANAPUZOSIA MATSUMOTO
W GÓRNYM ALBIE KRYMU**

(Streszczenie)

Przedmiotem pracy są dwa nowe gatunki amonitów *Puzosia* (*Anapuzosia*) *naidini* oraz *P. (A.) grandis*, występujące w piaszczystych utworach górnego albu południowo-zachodniego Krymu (warstwy z *Mortoniceras* w ujęciu Marcinowskiego & Naidina 1976). Wymienione gatunki (por. fig. 1—3 oraz pl. 1—2) osiągały średnicę 590—825 mm i przewyższają znacznie swymi rozmiarami znanych dotychczas przedstawicieli podrodzaju *Anapuzosia* Matsumoto, 1954. Szereg cech badanych okazów wskazuje, iż są to formy dorosłe. Zgodnie z teorią dymorfizmu płciowego (por. Makowski 1962a, b) uznane zostały one za makrokonchy, aczkolwiek obecny stan rozpoznania amonitów z podrodzaju *Anapuzosia* Matsumoto, 1954, uniemożliwia wskazanie ich odpowiedników dymorficznych.



Puzosia (Anapuzosia) naidini sp. n., specimen No. 6000 (holotype); outline of the ventral lappet is marked; arrow indicates the end of the phragmocone; asterisks indicate the retriradiate ribs



Puzosia (Anapuzosia) grandis sp. n., specimen No. 6001 (holotype); arrow indicates the end of the phragmocone