

The Triassic of Aghdarband (AqDarband), NE-Iran, and its Pre-Triassic Frame			Editor: Anton W. Ruttner	
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Triassic Brachiopods from Aghdarband (NE-Iran)

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With 4 Text-Figures and 1 Plate

NE-Iran
Triassic
Brachiopods
Taxonomy

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Zusammenfassung

Unter den bearbeiteten mitteltriassischen Brachiopoden wurden die folgenden neuen Taxa ermittelt: *Costirhynchopsis ruttneri* sp. n., *Tethyspira persis* gen. n. et sp. n. und *Dareithyris vulgaris* gen. n. et sp. n.

Abstract

Among the Middle Triassic brachiopods studied the following new taxa have been ascertained: *Costirhynchopsis ruttneri* sp. n., *Tethyspira persis* gen. n. et sp. n. and *Dareithyris vulgaris* gen. n. et sp. n.

1. Introduction

The brachiopod fauna dealt with in this paper comes from the area of Aghdarband, NE Iran. The study was based mostly on material collected in 1975 and 1976 by Dr. A. W. RUTTNER, and partly also by Swiss geologist Dr. K. T. GOLDSCHMID in 1956.

The present author is deeply indebted to Dr. A. W. RUTTNER (Vienna) for his kind offer to study the material and for giving him necessary information concerning the localities. Many thanks are due to Dr. F. TATZREITER who made available all the material deposited now in the Geologische Bundesanstalt (Museum) in Vienna.

According to the personal communication by A. W. RUTTNER, brachiopod fauna derives mostly from 2 fossiliferous, locally ammonite-bearing levels (ammonites studied by F. TATZREITER and L. KRYSYTN):

Horizon 1 (σ_1 **) = Nazarkardeh Formation – Lower Anisian – Bithynian (sensu ASSERETO, 1974) (*Osmani* and *Ismidicus* Zones);

Horizon 2 (σ_2) = Faqir Marl Bed at the base of Shale Member, Sina Formation – Upper Ladinian – Langobardian 3 (*Frankites regoledanus* Zone).

There are 2 brachiopod species, most frequent and characteristic of the area. *Tethyspira persis* gen. et sp. n. is Upper Ladinian in age according to the accompanying ammonites and can be considered typical of the horizon 2. The age of the second brachiopod *Costirhynchopsis ruttneri* sp. n. is somewhat doubtful. It was partly found in the localities (e.g. Agh 75/11, Agh 75/18, Agh 75/26) lacking determinable ammonites and at present supposed to be of Anisian age by A. W. RUTTNER (pers. comm.). On the other hand, this species was

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**) The symbol " σ " is supposed to be a fossil symbol which is unfortunately not among the typesetting characters at our disposal.

collected also in some other places together with *Tethyspira persis* gen. n. et sp. n. According to A. W. RUTTNER, some samples in question were collected either in strongly tectonized localities (Agh 75/23a, Agh 75/28, Agh 76/60), or in slope debris (Agh 75/17) where secondary mixture is feasible. Even if the Anisian age of *Costirhynchopsis ruttneri* sp. n. seems to be most probable, further contingent corrections in behalf of its younger age are not excluded.

1.1. Brachiopod Localities

P 56/160	(collected by K. T. GOLDSCHMID): <i>Tethyspira persis</i> Horizon 2.
Agh 75/11	(Horizon 1 according to RUTTNER, pers. comm.): <i>Costirhynchopsis ruttneri</i> , <i>Dareithyris vulgaris</i> , <i>Tetractinella trigonella</i> .
Agh 75/16(2)	<i>Tethyspira persis</i> .
Agh 75/17(2)	<i>Costirhynchopsis ruttneri</i> .
Agh 75/18(1)	<i>Costirhynchopsis ruttneri</i> .
Agh 75/22a(1)	1 poorly preserved specimen of <i>Costirhynchopsis ruttneri</i> .
Agh 75/23a(1)	<i>Costirhynchopsis ruttneri</i> , <i>Tethyspira persis</i> , <i>Camerothyris</i> (?) sp. Secondary mixture (see introductory part).
Agh 75/25(1)	Undeterminable semicostate rhynchonellid.
Agh 75/26(1)	<i>Costirhynchopsis ruttneri</i> , <i>Dareithyris vulgaris</i> .
Agh 75/28(1)	<i>Costirhynchopsis ruttneri</i> , <i>Tethyspira persis</i> . Secondary mixture?
Agh 75/30(2)	<i>Tethyspira persis</i> , 3 fragmentary depressed specimens of <i>Costirhynchopsis ruttneri</i> (?).
Agh 75/35(2)	<i>Tethyspira persis</i> .
Agh 75/36/1(2)	<i>Tethyspira persis</i> .
Agh 75/37(1)	<i>Punctospirella</i> aff. <i>fragilis</i> .
Agh 75/42b(2)	<i>Tethyspira persis</i> .
Agh 76/60	<i>Tethyspira persis</i> , 2 depressed specimens most probably of <i>Costirhynchopsis ruttneri</i> . Secondary mixture(?).
Agh 76/82	Mostly small single valves resembling <i>Costirhynchopsis ruttneri</i> but insufficient for definitive determination.
Agh 76/92	Undeterminable fragments of small spiriferinid and smooth rhynchonellid brachiopods.

2. Descriptions

Order	Rhynchonellida KUHN, 1949
Superfamily	Rhynchonellacea GRAY, 1848
Family	Rhynchonellidae GRAY, 1848
Subfamily	Tetrarhynchiinae AGER, 1965
Genus	<i>Costirhynchopsis</i> DAGYS, 1977
Type-species:	<i>Costirhynchia spatiosa</i> DAGYS, 1974.
	Carnian of the Caucasus.

Costirhynchopsis ruttneri sp. n.

(Pl. 1, Figs. 2,4,5; Text-Fig. 1)

Holotype: Figured on Plate, Fig. 5 and deposited in the collections of the Geologische Bundesanstalt

(Museum) in Vienna under registered number GBA 1982/8/3.

Stratum typicum et locus typicus: Nazarkardeh Formation, Bithynian (see introductory part), Aghdarband, loc. Agh 75/18.

Derivatio nominis: After Dr. Anton W. RUTTNER.

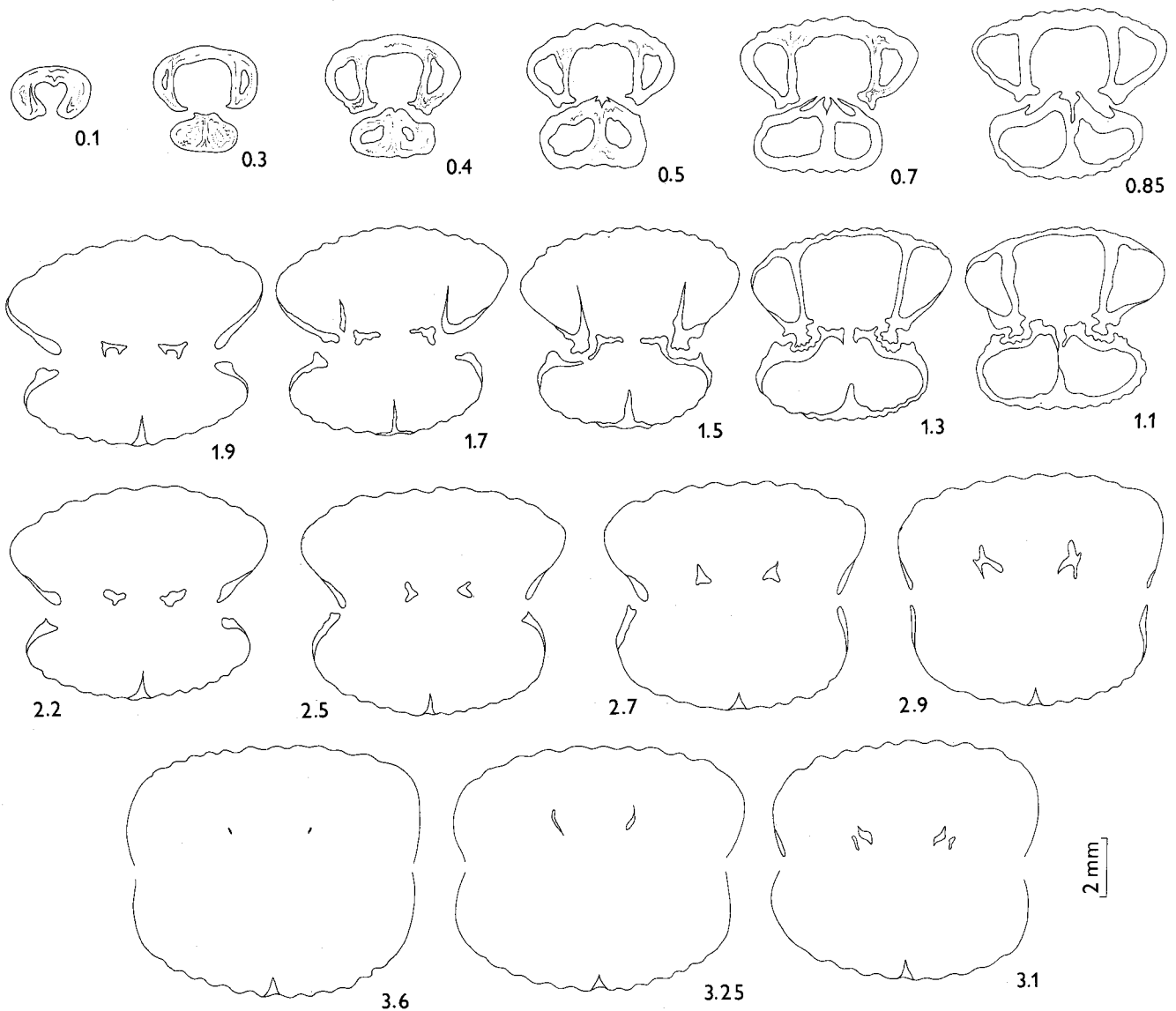
Material: In addition to the holotype, 19 mostly incomplete specimens with joint valves, 18 brachial and 5 pedicle valves, partly decorticated. Dimensions of better preserved specimens in mm:

Length	Width	Thickness	
16.6	21.4	7.7	
16.5	19.5	10.4	
16.4	22.7	11.3	Pl. 1, Fig. 5, holotype
15.9	20.0	8.4	Pl. 1, Fig. 4
15.5	25.6	11.2	Pl. 1, Fig. 2
15.5	20.8	10.5	
15.5	18.8	10.9	
15.1	ca. 19.0	9.2	

Description: Medium-sized biconvex shells of rounded triangular outline. Width apparently exceeding length in most specimens, the maximum-width situated in the anterior third of shell. Low, but always well-developed uniplication of the anterior commissure present, with subquadrate linguiform extension. Fold and sulcus poorly marked. Costae sharp and clear right from beaks, without bifurcation. There are between 13 and 17 costae on each valve, 4 or 5 of which (in 2 specimens as many as 7) are confined to the uniplication. Posterolateral, somewhat sunken planareas well-delimited in some specimens. Beak of pedicle valve suberect to erect in lateral view, with sharp ridges. Pedicle opening hypothrydid. Apical angle 100 to 115 degrees.

Delthyrial cavity subquadrate, between well-developed subparallel to slightly ventrally diverging dental lamellae. Lateral umbonal cavities semicircular or subtriangular in cross-section. Massive hinge-teeth dorsally expanded and inserted in large sockets. Some specimens revealed tightly held teeth, stronger than as shown in Text-Fig. 1. Crenulation poorly developed. Stout, but short denticula to be seen laterally. Hinge-plates thick and clearly demarcated from the inner socket-ridges. Their orientation is subhorizontal, but the deflection towards pedicle valve was ascertained in some specimens. Short and narrow septalium present. Dorsal septum thick and very short in the dorso-ventral plane, but long in the longitudinal direction, extending as a low ridge beyond the ends of crura. Crura raduliform in general shape, strongly recurving into the cavity of pedicle valve and giving origin to the diabolo-shaped transverse sections (AGER, 1967, p. 143; AGER-CHILDS-PEARSON, 1972, p. 185).

Remarks: New species described here is attributed to *Costirhynchopsis* DAGYS, 1977, though considerable external resemblances could be found in some specimens of *Fissirhynchia* PEARSON, 1977 (type-species *F. fissicostata* [Suess, 1854] from the Alpine Rhaetian). This genus is characterized, however, by stronger development of beak of pedicle valve, by bifurcation of ribs and by its canaliform crura. New species reminds one of some variants of "*Rhynchonella*" *mentzeli* (BUCH, 1843) from the Alpine Anisian that was provisionally referred by DAGYS to *Costirhyn-*



Text-Fig. 1.
Costirhynchopsis ruttneri sp. n.
 Serial transverse sections through the posterior part of the shell.
 Original length of specimen 15.5 mm. Dorsal septum traceable to 4.9 mm. Agh 75/18. Magnified.

chopsis (originally *Costirhynchia* DAGYS, 1974). *C. ruttneri* sp. n. differs from *mentzeli* in its much bigger size and in higher and better delimited plication. Some similarity could be found also in multicostate "*Rhynchonella*" *orientalis* PETERS, 1867, from the Carnian of Dobrogea.

Occurrence: Bithynian, possibly up to Upper Ladinian, Aghdarband, loc. Agh 75/11, Agh 75/17, Agh 75/18, Agh 75/23a, Agh 75/26, Agh 75/28, Agh 75/30?, Agh 76/60?.

Order Spiriferida WAAGEN, 1883
 Superfamily Spiriferinacea DAVIDSON, 1884
 Family Spiriferinidae DAVIDSON, 1884
 Subfamily Mentzeliinae DAGYS, 1974
 Genus *Tethyspira* gen. n.
 Type-species: *Tethyspira persis* sp. n.
 Ladinian of Aghdarband, NE Iran.

Diagnosis: Medium to large-sized, smooth spiriferinids, transversally elongate. Hinge-line shorter than the maximum-width, anterior and lateral margins rounded. Valves moderately convex, with prominent folding. Beak suberect, area apsacline, sharply delimited. Dental lamellae fused with long median septum forming spondylium-like structure. Jugum V-shaped. Punctate.

Remarks: This genus is close to both *Mentzeliinae* DAGYS, 1974 and *Laballinae* DAGYS, 1962. The representatives of the former subfamily differ only in their twice smaller size and incomplete bridge of jugum. Semipyramidal pedicle valves and plates supporting descending lamellae of spiralia are absent in *Tethyspira* but are on the other hand characteristic of some *Laballinae*. *Tethyspira* gen. n. resembles most *Laballinae* by a ventral septum entering spondylium-like structure and thus differs from *Mentzeliinae* in this special feature. With some doubts, *Tethyspira* gen. n. is placed in *Mentzeliinae*.

Included species: Apart from the type-species the following species and subspecies may be attributed to *Tethyspira* gen. n.:

Spiriferina ampla BITTNER, 1890 from the "Cassianer Schichten" (sensu ROTHPLETZ, 1886) of the Bavarian Alps.

Spiriferina (Mentzelia) ampla bathycolpos SALOMON, 1895, *Spiriferina (Mentzelia) ampla radiata* SALOMON, 1895 – both latter from the Ladinian of the Southern Alps (Marmolata).

Range and distribution: Ladinian of NE Iran, ?Bavarian Alps, ?Southern Alps.

***Tethyspira persis* sp. n.**

(Pl. 1, Figs. 1,3,10; Text-Fig. 2)

Holotype: Specimen figured on Plate 1, Fig. 1 and deposited in the collections of the Geologische Bundesanstalt (Museum) in Vienna under registered number GBA 1982/8/4.

Stratum typicum and locus typicus: Faqir Marl Bed at the base of the Shale Member, Sina Formation, Langobard 3, Aghdarband, loc. Agh 75/36/1.

Material: 21 specimens with joint valves, 29 pedicle valves and 5 brachial valves, all more or less fragmentary internal moulds with shell remains. Dimensions of better preserved specimens in mm:

	Length of brach. valve	Width	Thickness	Width of card. area	Width of delthyrium	
	44.5	34.4	ca. 54.0	29.0	28.0	5.4
	40.9	33.2	55.4	25.9	25.1	7.8
ca.	40.0	33.4	?	29.0	32.0	6.9
	38.8	35.2	52.8	28.0	33.5	8.2
	?	31.2	48.2	27.8	33.1	7.1
	37.0	32.8	43.1	27.1	24.6	9.4
	37.0	29.1	ca. 48.0	24.2	27.0	7.5

Description: Large, transversally elongated shells with rounded lateral margins and high uniplication. Straight hinge-line shorter than the maximum-width. Both valves smooth, moderately vaulted. Brachial valve bearing strong rounded fold traceable for almost the length of valve. Corresponding sulcus deep and wide, extending from anterior margin to umbo. Triangular apsacline cardinal area large, sharply delimited, wider than high, and gently concave.

Delthyrial angle variable, 24 to 50 degrees. Beak of pedicle valve suberect. Very faint costation observed on the whole surface of 1 specimen. Growth-lines well marked in the anterior halves of shells. Punctuation only poorly developed, it has been ascertained to form very limited spots in 3 specimens only.

Interior of pedicle valve with spondylium-like structure formed by coalesced ventral septum and dental lamellae. Delthyrial cover not observed. Strong septum thickened at its base, entering spondylium-like structure and extending for about half length of valve. Hinge-teeth normally strong but short. Brachial valve with bilobed cardinal process. Sockets broad and shallow. Spiralia with 14–15 volutions in each postero-laterally directed spire. Transverse jugum V-shaped.

Remarks: *Spiriferina ampla* BITTNER, 1890 from the Wendeinstein area differs externally from *T. persis* sp. n.

only in its much smaller size. Internal characters of *ampla* are not known except for ventral septum shorter than that of *persis*. *Spiriferina (Mentzelia) ampla bathycolpos* SALOMON, 1895 from Marmolata differs from both *ampla* and *persis* in lower, massive and incurved beak of pedicle valve.

Occurrence: Faqir Marl Bed at the base of the Shale Member, Sina Formation, Langobardian 3, Aghdarband, loc. P 56/160, Agh 75/16, Agh 75/30, Agh 75/35, Agh 75/36/1, Agh 75/42b. Tectonically mixed: Agh 75/23a, Agh 75/28, Agh 76/60.

Subfamily **Punctospirellinae** DAGYS, 1974

Genus ***Punctospirella*** DAGYS, 1974

Type-species: ***Terebratulita fragilis*** SCHLOTHEIM, 1814.

Anisian of Germany.

Punctospirella* aff. *fragilis
(SCHLOTHEIM, 1814)

(Pl. 1, Fig. 8)

Material: 1 incomplete mould of pedicle valve. Its length measures 21.0 mm.

Description: Valve of semicircular outline, with greatest width at straight hinge-line. Cardinal area wide and slightly curved, well-delimited. Beak low. Relatively narrow median sulcus flanked by 5 strong, subangular lateral costae on either side, extending from anterior margin to umbo. Another faint rib at each lateral extremity present.

Remark: Studied specimen reminds one very much of *Punctospirella fragilis* (SCHL.) but its size is two times greater and its beak lower.

Occurrence: Nazarkardeh Formation, Bithynian, Aghdarband, loc. Agh 75/37.

Order **Athyridida** BOUCOT-JOHNSON-STATON, 1964

Superfamily **Athyridacea** DAVIDSON, 1844

Family **Spirigerellidae** GRUNT, 1965

Subfamily **Spirigerellinae** GRUNT, 1965

Genus ***Tetractinella*** BITTNER, 1890

Type-species: ***Terebratulites trigonellus*** SCHLOTHEIM, 1820.

Anisian of Germany.

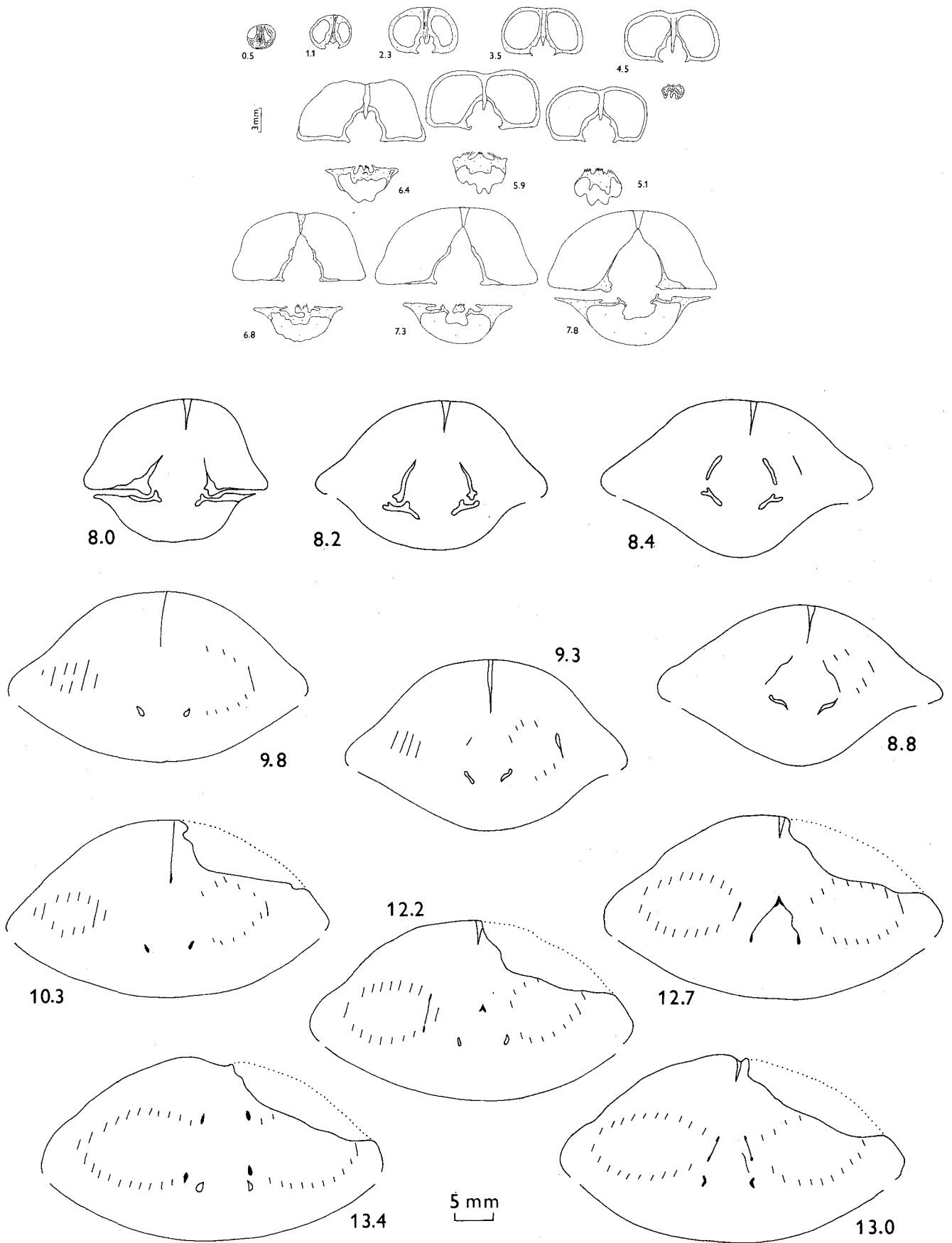
Tetractinella trigonella (SCHLOTHEIM, 1820)

(Pl. 1, Fig. 6)

1972 *Tetractinella trigonella* (SCHLOTHEIM)-SIBLIK, p. 189, Pl. 61, Figs. 1, 6–8; Text-Figs. 4–15 (cum syn.)

1972 *Tetractinella trigonella* (SCHLOTHEIM)-SCHOLZ, p. 342, Pl. 8, Fig. 1.

Material: 1 fragmentary internal mould. Its dimensions: 18.5×?×10.7 mm.

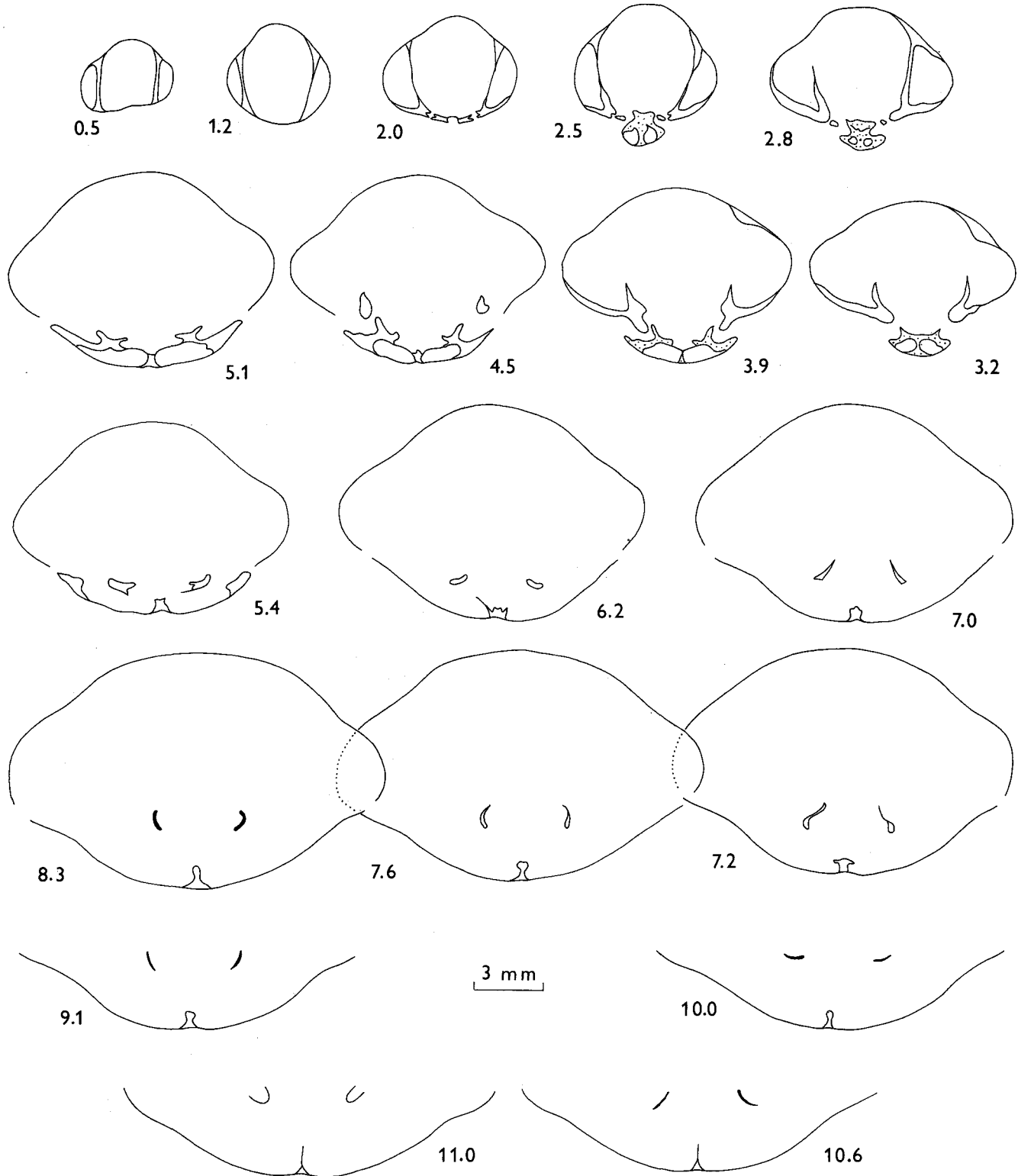


Description: Biconvex shell of sharply pentagonal outline. Fold and sulcus wanting. Each valve with 4 strong ribs extending right to umbo. Umbo of pedicle valve high and relatively narrow, strongly developed. Shell impunctate.

Remark: Despite its incomplete preservation, the specimen studied belongs indubitably to this species

which is a characteristic element of the Anisian brachiopod faunas of Europe.

Occurrence: The species is quite common in the Anisian of Europe. Basing on some older data, it was found also in Ladinian. ? Bithynian, Aghdarband, loc. Agh 75/11.



Text-Fig. 3.
Dareithyris vulgaris sp. n.
Original length of specimen 21.0 mm. Agh 75/11. Magnified.

Order Terebratulida WAAGEN, 1883
 Superfamily Dielasmatacea SCHUCHERT, 1913
 Family Dielasmatidae SCHUCHERT, 1913
 Subfamily Dielasmatinae SCHUCHERT, 1913
 Genus *Dareithyris* gen. n.

Type-species: *Dareithyris vulgaris* sp. n.
 Anisian of Aghdarband, NE Iran.

Derivatio nominis: Lat. Dareus – king of Persia.

Diagnosis: Medium-sized equibiconvex shells with smooth surface. Brachial valve sulcinate or axially flattened. Pedicle valve carinate, with erect to incurved strong beak. Anterior commissure rectimarginate or slightly sulcate. Dental lamellae developed. Dorsal interior with distinct cardinal process, strongly marked crural bases and shallow septalium. Crura dielasmoid. Dorsal septum long. Shell punctate.

Remarks: The interior of the new genus differs substantially from that in other known Triassic terebratulids, even if the knowledge of some internal details is still incomplete. The differences are sufficient for separating Aghdarband forms from other possible allied genera. Development of dental lamellae, long dorsal septum, dielasmoid crura with unusually well-marked bases, and presumed simple loop, about half valve length long are the most distinctive characters of *Dareithyris* gen. n.

Range and distribution: Anisian of NE Iran.

***Dareithyris vulgaris* sp. n.**

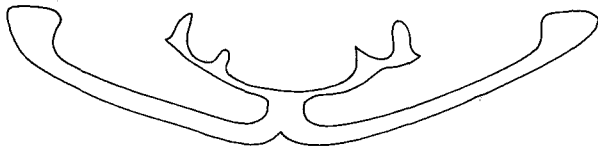
(Pl. 1, Figs. 7,9; Text-Figs. 3–4)

Holotype: Specimen figured on Plate 1, Fig. 9 and deposited in the collections of the Geologische Bundesanstalt (Museum) in Vienna under registered number GBA 1982/8/10.

Stratum typicum et locus typicus: Nazarkardeh Formation, Bithynian, Aghdarband, loc. Agh 75/26.

Derivatio nominis: Lat. vulgaris – ordinary.

Material: 4 partially decorticated specimens with both valves and 2 pedicle valves. Dimensions in mm:



Text-Fig. 4.

Dareithyris vulgaris sp. n.

Section through another specimen, showing longer connection between crural bases and hinge-plates.

Agh 75/11. Magnified.

Length	Width	Thickness	
22.8	18.0	8.8	Pl. 1, Fig. 7
21.0	18.7	10.2	
20.0	16.8	9.0	Pl. 1, Fig. 9; holotype

Description: Medium-sized smooth shells of ovate-subpentagonal outline. Maximum-width situated at or backward of mid-length. In lateral profile, valves are equi- or slightly ventribiconvex. Anterior commissure with faint sulcation. Brachial valve gently sulcinate, narrow median sulcation reaching up to umbo. Corresponding fold of pedicle valve well-developed, though not sharply delimited from lateral shell curvature. Beak strongly developed, showing erect to incurved orientation. Blunt beak-ridges present. Dorsal adductor muscle-scars narrowly linguiform. Ventral muscle-scars difficult to interpret.

Dental lamellae short, subparallel or dorsally convergent. Pedicle collar not observed. Hinge-teeth not accompanied by denticula. Cardinal process short, undivided. Sockets large, well-delimited from short and narrow outer hinge-plates. Crural bases strongly expressed, given off ventrally of hinge-plates. Crura of dielasmoid type (sensu DAGYS, 1974) with short, ventrally directed processes. Septalial plates thin, forming broad but very shallow septalium. Low, stubby dorsal septum long, extending for half length of valve. Bad preservation of both specimens sectioned precluded getting complete information concerning loop.

Remarks: *Dareithyris* gen. n. is monotypic. No species of Triassic dielasmatid or zeilleriid brachiopods known to the author resembles closely new species described herein from Aghdarband area (dielasmatid and zeilleriid stocks may be more closely related than it was supposed before, according to HOOVER, 1979, p. 18).

Occurrence: Nazarkardeh Formation, Bithynian, Aghdarband, loc. Agh 75/11, Agh 75/26.

Superfamily Zeilleriaceae ALLAN, 1940
 Family Zeilleriidae ALLAN, 1940
 Genus *Camerothyris* BITTNER, 1890

Type-species: *Terebratula raumsaueri* SUSS, 1855.
 Hallstatt Limestone of the Northern Alps.

***Camerothyris* (?) sp.**

Material: 3 moulds of brachial valves. They measure 16.0 x ca. 15.5 mm, ca. 15.0 x 16.1 mm and 14.8 x 14.0 mm.

Description: Valve of circular outline, moderately vaulted. Slight median sulcation reaching the umbo present, anterior commissure nearly rectimarginate. Dorsal septum extending to the anterior half of valve length. Punctation well visible.

Remark: Certain external resemblances could be only found in some specimens of *Camerothyris dualis* (BITTNER, 1890) and *C. sandlingensis* (BITTNER, 1890), both of them coming from the Upper Triassic of the Alps.

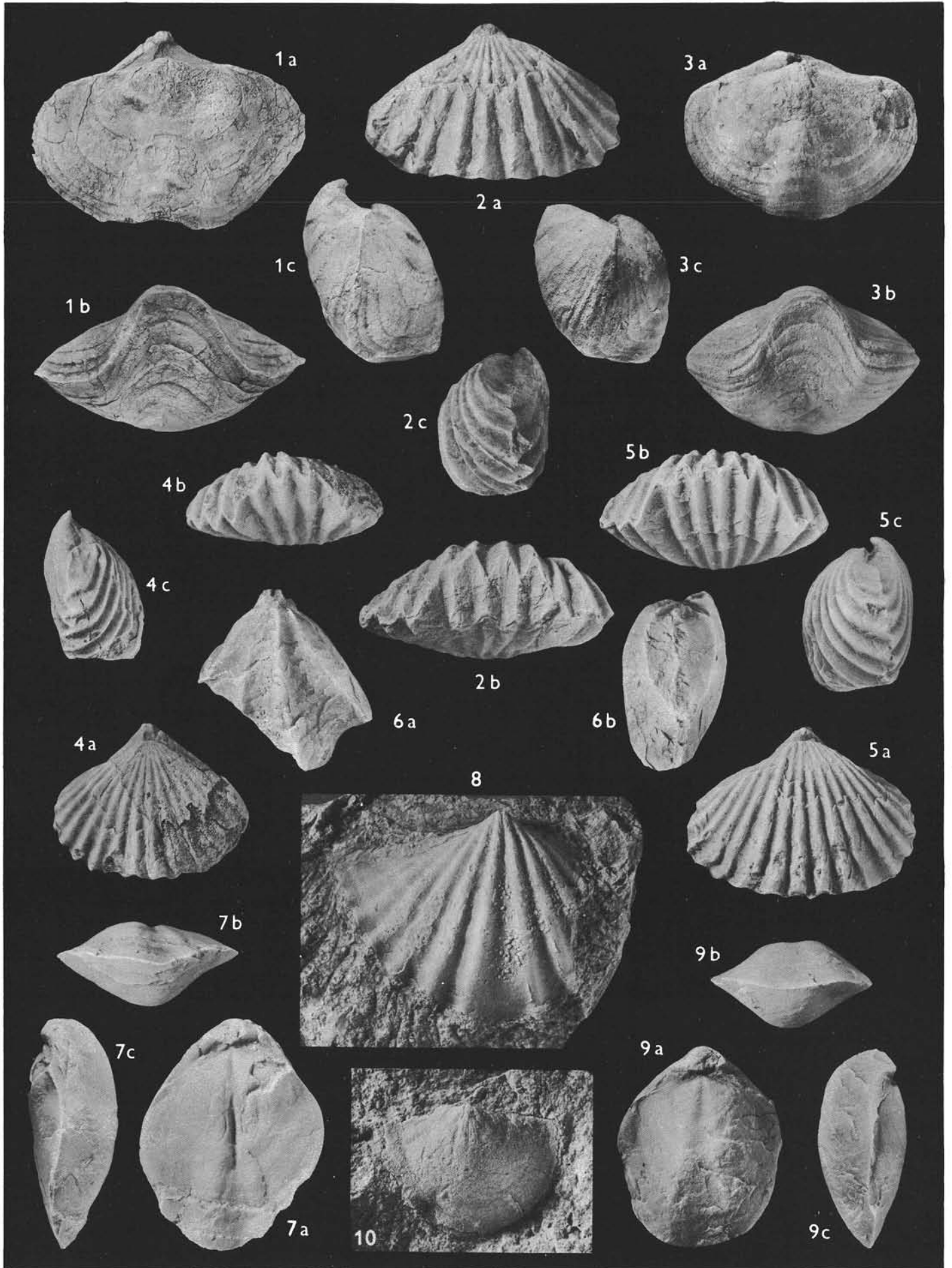
Occurrence: Aghdarband, loc. Agh 73/23a (with secondarily mixed fauna?).

Plate 1

Triassic Brachiopods from Aghdarband.

- Fig. 1: *Tethyspira persis* sp. n.
Holotype. Agh 75/36/1. Collection of the Geologische Bundesanstalt Wien (Museum) GBA no. 1982/8/4.
× 1.
- Fig. 2: *Costirhynchopsis rutneri* sp. n.
Agh 75/26. GBA no. 1982/8/1.
× 2.
- Fig. 3: *Tethyspira persis* sp. n.
Agh 75/36/1. GBA no. 1982/8/5.
× 1.
- Fig. 4: *Costirhynchopsis rutneri* sp. n.
Agh 75/18, GBA no. 1982/8/2.
× 2.
- Fig. 5: *Costirhynchopsis rutneri* sp. n.
Holotype. Agh 75/18. GBA no. 1982/8/3.
× 2.
- Fig. 6: *Tetractinella trigonella* (SCHLOTHEIM).
Agh 75/11. GBA no. 1982/8/7.
× 2.
- Fig. 7: *Dareithyris vulgaris* sp. n.
Agh 75/26. GBA no. 1982/8/9.
× 2.
- Fig. 8: *Punctospirella aff. fragilis* (SCHLOTHEIM).
Agh 75/37. GBA no. 1982/8/8.
× 2.
- Fig. 9: *Dareithyris vulgaris* sp. n.
Holotype. Agh 75/26. GBA no. 1982/8/10.
× 2.
- Fig. 10: ?*Tethyspira persis* sp. n.
Young specimen. Agh 75/30. GBA no. 1982/8/6.
× 3.

All specimens were coated with ammonium chloride before photographing.
Photographs by Mr. J. BROŽEK.



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