

# *Arzonella exotica* n. g. n. sp., a new brachiopod of indeterminate systematic position from the Lower Liassic (Broccatello) of Arzo (Southern Alps of Switzerland): A short note

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*Key words:* Brachiopod, new species, new genus, Liassic, Broccatello, Arzo, Southern Alps, southern Switzerland.

## SUMMARY

A new brachiopod, *Arzonella exotica* n. g. n. sp., from the Liassic (Broccatello) of Arzo in the Southern Alps of Switzerland was described. By the associated rhynchonellid brachiopod *Sulcirostra alpina* the stratigraphical stage could be specified as Sinemurian. *Arzonella exotica* is an unusual, probably conservative form. Its systematic position is not established yet. Possible relationships were discussed.

## ZUSAMMENFASSUNG

Ein neuer Brachiopode, *Arzonella exotica* n. g. n. sp., aus dem Lias (Broccatello) von Arzo in den Südalpen der Schweiz wurde beschrieben. Durch den assoziierten rhynchonelliden Brachiopoden *Sulcirostra alpina* konnte die stratigraphische Stufe als Sinemurian präzisiert werden. *Arzonella exotica* ist eine ungewöhnliche, wahrscheinlich konservative Form. Die systematische Position ist noch nicht geklärt. Mögliche Beziehungen wurden diskutiert.

## Introduction

The Liassic of the so-called Broccatello of Arzo in the Southern Alps of Switzerland includes a diversified brachiopod fauna, represented by rhynchonellids, spiriferinids, terebratulids and zeillerids (Parona 1885, 1891; Sacchi-Vialli 1964). A revision of these brachiopods will be published in due time elsewhere. Here we report on an undescribed and by previous authors obviously overlooked brachiopod.

The brachiopods of Arzo present as a whole an assemblage which indicates a tethysian origin. It also contains some endemic elements, at first place the dimerelloid *Sulcirostra alpina* (Parona), known hitherto only from Arzo. The unknown brachiopod on which we shortly report here proved to be an exotic form of not established systematic position yet. It is described as *Arzonella exotica* n. g. n. sp.

## Material and methods

The material came from the quarries of Arzo, a village located about 5 km south of Monte San Giorgio in the southern part of the canton Tessin (Switzerland). It was collected during the many years of field work by the Paleontological Institute and Museum of the University of Zurich, recovering the famous Triassic reptiles and fishes from Monte San

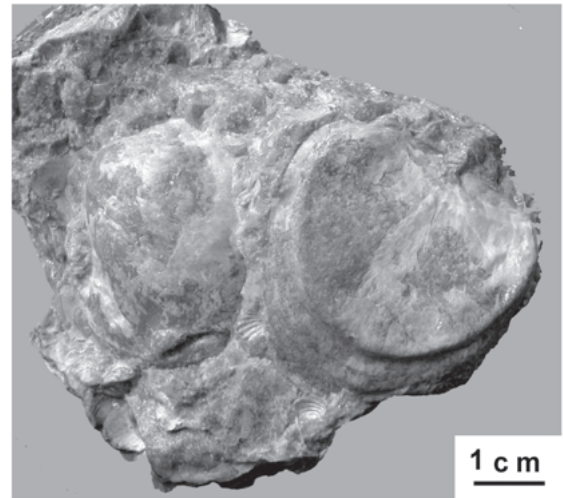


Fig. 1. Typical piece of sediment with embedded ventral (left) and dorsal (right) valve of *Arzonella exotica* and some impressions of small rhynchonellids (PIMUZ 25005).

Giorgio (since 2003 Unesco World Heritage, see Furrer 2003).

The species described here occurs in a greyish block of limestone, lithologically comparable with the typical facies of

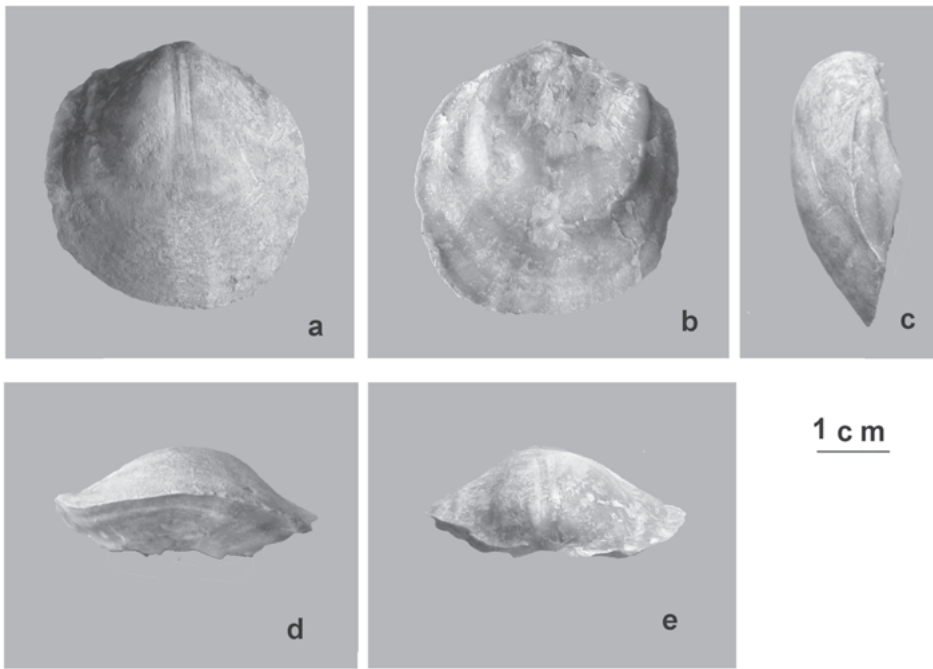


Fig. 2. *Arzonella exotica*. Holotype (length/breadth/thickness = 37.5/35.7/15.0 mm). a, b, c, d, e: ventral, dorsal, lateral, anterior, posterior view (PIMUZ 25000).

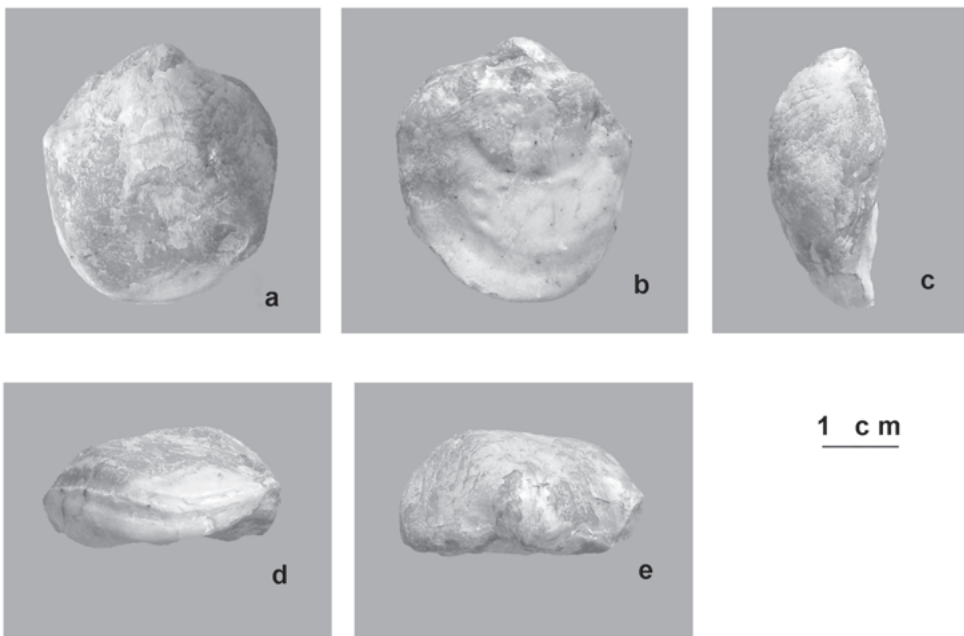


Fig. 3. *Arzonella exotica*. Paratype (length/breadth/thickness = 35.3/31.7/16.2 mm). a, b, c, d, e: ventral, dorsal, lateral, anterior, posterior view (PIMUZ 25001).

Broccatello (Fig. 1). It is quite frequent, associated with a multitude of minute, mostly disintegrated rhynchonellids, small pectinids and fragments of crinoids. Intact double-valved shells are rare, only five specimens were at disposal for the description of external morphology. The more resistant posterior part of ventral valves with their beaks and adherent parts of dorsal

valves are relatively frequent and serial sections could be performed not only in complete specimens but also in some of those fragments as well.

The internal structures are partly lined by a thin calcitic layer. In these cases the conventional method of taking acetate-peels after etching with hydrochloric acid did not give

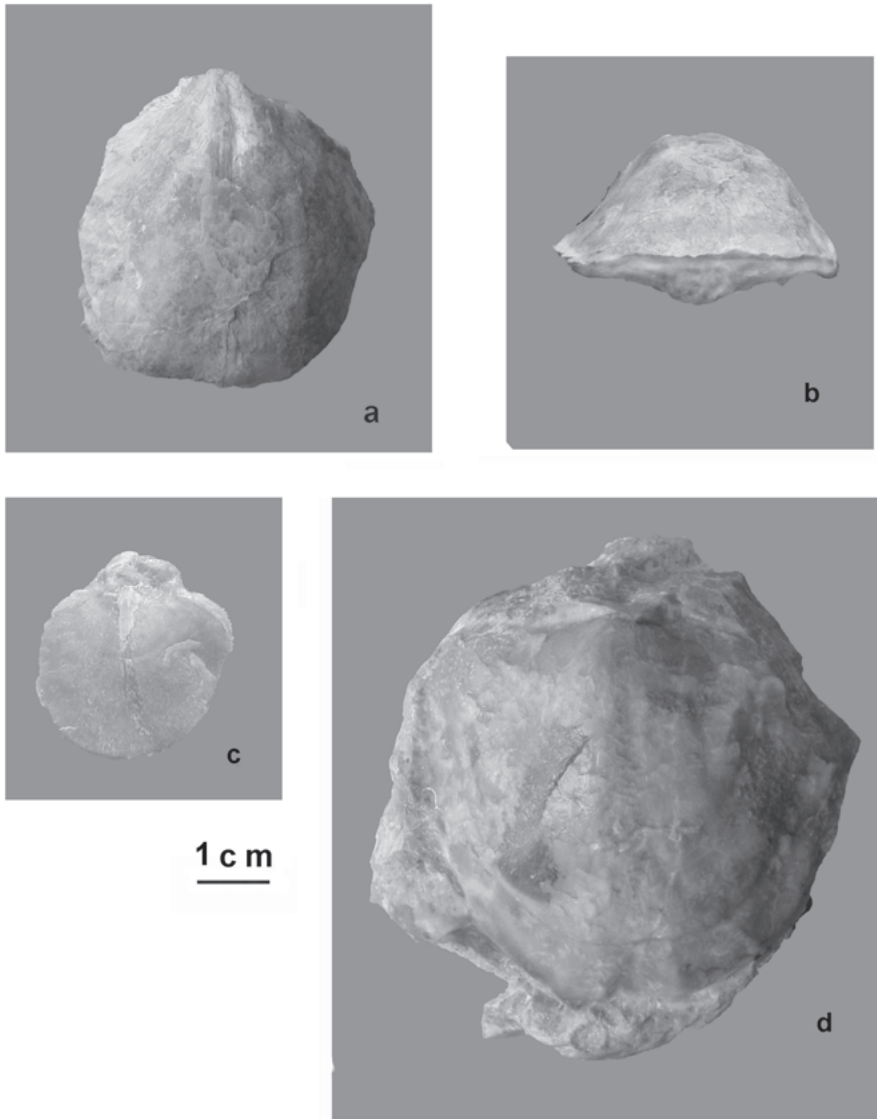


Fig. 4. Different specimens showing variability of *Arzonella exotica*. a: ventral valve with posterior, median depression, caused by parallel scars. b: same specimen as a, anterior view of highly arched ventral valve (PIMUZ 25002). c: small dorsal valve with radial *striae* and median thickening of shell fibers (PIMUZ 25003). d: ventral valve of extremely large specimen (PIMUZ 25004).

satisfactory results. The succession of sections was reproduced by digital photography and documented by drawing.

All figured specimens are deposited in the Paleontological Institute and Museum of the University of Zurich, Switzerland (PIMUZ).

#### Paleontology

Phylum Brachiopoda Duméril 1806  
 Subphylum Rhynchonelliformea Williams et al. 2000  
 Incertae sedis  
 Genus *Arzonella* n. g.  
 Derivation of name: *Arzo* – with reference to the village Arzo.  
 Type species (by monotypy): *Arzonella exotica* n. sp.

#### *Arzonella exotica* n. g. n. sp. (Fig. 1–8)

Derivation of name: *exotica* (lat.) – with reference to the foreign occurrence.

*Type specimens.* – Holotype (Fig. 2), paratype (Fig. 3) from the Lower Liassic (Broccatello) of Arzo (canton Tessin), Switzerland.

*Stratigraphical stage.* – Sinemurian (see “Discussion and Conclusion”).

*Diagnosis.* – Rounded, plano-convex shell with smooth, partly wrinkled surface; interareas low; pedicle opening not well defined; dental lamellae absent; cardinalia forming an open dendritic structure.

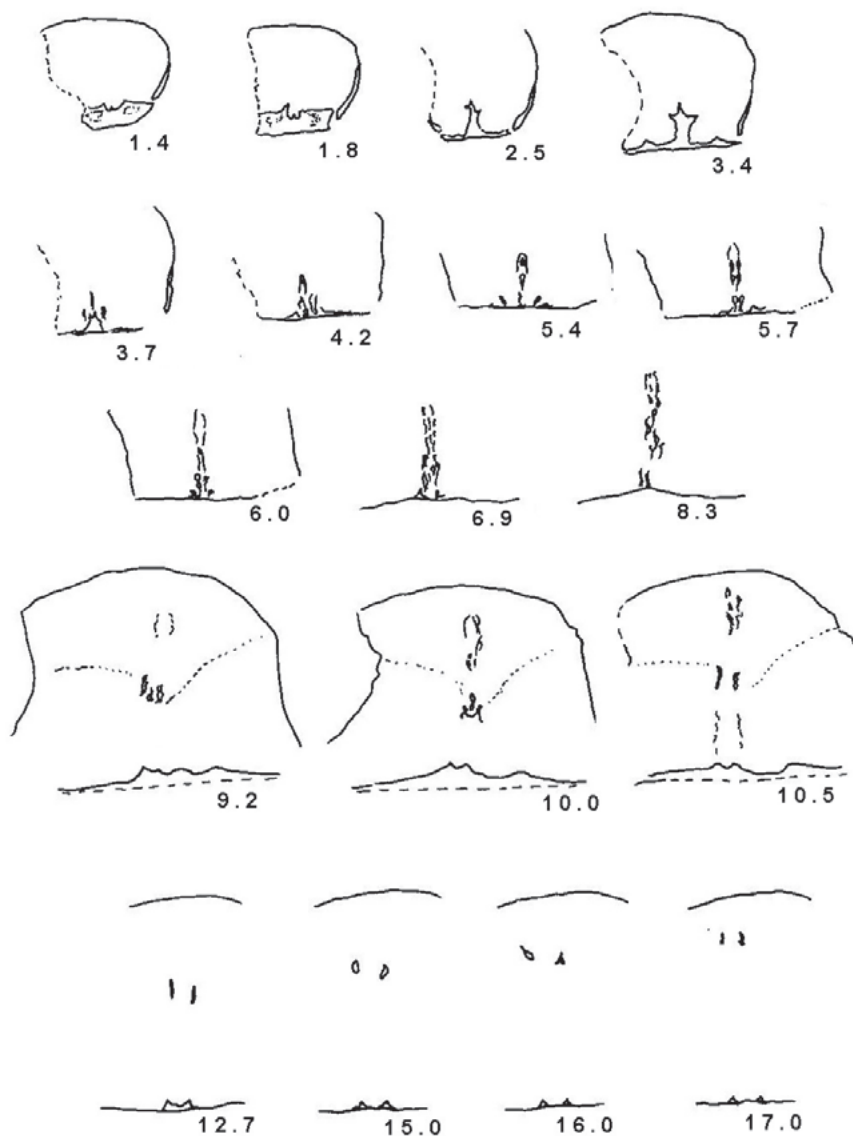


Fig. 5. *Arzonella exotica*. Transverse serial sections. Measures of sectioned specimen: length/breadth/thickness: 34.2/ 33.8/ 16.4 mm. Numbers give distance (mm) from the ventral apex.

*Description*

Shell morphology (Fig. 1–4).

Outline subcircular to subrectangular, often irregular; profile plano-convex; shell margins sharp, anteriorly more or less rectimarginate, laterally straight; shell surface smooth, with scarcely perceptible radial *striae* (Fig. 4a, 4c), frequently with coarse, partially concentric *rugae* (chiefly on dorsal valve, Fig. 1right, 2b, 3b); hinge line with very low interareas; calcitic shell fibers.

*Ventral valve.* Convex, anteriorly flattened, no median fold, but with a parallel pair of slender (muscle?) scars of about one

third shell length (Fig. 2a, 4a); beak broad, rounded, rather flat; pedicle opening not well defined; no deltidial plates or pseudodeltidium.

*Dorsal valve.* Generally plane, but wavy by *rugae*; no median sinus; a bundle of dense shell fibers, simulating fine stripes, extends medianly from the hinge line to near the anterior end (Fig. 1right, 4c).

Internal morphology

*Ventral valve.* Umbonal cavities mostly obscured by callosities; hinge teeth elongate, club-like, oblique, inaccurately fitting

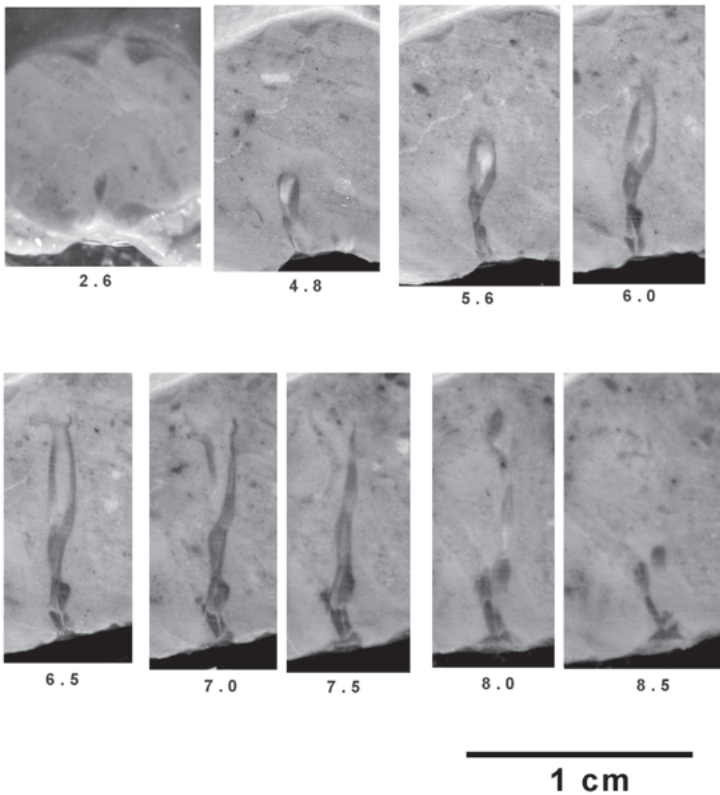


Fig. 6. *Arzonella exotica*. Transverse serial sections showing the spiny and branching structure originating at the dorsal valve floor and extending into the ventral valve. Measures of sectioned specimen: length/sbreadth/thickness: 32.0/ 30.6/ 12.8 mm. Numbers give distance (mm) from the ventral apex (PIMUZ 25006).

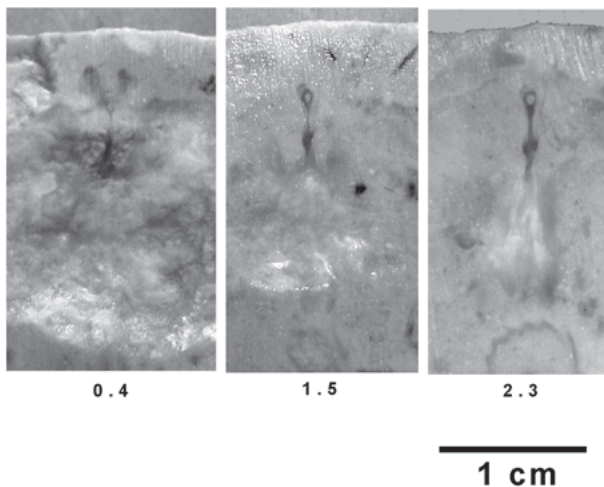


Fig. 7. *Arzonella exotica*. Serial sections parallel to dorsal valve (posterior margin up). Explications see text. Numbers give distance (mm) from the ventral apex (PIMUZ 25007).

into small, indistinct sockets (Fig. 5: sections 1.4–2.5); no dental lamellae; at the posterior valve floor occasionally with a pair of ridges (for muscle attachment?, Fig. 6: section 2.6).

**Dorsal valve.** Trunk-like structure (Fig. 5: sections 2.5, 3.4; Fig. 6: section 2.6), in successive sections branching off and forming a dendritic structure reminiscent of a fountain (Fig. 5: sections 3.7–8.3; Fig. 6: sections 4.8–7.5).

## Discussion and conclusion

*Arzonella exotica* displays a shell shape which is not easily comparable with any other Mesozoic brachiopod. When the shell is sectioned, the cardinalia of the dorsal valve lack a structure which can be recognized as crura, loops or spiralia, i.e. one of the well-known supports of the lophophor which characterize a rhynchonellid, terebratulid or spiriferid brachiopod of Mesozoic age. Instead endospinose, slightly bent extensions with multiple branching and irregular tips arise from the dorsal floor (Fig. 5, 6). These uncommon features brought us first to believe that some foreign material might have penetrated the shell, simulating brachiopod internal structures. By repeated sectioning, however, always the same picture was obtained, and the mentioned features had to be taken for authentic.

Serial sections parallel to the surface of the dorsal valve revealed further details whose interpretation, however, is tentative. On the internal valve floor near the posterior margin a pair of sockets (?) connected with a thin, short *lamella* can be detected (Fig. 7: section 0.4). Further sections exposed a small circle at the posterior end of the *lamella* (Fig. 7: sections 1.5, 2.3) which may be part of a supposed cardinal process.

*Arzonella exotica* occurs together with small rhynchonellids. These were partly identified as *Sulcirostra alpina* (Fig. 8a) by their unmistakable long crura<sup>1</sup>. *Sulcirostra alpina* grants for

<sup>1</sup> This species will be treated in the revision work of the Arzo brachiopod fauna as mentioned before.



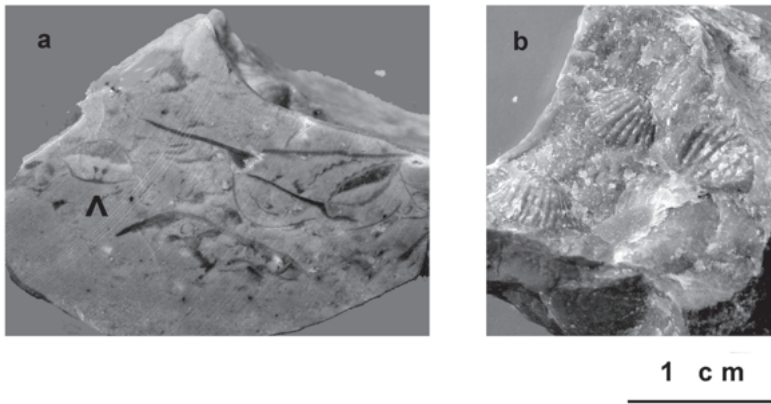


Fig. 8. Rhynchonellids. a: arrow head marks transverse section of *Sulcirostra alpina* with typical ensiform crura, embedded in a shell of *Arzonella exotica* which was cut laterally and where spinose elements can be recognized (PIMUZ 25008). b: costate rhynchonellids, probably juveniles of *Prionorhynchia* sp (PIMUZ 25009).

a Sinemurian age. Other rhynchonellids of more coarsely ribbed shells (Fig. 8b) were not strictly identified, but they presumably belong to juvenile specimens of *Prionorhynchia* sp. A certain probability exists that *Arzonella exotica* is older (Triassic?) and was embedded later in a younger (Liassic) sediment.

Up-to-now even the gross systematic position of the present species remains dubious. To summarize the most pertinent characters, these are: a non-strophic shell with actually inexistent interareas, an ill-defined pedicle opening with a questionable functional pedicle, a wrinkled shell surface, characteristic scars on both valves, structures which may be interpreted as a cardinal process. In some aspects this brachiopod shares similarities with certain Permian productids. With genera of not extreme aberrant shape, such as *Wyndhamia*, *Arcticalosia*, *Marginalosia* or *Notolosia* it has some properties in common, e.g. the overall shell morphology, low interareas, elements of shell sculpture, internal outgrowths and others (Brunton et al. 2000).

Several strange-looking brachiopods are known from Liassic strata. These are small individuals of the genera *Cadomella* Oehlert (1887) and *Koninckella* Munier-Chalmas (1880). Their ancestors are supposed to have lived in the Paleozoic era. Due to the strophic shell and a distinctive concavo-convex profile, *Cadomella* was in the past treated as a strophomenide (chonetoid?) brachiopod. In *Cadomella davidsoni* (Eudes-Deslongchamps 1853) a spiral brachidium was discovered by Cowen & Rudwick (1966), and the species placed in the athyridid genus *Koninckodonta* Bittner 1893. The type species of *Cadomella*, *Leptaena moorei* Davidson 1851, however, is morphologically quite different so that the cadomelloids were separated from the koninckinids and placed in *incertae sedis* (MacKinnon 2002).

*Arzonella exotica* is much larger and in many other respects clearly different from all the species mentioned above. A convincing argument for constructing a link between them and *Arzonella exotica* is not obvious and with the knowledge available now not feasible. The new species is an articulate, rhynchonelliform brachiopod of *incertae sedis*. It remains a mysterious species because of its confusing Paleozoic look. It

seems to be much different from any known brachiopod, and we think that it deserves both a new species and genus name. For a substantial progress in giving *Arzonella exotica* a home for classification further studies are required.

#### Acknowledgement

M. Siblik, Praha (Czech. Rep.), reviewed critically the manuscript and gave helpful suggestions for improvement.

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Manuscript received March 1, 2004

Revision accepted September 25, 2004