ՀՀ ԳԱԱ Տեղեկագիր, Գիտություններ Երկրի մասին, 2022, h. 75, N 2, 5-15
Известия НАН РА Науки о Земле, 2022, т. 75, N 2, 5-15
Proceedings NAS RA, Earth Sciences, 2022, v. 75, N 2, 5-15

PALEONTOLOGY

ON TWO CYRTOSPIRIFERID BRACHIOPOD SPECIES FROM THE LOWER FAMENNIAN OF CENTRAL ARMENIA

Serobyan Vahram[1, 2], Mottequin Bernard[3]

DOI: 10.54503/0515-961X-2022.75.2-5

[1] Univ. Lille, CNRS, UMR 8198- Evo-Eco-Paleo, F-59000 Lille, France
e-mail: vahram.serobyan.etu@univ-lille.fr
[2] Institute of Geological Sciences of the National Academy of Sciences of the Republic of Armenia-Yerevan, Armenia, 24A, Marshal Baghramyan Avenue, Yerevan 0019, Republic of Armenia e-mail:vahramserobyan@gmail.com
[3] O.D. Earth and History of Life, Royal Belgian Institute of Natural Sciences, rue Vautier 29, B 1000 Brussels, Belgium e-mail:bmottequin@naturalsciences.be
Received by the Editor 28.04.2022

In an effort to describe the brachiopod diversity of the lower Famennian *Aramazdospirifer orbelianus* brachiopod Zone of Central Armenia (coeval to the *Palmatolepis crepida* conodont Zone), our attention is here focused on the description and illustration of two previously unknown spiriferide species (*Cyrtospirifer* sp. A and *C.* sp. B) of the Subfamily Cyrtospiriferinae.

Keywords: Brachiopoda; Spiriferida; Cyrtospiriferinae; Upper Devonian; *Aramazdospirifer orbelianus* Zone; Lesser Caucasus.

Introduction

The Upper Devonian of Central Armenia constitutes a continuous successsion of mixed carbonate-siliciclastic deposits, accumulated in a shallow water environment. Geodynamically speaking, they are part of the South Armenian Block (SAB), a microcontinent that was detached from Gondwana during the Triassic and Jurassic (Sosson *et al*., 2010). These sequences contain a diverse and abundant brachiopod fauna, among which the spiriferides are the most common. Brachiopods were systematically studied by Abrahamyan (1957, 1964, 1974) and Serobyan *et al*. (2019, 2021, 2022a, b). Most notably, Serobyan *et al*. (2022a) revised *Spirifer orbelianus* Abich, 1858 and erected the cyrtospiriferid genus *Aramazdospirifer* for this biostratigraphically important species for the lower Famennian of the Lesser Caucasus. They also discussed and discarded reports indicating the presence of Abich‘s species outside this Gondwanan area. However, the brachiopod assemblages from Armenia are still poorly understood, both taxonomically and biostratigraphically. Moreover, the rarely encountered species are not well known and often were even not collected. This is particularly true for the spiriferides that were generally ascribed to the widespread cyrtospiriferid genus *Cyrtospirifer* Nalivkin in Fredericks

(1924). Despite its unique and distinctive morphology, the concept of this genus was often misunderstood. During the twentieth century, as many as 150 species or varieties (equivalent to species or subspecies in modern terminology (Article 45 of the International Code on Zoological Nomenclature (fourth edition, 1999) (consult also Article 10.2)) were incorrectly assigned to *Cyrtospirifer* (Ma and Day, 2003). This has led to an overextension of its published stratigraphic range, from the late Givetian to the early Carboniferous (see discussion in Schemm-Gregory, 2011; Ma and Day, 2003, 2007; Gourvennec, 2019), but recent systematic revisions over the past fifty years considerably reduced the number of species erroneously ascribed to *Cyrtospirifer*. Nonetheless, many cyrtospiriferids remain poorly known.

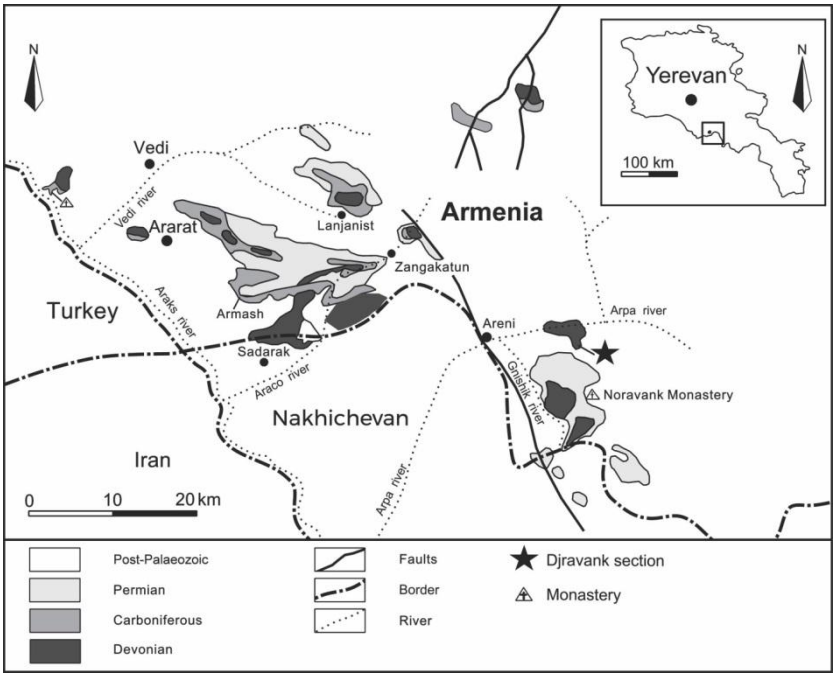

Fig.1. Schematic geological map and distribution of Upper Palaeozoic sequences in Central Armenia, including the location of the studied Djravank section (after Serobyan et al., 2019, modified).

The prime objective of this paper is to describe two cyrtospiriferid taxa (Spiriferida) on the basis of the newly collected, although restricted, material from the lower Famennian succession of Central Armenia (fig.1), in order to better document the diversity of Cyrtospiriferid brachiopods from this interval, in addition to the fauna recently published by Serobyan *et al*. (2022a, b).

Material and methods

The brachiopods described in the present paper were collected in the marly/sandy limestone layers of the Ertych Regional Stage, which constitutes

the upper part of the Djravank section (Vayots Dzor Province) (fig.1). The Ertych Regional Stage is correlated with the *Aramazdospirifer orbelianus* brachiopod Zone of Abrahamyan (1957), which corresponds to the *Aramazdospirifer orbelianus–Tornatospirifer armenicus* brachiopod Zone of Rzhonsnitskaya and Mamedov (2000) (see Serobyan *et al*., 2022a, b), and is coeval with the *Palmatolepis crepida* conodont Zone (Rzhonsnitskaya and Mamedov, 2000). The Djravank section crops out along a mountain path originating from the ruins of the Ertych village and leads to a tiny church hidden in the mountains at the locality known as Djravank (fig.1).

All specimens illustrated and investigated herein are deposited at the Geological Museum of the Institute of Geological Sciences of the National Academy of Sciences of Armenia, Yerevan (IGSNASRAGM/PS). The prefix PS indicates the laboratory of Palaeontology and Stratigraphy. The specimens were coated with magnesium oxide before being photographed with a Canon EOS 700D camera.

Systematic palaeontology

Order Spiriferida Waagen, 1883
Suborder Spiriferidina Waagen, 1883
Superfamily Cyrtospiriferoidea Termier and Termier, 1949
Family Cyrtospiriferidae Termier and Termier, 1949
Subfamily Cyrtospiriferinae Termier and Termier, 1949

Genus *Cyrtospirifer* Nalivkin in Fredericks, 1924

Type species.—*Spirifer verneuili* Murchison, 1840; from the Frasnian of Ferques (France, Boulonnais area).

Cyrtospirifer sp. A
Figure 2, Plate 1.1–1.7

Material.—Two mostly complete, but strongly exfoliated, articulated specimens from the Djravank section (Fig. 1), lower Famennian *Aramazdospirifer orbelianus* brachiopod Zone.

Description.—Shell medium-sized (up to c. 39 mm in width, 17.9 mm in length and 20.1 mm in thickness), wider than long, markedly ventribiconvex, rounded subtrapezoidal in outline; widest at hinge line; cardinal extremities acute; anterior margin emarginate (in ventral view); anterior commissure uniplicate.

Ventral valve inflated, with convex flanks sloping moderately towards lateral commissures; umbo small, not prominent; beak presumably small and erect (tip broken); interarea triangular, very high, slightly concave, procline at its base then becoming apsacline; delthyrium wide, partly covered by a convex pseudodeltidium (poorly preserved); sulcus wide, relatively deep, originating from beak, round-bottomed at front; tongue high, not perpendicular to com-

missural plane (bent dorsally), subcircular to subogival in outline.

Dorsal valve subtrapezoidal in outline, moderately inflated with flanks sloping gently towards lateral commissures; highest slightly posteriorly to midlength, then progressively declining towards the anterior margin; interarea linear, nearly flat, orthocline; fold wide, well-delimited, moderately high, starting from beak and widening anteriorly, round-topped at front.

Up to 22 simple, low, round-topped ribs on flanks with top rounded; 5 ribs per 5 mm at anterior margin near sulcus and fold; in sulcus and on fold, at least 10 ribs (poorly preserved) increasing by bifurcations and narrower than those on flanks; interspaces narrower than ribs; micro-ornament not preserved.

Ventral interior (fig.2) with relatively stout dental plates, intrasinal or subsinal posteriorly but extrasinal more anteriorly; delthyrial plate distinct, short, relatively thick; post-delthyrial and lateral apical cavities moderately infilled.

Dorsal valve interior (fig.2) with an unsupported ctenophoridium consisting of up to 23, relatively short lamellae; hinge plates divided; crural bases dorsally convergent; spiralia unknown.

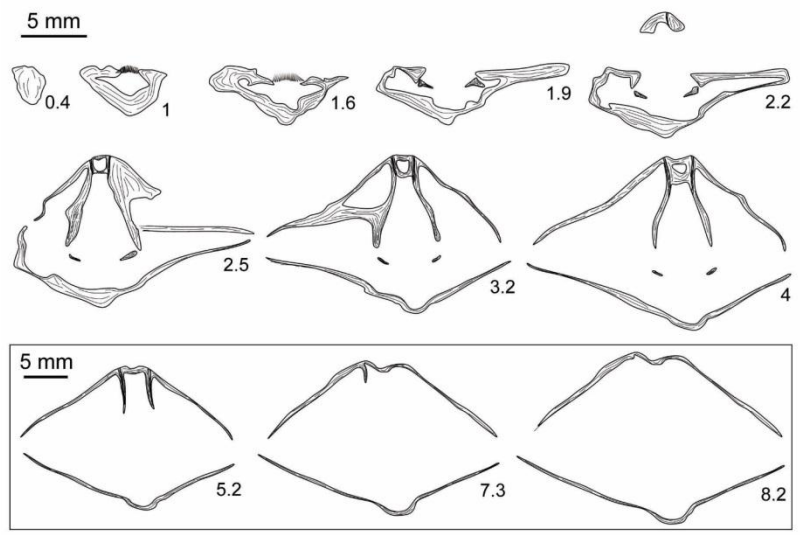

Fig. 2. Transverse serial sections of *Cyrtospirifer* sp. A (IGSNASRAGM 3945/PS 3051) from the lower Famennian *Aramazdospirifer orbelianus* Zone of Armenia, Djravank section. Numbers refer to distances in mm from the tip of the ventral umbo.

Remarks.—Our material is ascribed to the genus *Cyrtospirifer* on the basis of the external (e.g. type of ribbing, general shape) and internal (e.g. well-developed, relatively thick delthyrial plate; position of the dental plates) features and is left in open nomenclature due to the very limited number of specimens available. We herein provide a comparison of *Cyrtospirifer* sp. A with other *Cyrtospirifer* representatives but only with those which are described with respect to modern standards, as several species were previously lumped

under the genus *Cyrtospirifer* and revision of which may reveal that they belong to different genera (Ma and Day, 2003).

Cyrtospirifer sp. A differs from *C. verneuili* (Murchison, 1840) as revised by Brice (1988) and Ma and Day (2003), mainly by its higher ventral interarea and by its unsupported ctenophoridium.

Cyrtospirifer sp. A appears to be closely related to *C. sinensis*‘ (Grabau, 1931) *sensu* Ma and Day (2003), known from the lower(?)–uppermost Frasnian of China; however, the ventral interarea of the species is procline at its base, then becoming apsacline, whereas the latter has an apsacline to catacline ventral interarea. Moreover, *C.* sp. A differs by having fewer ribs on flanks and non-thickened dental plates.

Cyrtospirifer sp. A differs from the specimens of the lower Famennian of Afghanistan ascribed to *C. asiaticus* Brice, 1971 by Brice (1971) by its transversely elongated shell and unsupported ctenophoridium. It is important to note that *Cyrtospirifer asiaticus* was proposed to include specimens from the Upper Devonian of the Zadonsk area (Russia), mistakenly identified as *Spirifer archiaci* Murchison, 1840 by de Verneuil (in Murchison et al., 1845), but the latter material has never been revised.

Cyrtospirifer sp. A is distinguished externally from *C. placitus* Stainbrook, 1945, known from the Upper Frasnian of Iowa (USA), by its high ventral interarea, lower tongue, fewer ribs on flanks, as well as in sulcus and on fold. Additionally, *C.* sp. A differs by the absence of a dorsal myophragm.

Cyrtospirifer sp. A may be distinguished externally from *C. whitneyi* (Hall, 1858), a middle–Upper Frasnian species from Iowa (USA), by its shell shape, wider sulcus and fold, lower and subcircular to subogival tongue. Internally, the former differs from the latter by the absence of myophragm on floors of both valves.

Cyrtospirifer sp. A differs from *C. vjacheslavi* Sokiran, 2013, known from the Middle Frasnian of the East European Platform, mainly by its shell shape, high ventral interarea and lower tongue. Additionally, *C.* sp. A may be separated by the presence of a strong, ventral apical callosity, developed by its nearly flat ctenophoridium and the absence of a dorsal myophragm.

Cyrtospirifer sp. A is distinguished from *C.* sp. B by its larger size, higher ventral interarea, deeper sulcus and higher fold, higher tongue, and larger number of ribs on flanks as well as in sulcus and on fold. Furthermore, *C.* sp. A differs by its convergent dental plates and unsupported ctenophoridium.

Cyrtospirifer sp. B
Figure 3, Plate 1.8–1.12

Material.—Two partly exfoliated articulated specimens from the Djravank section (fig.1), lower Famennian *Aramazdospirifer orbelianus* brachiopod Zone.

Description.—Shell medium-sized (up to c. 27 mm in width, 20.6 mm in length and 17.6 mm in thickness), wider than long, ventribiconvex, subpentagonal in outline; widest presumably at the hinge line; cardinal extremities broken; anterior margin straight; anterior commissure uniplicate.

Ventral valve strongly inflated, with convex flanks sloping moderately towards lateral commissures; umbo inflated, prominent; beak incurved; interarea apsacline, strongly concave, low; delthyrium unobserved (concealed by sediment); sulcus narrow, shallow to relatively deep, originating from beak, flat-bottomed at front, well-defined by bounding ribs; tongue low, subtrapezoidal in outline, perpendicular to commissural plane or slightly bent dorsally.

Dorsal valve slightly inflated with flanks sloping gently towards lateral commissures, subquadrangular to subtrapezoidal in outline; highest at mid-length, then decreasing gradually towards anterior margin; interarea concave, linear, orthocline; fold low, well-delimited, originating from beak, round to flat-topped at front.

Ornamentation of up to 16 rounded, simple, low ribs on each flank, becoming fainter towards posterolateral margins; 5 ribs per 5 mm at anterior margin near sulcus and fold; in sulcus and on fold, up to 4–5 ribs, slightly narrower than those present on flanks; ribs slightly wider than interspaces on flanks; micro-ornament poorly preserved, only a few capillae observed in ventral interspaces.

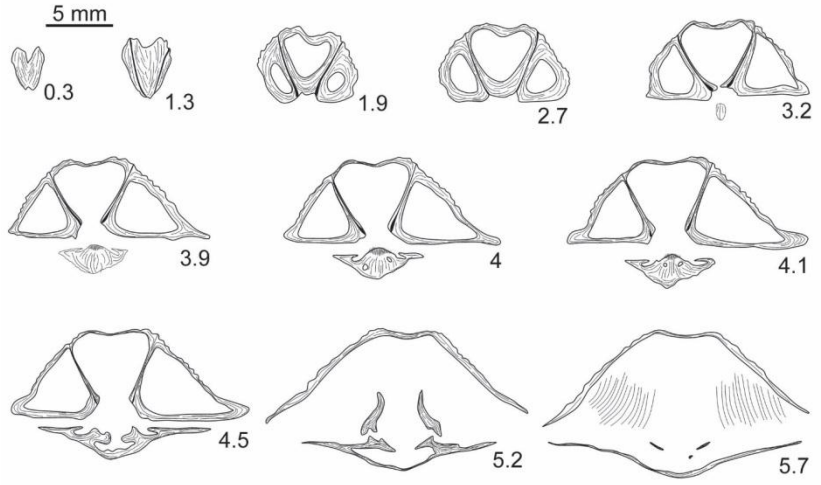

Fig. 3. Transverse serial sections of *Cyrtospirifer* sp. B (IGSNASRAGM 3947/PS 3053) from the lower Famennian *Aramazdospirifer orbelianus* Zone of Armenia, Djravank section. Numbers refer to distances in mm from the tip of the ventral umbo.

Ventral valve interior (fig.3) with stout, long, extrasinal and markedly divergent dental plates, converging dorsally in umbonal region (as seen in transverse section); teeth massive, bilobed; delthyrial plate short, thick; postdelthyrial (large) and lateral apical cavities poorly filled in by callus.

Dorsal valve interior (fig.3) with supported ctenophoridium that is composed of up to 19 well-developed, relatively long lamellae; hinge plate divided;

crural bases stout; spiralia oriented posterolaterally with at least 15 whorls per spiral cone.

Remarks.—The external and internal features observed (e.g., well-developed fold and sulcus, long and extrasinal dental plates, delthyrial plate) in the two studied specimens are in favour of an assignment to the genus *Cyrtospirifer*.

Cyrtospirifer sp. B differs from *C. verneuili* (Murchison, 1840) mainly by its smaller size, short hinge line, lower tongue, fewer ribs on flanks as well as in sulcus and on fold. Furthermore, the former is distinguished by its markedly divergent dental plates.

Cyrtospirifer sp. B is separable externally from *C. thalattodoxa* Crickmay, 1952, by its shorter hinge line, lower tongue and fewer number of ribs on flanks as well as in sulcus and on fold. However, it is worth noting that Ma and Day (2003; pl. 9.6–9.8) illustrated a specimen of *C. thalattodoxa* with very short hinge line and obtuse cardinal extremities, but they specified that it is a result of abnormal growth. Additionally, *C.* sp. B differs by its supported ctenophoridium.

Cyrtospirifer sp. B differs externally from *C. whitneyi* (Hall, 1858) by its lower and subtrapezoidal tongue, fewer ribs on flanks as well as in sulcus and on fold. Moreover, *C.* sp. B is distinguished by its markedly divergent dental plates, supported ctenophoridium and by the absence of a ventral myophragm.

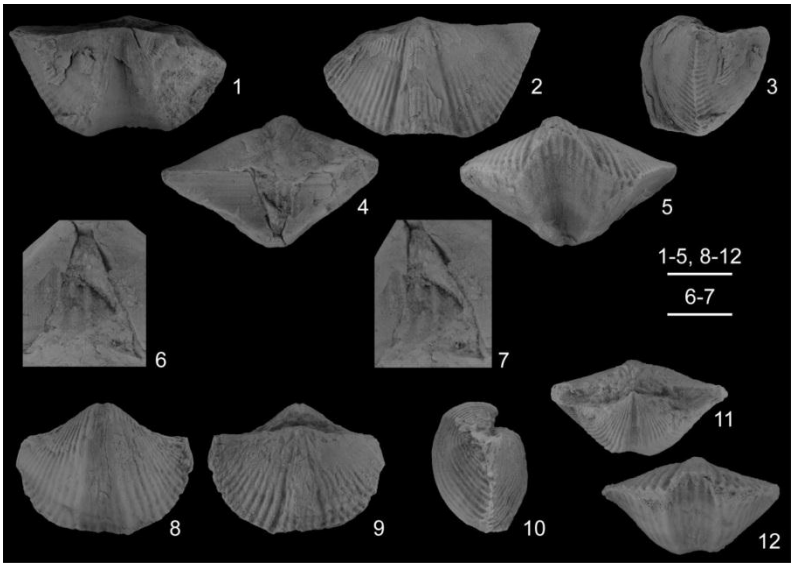

Plate 1. *Cyrtospirifer* sp. A from the lower Famennian *Aramazdospirifer orbelianus* Zone of Abrahamyan (1957) in Armenia. (**1–7**). IGSNASRAGM 3946/PS 3052 (Djravank section), corroded specimen in ventral, dorsal, lateral, posterior and anterior views (**1–5**), close-up of the ventral interarea (pseudodeltidium) (**6**, **7**).
Cyrtospirifer sp. B from the lower Famennian *Aramazdospirifer orbelianus* Zone of Abrahamyan (1957) in Armenia. (**8–12**). IGSNASRAGM 3948/PS 3054 (Djravank section), almost complete specimen in ventral, dorsal, lateral, posterior and anterior views. Scale bars: 10mm (1–12), 5mm (6–7).

Discussion

According to Ma and Day (2003) representatives of the genus *Cyrtospirifer* occur in upper Givetian and Frasnian sequences, and perhaps in the lower Famennian, pending the reinvestigation of the Famennian cyrtospiriferids. Concerning the earliest known occurrence of this genus, Gourvennec (2019) stated that its first known occurrence is from the upper Eifelian–lower Givetian transitional layers of the Tindouf Basin in Algeria. Regarding its youngest occurrence, Abrahamyan (1957, 1974) described and illustrated numerous brachiopods that were assigned to *Cyrtospirifer* from the lower–upper Famennian sequences of Armenia. Although most of the species she illustrated were subsequently assigned to other genera (e.g., see Ma and Day, 2007; Grechishnikova in Alekseeva *et al*., 2018a), some appear to belong indeed to *Cyrtospirifer*. This is the case of the specimens from the lower–upper Famennian of the Lesser Caucasus (Armenia and Nakhichevan) that were identified as *C. verneuili* (Murchison, 1840) by Abrahamyan (1957), who did not illustrate their internal features. It is important to stress here that *Cyrtospirifer verneuili* was originally described from the Frasnian of Ferques in the Boulonnais area (northern France) (Brice, 1988; Sartenaer, 2017), more precisely from the Ferques Formation, and Murchison (1840) also included Belgian material in describing this emblematic Frasnian species. It is highly probable that the specimens ascribed to *C. verneuili* by Abrahamyan (1957) do not belong to this species, but they just display some external similarities with it. Nevertheless, they apparently belong to *Cyrtospirifer*. Consequently, it is reasonable to assume that resampling and reinvestigation of the Middle and Upper Devonian succession of the Lesser Caucasus is a necessary task as it might improve our understanding of the biostratigraphic distribution of the genus *Cyrtospirifer*.

Conclusion

The examination of the lower Famennian *Aramazdospirifer orbelianus* Zone of the Djravank section (Central Armenia) reveals two uncommon cyrtospiriferid brachiopods. Both of them are herein assigned to the genus *Cyrtospirifer* Nalivkin in Fredericks (1924), which is one of the most widespread cyrtospiriferid genera, and left in open nomenclature due to the very limited material available for each species. It is well-known that the lower Famennian is characterized by the huge development of representatives of the subfamily Cyrtiopsinae in comparison with the Cyrtospiriferinae (e.g. Ma and Day, 2007; Mottequin and Poty, 2016) as is also the case in Armenia. Further investigations on the Armenian material are required in order to complete the recent revisions conducted on the Famennian brachiopods recoveredfrom the different parts of northern Gondwana that crop out now in the Lesser Caucasus, Afghanistan and Iran (Alekseeva *et al*., 2018a, b; Mottequin and Brice, 2019).

Acknowledgments

V. Serobyan is grateful to the French Embassy in Yerevan, the MOBLILEX International Mobility Grant Programme of the University of Lille and the Erasmus + ICM Programme for funding his studies in France. Fieldwork was also facilitated by the logistic support of the Institute of Geological Sciences (Armenian Academy of Sciences). The manuscript benefited from an anonymous reviewer to whom we are much indebted.

References

Абрамян М.С. 1957. Брахиоподы верхнефаменских и этренских отложений югозападной Армении. Ереван, Акаедмиа Наук Армянской ССР, Институт Геологических Наук, 144с.

Абрамян М.С. 1964. Стратиграфия каменноугольных отложений, в кн. Геология Армянской ССР. Ереван, Академия Наук Армянской ССР, Институт Геологических Наук, том 2, с.96–118.

Абрамян М.С. 1974. Описание фауны. Девонская система, Тип Brachiopoda. Брахиоподы, Атлас ископаемой фауны Армянской ССР. Ереван, Издательство Академии Наук Армянской ССР Институт Геологических Наук, с.48–64, 77–85.

Аракелян Р.А. 1952. Стратиграфия палеозойских отложений юго-западной Армения и прилегающие части Нахичеванской АССР. Ереван, Академия Наук Армянской ССР, Институт Геологических Наук, 142с.

Аракелян Р.А. 1964. Стратиграфия девонских отложений, в кн. Геология Армянской ССР. Ереван, Академия Наук Армянской ССР, Институт Геологических Наук, т. 2, с.46–96.

Фредерикс Г.Н. 1924. Палеонтологические исследования. 2. О Верхнекаменноугольных спириферидах Урала. Известия Геологического Комитета, т. 38, с.295–324.

Alekseeva R.E., Afanasjeva G.A., Grechishnikova I.A., Oleneva N.V. and Pakhnevich A.V. 2018a. Devonian and Carboniferous Brachiopods and Biostratigraphy of Transcaucasia (Ending). Paleontological Journal, v. 52, p.969–1085.

Alekseeva R.E., Afanasjeva G.A., Grechishnikova I.A., Oleneva N.V. and Pakhnevich A.V. 2018b. Devonian and Carboniferous Brachiopods and Biostratigraphy of Transcaucasia. Paleontological Journal, v. 52, p.829–967.

Brice D. 1971. Étude paléontologique et stratigraphique du Devonien de l'Afghanistan. Notes et Mémoires sur le Moyen-Orient 11, 1–364.

Brice D. 1988. Brachiopodes du Dévonien de Ferques (Boulonnais–France). Biostratigraphie du Paléozoïque, v. 7, p.323–395.

Crickmay C.H. 1952. Discrimination of late Upper Devonian. Journal of Paleontology, v. 26, p.585–609.

Gourvennec R. 2019. Silurian-Devonian Spiriferida and Spiriferinida (Brachiopods) from the Tindouf Basin (Algeria). Palaeontographica Abteilung A, v. 313 (4–6), p.81–149.

Grabau A.W. 1931. Devonian Brachiopoda of China, I: Devonian Brachiopoda from Yunnan and other districts in South China. China Geological Survey, Palaeontologia Sinica Ser. B, v. 3, p.1–545.

Hall J. 1858. Report on the Geological Survey of the state of Iowa; embracing the results of investigations made during portions of the years 1855–1857, Palaeontology, v. 1, part 2. Published by authority of the legislature of Iowa, Des Moines, p.473–724.

International Commission on Zoological Nomenclature 1999. International Code of Zoological Nomenclature, 4th edition. International Trust for Zoological Nomenclature, London.

Ma X.-P., and Day J. 2003. Revision of North American and selected Eurasian Late Devonian (Frasnian) species of *Cyrtospirifer* and *Regelia* (Brachiopoda). Journal of Paleontology, v. 77, p.267–292.

Ma X.-P., and Day J. 2007. Morphology and revision of Late Devonian (Early Famennian) Cyrtospirifer (Brachiopoda) and related genera from South China and North America. Journal of Paleontology, v. 81, p.286–311.

Mottequin B. and Brice D. 2019. Reappraisal of some Upper Devonian (Famennian) spiriferide brachiopods from the Band-e Bayan Domain (Afghanistan). Geobios, v. 52, p.47–65.

Mottequin B. and Poty E. 2016. Kellwasser horizons, sea-level changes and brachiopod-coral crises during the late Frasnian in the Namur-Dinant Basin (southern Belgium): a synopsis. Geological Society, London, Special Publications, v. 423, p.235–250.

Murchison R.I. 1840. Description de quelques-unes des coquilles fossiles les plus abondantes dans les couches dévoniennes du Bas-Boulonnais. Bulletin de la Société géologique de France, v. 11, p.250–256.

Murchison R.I., Verneuil E. de and Keyserling A. de 1845. Géologie de la Russie d'Europe et des Montagnes de l'Oural, vol. 2, 3e partie, Paléontologie. John Murray, London, and Bertrand, Paris, 512p.

Rzhonsnitskaya M.A. and Mamedov A.B. 2000. Devonian stage boundaries in the southern Transcaucasus. Courier Forschungsinstitut Senckenberg, v. 225, p.329–333.

Sartenaer P. 2017. *Spirifer disjunctus* (Sowerby, J. de C. in Sedgwick & Murchison, 1840) and *S. verneuili* Murchison, 1840 (Brachiopoda, Spiriferida): 175 years of confusion. Geologica Belgica, v. 20(3-4), p.181–188.

Schemm-Gregory M. 2011. A new species of *Cyrtospirifer* (Brachiopoda) from the Middle Devonian of the Western Sahara (Northwest Africa). Rivista Italiana di Paleontologia e Stratigrafia 117, p.3–13.

Serobyan V., Grigoryan A., Mottequin B., Mayilyan R., Crônier C. and Danelian T. 2019. Biostratigraphy of the Upper Devonian trigonirhynchiid brachiopods (Rhynchonellida) from Armenia. Proceedings of National Academy of Sciences of the Republic of Armenia. Earth Sciences, 72/2, p.3–18.

Serobyan V., Danelian T., Crônier C., Grigoryan A. and Mottequin B. 2021. Lower Famennian (Upper Devonian) rhynchonellide and athyride brachiopods from the South Armenian Block. Journal of Paleontology, v. 95, p.527–552.

Serobyan V., Danelian T., Crônier C., Grigoryan A. and Mottequin B. 2022a. *Aramazdospirifer orbelianus* (Abich, 1858) n. comb., a new cyrtospiriferid brachiopod genus and a biostratigraphically important species from the lower Famennian (Upper Devonian) of Armenia. Comptes Rendus Palevol, 21(2), p.145–156.

Serobyan V., Danelian T., Crônier C., Grigoryan A. and Mottequin B. 2022b. New and revised cyrtospiriferid (Spiriferida) brachiopods from the lower Famennian (Upper Devonian) of Armenia. Journal of Paleontology.

Sokiran E.V. 2013. *Cyrtospirifer vjacheslavi*, a new cyrtospiriferid species (Cyrtospiriferidae, Brachiopoda) from the Middle Frasnian of the East European Platform. Paleontological Journal, v. 47, p.581–587.

Sosson M., Rolland Y., Müller C., Danelian T., Melkonyan R., Kekelia S., Adamia S., Babazadeh V., Kangarli T., Avagyan A., Galoyan G. and Mosar J. 2010. Subductions, obduction and collision in the Lesser Caucasus (Armenia, Azerbaijan, Georgia), new insights, In: Sosson M., Kaymakci N., Stephenson E.A., Bergerat F. and Starostenko V., eds., Sedimentary Basin Tectonics from the Black Sea and Caucasus to the Arabian Platform. London, Geological Society, Special Publication v. 340, p.329–352.

Stainbrook M.A. 1945. Brachiopoda of the Independence Shale of Iowa. Geological Society of America, Memoir 14, p.l–74.

Termier H. and Termier G. 1949. Essai sur l'évolution des Spiriféridés. Notes et Mémoires, Service géologique, Division des Mines et de la Géologie (Maroc), v. 74, p.85–112.

Waagen W.H. 1883. Salt Range fossils, I. Productus-Limestone Fossils: Brachiopoda. Palaeontologia Indica, Series, 13–14, p.391–546.

ԿԵՆՏՐՈՆԱԿԱՆ ՀԱՅԱՍՏԱՆԻ ՍՏՈՐԻՆ ՖԱՄԵՆԻ *CYRTOSPIRIFERID* ԲՐԱԽԻՈՊՈԴԻ ԵՐԿՈՒ ՏԵՍԱԿՆԵՐԻ ՄԱՍԻՆ

Սերոբյան Վ., Մոտտեքուին Բ.

Ամփոփում

Կենտրոնական Հայաստանի ստորին ֆամենի *Aramazdospirifer orbelianus* բրախիոպոդային բիոզոնայի (որը համապատասխանում է *Palmatolepis crepida* կոնոդոնտային բիոզոնային) բրախիոպոդների կենսաբազմազանությունը գնահատելու նպատակով, սույն աշխատանքում անդրադարձ է կատարվել նախկինում անհայտ՝ Cyrtospiriferinae ենթաընտանիքին պատկանող երկու սպիրիֆերիդների (*Cyrtospirifer* sp. A. and *C.* sp. B) նկարագրությանն ու նկարազարդմանը:

О ДВУХ НОВЫХ ВИДАХ *CYRTOSPIRIFERID* БРАХИОПОД ИЗ НИЖНЕГО ФАМЕНА ЦЕНТРАЛЬНОЙ АРМЕНИИ

Серобян В., Моттекуин Б.

Резюме

В данной работе, для оценки биоразнообразия брахиопод зоны *Aramazdospirifer orbelianus* нижнего фамена Центральной Армении (которая соответствует конодонтовой зоне *Palmatolepis crepida*), внимание уделено описанию и иллюстрации двух ранее неизвестных видов спириферид (*Cyrtospiriferid* sp. A. и *C.* sp. B) принадлежащих подсемейству Cyrtospiriferinae.