

***Bozorgnites* nom. nov. and *Crassispirellina* nom. nov.:
New names for the preoccupied foraminiferal genera
Bozorgniella and *Crassispirella***

Daniel Vachard, François Le Coze, Pedro Cózar, and Jérémie Gaillot

ABSTRACT

The name *Bozorgniella* Cózar and Vachard, 2001 is preoccupied by the nummulitid foraminifer *Bozorgniella* Rahaghi, 1973 and is replaced here by *Bozorgnites* Cózar, Vachard and Le Coze. The name *Crassispirella* Gaillot and Vachard, 2007 is preoccupied by the gastropod subgenus *Crassispira* (*Crassispirella*) Bartsch and Rehder, 1939 and is replaced here by *Crassispirellina* Gaillot, Vachard and Le Coze. In addition to these nomenclatural revisions, emended diagnoses for both genera are proposed here.

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INTRODUCTION

Two replacement names are proposed for two preoccupied foraminiferal genera.

The name *Bozorgniella* Cózar and Vachard, 2001 is preoccupied by the nummulitid foraminifer

Bozorgniella Rahaghi, 1973 and is replaced here by *Bozorgnites* Cózar, Vachard and Le Coze. The name *Crassispirella* Gaillot and Vachard, 2007 is preoccupied by the gastropod subgenus *Crassispira* (*Crassispirella*) Bartsch and Rehder, 1939

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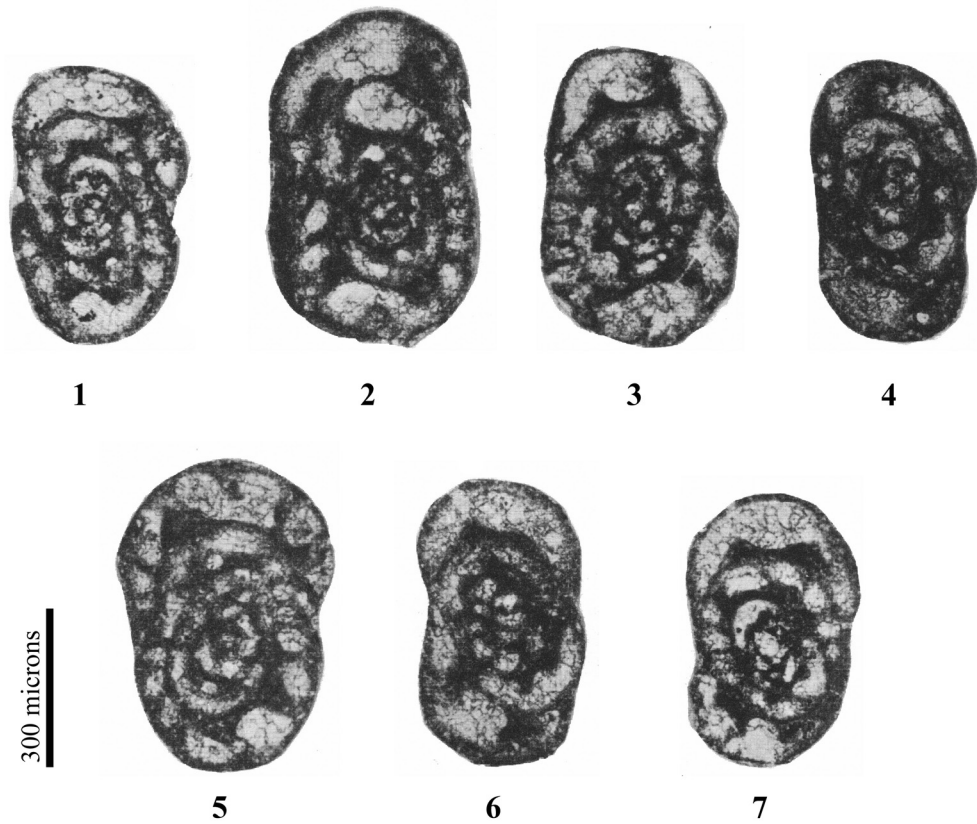


FIGURE 1. *Bozornites tumultuosus* (Bozorgnia, 1973) modified from plate 12, figures 6-12 in Bozorgnia (1973). **1**, paratype. Axial section. Immature specimen, similar to *Eoparastaffellina* but showing a subcarinate periphery in the inner whorls and chomata. **2**, paratype. Typical axial section. **3**, holotype. Axial section. Subcarinate periphery at the penultimate whorl, rounded in the other whorls. **4-7**, four paratypes relatively similar to *Eoparastaffellina*, except for the strong chomata. Scale bar equals 0.300 mm.

and is replaced here by *Crassispirellina* Gaillot, Vachard and Le Coze. In addition to these nomenclatural revisions, emended diagnoses of both genera are proposed here.

SYSTEMATIC PALAEOONTOLOGY

Phylum FORAMINIFERA d'Orbigny, 1826
 Class FUSULINATA von Möller, 1878 nomen correctum Vachard, Krainer, and Lucas, 2013
 Subclass FUSULINANA von Möller, 1878 nomen translatum Maslakova, 1990
 nomen correctum Vachard, Pille, and Gaillot, 2010
 Order FUSULINIDA von Möller, 1878 nomen translatum Vachard, Krainer, and Lucas, 2013
 Superfamily STAFFELLOIDEA Miklukho-Maklay, 1949 nomen translatum Solovieva, 1978
 Family PSEUDOENDOTHYRIDAE Mamet in Mamet, Mikhailoff, and Mortelmans, 1970
 Subfamily EOPARASTAFFELLINAE Vachard and Arefifard, 2015
 Genus BOZORGNITES Cózar, Vachard, and Le Coze pro *Bozorgniella* Cózar and Vachard, 2001 emend.

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Etymology. As *Bozorgniella*, *Bozorgnites* is named in honor of Dr. Fathollah Bozorgnia, who described the type species. The genus is masculine.

Type Species. *Dainella tumultuosa* Bozorgnia, 1973 (Figure 1). The holotype (Figure 1.3) is deposited in the collections of the Geological Laboratories of the National Iranian Oil Company, Tehran, Iran.

Diagnosis. Test free, asymmetrical, with the last volution semi-evolute to evolute. Permanent deviations of the axis of coiling, varying up to 45° in the internal volutions, and reaching 90° for the last volution. Strong chomata. Wall coarsely granular and relatively brownish. Rounded periphery in the last whorl, subcarinate periphery in the inner whorls.

Comparisons. *Bozorgnites* nom. nov. differs from *Eoparastaffellina* by the subcarinate inner whorls and from *Eoparastaffella* by the rounded periphery of the last whorl (Vachard and Arefifard, 2015).

Other species. Monotypic.

Occurrence. Endemic to Alborz (Iran), where it seems to be latest Tournaisian and/or early Visean in age.

Remarks. The genus *Bozorgniella/Bozorgnites* was introduced as a transitional form between the Dainellidae and the Eoparastaffellinae, but this hypothesis was refuted by Devuyst (2006),

because, in Iran, *Bozorgnites* appears after the first *Eoparastaffellina*. As a result, *Bozorgnites* is most probably transitional between *Eoparastaffellina* (with an ancestral rounded periphery) and true (i.e., carinate) *Eoparastaffella*. On the other hand, due to its strong deviations of the axis, coarse wall, and very sharp chomata, *Bozorgnites* is also possibly transitional to *Pojarkovella* and its plexus, which are relatively common in Iran (Zandkarimi et al., 2014) and South China (Hance et al., 2011).

Class ?MILIOLATA Saidova, 1981

Order MILIOLIDA Delage and Hérouard, 1896
 Suborder MILIOLINA Delage and Hérouard, 1896
 Superfamily CORNUSPIROIDEA Schultze, 1854

Family NEODISCIDAE Lin, 1984 nomen translatum Gaillot and Vachard, 2007
 Genus CRASSISPIRELLINA Gaillot, Vachard and Le Coze pro *Crassispirella* Gaillot and Vachard, 2007 emend.

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Etymology. Derivative of *Crassispirella* from Latin crassus (= fat), spira (= spire); i.e., thick-walled. The genus is feminine.

Type Species. *Crassispirella hughesi* Gaillot and Vachard, 2007 (Figure 2). The holotype (plate 58, figure 10 in Gaillot and Vachard, 2007 = Figure 2.2 herein) is deposited in the collection of Total Company, Pau (France).

Diagnosis. Test consisting of a proloculus followed by an undivided chamber. Planispiral coiling evolute. Some initial whorls are faintly glomospirally coiled. Aperture terminal simple. Thick porcellaneous wall bilayered with a darker tectum and an inner thicker greyish layer.

Other species. *Hemigordius?* sp. A sensu Ueno (2001, plate 2, figures 19-20); *H.?* sp. B sensu Ueno (2001, plate 2, figure 23).

Occurrence. Late Changhsingian of Saudi Arabia; late Changhsingian of South China; Changhsingian of Turkey (Hazro); Lopingian of Persian Gulf (Gaillot and Vachard, 2007).

Remarks. *Crassispirellina* nomen novum is a planispiral evolute Neodiscidae that mimics several characters of cornuspirids, but fundamentally differs from the cornuspirids by its bilayered wall with a dark tectum and a thick and clear inner layer (very visible in the penultimate whorl of the holotype: Figure 2.2). *Crassispirellina* differs from other neodiscids by its planispiral coiling, and its test is discoid and biumbilicate. It encompasses several homeomorphous genera among the cornuspirids, which differ by their unilayered wall microstructure

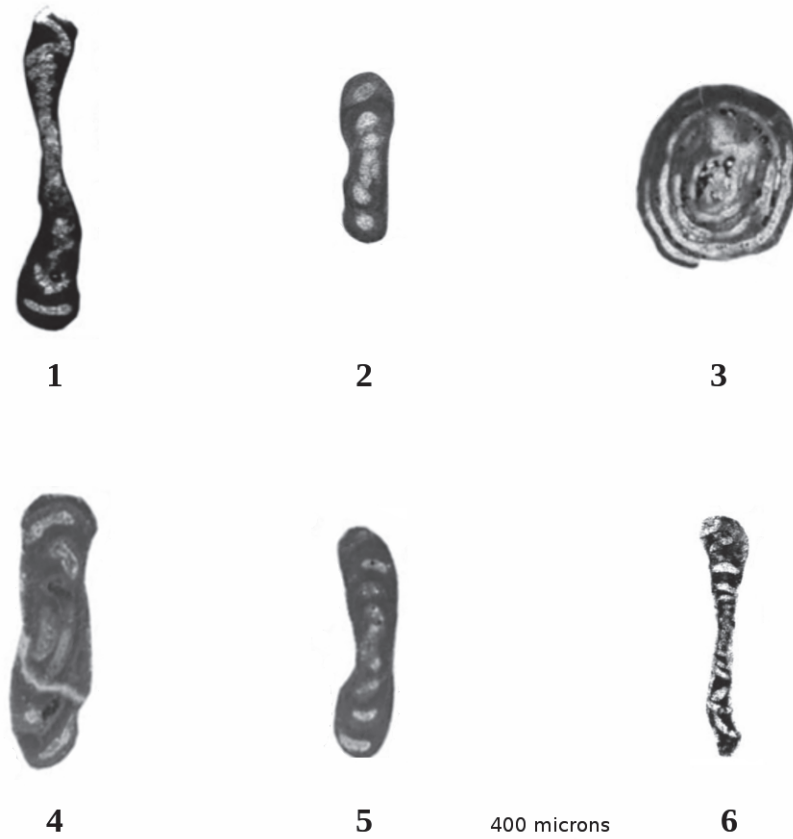


FIGURE 2. *Crassispirellina hughesi* (Gaillot and Vachard, 2007) modified from plate 55, figure 3; plate 56, figure 10; plate 59, figure 8; plate 66, figures 17-18; plate 69, figure 4 in Gaillot and Vachard (2007). **1**, paratype relatively atypical (see comments in the text). **2**, holotype. Axial section (see comments in the text). **3**, paratype. Subequatorial section relatively well-preserved in the last whorls. **4-6**, three paratypes in subaxial sections (see comments in the text for Figure 2.6). Scale bar equals 0.400 mm.

(e.g., *Cornuspira*, *Postcladella*, and *Hoyenella*); but all of these genera are very small-sized.

On the other hand, *Megacrassispirella* Zhang in Zhang et al. (2016) has been described as being similar to *Crassispirella*. *Crassispirellina* differs from *Megacrassispirella* by its smaller size and smaller number of whorls. Nevertheless, some paratypes of *Crassispirellina hughesi* (Figure 2.1, 2.6) are possibly transitional to *Megacrassispirella*. The similarity between both genera is confirmed herein, and it could also be possible that *Megacrassispirella* belongs to the family Neodiscidae and not to the Agathammininae, as originally stated. Alternatively, for classifications not based on the importance of the wall microstructure, an assignment of both genera to the Cornuspirinae might be acceptable.

Moreover, a poorly known genus, very large and described as bilayered, *Kozhimia* Igonin, 1998, could be theoretically similar to *Crassispirellina*. However, this possible priority cannot be sustained for the following reasons. First, the two genera are of different ages: *Kozhimia* is Ufimian (early Middle Permian), whereas *Crassispirellina* is latest Permian in age. Second, the bilayered wall of *Kozhimia* is not precisely described nor visible on the unique illustration of Igonin (1998). Third, *Kozhimia* is only illustrated in equatorial section, and its perpendicular axial section remains hypothetically described in the text. Lastly, *Kozhimia* was never redescribed after its creation, which makes any further comparison purely hypothetical. In reality, *Kozhimia* seems to be more related to these large, late Early Permian and Middle Permian genera originally described as *Hemigordius*

sensu Grozdilova, 1956, sensu Rauzer-Chernousova in Akopian (1974), and sensu Kobayashi (2002, figures 9.19, 9.20); secondly as *Neodiscus* sensu Ueno (1992); thirdly as *Neohemigordius* sp. sensu Kobayashi (1993, plate 1, figure 3); and fourthly as *Uralogordius* Gaillot and Vachard (2007) synonym of “*Arenovidalina*” sensu Baryshnikov et al. (1982) not Ho (1959). Furthermore, the holotype of *Kozhimia* has similarities with the transverse section of *Hemigordius discoideus* Reitlinger, 1950, illustrated by this author (plate 3, figure 14) from the Myachkovian (latest Moscovian) of Russia.

Compared with the evolutionary scheme of the Tournayellida sensu Hance et al. (2011), the relationships of *Crassispirellina* and *Cornuspira* are similar to those of *Eoforschia* and *Eotournayella*. Similarly, in foraminiferal history, a phylogenetic lineage, existing among the Loeblichioidea, which initially displayed a very deviated coiling (e.g., in *Dainella* or *Pojarkovella*), leads finally to *Loeblichia*, which is a planispiral and evolute genus. As a consequence, *Crassispirellina* is maintained here in the Neodiscidae, even if the coilings of *Neodiscus* and *Crassispirellina* are very different.

No biological or paleobiological explanations have been given for such patterns of evolution: gigantism in the planispirally evolute lineages; adoption of a discoid planispirally coiled test in lineages initially nautiloid to subglobular and with strong deviations of the coiling axis. This is a very interesting issue in the evolution of the Foraminifera.

CONCLUSIONS

Two genera, *Bozorgniella* and *Crassispirella*, which have an interesting phylogenetic significance, although they are probably endemic and/or rarely cited in the literature, are renamed as *Bozorgnites* nomen novum and *Crassispirellina* nomen novum. Their renaming is followed by their redescription and revision.

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REFERENCES

- Akopian, V.T. 1974. *Atlas iskopaemoi fauny Armyanskoi SSR*. Akademiya Nauk Armyanskoi SSR, Institut Geologicheskikh Nauk, Yerevan. (In Russian)
- Bartsch, P. and Rehder, H.A. 1939. New turritid mollusks from Florida. *Proceedings of the United States National Museum*. 87(3070):127-138. <https://doi.org/10.5479/si.00963801.87-3070.127>
- Baryshnikov, V.V., Zolotova, V.P., and Kosheleva, V.F. 1982. *Novye vidy foraminifer artinskogo yarusa permskogo Priuralya*. Akademiya Nauk SSSR, Uralskii Nauchnyi Tsentr, Institut Geologii i Geokhimii, Preprint, Sverdlovsk. (In Russian)
- Bozorgnia, F. 1973. Paleozoic foraminiferal biostratigraphy of central and east Alborz Mountains, Iran. *National Iranian Oil Company, Geological Laboratories, Publication*, 4:1-185.
- Cózar, P. and Vachard, D. 2001. Dainellinae subfam. nov. (Foraminiferida du Carbonifère inférieur), révision et nouveaux taxons. *Geobios*, 34(5):505-526. [https://doi.org/10.1016/S0016-6995\(01\)80066-8](https://doi.org/10.1016/S0016-6995(01)80066-8)
- Delage, Y. and Hérouard, E. 1896. *Traité de Zoologie Concrète. Tome I. La Cellule et les Protozoaires*. Schleicher Frères, Paris.
- Devuyt, F.X. 2006. *The Tournaisian–Viséan Boundary in Eurasia. Definition, Biostratigraphy, Sedimentology and Early Evolution of the Genus Eoparastaffella (Foraminifer)*. Unpublished PhD Thesis, Université Catholique de Louvain, Louvain-la-Neuve, Belgium.
- d'Orbigny, A. 1826. Tableau méthodique de la classe des Céphalopodes. *Annales des Sciences Naturelles*, 7:245-314.
- Gaillot, J. and Vachard, D. 2007. The Khuff Formation (Middle East) and time-equivalents in Turkey and South China: biostratigraphy from Capitanian to Changhsingian times (Permian), new foraminiferal taxa, and palaeogeographical implications. *Coloquios de Paleontología*, 57:37-223.

- Grozdilova, L.P. 1956. *Miliolidy verkhneartinskikh otlozheniy nizhney permi zapadnogo sklona Urala*. Trudy VNIGRI, 98, Mikrofauna SSSR, 8:521-529. (In Russian)
- Hance, L., Hou, H.F., and Vachard, D. 2011. *Upper Famennian to Viséan Foraminifers and Some Carbonate Microproblematica from South China, Hunan, Guangxi and Guizhou*. Geological Science Press, Beijing.
- Ho, J. 1959. Triassic Foraminifera from the Chialingchiang Limestone of South Szechuan. *Acta Paleontologica Sinica*, 7:387-418.
- Igonin, V.M. 1998. *Novye vidy foraminifer pogranychnykh sloev nizhnei i verkhnei permi i Pechorskoy yugolnoy basseine*. Paleontologicheskii Zhurnal, 1998(2):19-29. (In Russian)
- Kobayashi, F. 1993. Fusulinaceans contained in pebbles of the intraformational conglomerate of the Kanyo Formation, North of Itsukaichi, Southern Kwantu Mountains, Japan. *Human and Nature*, 2:125-137.
- Kobayashi, F. 2002. Lithology and foraminiferal fauna of allochthonous limestones (Changhsingian) in the upper part of the Toyoma formation in the South Kitakami Belt, Northeast Japan. *Paleontological Research*, 6:331-342.
- Lin, J.X. 1984. Protozoa, p. 110-177, 323-364. In Yichan Institute of Geology and Mineral Resources (ed.), *Biostratigraphy of the Yangtze Gorge Area Chiefly, (3) Late Paleozoic Era*. Museum Changzhou, Changzhou City, Jiangsu Province, Geological Publishing House, Beijing. (In Chinese [p. 110-177] and in English [p. 323-364])
- Mamet, B., Mikhailoff, N., and Mortelmans, G. 1970. La stratigraphie du Tournaisien et du Viséen inférieur de Landelies. Comparaison avec les coupes du Tournaisien et du bord nord du synclinal de Namur. *Mémoires de la Société belge de Géologie, de Paléontologie et d'Hydrologie. Série 8*, 9:1-81.
- Maslakova, N.I. 1990. *Kriterii vydeleniya vysshih taksonov foraminifer*, p. 22-27. In Menner, V.V. (ed.), *Sistematika i filogeniya bespozvonochnykh. Izdatelstvo Nauka, Moscow*. (In Russian)
- Miklukho-Maklay, A.D. 1949. *Verhnepaleozojskie fuzulinidy Srednej Azii*. Publishing House of the Leningrad State University, Leningrad. (In Russian)
- Rahaghi, A. 1973. Etude de quelques grands foraminifères de la Formation de Qum (Iran Central). *Revue de Micropaléontologie*, 16(1):23-28.
- Reitlinger, E.A. 1950. *Foraminifery srednekamennougolnykh otlozhenii tsentralnoi chasti Russkoi platformy (isklyuchaya semeistvo Fusulinidae)*. Akademiya Nauk SSSR, Trudy Instituta Geologicheskikh Nauk, 126, geologicheskaya seriya, 47:1-126. (In Russian, French translation BRGM n° 1456)
- Saidova, Kh.M. 1981. *O sovremennom sostoyanii sistemy nadvidovykh taksonov kaynozoykskikh bentosnykh foraminifer*. Publishing House of the P.P. Shirshov Institute of Oceanology, Moscow. (In Russian)
- Schultze, M.J.S. 1854. *Über den Organismus der Polythalamien (Foraminiferen), nebst Bemerkungen über die Rhizopoden im allgemeinen*. Ingelmann, Leipzig.
- Solovieva, M.N. 1978. *K sisteme foraminifer (interpretatsiya biologicheskogo znacheniya osobennostey strukturnoy i prostranstvennoy organizatsii foraminifer)*. Byulletin' Moskovskoe Obshchestva Ispytateley Prirody, Otdelenie Geologicheskii, 53(5):159-160. (In Russian)
- Ueno, K. 1992. Permian foraminifers from the Takakurayama Group of the Southern Abukuma Mountains, Northeast Japan. *Transactions and Proceedings Paleontological Society Japan, New Series*, 168:1265-1295.
- Ueno, K. 2001. *Jinzhangia*, a new staffellid fusulinoidea from the Middle Permian Daaazi Formation of the Baoshan Block, West Yunnan, China. *Journal of Foraminiferal Research*, 31(3):233-243. <https://doi.org/10.2113/31.3.233>
- Vachard, D. and Arefifard, S. 2015. Foraminifers and algae of the late Tournaisian-early Viséan boundary interval (MFZ8-9) in the Gachal Formation (Central Iran). *Revue de Micropaléontologie*, 58(3):185-216. <https://doi.org/10.1016/j.revmic.2015.07.001>
- Vachard, D., Krainer, K., and Lucas, S. 2013. Pennsylvanian (Late Carboniferous) calcareous microfossils from Cedro Peak (New Mexico, USA); Part 2: Smaller foraminifers and fusulinids. *Annales de Paléontologie*, 99:1-42. <https://doi.org/10.1016/j.annpal.2012.08.002>
- Vachard, D., Pille, L., and Gaillot, J. 2010. Palaeozoic Foraminifera: systematics, palaeoecology and responses to the global changes. *Revue de Micropaléontologie*, 53:209-254. <https://doi.org/10.1016/j.revmic.2010.10.001>
- von Möller, V. 1878. Die spiral-gewundenen Foraminiferen des russischen Kohlenkalks. *Mémoires de l'Académie Impériale des Sciences de St Pétersbourg, 7th Series*, 25(9):1-147.

- Zandkarimi, K., Najafian, B., Vachard, D., Bahrammanesh, M., and Vaziri, S.H. 2014. Late Tournaisian-late Viséan foraminiferal zonation (MFZ8-MFZ14) of the Valiabad area, northwestern Alborz (Iran): geological implications. *Geological Journal*, 51(1):125-142. <https://doi.org/10.1002/gj.2616>
- Zhang, Y.C., Shen, S.Z., Zhang, Y.J., Zhu, T.X., and An, X.Y. 2016. Middle Permian non-fusuline foraminifers from the middle part of the Xiala formation in Xainza County, Lhasa Block. *Journal of Foraminiferal Research*, 46(2):99-144. <https://doi.org/10.2113/gsjfr.46.2.99>