TYPE SPECIES OF PSEUDOFUSULINA DUNBAR & SKINNER

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ABSTRACT

A restudy of the type specimens of Pseudofusulina huecoensis Dunbar & Skinner, the type species of the genus Pseudofusulina Dunbar & Skinner, shows that all of these specimens display the characters considered diagnostic of Rugosofusulina Rauser-Chernoussova. Because Pseudofusulina has a priority of some six years over Rugosofusulina, the latter must be regarded as a junior synonym.

The history of fusulinid nomenclature is a tangled one, indeed, replete with errors most of which were based on misunderstandings or unjustifiable assumptions. In this paper we propose to review this sequence of errors and the efforts that have been made to correct them.

Fischer de Waldheim (1829, 6) proposed the generic name Fusulina for some Foraminifera which he had found in the “Mountain limestone” of Moscovian (Middle Pennsylvanian) age in a quarry at Myachkova, Russia. In 1837 (7), he briefly described, without illustrations, two species of Fusulina, F. cylindrica and F. depressa, in that order. For the next forty years nearly all fusulinids were indiscriminately assigned to Fusulina, regardless of age or morphological characters.

In 1842 Ehrenberg (4) published a brief description, without illustrations, of a highly inflated fusulinid which he had found in a piece of chert collected by Helmerson from Pinega Valley, near Archangel, Russia. Apparently Ehrenberg did not associate his specimens with Fischer’s genus, but assigned them to the Tertiary genus Borelis under the name B. princeps. In 1854 (5) he published, without text, illustrations of B. princeps and an associated more fusiform fusulinid which he named Alveolina montipara. The illustrations consisted of a drawing of one end of a piece of chert, and several drawings, at a magnification of four diameters, of individual specimens exposed on the weathered or broken surfaces. A third species from the same area was described briefly in 1842 (4) and illustrated in 1854 (5) as Alveolina prisca.

Valerian von Möller (1877, 10) published a study of Russian fusulinids in which he redefined Fusulina and proposed three new genera, Schwagerina, Fusulinella, and Hemifusulina. In his diagnosis of Fusulina he stated that it has more or less strongly fluted septa and a porous spirotheca. The wall structure which von Möller described as “porous” is the type which is now commonly called alveolar or schwagerinid. In Fusulina von Möller placed all slender or subcylindrical fusulinid species with strongly fluted septa, while the new genus Schwagerina was proposed for the globular and thickly fusiform types. Although no species of Schwagerina was described in his 1877 paper (10), he designated Borelis princeps Ehrenberg as the typical species. According to von Möller, Schwagerina displayed the same type of wall structure as that which he
ascribed to Fusulina. Fusulinella was erected for species having a different kind of wall structure and nearly plane septa. In this genus the wall included a clear, translucent layer which von Möller thought to be a void space and which he called the "Zwischenraum." This is the diaphanotheca of modern terminology.

The following year von Möller (11) published a second paper in which he described and illustrated specimens from the Timan Plateau as Schwagerina princeps (Ehrenberg). These illustrations showed a nearly globular fusulinid with tightly coiled inner whorls and abruptly inflated, loosely coiled outer whorls. In the same paper he published drawings of topotypes of Fusulina cylindrica which showed many fine lines crossing the spirotheca in a direction normal to its surface.

Following von Möller’s work, Fusulina was generally assumed to have an alveolar wall, and when subcylindrical species possessing fluted septa and such a wall were found in the Permian they were assigned to that genus. Similarly, the accepted concept of Schwagerina princeps, and of the genus Schwagerina, was based on von Möller’s illustrations. Thus, all forms with a tightly coiled juvenarium followed by an abruptly inflated adult stage were assigned to Schwagerina. Some of these species, like von Möller’s illustrated specimens, had nearly plane septa, whereas others possessed strongly fluted septa.

Girty (1904, 8) proposed the genus Triticites, with Miliolites secalicus Say as the type species, for a group of forms which differed from the common concept of Fusulina in having nearly plane septa. It possessed an alveolar spirotheca as Fusulina was believed to do.

Hans von Staff (1909, 14), working with material from North America, proposed the genus Girtyina for species having fluted septa, as in Fusulina, but a fusulinellid-type wall. However, he designated Fusulina ventricosa Meeke & Hay- as the type species, a species that belongs in Triticites. It is now evident that von Staff’s specimens had been mislabelled and did not actually belong in F. ventricosa. In any event, Girtyina is a junior synonym of Triticites.

J. S. Lee (1927, 9) reported that he had studied topotype specimens of Fusulina cylindrica and had found them to have a fusulinellid wall. He pointed out that this was exactly the sort of thing for which von Staff had proposed the name Girtyina. Accordingly, he suggested resurrecting Girtyina as a subgenus of Fusulina to include F. cylindrica and similar species. This, of course, is contrary to the International Rules of Zoological Nomenclature which require that if a genus be divided into subgenera, the name of the typical subgenus must be the same as the name of the genus. Thus, so long as the genus Fusulina is in good standing, no other name can be used in either a generic or subgeneric sense for F. cylindrica.

In 1930 Dunbar & Henbest (1), working with topotypes of Fusulina cylindrica in the collections of Yale Peabody Museum, were able to confirm Lee’s observations. Von Möller’s misconception as to the spirothecal structure of that species probably stemmed from two sources. First, because of the peculiar preservation the very fine tubes of the mural pores, which ordinarily are not evident, can be seen crossing the wall. Von Möller apparently confused these with the much coarser alveoli of the schwagerinid wall. Furthermore, because the secondary deposit of the inner tectorium is very weakly developed in F. cylindrica, the diaphanotheca is not so obvious as it is in many species having a fusulinellid wall. Second, the upper part of the quarry wall at Myachkova is composed of younger limestones containing fusulinids which do have a schwagerinid spirotheca. Von Möller probably thought the differences were merely a matter of relative coarseness of texture.

EXPLANATION OF PLATE 1
All figures are unretouched photographs.

Skinner & Wilde--Type Species of Pseudofusulina  

Paper 13, Plate 1
THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS
Paper 13, Plate 2
Skinner & Wilde--Type Species of Pseudofusulina
This discovery left the elongate Permian fusulinids, which have strongly fluted septa and an alveolar wall, without a valid name. In 1931 Dunbar & Skinner (2), who had been studying the Permian fusulinids of West Texas, proposed three new generic names for this group. For the oldest and comparatively simple forms they erected the genus Pseudo-fusulina, with P. huecoensis as the type species. They proposed the generic name Parafusulina, with P. wordensis as the type species, for a more advanced type in which the fluting of the septa was carried to the point at which the toes of the folds of adjacent septa were fused together. A small opening was then resorbed at each of these junctions, resulting in a series of low passages, called cuniculi, running around the shell in an equatorial direction. The most advanced type possessed auxiliary tunnels, in addition to cuniculi, and for this group they proposed the name Polydiexodina.

In 1936 Dunbar & Skinner (3), through the good offices of Dr. O. H. Schindewolf and the kindness of Dr. W. O. Dietrich, were entrusted with the piece of chert containing the type specimens of Borelis princeps EHRENBERG and Alveolina montipara EHRENBERG. They discovered that these species are quite different from the specimens described and illustrated by von Möller under the names Schwagerina princeps (EHRENBERG) and Fusulina montipara (EHRENBERG), respectively. In fact, both species appeared to possess essentially the same characters as the group for which they had proposed the name Pseudo-fusulina. Therefore, they redefined Schwagerina in accordance with its type species and suppressed Pseudo-fusulina as a synonym. This procedure left the forms which had previously been called Schwagerina without a valid name. Accordingly, they proposed the name Pseudoschwagerina for those members of the group having nearly plane septa and a tightly coiled juvenarium followed by an abruptly inflated adult stage. For species having a similar mode of coiling but strongly fluted septa they erected the new genus Paraschwagerina. This action was questioned by several fusulinid specialists, and the matter was submitted to the International Commission on Zoological Nomenclature for settlement. In 1954 the Commission, in Opinion 213, fixed the type species of Schwagerina as Borelis princeps EHRENBERG, 1842, (not Schwagerina princeps von Möller, 1878, =S. moelleri RAUSER-CHERNOUSSOVA, 1936).

Rauzer-Chernoussova (1937, 12) proposed the new generic name Rugosofusulina to embrace species which differ from Schwagerina principally in possessing a "rugose" spirotheca. Other characters include strong but irregular septal fluting and the common presence of phrenothecae and abundant conspicuous septal pores. She recognized two general types of "rugosity." The first, which she regarded as more primitive, consists of "sharply expressed undulations of the whole wall," while the second consists of "rugosity of its surface due to the rugose structure of the tectum—the outside layer of the theca." A third type is observed in some species where the first two are combined. Dunbar (1948) pointed out that the wall is not actually rugose, saying, "Since the wall appears to undulate, regardless of the orientation of the section, it is evident that the inequalities are of the nature of dimples and mounds rather than rugae." It would be more accurate to state that the outer surface is scored by numerous sharp furrows which are directed both axially and sagittally, resulting in a surface which resembles a miniature cobblestone pavement.

It should be pointed out that there has always been some uncertainty as to the validity of Rugosofusulina. In erecting the genus, Rauzer-Chernoussova designated "Fusulina prisca EHRENBERG em. Möller" as the "genoholotype" of Rugosofusulina. Since there is no evidence that von Möller ever saw Ehrenberg's specimens, and since Ehrenberg published only very crude small-scale drawings of the exterior of his

EXPLANATION OF PLATE 2
All figures are unretouched photographs.

FIGURES
1-3. Pseudo-fusulina huecoensis Dunbar & Skinner.—1. Axial section of holotype, X20 (Y.P.M. 9919F).—2, 3. Parts of same specimen, X40, showing "rugosity" of spirotheca. From R. E. King's coll. 395 (Dunbar & Skinner loc. 74), Hueco Limestone, Lower Permian, about 2 miles southeast of Hueco Tanks on the west slope of hill 5345, Hueco Mountains, El Paso County, Texas.
species, it seems quite possible that von Möller's "emendation" may actually have been a misidentification. This possibility is strengthened by the fact that von Möller is known to have misidentified his own specimens with the other two of Ehrenberg's three species. Rauser-Chernousova's concept of Alveolina prisca Ehrenberg is obviously based on the published drawings of a form, showing "rugosity," which von Möller identified, correctly or not, with Ehrenberg's species. Ehrenberg's specimens are apparently now lost, and it seems improbable that their true nature will ever be learned.

In subsequent years a number of fusulinid specialists have concluded that the type species of Pseudo fusulina, P. huecoensis, is not congeneric with Schwagerina princeps (Ehrenberg). Therefore, they resurrected Pseudo fusulina for some of the species which other students now include in Schwagerina.

About ten years ago, while studying numerous topotypes of Pseudo fusulina huecoensis, we observed that, without exception, they exhibited a certain amount of "rugosity" of the spirotheca as well as the other features which characterize Rugosofusulina. The degree of "rugosity" is highly variable from one specimen to another, but it is always present to some extent and both types cited by Rauser-Chernousova are represented. We wrote to Dr. Carl O. Dunbar asking him to check the type specimens for the presence of this character. He replied that it appeared to be present and sent us the specimens for study.

When Dunbar & Skinner described the species in 1931, no holotype was designated. However, THOMPSON (1948, 15) later designated the specimen shown in figure 5 of plate 1 of the 1931 paper as the holotype. This specimen, an axial section, is abnormally thick, and although a slight degree of "rugosity" is visible under the microscope it is very difficult to obtain adequate photographs. Consequently, when we published our findings in 1965 (13), reviving Pseudo fusulina and suppressing Rugosofusulina as a synonym, we chose one of the paratypes to illustrate the characters of P. huecoensis.

Several months later, Dr. Franz Kahlér, of Klagenfurt, Austria, pointed out (personal communication) that in order to establish this relationship firmly it is absolutely necessary to demonstrate that these characters are present in the holotype of Pseudo fusulina huecoensis. Through the good offices of Dr. Dunbar and the kindness of Dr. Karl M. Waage, presently Curator of Invertebrate Paleontology at Yale Peabody Museum, we have been entrusted with the type specimens of P. huecoensis for further study.

Although, as mentioned above, the holotype is an abnormally thick axial section, we have succeeded in obtaining photographs which demonstrate the presence of sporadic "rugosity" in this specimen (Pl. 2, figs. 2, 3). In addition, it displays the other characters ascribed to Rugosofusulina such as strong but irregular septal fluting, phrenothecae, and abundant conspicuous septal pores (Pl. 2, fig. 1). Admittedly, this specimen (Y.P.M. 9919F) does not exhibit these features so well as some of the other specimens in the collection, but they are definitely present.

One of the paratypes (Y.P.M. 15086A) shows all these characters unusually well. We are figuring it here as Plate 1, figure 2, Plate 3, figures 1-3, and Plate 4, figures 1, 2. This is the specimen illustrated in our 1965 (13) paper, which, incidentally, was the first time this section had ever been figured in a publication.

Another paratype (Y.P.M. 24855) also displays spirothecal "rugosity" very well, and we are showing it here as Plate 1, figure 3 and Plate 4, figure 3. This specimen has not previously been figured in any publication.

Although it is true that some specimens of Schwagerina may exhibit a varying degree of undulation of the spirotheca, this irregularity is not accompanied by sharp indentations of the tectum as in Pseudo fusulina. Consequently, there is usually little difficulty in distinguishing between members of the two genera.

In summary, we believe that the accompanying photographs definitely establish that Pseudo fusulina huecoensis possesses all the generic characters ascribed to Rugosofusulina and that the latter, therefore, should be suppressed as a junior synonym of the former.
REFERENCES


EXPLANATION OF PLATE 3
All figures are unretouched photographs.

FIGURES
1-3. *Pseudofusulina huecoensis* Dunbar & Skinner.—
   1. Part of specimen shown in Plate 1, figure 2, X20.—2, 3. Parts of same specimen, X40, showing "rugosity" of spirotheca.
Type Species of Pseudofusulina
EXPLANATION OF PLATE 4
All figures are unretouched photographs.

FIGURES
1-3. *Pseudofusulina huecoensis* Dunbar & Skinner.—
   1, 2. Parts of specimen shown in plate 1, figure 2, X40, showing "rugosity" of spirotheca
   (Y.P.M. 15086A).—3. Part of specimen shown
   in plate 1, figure 3, X20 (Y.P.M. 24855).