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CARBONIFEROUS FUSULINIDS IN A COASTAL SECTION NEAR PENDUELES (ASTURIAS, SPAIN)

BY

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ABSTRACT

A 400 m thick succession of Carboniferous rocks near Pendueles (E Asturias) at the north coast of Spain has yielded fusulinid foraminifera indicating an Upper Bashkirian age for the basal strata, and at least an Upper Podolskian age for the uppermost fusulinid-containing limestone 135 m below the top of the sequence. The fusulinid species from the Pendueles section have been sampled and described from seven stratigraphic levels at regular intervals from each other. Age determinations for each of these levels showed that strata of Vereyan and Lower Kashirian age (Lower Moscovian) are either missing or represented by a thin (40 m) sequence of chert below the Escalada Limestone. One new subspecies of *Profusulinella ovata* Rauser-Chernoussova is described. It occurs at the base of the Escalada Limestone and is of Middle? Kashirian age. With respect to the time-span involved, the Pendueles succession is very thin relative to other well-known Carboniferous sequences in Asturias especially when compared to those described from the Central Coal Basin of Asturias and eastward adjoining areas such as around Campo de Caso and Beleño, where time-equivalent sequences attain a thickness in the range of about 1250 m to over 3000 m. The Pendueles section is singular in being the only one in W. Europe where marine Moscovian rocks in a cliff coast are so completely represented, well exposed and easy to get at. In many beach sections of N Spain, Carboniferous successions do not reach beyond the Bashkirian (Llanes; Playa de San Pedro, W of Gijón); others which include Moscovian rocks are less accessible (Hontoria).

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**) Incorporated in a joint paper of dr. E. Martínez-García and the present writer, to be presented at the X International Congress on Stratigraphy and Geology of the Carboniferous (Madrid, 1983).

I. INTRODUCTION

Along the Spanish north coast near Pendueles, 10 km E of Llanes in Asturias, a succession of Carboniferous sediments 400 m in thickness is exposed on top of the Mountain Limestone or Caliza de Montaña. Attention to this easily accessible section was drawn by dr. Martínez-Alvarez who in 1965 briefly described the sequence and discussed its age. More detailed information especially on the lithology and the sedimentary characteristics was given by Martínez-García, Corrales & Carballeira in 1971.

In the early seventies dr. E. Martínez-García offered me the opportunity to visit the section and we collected fusulinid foraminifera from seven horizons. The oldest horizon (A 10-3) is in limestone at the base of the succession which rests on the Caliza de Montaña; the next three horizons (A 11-1, A 11-2, A 11-3) are in the Escalada Limestone; the youngest ones (A 12-1, A 12-2, A 12-3) are in the flysch deposits towards the top of the section (Text-fig.1). The primary goal was to establish a correlation with the Russian chronostratigraphical subdivision (II-2, Appendix II). Shortly after the start of this study it became clear that the succession is very thin with respect to the time-span involved, which induced me to compare the section at Pendueles with other sections in Asturias (II-3, Appendix I). The species content in each of the sampling localities at Pendueles is discussed in the second part of the paper (III-I), which ends with the description of a new subspecies: *Profusulinella ovata* Rauser-Chernoussova *penduelesensis* from the base of the Escalada Limestone (III-2).

II. STRATIGRAPHY, AGE AND CORRELATIONS

1. EARLIER OPINIONS WITH REGARD TO THE AGE OF THE SUCCESSION

Pendueles is mentioned by Hernandez-Sampelayo (1928) as one of the places in Asturias, where Carboniferous rocks are exposed along the coast. This Spanish author describes from personal observation Carboniferous strata in beach exposures to consist of a "Caliza de Montaña" often overlain by fusulinid-bearing strata. As an example, a photograph of Carboniferous rocks at the coast of Hontoria is presented in his paper. Together with this picture, he refers to the overlying fusulinid-bearing beds as the "tramo de *Fusulinella*". The presence of *Fusulinella* in Hontoria could indicate yet another sequence of Moscovian age besides the one at Pendueles beach. However, it has to be realized that in the late twenties the generic name *Fusulinella* was applied also to species at present included in more recently established genera such as *Profusulinella* and *Pseudostaffella*, which occur also in Bashkirian rocks.*)

Martínez-Alvarez rightly supposed a Westfalian age for the Pendueles succession by comparing it with other Carboniferous successions in Asturias. His conclusion was, as he admitted, not sustained by palaeontological data. Because the succession at Pendueles follows apparently without interruption on top of what he considered to be the Caliza de Montaña of Namurian age, a Lower Westfalian age seemed most probable for the Pendueles succession (Martínez-Alvarez, 1965). In view of the thickness and lithology of the three lithological units - C, B and A - distinguished by Martínez-Alvarez for his Westfalian part of the section, one is tempted to accept that these are equivalent to the units 6, 5, 4 and upper part of 3 as distinguished by Martínez-Garcia, Corrales & Carballeira (1971) in the same section. These latter units taken together form the complete sequence above the Escalada Limestone (= Caliza Masiva) in the present paper (Text-fig. 1). It seems therefore probable that Martínez-Alvarez mistook the Escalada Limestone for the Caliza de Montaña which is understandable because both limestones are separated by an interval of only tens of meters, whereas they are usually separated by hundreds of meters of shale and sandstone in the western parts of Asturias, SE of Oviedo (Text-fig. 3). In the present paper it will be shown that the succession overlying the Escalada Limestone is definitely younger than Lower Westfalian.

In a brief discussion on the age of the Pendueles succession by Martínez-García et al. (1971), the Westfalian age of it as proposed by Martínez-Alvarez, was not adopted. According to Martínez-García et al. (1971) a Namurian age was more likely because of the resemblance of the Pendueles succession to a succession in a coastal section W of Gijón (Playa de San Pedro) which yielded a goniatite indicating a Namurian B age. Moreover, foraminifera encountered in the Pendueles section, were tentatively held to be of Upper Namurian age (Ramirez del Pozo in Martínez et al., 1971). These forams, however, are reported from a horizon about 100 m below the top of the Caliza de Montaña i.e. at least 100 m below the lowest unit (= unit 1) of the Pendueles succession proper. With the exception of *Pseudostaffella sphaeroidea* (Möller), which indicates a younger age, the listed forams may occur in the upper fossiliferous part of the Caliza de Montaña (Valdeteja Limestone**), and constitute an assemblage somewhat similar to that found in unit 1, sampling locality A 10-3 (Text-fig. 1).

*) Recently I received from dr. C.F. Winkler-Prins (Rijksmuseum van Geologie, Leiden) fusulinid-bearing limestone collected in the coastal section at Hontoria. The age of it is Moscovian, near the boundary of Upper and Lower Moscovian.

**) Winkler-Prins, C.F., 1968. Carboniferous Productidina and Chonetidina of the Cantabrian Mountains (NW Spain): Systematics, Stratigraphy and Palaeoecology. Leidse Geol. Med. 41, p. 49.

2. CORRELATION WITH CHRONOSTRATIGRAPHICAL UNITS OF THE U.S.S.R. (MOSCOW PLATFORM BASIN, DONETZ BASIN)

It is obvious from the fusulinid species lists of the Pendueles localities as given in Appendix II that most species are closely related to or identical with species originally described from the U.S.S.R., notably the Moscow-platform basin and the Donetz basin. For this reason, it is a matter of course that a correlation with the Russian chronostratigraphic units should be made in the first place.

The following short description of the succession summarizes the detailed information provided by Martínez-García, Corrales and Carballeira in 1971. The lithologic-unit numbers are also borrowed from that paper (Text-fig. 1).

The section at the beach starts at the base with clear-coloured limestone. Fusulinid foraminifera have not been found here.

The clear-coloured limestone is followed by 35 m of dark grey, fine-grained and fossiliferous limestone (unit 1). A sample rich in fusulinids is from an alternation of limestone and chert at the top of this unit and indicates the:

Upper Bashkirian ....(Loc. A 10-3)

The succession continues with 39 m of chert, siliceous shale and towards the top also reddish shale and greenish sandstone (unit 2). Fusulinids are absent.

There follows the lower part of unit 3 which consists of 80 m of often massively bedded, shallow marine fusulinid/algal limestone comparable to the Escalada Limestone (= Caliza Masiva) of the Beleño region to the south-west (Text-fig. 3). Three samples respectively from the base, the middle and the top of the limestone yielded fusulinids which are correlated to:

Kashirian,
probably top of Middle Kashirian ..(Loc. A 11-1)
Upper Kashirian ....(Loc. A 11-2)
Lower Podolskian ....(Loc. A 11-3)

The upper part of unit 3 which has not been sampled consists of 36 m of thinly bedded limestone.

Unit 3 is overlain by 65 m of shale with in the upper part intercalations of sandstone and - usually bioclastic - limestone (= units 4 + 5). Fusulinids have been obtained from the base, from the boundary between units 4 and 5 and from the top of this succession. These faunas correspond to those found in respectively the:

Middle Podolskian ....(Loc. A 12-1)
Middle to Upper Podolskian ....(Loc. A 12-2)
Upper Podolskian or Lower Myachkovian,
probably Upper Podolskian ....(Loc. A 12-3)

The top of the succession consists of (at least) 135 m sandstone with shale intercalations which are only fully exposed at low tide (unit 6). Fusulinids have not been found.

The correlations with chronostratigraphic units as used in the U.S.S.R. were the result of a comparison of the fusulinids from Pendueles with fusulinid biozones as have been recognized by Rauser-Chernoussova (1961a, b, pp. 55-66, pp. 149-211).

Further it has been considered useful to check these results by carrying out the correlations in yet another way. This was achieved by plotting the range of each Eurasian-type species found in the Pendueles localities,*) the range being expressed in terms of "Donetz suites" as indexed A to N from basal Tournaisian to Kasimovian. This resulted in seven rangecharts, one for each

*) For practical reasons the range as stated in the original description of the species was adopted, often supplemented by the original ranges of other species in cases where the Spanish species have been compared to more than one Eurasian. As an example, *Millerella (Pseudonovella)* cf. *variabilis* (Rauser, 1951) from the Pendueles locality A 11-1 was compared with *M.(P.) variabilis* and *M.(P.) aperta* (Grozd. et Leb., 1950). The range of these species when introduced as new, was Upper Bashkirian (Sub-Vereyan) - Lower Moscovian and Bashkirian-Lower Moscovian respectively. Accordingly the range of *M.* cf. *variabilis* from locality A 11-1 entered in the rangechart as Bashkirian to Lower Moscovian.

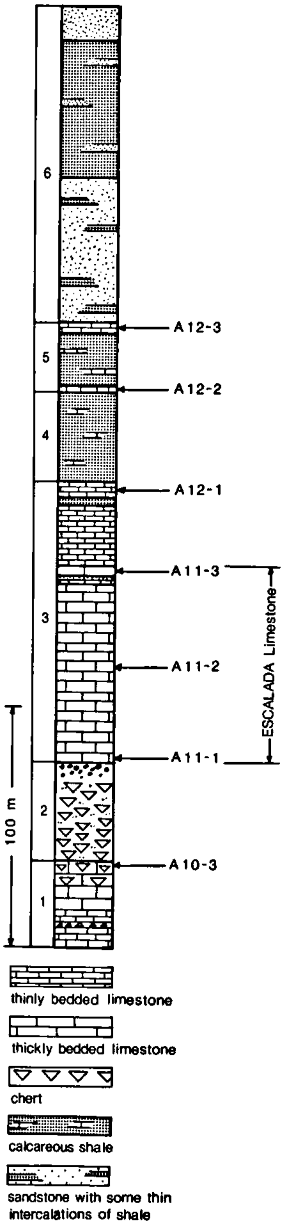


Fig. 1. The Pendueles succession, modified after E. Martínez-García et al., 1971. The horizons which yielded the fusulinid fauna are shown as well.

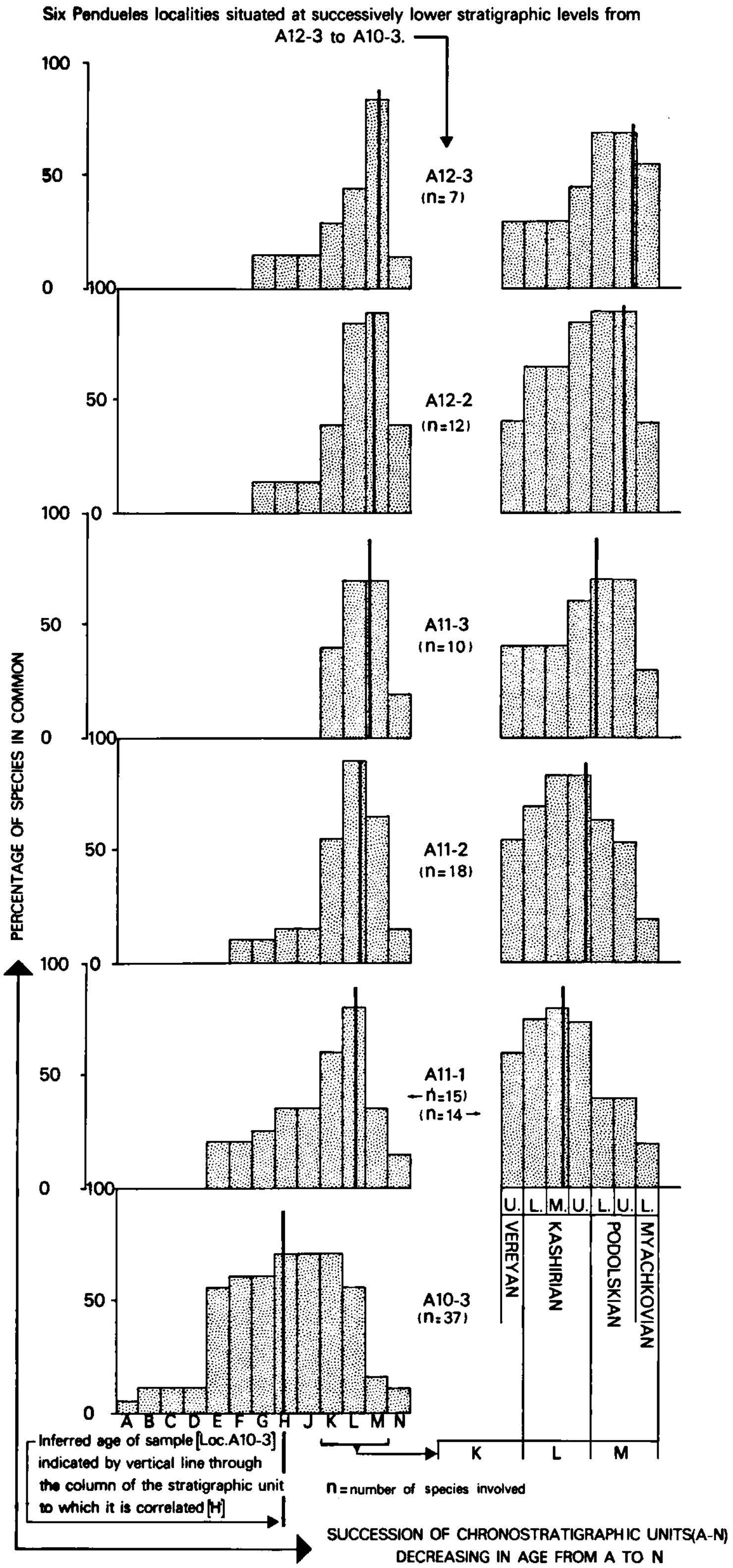


Fig. 2. Number of fusulinid species in six Pendueles localities also occurring in each of the successive chronostratigraphical units in the Donetz Basin - or its correlatives elsewhere in Eurasia - expressed in percentage of total number of fusulinid species found in each

locality in the Pendueles section. One of these was discarded (Loc. A 12-1) since it contained only a few and often relatively long-ranging species. Subsequently, the percentage of the total number of species in a rangechart which occur in the A suite, the B suite etc. up to the N suite was computed. In this way the six rangecharts were transformed into six different histograms, which appear one above the other at the left side of Text-figure 2. The figure shows that the localities A 11 (1, 2 and 3) and A 12 (2 and 3) have with the L and M suites the greatest number of species in common. Puzzling is the relatively rapid decrease of shared species towards the younger suites, which results in slightly skew-shaped histograms. The earlier reached results of the correlation based on a succession of Russian biozones is shown in the histograms by a vertical line. This vertical falls in a distinctly expressed modal class in all histograms except the ones for the localities A 10-3 and A 11-3. This correspondence is somewhat less marked in the right-side histograms. The latter represent an enlarged and limited part of each of the left-side histograms i.e. the x-axis includes only the upper K and subdivided L and M suites. Although the age decreases in Text-figure 2 from locality A 11-3 to A 12-3, the corresponding histograms to the right neither support nor contradict this, and are apparently not sensitive to such small differences in age as indicated by the successive classes on the x-axis. The change of the fusulinid fauna with time probably is too slow and the number of species involved too small for significant shifts of the histograms toward younger ages from A 11-3 to A 12-3. With the subdivision of the K, L and M suites we have possibly approached the limit for long-distance correlation.

3. CORRELATION WITH OTHER CARBONIFEROUS SEQUENCES IN ASTURIAS

For comparison of the Pendueles succession with other successions in Asturias, attention was focussed on the Central Coal Basin of Asturias and the adjoining regions to the east i.e. the area W of Campo de Caso and the area around Beleño (Text-fig. 3).

In the Central Coal Basin of Asturias the marine-paralic Sama Formation covers large areas. The formation in the Langreo/La Felguera NE part of the basin consists of over 2000 m of predominantly marine sediments, mainly shale and sandstone as well as a large number of coal seams, of which a small minority is exploitable (Bless in van Amerom et al., 1970; García-Loygorri et al., 1971). Fusulinid foraminifera indicate that deposition took place in Upper Moscovian time. The possibility exists that deposition still continued in Upper Myachkovian time (van Ginkel, 1973).

In the mountainous region of Campo de Caso which bounds the Central Coal Basin on E, the Sama Formation is much thinner (up to 1200 m); further to E, in the Beleño area the formation is absent. In these areas the Carboniferous formations below the Sama Formation can be observed from the Upper Moscovian Lena Formation at the top, down to the Upper Tournaisian Vegamián Formation*). The lithological properties of these formations presented in Text-figure 3 are primarily after data provided by dr. J.A. Martínez-Alvarez (1962) and dr. M. Julivert (1961).

With regard to Text-figure 3 we may add the following:

1. Proceeding from E to W from the "Cuenca de Beleño" to the area W of Campo de Caso and further to the W into the Central Coal Basin of Asturias, the continental influence increases through the gradual facies change of the marine Lena Formation into the marine-paralic and coal-bearing Sama Formation. The Sama Formation gains in thickness at the expense of the Lena Formation and their boundary may be conceived to shift to progressively lower stratigraphic levels ranging from the Upper Podolskian in Campo de Caso to the Upper Kashirian or Lower Podolskian in Langreo/La Felguera.
2. Moscovian successions (Units II + III) become thicker in an E-W direction, from Beleño to Campo de Caso and probably also from Campo de Caso to the Central Coal Basin.
3. Recent examination of samples from consecutive stratigraphic levels in the Escalada Limestone has shown that deposition started and ended later in the Beleño area than in the Campo de Caso area to the W**). An inspection of Text-figure 3 shows the possibility of a gradual transition of the Escalada Limestone into the Lena Formation and of the latter into the Sama Formation from the Beleño area to the Central Coal Basin. Similarly we might encounter a lithofacies transitional to the shales of the Beleño Formation E of the depositional area of the Escalada Limestone. This is best demonstrated by following in an E-W direction the sediments deposited in the early Lower Podolskian.

When these facts are put together, a picture emerges of a gradual extension to the E of the Central Coal Basin of Asturias. At the same time we may conceive a rather narrow strip with shallow marine limestone deposition - the Escalada Limestone - which bordered the Asturian paralic basin, was about 30 km wide in the Campo de Caso/Beleño area, and shifted to the E***) as well.

*) According to Mr. J.G.M. Raven (Leidse Geol. Med., 52/2, in prep.) the Vegamián Formation is not always present in this region because of its patchy deposition pattern. If present, the age is Upper Tournaisian.
**) This trend of earlier deposition to the W, perhaps also persists to the S and SW because fusulinid faunas from this limestone in the province of León have yielded fusulinids of only Lower Moscovian age. The foraminiferal fauna from Entrepeñas (Asturias) (Martínez-Díaz, 1970) may be even older and resembles the Upper Bashkirian fauna of our locality A 10-3 in Pendueles.
***) Probably to the N and NE during the Lower Moscovian in the province of León.

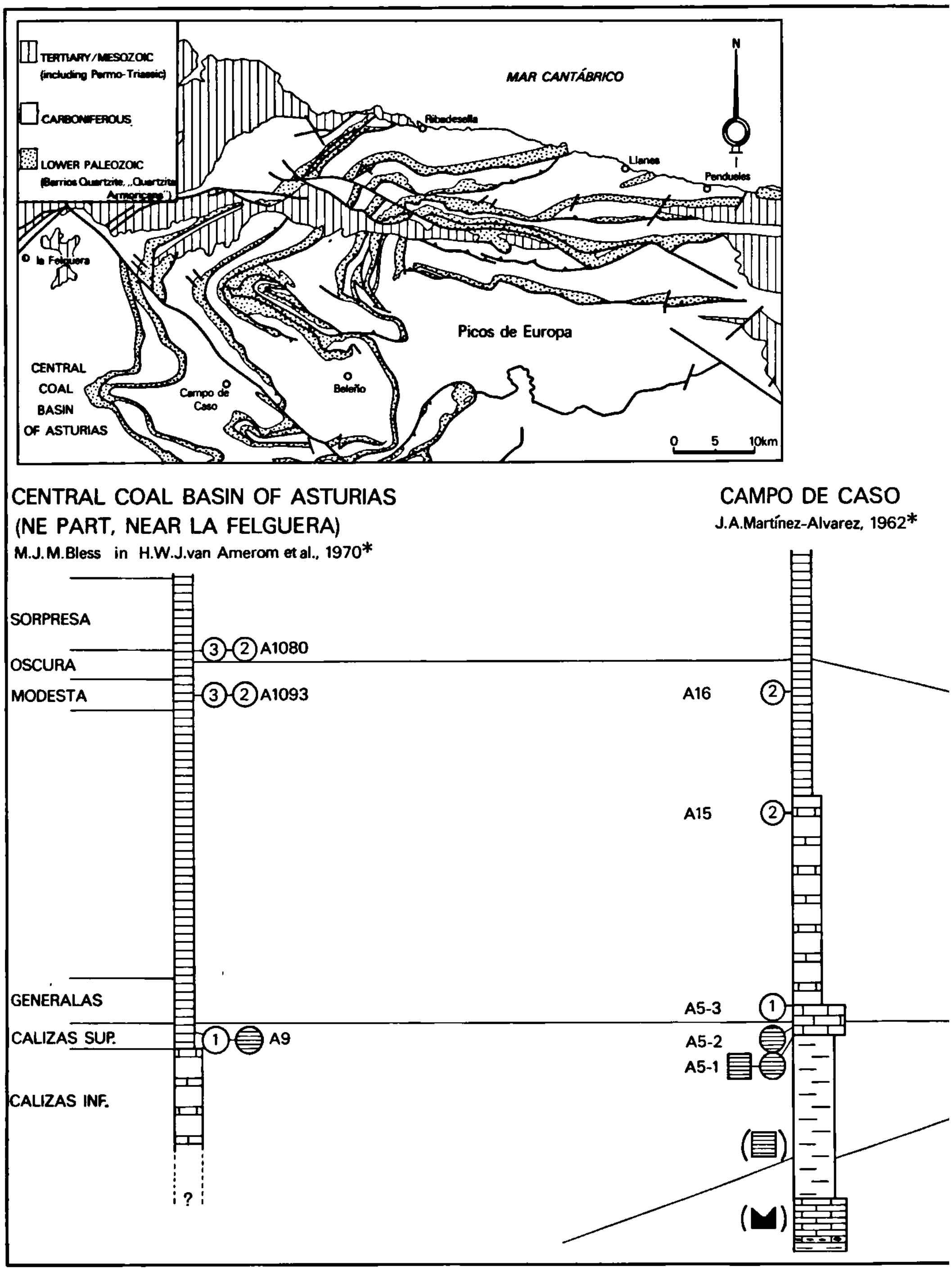
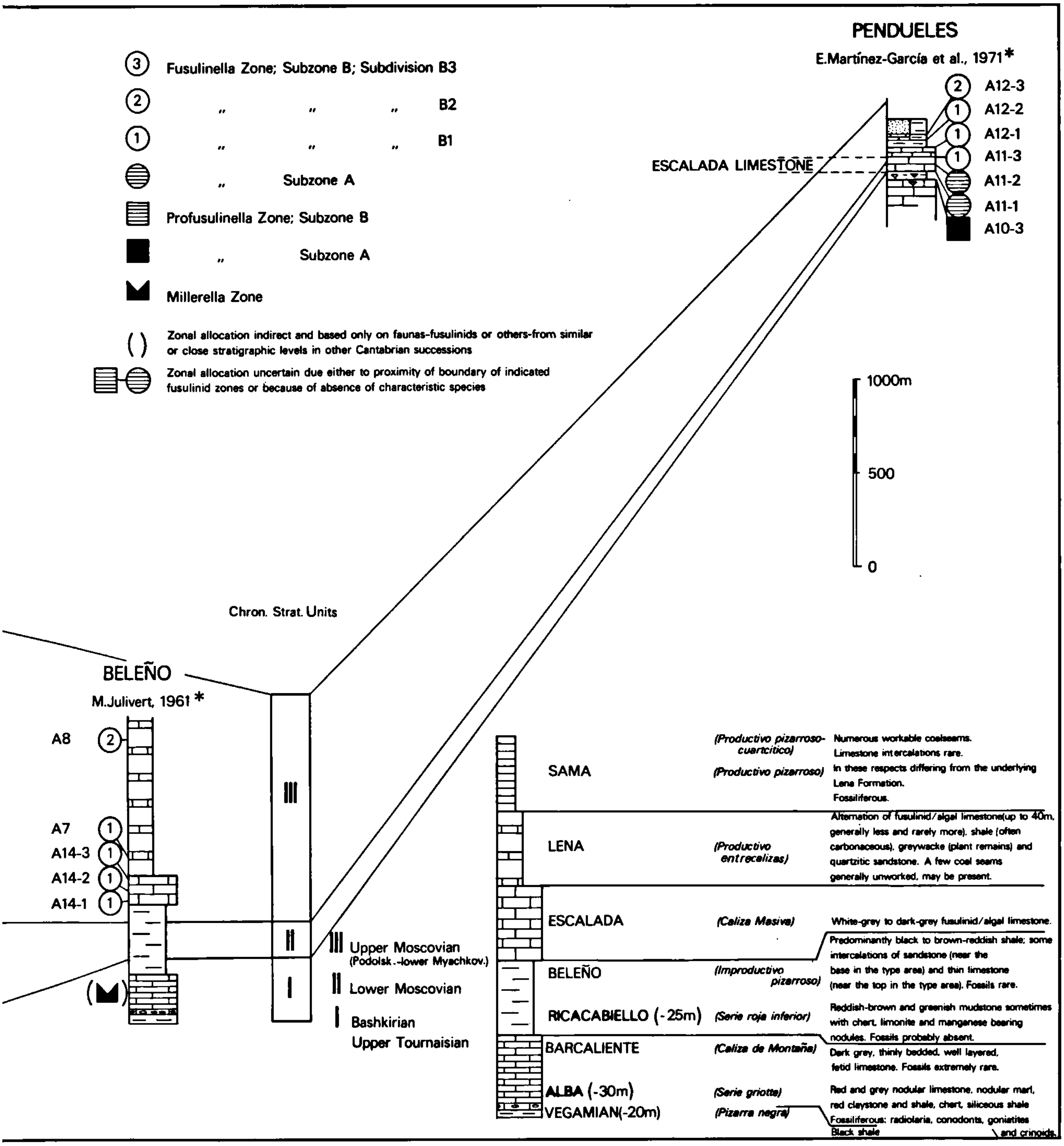


Fig. 3. Correlation of the Pendueles succession with other Carboniferous sequences in Asturias.

*) The sections are drawn after data provided by the cited authors but in a more generalized form.



Fusulinella Zone; Subzone B; Subdivision B3
„ „ „ B2
„ „ „ B1
„ Subzone A
Profusulinella Zone; Subzone B
„ Subzone A
Millerella Zone
( ) Zonal allocation indirect and based only on faunas-fusulinids or others-from similar or close stratigraphic levels in other Cantabrian successions
Zonal allocation uncertain due either to proximity of boundary of indicated fusulinid zones or because of absence of characteristic species
PENDUELES
E.Martínez-García et al., 1971*
A12-3
A12-2
A12-1
A11-3
A11-2
A11-1
A10-3
ESCALADA LIMESTONE
1000m
500
0
Chron. Strat. Units
BELEÑO
M.Julivert, 1961 *
A8
A7
A14-3
A14-2
A14-1
III Upper Moscovian (Podolsk.-lower Myachkov.)
II Lower Moscovian
I Bashkirian
Upper Tournaisian
SAMA
(Productivo pizarroso-cuarcítico)
(Productivo pizarroso)
Numerous workable coalseams. Limestone intercalations rare. In these respects differing from the underlying Lena Formation. Fossiliferous.
LENA
(Productivo entrecalizas)
Alternation of fusulinid/algal limestone(up to 40m, generally less and rarely more), shale (often carbonaceous), greywacke (plant remains) and quartzitic sandstone. A few coal seams generally unworked, may be present.
ESCALADA
(Caliza Masiva)
White-grey to dark-grey fusulinid/algal limestone.
BELEÑO
(Improductivo pizarroso)
Predominantly black to brown-reddish shale; some intercalations of sandstone (near the base in the type area) and thin limestone (near the top in the type area). Fossils rare.
RICACABIELLO (-25m)
(Serie roja inferior)
Reddish-brown and greenish mudstone sometimes with chert, limonite and manganese bearing nodules. Fossils probably absent.
BARCALIENTE
(Caliza de Montaña)
Dark grey, thinly bedded, well layered, fetid limestone. Fossils extremely rare.
ALBA (-30m)
(Serie griotte)
Red and grey nodular limestone, nodular marl, red claystone and shale, chert, siliceous shale
Fossiliferous: radiolaria, conodonts, goniatites and crinoids.
VEGAMIAN(-20m)
(Pizarra negra)
Black shale

Summarizing we state that the results of a biostratigraphy based on fusulinids indicate a regression to the E in this part of the Asturian realm. Somewhat similar conclusions have been put forward by other investigators of different disciplines e.g. Wagner (1959) who compared fossil floras from the Central Asturian Coal Basin and the Palencia province to the SE, García-Loygorri et al. (1971) in their stratigraphical and sedimentological investigations of the Central Asturian Coal Basin, and Julivert (1978) in a study on the Carboniferous palaeogeography in NW Spain.*) The justification of my opinion with regard to the relation between the Central Coal Basin of Asturias and its adjacent areas to the E, rests largely on the correlation of the fusulinid-bearing strata of the three successions presented in Text-figure 3 i.e. Langreo/La Felguera, Campo de Caso and "Cuenca de Beleño". For this reason a discussion on the fusulinid content of the various samples as given in Appendix I is considered opportune.

If we turn our attention to the Pendueles coastal section and compare it with the sections of the Central Coal Basin and its adjoining areas to the E, we note a striking difference in thickness of the Lower Moscovian strata as well as of the Upper Moscovian part of the succession, corresponding respectively with the chronostratigraphical Units II and III in Text-figure 3.

The very thin (40-80 m) Lower Moscovian succession at Pendueles (cf. Unit II) is believed to be due to non-deposition during Vereyan and Lower Kashirian time. Field observations by E. Martínez-García point to a hiatus immediately below the Middle Kashirian-Lower Podolskian Escalada Limestone (Martínez-García, pers. comm.). A much higher average sedimentation rate in Lower Moscovian time was attained in the Beleño/Campo de Caso areas. Here the thick (350-775 m) siliciclastic deposits of the Beleno Formation were laid down. However, we have no direct evidence for a Lower Moscovian age of the formation, nor do we know where to place the boundary between the Moscovian and the Bashkirian. Fossils are rare and fusulinid foraminifera have not yet been found here. Fortunately fusulinids occur in this formation about 20 km S, in the province of León. A single lens-shaped limestone about 250 m above the base of the formation yielded fusulinids of the Profusulinella Zone, Subzone B of probably Vereyan age (Sjerp, 1967). It is precisely this limestone lens which forms the basis for the assumed time-equivalence of the lower part of the Pendueles succession and the Beleño Formation. The position of the find is indicated in the Campo de Caso stratigraphic column of Text-figure 3 (vide: square in parentheses).

The large difference in thickness holds good also for the Upper Moscovian. There are thick sequences in the Central Coal Basin (about 1700 m at La Felguera) and the bordering areas to the east (1100-1700 m), whereas the corresponding succession in Pendueles is quite thin (250-275 m). The Upper Moscovian strata at Pendueles contain flysch-type sediments (Martínez-García et al., 1971) and the thin intercalated limestone beds are of bioclastic type. The thin sequence relative to the time-span involved should probably be envisaged as the result of short intervals of sudden influx of sediment alternated with long intervals of hardly any deposition. Erosion may have played a role as well.

In view of the exceptionally well preserved sedimentary features in the Upper Moscovian strata of Pendueles, more information as to the environment of deposition is to be expected in the future. These data supplemented by data on the tectonics of the Cantabrian mountains could reveal the relationship between the Pendueles section and the basinal area of Asturias situated at present to the W and SW of our coastal section.

APPENDIX I

ASTURIAN FUSULINIDS FROM THE CENTRAL COAL BASIN AND THE AREAS AROUND CAMPO DE CASO AND BELENO

1. *Central Coal Basin of Asturias (Langreo/La Felguera)*
Siliciclastic sediments yielded mainly species of *Hemifusulina* as well as some species of *Schubertella, Fusiella, Ozawainella,* and *Pseudostaffella* (van Ginkel, 1973). The fusulinid fauna found here, constitutes a biofacies quite different from the biofacies of the Campo de Caso and Beleño areas to the E. As a consequence direct comparison of the Coal Basin area to these adjacent areas is difficult and the correlation in Text-figure 3 is by comparison of each area to the classical areas in Russia.

Of special importance with respect to the correlation in Text-figure 3 are the localities A 1080, A 1093 and A 9. The latter is near the base of the Sama Formation at the boundary of the Calizas superiores and the Generalas Member and yielded *Hemifusulina hispanica* (Gübler, 1943). This species belongs to the group of *Hemifusulina moelleri* Rauser-Chernoussova, 1951 and is somewhat similar to *H. pseudobocki vjatkensis* Rauser-Chernoussova, 1951 from the upper part of the Kashirian in the U.S.S.R. Species of the group of *H. moelleri* are also reported to occur in the Lower Podolskian. The sampling localities A 1093 and A 1080 are at about the top of the sequence in respectively the Modesta Member and the top of the Oscura Member. They contain *Hemifusulina mosquiterensis* van Ginkel, 1973. This species is close to *H. implicata* Bogush, 1963 which latter is from the Dzjilanda Formation (Alaj Mts., Siberia) regarded as of Upper Podolskian or Myachkovian age (Bogush, 1963).

*) Similar results are reported also by Bless and Winkler Prins in a publication which had escaped my attention: M.J.M. Bless and C.F. Winkler Prins, 1973. Paleoecology of Upper Carboniferous Strata in Asturias (N Spain). Septième Congrès International de Stratigraphie et de Géologie du Carbonifère. Compte Rendu, Band II, pp. 129-137.

2. *Campo de Caso; headwaters of the rivers San Isidro, Nalón and La Marea; cuenca de La Marea-Caleao-San Isidro; section of Campo de Caso-Coballes-Tanes*)*
Fusulinid forams in the Campo de Caso area have been found in the Sama, Lena, and Escalada formations. The chances of finding fusulinids in the Beleño Formation, which follows below the Escalada Limestone Formation, are small and only the upper 150 m which consist of shale and intercalated limestone are promising. The larger part of this formation consists of shale and sandstone, poor in fossils and probably without fusulinids. However, in the province of León, the Beleño Formation contains a single limestone lens - the Lázaro Limestone - which yielded fusulinids. It is 225 m above the Ricacabiello Formation and over 800 m from the top of the Beleño Formation. A single species was reported: *Aljutovella elongata* (Rauser, 1938) subsp. *lazarensis* subsp. nov. (Sjerp, 1967). This species of the Profusulinella Zone, Subzone B indicates a Vereyan age for the limestone.

Samples from the Escalada Limestone had the following outcome:

Locality A 5. - (Escalada Limestone near Campo de Caso, about 1 km along the road to Pola de Laviana; valley of the Río Nalón).***)*

Loc. A 5-1 (At about the base of the formation).
Staffella sp. - common
Millerella acuta (Grozdilova & Lebedeva, 1950) - rare
Profusulinella cf. *polasnensis* Safonova, 1951 - rare
The single specimen present resembles *P. polasnensis* and also *Profusulinella* sp. from the Piedras Luengas Limestone (van Ginkel, 1965, pl. XXVI, fig. 1, p. 114).
Profusulinella ex gr. *prisca* - rare
Schubertella ex gr. *inflata* - rare
Two specimens have been found of which one is close to *Sch. minima* Sosnina, 1951 and *Sch. inflata* Rauser, 1951 and the other resembles *Sch. acuta* Rauser, 1951.
Taitzehoella taitzehoensis Sheng, 1951 - rare
A closely similar form was found at locality A 11-2 (Pendueles section).
Eofusulina sp. - rare
Hidaella ? sp. - common
Numerous specimens are present which belong to a species closely related to *Hidaella kameii* Fujimoto & Igo subsp. *nalonensis* van Ginkel, a subspecies described in 1965 from this locality.***)* The present specimens from locality A 5-1 differ from this subspecies by the absence of a diaphanotheca and by the less undulant spirotheca. Some types in our collection point to a relation with *Fusulinella* of the group *subcolaniae* and are similar to *F. prolifica* Thompson, 1935 and *F. subcolaniae plana* Reitlinger, 1961. Another allied group is *F.* ex gr. *schubertellinoides* and particularly the tightly coiled inner and loosely coiled outer whorls but also the often subcylindrical shape of the Spanish specimens point to a close relation to some species of this group (vide *F. schubertellinoides* Putrya, 1938 and the subspecies *elshanica* Rauser, 1951).

Biozone: ?Profusulinella Zone; top of Subzone B.
Since no *Fusulinella* species have been found at this locality or lower in the section, there is no good reason to place locality A 5-1 in the Fusulinella (Interval) Zone of which the lower boundary is the first occurrence of this genus. However, some of the species which occur here, suggest that locality A 5-1 probably is slightly above the base of the chronozone of the Fusulinella Zone, Subzone A.
Correlation: Pendueles section: About the level of locality A 11-1; apparently the base of the Escalada Limestone is synchronous in both sections.
U.S.S.R. (Moscow basin): Lower Moscovian; approximately the boundary between Middle and Upper Kashirian.

Loc. A 5-2 (At about 0.3-0.4 of the formation thickness from the base of the formation).
Ozawainella ex gr. *pseudoangulata* et *mosquensis* - rare
The single specimen present may be closely allied to *O. sandalina* Manukalova, 1956 and *O. praeumbonata* Putrya & Leontovich, 1948. Other similar species are *O. kurakhovensis* Manukalova, 1956 and *O. umbonoplicata* Putrya, 1956.
Pseudostaffella topilini Putrya, 1939 - common
The specimens conform wholly to the description and illustration of the species by Putrya in 1956.
Taitzehoella ex gr. *librovitchi* (Dutkevich, 1934) - rare
The only specimen present resembles *T. taitzehoensis* Sheng, 1951 and is transitional between that species and *T. librovitchi* (Dutkevich, 1934).
Beedeina cf. *dunbari* (Chernova, 1951) - rare
Not only *B. dunbari* (Chernova, 1951) but also *B. pseudoelegans* (Chernova, 1951) is similar to the Spanish specimen.
Eofusulina aff. *paratriangula* (Putrya, 1939) - common
The axial filling, albeit weakly developed in the Spanish specimens, points to a second related species i.e. *Eofusulina binominata* Putrya, 1956. The Spanish species is possibly transitional between the two.
Fusulinella ex gr. *pulchra* et *itoi* - common
The species from this locality differs from the species encountered in the nearby A 1 locality at Ribadesella in having more whorls and a smaller diameter of the proloculum. Another related species is from the Pendueles locality A 11-2, which has a close affinity to *F. subpulchra* Putrya, 1938.

**)* J.A. Martínez-Alvarez, 1962, pp. 77-90.
***)* Fusulinids described from locality A 5 in van Ginkel (1965) (= locality M 1 in Martínez-Alvarez, 1962, p. 80) have been found 33 m above the base of the Escalada Limestone at about km 52, whereas the present samples A 5-1, A 5-2 and A 5-3 are from the Escalada Limestone at km 54, which is closer to Campo de Caso. The stratigraphic position of A 5 is probably between A 5-1 and A 5-2.

Biozone: Fusulinella Zone; Subzone A.
Correlation: Pendueles section: Locality A 11-2 or slightly higher, but lower than locality A 11-3.
U.S.S.R. (Moscow basin): Lower Moscovian; top of Upper Kashirian (a lowermost Podolskian age cannot be excluded; at all events the locality is very close to the Lower/Upper Moscovian boundary).

Locality A 5-3 (At the top of the formation).

Taitzehoella cf. *taitzehoensis* Sheng, 1951 - rare

The single specimen present may belong to the Chinese species. Also very close is *Taitzehoella* sp. 1 from the localities A 12-1 and A 12-2 of the Pendueles section.

Beedeina ex gr. *elegans* et *distenta* - rare

The single specimen encountered is probably closely related to *B. elegans* (Raus. & Belj., 1937) especially to the specimen described as forma *longa* by Rauser-Chernoussova (1951). The Spanish specimen differs in having higher septal folding.

Beedeina cf. *pseudokayi* (Putrya, 1956) - rare

The single specimen found may be compared with *B. pseudokayi*. The Spanish specimen shows a more rhomboidal shape, a less tightly coiled spire and possibly higher and wider chomata in inner whorls. This rather primitive specimen of *Beedeina* bears some resemblance to *B. ielshanica vaskinensis* (Rauser, 1951) as well as to the American species *B. spissiplicata* (Dunbar & Henbest, 1942) and *B. meeki similis* (Galloway & White, 1932).

Fusulinella ex gr. *paracolaniae* Safonova, 1951 spp. - common

The following species are present:

Fusulinella paracolaniae Safonova, 1951

Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951

The Pendueles section at locality A 12-1 yielded *F.* aff. *meridionalis* conspecific with the present form.

Biozone: Fusulinella Zone; Subzone B, subdivision B 1
Correlation: Pendueles section: Locality A 12-1.
U.S.S.R. (Moscow basin): Upper Moscovian; Podolskian; Middle Podolskian.

Locality A 15. - (Lena Formation, 70-80 m from the top of the formation; a limestone of 5-10 m, exposed 875 m from the bridge over the Nalón river in Coballes along the old road to Pola de Laviana on the left bank of the river).

Schubertella cf. *obscura* Lee & Chen, 1930 - rather rare

Our specimens may be compared with *Schubertella* cf. *obscura* as described by Ishii from the It_2 fossil zone (Ishii, 1962), and *Schubertella* cf. *obscura* reported by Sheng from the B. schellwieni subzone up to the F. provecta subzone (Sheng, 1958). Of the species previously described from the Cantabrian Mountains similar forms have been encountered in the Brañosera Limestone (loc. P. 38), the Cuenca de Beleño (loc. A 8) and in the Maldrigo Limestone (loc. P 7). Particularly similar is *Schubertella* sp. form 2 from the Maldrigo Limestone (van Ginkel, 1965).

Schubertella cf. *lata elliptica* Sheng, 1958 - fairly common

The Spanish specimens are intermediate between *Schubertella lata* including the subspecies *Sch. lata elliptica* as described by Sheng and *Schubertella lata* Lee & Chen, 1930. A previously described similar Asturian species is *Sch.* ex gr. *lata* from the Cuenca de Beleño (loc. A 8) (van Ginkel, 1965).

Schubertella cf. *acuta chistjakovensis* Manukalova, 1956 - rare

Two specimens have been encountered of which a rhomboidal-shaped specimen is quite similar to *Sch. acuta chistjakovensis* Man. Another specimen of ellipsoidal shape resembles *Profusulinella ovata* Rauser-Chernoussova, 1938 and *Schubertella*? sp. from the Escalada Limestone at Ribadesella (loc. A 1) (van Ginkel, 1965), as well as some Permian species such as *Sch. paramelonica* Suleimanov, 1949 and *Sch. giraudi* (Deprat, 1915). The former species of Carboniferous (Lower Moscovian) age are slightly larger and may have better developed chomata.

Fusiella cf. *typica* Lee & Chen, 1930 - fairly common

The most similar species are *Fusiella typica* Lee & Chen and *Fusiella praetypica* Safonova, 1951. Both species probably have more volutions on average, and notably *Fusiella praetypica* has a smaller diameter for corresponding whorls. *Fusiella typica* may have on average a slightly larger L/D ratio in the outer whorls, which amounts to 2.1-2.7 in our specimens. With respect to previously described Cantabrian species similar forms are *Fusiella* ex gr. *typica* from the Maldrigo Limestone (loc. P 7), and *Fusiella* cf. *typica* from locality A 12-2 in the Pendueles section. The latter may be considered conspecific with our present form.

Beedeina (Dagmarella) sp. - rare

Beedeina (Dagmarella) prima Solovieva, 1955 and *Beedeina ninensis* (Putrya, 1938) are among the most similar to the Spanish form. The former has better developed chomata in inner whorls, and the latter a slightly larger diameter for corresponding whorls as well as differently shaped chomata. A less advanced but probably related species may be *Profusulinella topiliensis* (Putrya, 1938). Somewhat similar is also *Beedeina rasdorica* (Putrya, 1938). These species have all been described from the Lower Moscovian of the U.S.S.R. From China, Sheng (1958) described *Profusulinella wangyui yentaiensis* and *Beedeina mayiensis* from the Mayi limestone correlated with the Lower Moscovian (Kashirian). The former is more primitive, the latter more advanced with respect to the Spanish form. Of the American fauna most similar is *Beedeina pattoni* (Needham, 1937) from Desmoinesian strata of New Mexico.

Fusulina ex gr. *kamensis* - abundant

The present species resembles *Fusulina elegantissima* Manukalova, 1950 from the U.S.S.R. The Russian species differs by its thinner wall which is considered more advanced by the presence of clearly expressed mural pores. Moreover, it has less developed chomata and in this respect is advanced as well. It has a large proloculum and only few whorls (400 microns and 2½-3½ volutions) which is typical also for the Spanish form (375 microns and 2½-4 whorls). Although the dimensions of *F. elegantissima* are smaller, the diameter for corresponding whorls is similar. Manukalova's species has been described from M 7 and M 10 limestones of the Donetz Basin.

Fusulinella cf. *pseudobocki* Lee & Chen, 1930 - fairly rare
The two specimens we have found differ from *Fusulinella pseudobocki* in having less closely coiled inner whorls, a larger diameter for corresponding whorls, and probably slightly less whorls on average. A second similar species is *Fusulinella maldrigensis* from the Maldrigo Limestone (loc. P 7) (van Ginkel, 1965).

Biozone : Fusulinella Zone; Subzone B, base of subdivision B 2.
Correlation: Pendueles section: close to locality A 12-2, slightly higher.
U.S.S.R. (Moscow basin): Upper Moscovian; Podolskian; Middle to Upper Podolskian.

Locality A 16. - (Sama Formation, 675 m from the top of the formation; a limestone of 5-10 m exposed along the new road from Coballes to Pola de Laviana on the right bank of the river Nalón between Abantro and Tanes. The sampling locality is close to a small church situated between the road and the river).

Ozawainella cf. *krasnodonica* Manukalova, 1951 - fairly common
The Spanish species resembles *O. krasnodonica* but differs in having a larger diameter on average (up to 1550 microns). Other similar species are *O. umbonoplicata* Putrya, 1956 and *O. nikitovkensis* (Brazhnikova, 1939).

Ozawainella ex gr. *pseudoangulata* et *mosquensis* - rare
A single specimen has been found which is quite close to *Ozawainella* sp. 1 from locality A 8 in the Beleño area (van Ginkel, 1965, pl. XVI, fig. 15).

Pseudostaffella ex gr. *parasphaeroidea* et *larionovae* - common
The Spanish specimens are close to *Pseudostaffella wardensis* Thompson, 1961 and differ only in the smaller L/D ratio, which is 0.75-0.95 in the last two whorls (7-8th whorl), as well as the more convex, less flattened, median region. Typical are the very high and sometimes subquadrangular-shaped chomata in the 4-7th whorl which develop into lower, narrower, and rounder chomata in the last two whorls. Similar chomata may be observed in the species *Pseudostaffella parasphaeroidea* (Lee & Chen, 1930) and *Ps. larionovae* Raus. & Saf., 1951. Another related species is *Ps. syzranica* Raus. & Saf., 1951 which is somewhat smaller (the Spanish specimens attain a diameter of 1700 microns).

Taitzehoella sp. - fairly rare
Our specimens resemble *Taitzehoella globulus* (Manukalova, 1951) (= *Profusulinella librovitchi* var. *globulus* Man., 1951) as well as *Taitzehoella taitzehoensis* Sheng, 1951. The former has wider chomata, less volutions on average (= 7-7½ in our specimens), and a somewhat smaller diameter; the latter has a larger L/D ratio (= 1.52 -1.74 in our specimens). Quite close is also *Taitzehoella* sp. 2 from locality A 12-3 in the Pendueles section. That species may have a still smaller L/D ratio.

Beedeina cf. *grigorovichi* (Putrya, 1956) - fairly rare
The Spanish specimens resemble species of the group of *Beedeina schellwieni* with respect to shape, loose coiling, and high and somewhat irregular septal folding. They resemble some species of the group of *B. samarica* in the prominent, high and subquadratical chomata. Most similar is *Beedeina grigorovichi* (Putrya, 1956), yet this Russian species has less whorls (= up to 5½ in our specimens) and a larger proloculum (= 150-180 microns in our specimens) Moreover, the L/D ratio is slightly greater, which in our specimens may not surpass 1.75. The diameter of both species is similar; by implication the diameter is larger for corresponding whorls in the Russian form. A more important difference is the fine fibrous structure in the diaphanotheca, which has not been observed in the Spanish species.

Biozone : Fusulinella Zone; Subzone B, subdivision B 2
Correlation: Pendueles section: close to the level of sampling locality A 12-3.
U.S.S.R. (Moscow basin): Upper Moscovian; Podolskian; Upper Podolskian.

3. *Cuenca de Beleño*
A field excursion (1956) under the guidance of dr. J. Julivert yielded fusulinid-containing samples of limestone of the Fito Formation*) (locs. A 7, A 8) and the underlying Escalada Formation (loc. A 6). These samples have been examined and described (van Ginkel, 1965), the result of which is recapitulated below.

Locality A 6. - Escalada Limestone**)

Schubertella cf. *pseudoobscura* Chen, 1934

Fusulinella ex gr. *bocki* Moeller, 1878
The species belongs to the group *F. bocki* s.l. and bears some resemblance to species close to *F. pseudobocki* Lee & Chen, 1930. Another related species may be *F. bocki pauciseptata* Raus. & Belj., 1936.

Biozone : Fusulinella Zone: Subzone B, subdivision B 1.
Correlation: Upper Moscovian; Podolskian.

*) Deposits of the Fito Formation in the Cuenca de Beleño are marine, whereas those of the Lena Formation in the Central Coal Basin are marine to paralic (van Ginkel, 1965). The difference in lithology is considered insufficient to uphold two formational names for these rocks. The former name is suppressed in favour of the latter, which is the older.
**) The precise location and level within the formation have not been recorded.

Locality A 7. - (Lena Formation; near the base of the formation).
Millerella acuta (Grozd. & Leb.) var. *lata* (Kireeva, 1949)
Millerella cf. *mutabilis* (Raus.) var. *postera* (Kireeva, 1949)
Ozawainella cf. *krasnokamski* Saf. var. *kirovi* Dalmatskaya, 1951
Pseudostaffella cf. *larionovae* Raus. & Saf., 1951
Schubertella cf. *pseudoobscura* Chen, 1934
Fusiella praetypica Safonova, 1951
Fusulina agujasensis van Ginkel, 1965

Biozone : Fusulinella Zone; Subzone B, subdivision B 1 (near top)
Correlation: Upper Moscovian; Podolskian; probably middle to upper part of Podolskian.

Locality A 8. - (Lena Formation; near the top of the formation).
Ozawainella sp.1
Schubertella spp.
(ex gr. *Sch. obscura* Lee & Chen, 1930
ex gr. *Sch. lata* Lee & Chen, 1930)
Profusulinella ex gr. *librovitchi* (Dutkevich, 1934)
(= *Taitzehoella* ex gr. *librovitchi* in the present paper)
Fusulinella sp. 1
The species is compared with *F. schwagerinoides adjuncta* Shlykova, 1948, *Fusulinella colaniae meridionalis* Rauser-Chernoussova, 1951 (= *F. meridionalis* Raus. in the present paper), and *Fusulinella velmae protensa* Thompson, 1936.

Biozone : Fusulinella Zone; Subzone B; subdivision B 2.
Correlation: Upper Moscovian. (Podolskian; Upper Podolskian).

Recent additional sampling at various levels of the Escalada Limestone had the following result:

Locality A 14. - (Escalada Limestone; Beleño village, near the tunnel through this limestone along the road from Beleño to Sobrefoz).

Loc. A 14-1 (At the base of the formation).
Ozawainella cf. *adducta* Manukalova, 1950 - rare
Ozawainella ex gr. *pseudoangulata* et *mosquensis* - rare
The single specimen encountered is best compared with *Ozawainella vozhgalica* Safonova, 1951 and *O. magna* Sheng, 1958.
Pseudostaffella ex gr. *paraozawai* - common
Two forms are present of which one is close to *Ps. paraozawai* Manukalova, 1951, and the other to *Ps. compacta* Manukalova, 1950. Some of our specimens attain a diameter of over 2 mm which is an exceptionally large size for species of this genus. The maximum value for *Ps. compacta* and *Ps. paraozawai* is respectively 1.56 mm and 1.86 mm. The L/D ratio of our specimens varies between 0.80 and 0.90 which is intermediate between the values reported for *Ps. paraozawai* (= 0.70-0.84) and *Ps. compacta* (= 0.90).
Beedeina ? sp. - rare
The single specimen encountered belongs to a primitive group of *Beedeina* and is similar to the *Beedeina*? sp from the Pendueles localities A 11-2, A 11-3, A 12-3.
Fusulina ex gr. *kamensis* Safonova, 1951 - fairly common
The specimens are best compared with species of the group *Fusulina kamensis* Safonova, 1951. Particularly similar is the species from locality A 12-1 (Pendueles section) which resembles *Fusulina aspera* Chernova, 1954.

Biozone : Fusulinella Zone; Subzone B, subdivision B 1.
Correlation: Pendueles section: probably some level between the sampling localities A 11-3 and A 12-1.
U.S.S.R. (Moscow basin): Upper Moscovian; Podolskian; Lower to Middle Podolskian.

Loc. A 14-2 and loc. A 14-3 (loc. A 14-2: at the entrance of the tunnel through the limestone, which is about 1/4-1/3 of the thickness of the formation from the base.
Loc. A 14-3: near the top of the formation).
The fusulinid fauna of the localities A 14-2 and A 14-3 is very similar and consists exclusively of the very commonly occurring *Fusulina agujasensis* van Ginkel, 1965. This species of the group of *Fusulina kamensis* Safonova 1951 occurs also in the Agujas Limestone (Pernía, N Palencia) and in the Panda Limestone (NE León).

Biozone : Fusulinella Zone; Subzone B, subdivision B 1.
Correlation: Pendueles section: Locality A 12-1 up to locality A 12-2.
U.S.S.R. (Moscow basin): Upper Moscovian; Podolskian; probably Middle Podolskian.

APPENDIX II

SPECIES LIST OF SAMPLING LOCALITIES AT PENDUELES

Locality A 10-3

Some Foraminifera other than Fusulinidae:

Planoendothyra cf. *aljutovica* (Reitlinger, 1950)
Planoendothyra cf. *spirilliniformis* (Brazhnikova & Potievskaya, 1948)
Mediocris cf. *breviscula* (Ganelina, 1951)
Archaediscidae (rare)

Fusulinidae:

Pseudoendothyra ex gr. *bradyi* (Moeller, 1878)
Pseudoendothyra sp. 1
Millerella (Pseudonovella) cf. *uralica* (Kireeva, 1951)
Millerella (Pseudonovella) cf. *paraconcinna* Manukalova et al., 1969
Millerella cf. *acuta* (Grozdilova & Lebedeva, 1950)
Millerella cf. *acuta lata* (Kireeva, 1949)
Millerella cf. *pseudostruvei* (Rauser & Beljaev, 1936)
Millerella cf. *bigemmicula* Igo, 1957
Millerella ex gr. *designata* Zeller, 1953
Millerella cf. *postmosquensis* (Kireeva, 1951)
Millerella cf. *postmosquensis acutiformis* (Kireeva, 1951)
Millerella ex gr. *transita* (Kireeva, 1949)
Millerella cf. *transita* (Kireeva, 1949)
Millerella cf. *exilis* (Grozdilova & Lebedeva, 1950)
Millerella cf. *umbilicata* (Kireeva, 1951)
Millerella cf. *marblensis* Thompson, 1942
Ozawainella ex gr. *umbonata* Brazhnikova & Potievskaya, 1948
Ozawainella ex gr. *alchevskiensis* Potievskaya, 1958
Ozawainella cf. *alchevskiensis* Vakarchuk, 1967
Ozawainella cf. *paraumbonata* Potievskaya
Eostaffella ex gr. *parastruvei* (Rauser-Chernoussova, 1948)
Eostaffella (Eostaffellina) cf. *paraprotvae* Rauser-Chernoussova, 1948
Eostaffella (Eostaffellina) cf. *vischerensis* Grozdilova & Lebedeva, 1960
Pseudostaffella (Semistaffella) cf. *primitiva* Reitlinger, 1961
Pseudostaffella (Semistaffella) minor Rauser-Chernoussova, 1951
Pseudostaffella (Semistaffella) cf. *minor* Rauser-Chernoussova, 1951
Pseudostaffella (Semistaffella) ex gr. *variabilis* Reitlinger, 1961
Pseudostaffella antiqua (Dutkevich, 1934)
Pseudostaffella kanumai Igo, 1957
Pseudostaffella sp. 8
Profusulinella ex gr. *parva* (Lee & Chen, 1930)
Profusulinella ex gr. *primitiva* Grozdilova & Lebedeva, 1954
Profusulinella cf. *staffellaeformis* Kireeva, 1951
Eowedekindellina? sp.
Schubertella ex gr. *obscura* Lee & Chen, 1930
Schubertella obscura mosquensis Rauser-Chernoussova, 1951
Schubertella cf. *toriyamai* (Ishii, 1962)

Biozone : Profusulinella Zone; Subzone A.
Correlation: Bashkirian; Upper Bashkirian; (?) possibly Tasashtinsky bed (Ural).
(Profusulinella parva Zone)
C_2^3 (H) suite of the Donetz basin, lower part.
(Profusulinella primitiva-Ozawainella alchewskiensis Zone - C_2^b (b+c))

Locality A 11-1

Staffella (Parastaffelloides) ex gr. *pseudosphaeroidea* Dutkevich, 1934
Millerella (Pseudonovella) cf. *variabilis* (Rauser-Chernoussova, 1951)
Millerella korobcheevi (Rauser-Chernoussova, 1951)
Ozawainella ex gr. *pseudoangulata* et *mosquensis*
Ozawainella cf. *vozhgalica* Safonova, 1951
Pseudostaffella cf. *umbilicata* (Putrya & Leontovich, 1948)
Profusulinella cf. *pseudorhomboides* Putrya, 1948
Profusulinella cf. *nibelensis* Rauser-Chernoussova, 1951
(= *P. rhombiformis nibelensis* Rauser-Chernoussova, 1951)
Profusulinella cf. *rhomboides* (Lee & Chen, 1930)

Profusulinella ovata penduelesensis sp. nov.
Profusulinella ex gr. *prisca* (Deprat, 1912)
Profusulinella cf. *fittsi* (Thompson, 1935)
Profusulinella cf. *apodacensis* Thompson, 1948
Aljutovella cf. *complicata* Safonova, 1951
Aljutovella ex gr. *priscoidea* (Rauser-Chernoussova, 1938)
Aljutovella? sp. *(cf. Aljutovella cybaea* Leontovich, 1951*)*
Schubertella ex gr. *gracilis* Rauser-Chernoussova, 1951
Beedeina cf. *bona lenaensis* van Ginkel, 1965
Eofusulina paratriangula (Putrya, 1939)
Fusulinella aravanensis Bogush, 1960

Biozone : Fusulinella Zone; Subzone A, near the base of the subzone.
Correlation: Lower Moscovian; Kashirian; probably Middle Kashirian near the boundary with the Upper Kashirian.
(Aljutovella priscoidea - Hemifusulina volgensis - H. splendida Zone)
C_2^6(L) suite of the Donetz basin.

Locality A 11-2

Staffella (Parastaffelloides) cf. *expansa* Thompson, 1947
Pseudoendothyra ex gr. *bradyi* (Moeller, 1878)
Pseudoendothyra cf. *bradyi* (Moeller, 1878)
Pseudoendothyra plummeri (Thompson, 1947)
Pseudoendothyra sp. 2
Ozawainella ex gr. *fragilis* Safonova, 1951
Ozawainella ex gr. *pseudoangulata* et *mosquensis*
Pseudostaffella cf. *umbilicata* (Putrya & Leontovich, 1948)
Pseudostaffella cf. *larionovae mosquensis* Rauser-Chernoussova, 1951
Profusulinella cf. *fittsi* (Thompson, 1935)
Profusulinella cf. *apodacensis* Thompson, 1948
Profusulinella cf. *ovata* Rauser-Chernoussova, 1951
Schubertella ex gr. *gracilis* Rauser-Chernoussova, 1951
Schubertella cf. *gracilis znensis* Rauser-Chernoussova, 1951
Schubertella gracilis Rauser-Chernoussova, 1951
Taitzehoella cf. *taitzehoensis* Sheng, 1951
Beedeina? sp.
Beedeina ex gr. *schellwieni* (Staff, 1912)
Beedeina (Dagmarella) sp.
Eofusulina paratriangula (Putrya, 1939)
Eofusulina cf. *paratriangula* (Putrya, 1939)
Fusulinella aff. *subpulchra* Putrya, 1938
Fusulinella aff. *simplicata* Toriyama, 1958
Fusulinella sp. 4

Biozone : Fusulinella Zone; Subzone A.
Correlation: Lower Moscovian; Kashirian; Upper Kashirian.
C_2^6(L) suite of the Donetz basin; probably L 6 or L 7.

Locality A 11-3

Ozawainella cf. *stellae* Manukalova, 1950
Ozawainella ex gr. *pseudoangulata* et *mosquensis*
Pseudostaffella cf. *compressa donbassica* Putrya, 1956
Pseudostaffella confusa (Lee & Chen, 1930)
Schubertella cf. *gracilis znensis* Rauser-Chernoussova, 1951
Schubertella ex gr. *inflata* Rauser-Chernoussova, 1951
Taitzehoella taitzehoensis extensa Sheng, 1958
Beedeina? sp.
Fusulina aff. *chernovi* Rauser-Chernoussova, 1951
Fusulinella aff. *simplicata* Toriyama, 1958
Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
(= F. colaniae Lee & Chen, 1930 *meridionalis* Raus.,1951*)*
Fusulinella sp. 4A

Biozone : Fusulinella Zone, Subzone B, subdivision B 1.
Correlation: Upper Moscovian; Podolskian; Lower Podolskian.
(Zone of Ozawainella stellae)
C_2^7(M) suite of the Donetz basin, probably M 1 or M 2.
Close to the boundary of the Lower and Upper Akiyoshian in Japan.

Locality A 12-1

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
Taitzehoella sp. 1
Fusulina aff. *aspera* Chernova, 1954
Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951

Biozone : Fusulinella Zone; Subzone B, subdivision B 1.
Correlation: Upper Moscovian; Podolskian; Middle Podolskian.
C_2^7(M) suite of the Donetz basin.

Locality A 12-2

Staffella (Parastaffelloides)? sp. (cf. *S.(P.) heteromorpha* (Bogush, 1963))
Pseudoendothyra cf. *plummeri* (Thompson, 1947)
Pseudoendothyra cf. *timanica* (Rauser-Chernoussova, 1951)
Pseudoendothyra cf. *subrhomboides* (Rauser-Chernoussova, 1951)
Pseudoendothyra cf. *holmensis* (Ross & Dunbar, 1962)
Ozawainella ex gr. *krasnokamski* Safonova, 1951
Ozawainella ex gr. *pseudoangulata* et *mosquensis*
Pseudostaffella rostovzevi Rauser-Chernoussova, 1951
Pseudostaffella ex gr. *paraozawai* Manukalova, 1951
Pseudostaffella ex gr. *gorskyi* (Dutkevich, 1934)
Schubertella ex gr. *obscura* Lee & Chen, 1930
Fusiella cf. *typica* Lee & Chen, 1930
Taitzehoella sp. 1
Fusulina ex gr. *kamensis* Safonova, 1951
Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
Fusulinella ex gr. *asiatica* Igo, 1957
Fusulinella sp. 5

Biozone : Fusulinella Zone; Subzone B, subdivision B 1 (top).
Correlation: Upper Moscovian; Podolskian; Middle to Upper Podolskian.
C_2^7(M) suite of the Donetz basin.

Locality A 12-3

Pseudostaffella rostovzevi Rauser-Chernoussova, 1951
Pseudostaffella sp. 9
Schubertella ex gr. *obscura* Lee & Chen, 1930
Taitzehoella sp. 2
Beedeina? sp.
Fusulina ex gr. *kamensis* Safonova, 1951
Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
Fusulinella ex gr. *bocki* Moeller, 1878
Fusulinella sp. 6

Biozone : Fusulinella Zone, Subzone B, subdivision B 2.
Correlation: Upper Moscovian; Podolskian; Upper Podolskian or Lower Myachkovian. Probably Upper Podolskian.
C_2^7(M) suite of the Donetz basin.

III. SYSTEMATIC DESCRIPTIONS

1. THE FUSULINID FAUNA OF SEVEN HORIZONS IN THE SECTION*)

L O C A L I T Y A 10 - 3

NON-FUSULINIDS

Planoendothyra cf. *aljutovica* (Reitlinger, 1950)
1 specimen, sl. 88, Plate I, Fig. 1
The specimen resembles a specimen in Rozovskaya, 1975 (pl. I, fig. 4) from the Vereyan of the U.S.S.R. The latter differs in having a larger diameter in the adult stage.

*) Measurements of diameter, radiusvector, and wall thickness are given in microns.

Planoendothyra cf. *spirilliniformis* (Brazhnikova & Potievskaya, 1948)
3 specimens, Plate I, Figs. 2-4

Slide	Nr. of wh.	D. prol.	D	W.th.
4	3½	33	448	12-13
45	4	-	526	13-14
82	4	-	±435	8-10

The wall consists of a tectum which overlies a thicker and distinctly more transparent layer. Locally mural pores are present.

Pl. spirilliniformis may have less well developed secondary deposits and a slightly smaller diameter.

Mediocris cf. *breviscula* (Ganelina, 1951)
3 specimens, Plate I, Figs. 5-7

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
4	3-3½	-	256	6-9	0.28	145	0.25
47	±2½	23	206	5-6	0.39	110	0.36
66	±2½	25	202	4-8	0.34	117	0.31

The species described as *Mediocris breviscula* form e by Saurin in 1970 is a very similar form. *M. breviscula celsa* Poyarkov, 1965 conforms in its over-all shape, but is slightly smaller. Close is also *M. evolutis evolutis* Rozovskaya, 1963.

Specimens belonging to the ARCHAEDISCIDAE are very rare, which indicates that the stratigraphical position of this part of the section (Text-fig. 1) is probably high in the Upper Bashkirian.

FUSULINIDS

Pseudoendothyra ex gr. *bradyi*
2 specimens, Plate I, Figs. 8-9

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
28	4½	-	705(4)	19-23	0.55(4)	410(4)	0.47(4)
34	5-5½	42	1100	29-34	0.69	600	0.63

The chomata or pseudochomata are narrow and of medium height. The wall shows the light brown-grey color typical of *Pseudoendothyra*.

The specimens resemble *Pseudoendothyra laotiana* Saurin, 1970, *Pseudoendothyra* sp. 2 of Saurin, 1970 and *Pseudoendothyra plummeri* (Thompson, 1947) but cannot be identified with any of these.

Pseudoendothyra sp. 1
1 specimen, Plate I, Fig. 10

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
26	4-4½	±18	549	12-16	0.65	312	0.60

The wall is silicified. The last half-whorl has a wide tunnel bordered by narrow and low to moderately high chomata or pseudochomata. The 3rd whorl shows umbilical depressions which in the umbonate poles of the last whorl are only weakly expressed.

The present specimen resembles *Pseudoendothyra crassa* Rozovskaya, 1963 as well as some species of the group of *Pseudoendothyra struvii* notably *Ps. struvii* (Möller, 1878), *Ps. nautiliformis* (Durkina, 1959) and *Ps. propinqua* (Vissarionova, 1948). These species have all been reported from Viséan strata of the U.S.S.R.

Millerella (Pseudonovella) cf. *uralica* (Kireeva, 1951)*)
(ex gr. *M.(P.) fragilis* et *elegantula*)
4 specimens, Plate I, Figs. 11-14

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
23	4½	±20	428	8-9	±0.33	245	±0.28	form 1
4	4	±29	340	8-10	±0.30	180	±0.27	" 2
6	4½	38	360	8-9	±0.36	190	±0.32	" "
87	4½	25	357	5-7	0.40	200	0.32	" "

Millerella (Pseudonovella) uralica has more whorls and a smaller diameter for corresponding whorls. Similar is also *M. variabilis* (Rauser, 1951).

Millerella (Pseudonovella) cf. *paraconcinna* Manukalova et al., 1969
(ex gr. *M.(P.) fragilis* et *elegantula*)
2 specimens, Plate I, Figs. 15-16

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
74	3½	20	290	8-9	0.45	175	0.37
88	3½	25	302	5-8	0.42	165	0.38

*) In Rauser-Chernoussova et al., 1951

The Spanish specimens are partly evolute in inner whorls; the last whorl is involute but there is no overlap i.e. the opposite half-whorls are just in contact.

This type of coiling permits to include the Spanish form and the similar *M. paraconcinna* in the subgenus *Pseudonovella*. *M.(P.) paraconcinna* has more whorls, a greater diameter, but a smaller diameter for corresponding whorls. Moreover, coiling is perhaps more evolute.

Millerella cf. *acuta* (Grozdilova & Lebedeva, 1950)
(ex gr. *M. acuta* et *mutabilis)*
6 specimens, Plate I, Figs. 17-22

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
76	3	54	398	6-9	0.37	202	0.37	form 1
93	3½	34	268	7	0.38	142	0.36	" 2
3	3½	34	483	7-8½	0.28	250	0.27	" 3
61	3-3½	24	370	8-9	0.37	230	0.32	" "
93(2)	4	23	395	-	0.39	225	0.35	" "

The Spanish specimens differ from *M. acuta* in their slightly larger L/D ratio. Another related species is probably *Millerella (Pseudonovella) irregularis* (Kireeva, 1949). It shows better expressed evolute coiling in inner volutions. The specimen in slide 3 resembles *Millerella samarica* Reitlinger, 1961.

Millerella cf. *acuta lata* (Kireeva, 1949)
2 specimens, Plate I, Figs. 23-24

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
84	3	25	218	7	0.55	126	0.51
9	4	21	310	8-9	0.40	175	0.36

The present specimens may differ from *M.* cf. *acuta lata* in having a smaller proloculum and more volutions. Moreover, they are probably more evolute in inner volutions. *Millerella primitiva* (Manukalova et al., 1969) which is somewhat similar as well, differs in being more umbonate.

Millerella cf. *pseudostruvei* (Rauser & Beljaev, 1936)
(ex gr. *M. pseudostruvei)*
8 specimens, Plate I, Figs. 25-32

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
3	3½	29	388	7-9	0.37	220	0.33
19(1)	3½	29	309	6-9	0.45	180	0.38
19(2)	3½-4	19	361	8	0.37	215	0.34
20	4	22	323	7-9	0.45	180	0.40
53	4	23	349	10-11	0.36	190	0.33
54	3½	34	307	8-9	0.44	168	0.41
62	4	23	286	7	0.50	155	0.46
88	3½	31	250(3)	8-9	0.43(3)	135(3)	0.41(3)

A close species is *M. pseudostruvei* which differs only in having a slightly larger L/D ratio. With respect to this parameter our specimens are transitional between the nominal species and two of its subspecies: *M. pseudostruvei angusta* (Kireeva, 1951) and *M. pseudostruvei losovskensis* (Manukalova et al., 1969).

Millerella cf. *bigemmicula* Igo, 1957
(ex gr. *M. pseudostruvei)*
4 specimens, Plate I, Figs. 33-36

Slide	Nr. of Wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
1	3½	35	333	8-11	0.47	180	0.41
2	3½	24	302(3)	6-9	0.54(3)	158(3)	0.47(3)
27	4	35	455	8-10	0.42	255	0.34
86	4	34	340(3½)	7-10	0.44	192(3½)	0.40

Millerella bigemmicula may differ in having tighter coiled inner whorls. Moreover, the illustrations of this species include specimens which are very slender and show deep umbilical depressions. Similar species are also *M. postmosquensis acutiformis* (Kireeva, 1951) and *M. pseudostruvei chomatifera* (Kireeva, 1951).

Millerella ex gr. *designata*
1 specimen, Plate I, Fig. 37

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
77	4½	35	563	14-17	0.42	305	0.35

The Spanish specimen resembles species of the group of *M. designata* Zeller, 1953 such as *M. porcupensis* Ross, 1967 and *M. derbyi* (Petri, 1956). These American species resemble species of the group of *M. pseudostruvei* but differ in their large size. Our specimen may be most similar to *M. derbyi*.

Millerella cf. *postmosquensis* (Kireeva, 1951)*)
(ex gr. *M. pseudostruvei*)
4 specimens, Plate I, Figs. 38-41

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
50	3½-4	21	262	7	0.50	145	0.44	form 1
58	3½	21	227	6-9	0.54	135	0.48	" "
59	4-4½	20	247	6-9	0.49	138	0.42	" "
89	3½-4	25	256	8-9	0.55	140	0.50	" 2

Our specimens differ from *M. postmosquensis* in their slightly smaller diameter for corresponding whorls besides having a somewhat smaller proloculum.

Millerella cf. *postmosquensis acutiformis* (Kireeva, 1951)*)
4 specimens, Plate I, Figs. 42-45

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
70	4	21	309	6-9	0.54	160	0.52	form 1
6	3½-4	25	294	6-10	0.52	170	0.45	" 2
18	4	27	285	5-9	0.54	155	0.51	" "
29	4½	29	382	10-12	0.52	205	0.47	" "

Form 1. The subspecies *acutiformis* probably has a slightly larger diameter for corresponding whorls. Similar is also *M. postmosquensis evoluta* (Potievskaya, 1958) which conforms in shell shape and in the evolute last half-whorl. However, this subspecies has only 3½ whorls, a larger diameter for corresponding whorls, and a more stable axis of coiling. Form 2. The subspecies *acutiformis* has a slightly larger diameter for corresponding whorls and possibly better developed secondary deposits. The periphery may be more acute. Our specimens resemble also *M. pseudostruvei* (Rauser & Beljaev, 1936) although according to the original description, this species has a L/D ratio which does not surpass 0.50.

Millerella ex gr. *transita*
2 specimens, Plate I, Figs. 46-47

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
50	3	27	197	7-8	0.49	105	0.45
88	3	24	229	6	0.49	135	0.40

The specimens resemble *Eostaffella prisca ovoidea* (Rauser, 1948) from the Kashirian (Rauser-Chernoussova et al., 1951, pl. 1, fig. 7) yet differ notably from the holotype and paratypes from Upper Viséan and Serpuchovian strata. Other similar species are *M. infirma* (Kireeva, 1949), *M. transita* (Kireeva, 1949) and *M. acuta lata* (Kireeva, 1949).

Millerella cf. *transita* (Kireeva, 1949)
5 specimens, Plate I, Figs. 48-52

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
18	3½	23	223	7-9	0.48	125	0.41
23	3½	30	223	6-8	0.46	125	0.46
54	3½	29	243	7-9	0.48	133	0.42
63	3½-4	23	231	6-7	0.54	122	0.49
75	3	27	231	6-9	0.43	128	0.37

The species of *M.* ex gr. *transita* are closely related to *M.* ex gr. *pseudostruvei*, but are smaller, possess less whorls, and have on average a smaller L/D ratio. The Pendueles specimens are similar to *M. transita*; the latter has a slightly larger diameter for corresponding whorls, shallower umbilical cavities, and a more loosely coiled last whorl.

Millerella cf. *exilis* (Grozdilova & Lebedeva, 1950)
(ex gr. *M. transita*)
2 specimens, Plate I, Figs. 53-54

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
7	3½	37	260	9	0.41	150	0.35
13	3	30	195	6	0.51	105	0.48

The Pendueles specimens are best compared with *Millerella exilis* (Grozd. & Leb.) and possibly belong to this species.

Millerella cf. *umbilicata* (Kireeva, 1951)*)
(ex gr. *M. umbilicata*)
1 specimen, Plate I, Fig. 55

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
8	4-4½	17	275	6-7	0.50	145	0.47

The single specimen is intermediate between *M. umbilicata* (Kireeva, 1951) and *M. postmosquensis* (Kireeva, 1951). The former has a slightly smaller diameter for corresponding whorls, better developed umbilical cavities and less developed secondary deposits.

*) In Rauser-Chernoussova et al., 1951.

Millerella cf. *marblensis* Thompson, 1942
(ex gr. *M. marblensis*)
2 specimens, Plate II, Figs. 1-2

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
50	3½-4	27	441	10	0.29	265	0.26
88	3½	-	521	9-12	0.27	318	0.22

Millerella marblensis has more volutions, a slightly larger proloculum, and probably more conspicuous chomata.

Ozawainella ex gr. *umbonata*
3 specimens, Plate II, Figs. 3-5

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
70	4½	-	607	10-14	0.35	315	0.34
75	5	26	648	8-13	0.30	325	0.26
93	4½-5	±25	607	12-16	0.41	336	0.35

The present specimens may be regarded as intermediate between *Millerella* and *Ozawainella*. If this form is considered to be an *Ozawainella*, it may be referred to *Ozawainella* ex gr. *umbonata*. The Spanish specimens attain a diameter of about 0.65 mm whereas for *O. umbonata* Brazhnikova & Potievskaya, 1948 a diameter of over 0.50 mm is reported. Similar are also species of the group of *Millerella acuta* et *mutabilis* such as *M. mutabilis* (Rauser, 1951), *M. acutissima umbonata* (Kireeva, 1949) and *M. mixta* (Rauser, 1951). These species of *Millerella*, however, are smaller than the Spanish specimens; yet *M. acutissima umbonata* and *M. mixta* may attain a maximum diameter of over 0.60 mm.

Ozawainella ex gr. *alchevskiensis*
2 specimens, Plate II, Figs. 6-7

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
17	4½	35	853	10-11	0.38	484	0.32
60	3-3½	21	435	6-10	0.40	245	0.34

The two specimens are presumably close to *O. alchevskiensis* Potievskaya, 1958 from which they differ in the even more loosely coiled spiral in the adult stage. They differ from *O. plana* Potievskaya, 1958 in possessing protruding poles. They differ from species of the group of *O. umbonata*. Brazhn. & Pot., 1948 in not having umbilical cavities.

Ozawainella cf. *alchevskiensis orbiculata* Vakarchuk, 1967*)
4 specimens, Plate II, Figs. 8-11

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
10	4½	25	533(4)	12-13	0.49(4)	306(4)	0.43(4)
24	4½-5	34	670	12-17	0.53	345	0.53
85	4½	25	595	10-15	0.49	305	0.48
92	4	-	625	8-15	0.47	375	0.41

The present specimens are probably best compared with *O. alchevskiensis orbiculata*. They differ in having somewhat better developed chomata, a more pronounced keel which can be observed in an earlier stage of growth, and perhaps a more loosely coiled spirotheca. With respect to these features some species of the group of *O. fragilis* such as *O. muromskensis* Manukalova et al., 1969 and *O. pogorevichi* Rauser, 1951 resemble our specimens even more.

Ozawainella cf. *paraumbonata* Potievskaya
1 specimen, Plate II, Fig. 12

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
22	5½	-	1000	15-21	0.47	525	0.46

The single specimen present differs from *O. paraumbonata* merely in its larger diameter for corresponding whorls. In this character it more resembles *O. mosquensis* Rauser, 1951 and *O. vozhgalica* Safonova, 1951. The two species differ in having better developed chomata. Moreover, *O. vozhgalica* has concavo-convex lateral sides and deeper umbilical cavities, and *O. mosquensis* is more distinctly rhomboidal.

Eostaffella ex gr. *parastruvei* (Rauser-Chernoussova, 1948)
3 specimens, Plate II, Figs. 13-15

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
15	4½-5	35	623	19	0.58	330	0.55
66(1)	4½	48	435(4)	15-17	0.57(4)	233(4)	0.54(4)
66(2)	4½-5	44	630	15-20	0.60	335	0.48

Our specimens have a slightly larger L/D ratio and probably slightly better developed chomata in comparison with the very similar *E. parastruvei* (Rauser). With respect to these features they are probably closer to *E. parastruvei chusovensis* Kireeva, 1949.

*) In Brazhnikova et al., 1967

Eostaffella (Eostaffellina) cf. *paraprotvae* Rauser-Chernoussova, 1948
1 specimen, Plate II, Fig. 16

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
92	3½	17	275	10-12	0.61	165	0.54

The single specimen present differs from *E. (E.) paraprotvae* in the better expressed plectogyroid coiling. It differs from species of the somewhat similar *Eostaffella (Plecto staffella)* and from *Millerella varvariensis* (Brazhnikova & Potievskaya, 1948) in its greater L/D ratio.

Eostaffella (Eostaffellina) vischerensis Grozdilova & Lebedeva, 1960
(= *E. paraprotvae vischerensis* Grozd. & Leb.)
1 specimen, Plate II, Fig. 17

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
67	4	30	270	11-14	0.75	148	0.70

The Pendueles specimen resembles very much the illustration of *E. paraprotvae vischerensis* presented by Grozdilova and Lebedeva in 1960. Unfortunately, instead of a description of this new subspecies the description of the nominal species was given, and unless a description has been added since there is only this illustration to compare with. A second similar form is *Eostaffella (Eostaffellina) zelenica* Durkina, 1959.

Pseudostaffella (Semistaffella) cf. *primitiva* Reitlinger, 1961
(ex gr. *Ps.(S.) variabilis*)
4 specimens, Plate II, Figs. 18-21

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
55	2½-3	52	235	8-9	0.82	122	0.80
57	2½	48	216	8-11	0.84	126	0.72
59	3	42	235	6-9	0.73	132	0.65
64	3	46	281	12-13	0.70	155	0.64

Wall homogeneous or with two layers i.e. a tectum and a less dense and thicker lower layer. Axis of coiling changes position throughout growth or becomes stable in the outer 2 half-whorls. The symmetrical or asymmetrical chomata vary in height from low to medium. The number of septa in the 1st and 2nd whorl is 5-6 and 9 respectively.

Our specimens and *Ps.(S) primitiva* are possibly conspecific although the L/D ratio is slightly greater in the Spanish specimens and in this respect are closer to *Ps.(S.) variabilis* Reitlinger, 1961.

Pseudostaffella (Semistaffella) minor Rauser-Chernoussova, 1951
(ex gr. *Ps.(S.) variabilis*)
2 specimens, Plate II, Figs. 22-23

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
69(1)	3½	42	265	8-13	1.01	153	0.88
69(2)	3-3½	32	252	10-11	0.95	143	0.84

Wall homogeneous; locally a tectum and a lower less dense and thicker layer may be observed. Axis of coiling changes position throughout growth. Chomata are either conspicuous in all whorls, or they appear in the 3rd whorl in the form of low and symmetrical mounds. The number of septa is 5-6 in the 1st whorl and 11 in the 3rd whorl.

Pseudostaffella (Semistaffella) cf. *minor* Rauser-Chernoussova, 1951
3 specimens, Plate II, Figs. 24-26

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
13	2½	44	202	10-11	1.06	113	0.95
20	3	42	231	8-11	0.87	130	0.77
85	3½	23	279	12-15	0.89	164	0.75

Wall homogeneous; locally a tectum and a lower less dense and thicker layer may be observed. Axis of coiling changes position in early whorls but remains stable in the outer 2-3 half-whorls. Chomata variable in shape: symmetrical or asymmetrical, low or fairly high, narrow or wide.

The present specimens possibly belong to *Ps.(S.) minor* but could be referred perhaps also to *Ps.(S.) pumilla* Grozdilova & Lebedeva, 1960. The difference between the two, if any there is, must be small.

Pseudostaffella (Semistaffella) ex gr. *variabilis*
1 specimen, Plate II, Fig. 27

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
59	3	33	193	8-11	0.85	106	0.78

Wall homogeneous; chomata appear in the last half-whorl. Number of septa is 8 in the 2nd whorl.

The single specimen resembles *Ps.(S.) variabilis* Reitlinger, 1961, *Ps.(S.) minor* Rauser, 1951, and *Ps.(S.) minjarica* Grozd. & Leb., 1954 but is smaller than any of these.

Pseudostaffella antiqua (Dutkevich, 1934)
(ex gr. *Ps. antiqua)*
3 specimens, Plate II, Figs. 28-30

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
36	4½	27	377	10-13	0.91	197	0.87
37	4½	40	372	12-13	0.95	200	0.85
87	5	29	459	12-15	1.04	262	0.87

The wall consists of two layers: a tectum and a less dense lower layer. Occasionally a lower tectorium can be distinguished as well. The tunnel in the adult stage is very low and wide. The inner 2-2½ whorls are at an angle to subsequent whorls.

Pseudostaffella kanumai Igo, 1957
(ex gr. *Ps. kanumai)*
3 specimens, Plate II, Figs. 31-32

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
43	5½	40	804	10-29	0.92	390(5)	0.82
49	5½	46	-	13-25	1.08(4½)	352	0.95
85	5-5½	40	697	19-21	0.92	385	0.94

The wall consists of three layers. The inner 2-2½ whorls are at an angle to subsequent whorls.

Species of the group of *Ps. kanumai* which include *Ps. rotunda* Douglass, 1971, *Ps. magnifica* Grozdilova & Lebedeva, 1954 and *Ps. globoidea* Potievskaya represent an advanced evolutionary stage in comparison with species of the group of *Ps. antiqua* from which they may have evolved. Intermediate between both groups may be *Ps. antiqua grandis* Shlykova, 1950. One of our specimens (Sl.43) is closely similar to a specimen referred to *Ps. antiqua grandis* by Bogush (Bogush, 1963, pl. III, fig. 5).

Pseudostaffella sp. 8
2 specimens, Plate II, Figs. 33-34

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
11	2½	105	508	17-21	1.03	262	0.89
17	3	74	492	16-17	0.83	258	0.80

The wall consists of three layers including a relatively thin upper tectorium. The specimen in slide 17 with the smaller proloculum has its inner 2 whorls at a large angle to subsequent whorls, whereas the specimen with the larger proloculum shows hardly any shift of the axis.

The two specimens are primitive members of the genus *Pseudostaffella* somewhat similar to some species of *Ps.* ex gr. *compressa* and *Ps.* ex gr. *antiqua* as well as some species referred to the subgenus *Semistaffella*. A most conspicuous feature is the large proloculum by which it resembles *Ps. yukonensis* Ross, 1967. The latter species, however, is obviously more advanced in comparison with our Spanish specimens.

Profusulinella ex gr. *parva*
2 specimens, Plate II, Figs. 35-36

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
35	4	-	558	15-19	1.65	303	1.51
79	3	81	541	21-23	1.48	287	1.40

These short fusiform specimens have a wall which consists of three layers. The septa are plane or very weakly fluted at the poles. Chomata extend till the poles in the inner 2-3 whorls they are high or of medium height.

Similar specimens have been described and illustrated by Manukalova (Man. et al., 1969, pl. XX, p. 139, figs. 2-4) which were referred to *Pr. convoluta* (Lee & Chen, 1930). Similar are also some species of *Schubertella* notably *Sch. glendalensis* (Cassity & Langenheim, 1966) which differs in its smaller size.

Profusulinella ex gr. *primitiva*
1 specimen, Plate II, Figs. 37-37a

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
10	4½	36	558	13-21	2.47	312	2.21

The inner whorls, probably of nautiloid shape, are at an angle to subsequent whorls. A sharp increase in the L/D ratio occurs from the 3rd to the 4th whorl and the specimen attains an inflated elongate fusiform shape. The septa are straight and only slightly fluted at the poles of the 4½ whorl. The tunnel is relatively narrow and has a slightly irregular path. The chomata are of medium height or high, and show a steep slope at the tunnel side; they are wide and possibly extend till the poles in the inner 3 whorls. The wall structure is obscure; locally a tectum may be observed.

The single specimen present bears some resemblance to *Profusulinella primitiva pterix* Rauser, 1961 as well as to *Profusulinella extensa* Rauser, 1961 in the inflated median region. Both species, however, are slightly larger, have more volutions, and the inner whorls are more elongated. It is very similar to a specimen referred to *Profusulinella extensa* by Ektova (Ektova, 1976, pl. VII, fig. 13).

Profusulinella cf. *staffellaeformis* Kireeva, 1951*)

3 specimens, Plate II, Figs. 38-39

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
70	6	65	918	21-38	1.21	508	1.10
80	5½	80	853	25-34	1.31	476	1.17
72	3½	59	361	10-15	1.09	210	0.92

The wall comprises two or three layers and consists of a tectum underlain by a thicker and less opaque layer, and locally a thin upper tectorium. Chomata are low or of medium height and asymmetrical; their maximum width is reached in the 4th whorl where extension is till the poles; they stay wide in subsequent whorls, and have a steep slope, in the adult more often a low slope at the tunnel side. Septa are almost plane. The inner 1-1½ whorl is at a large angle to the succeeding whorls. The specimen in slide 72 is considered to be immature.

Kireeva's species has somewhat less volutions and is smaller in diameter and length, but measurements for corresponding whorls match pretty well. The Spanish form has thicker walls and a larger proloculum. *Profusulinella staffellaeformis* of larger size and corresponding in this respect to our specimens, are recorded from the Subvereyan in the U.S.S.R.

Eowedekindellina? sp.

3 specimens, Plate II, Figs. 40-42

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count (1-4th whorl)
14	1½	156	328	-	-	205	2.32	
44	4	136	918	28-30	-	484	-	
66	2½-3	157	635	25-29	-	360	-	8 16 - -

The wall structure is either obscure or comprises two layers i.e. a tectum and a lower less dense layer; the presence of an upper tectorium is doubtful. Chomata are high and reach the poles in inner 2½ whorls; in the 3½-4th whorl they are narrow and of medium height. The tunnel path seems to be fairly regular. Septa are straight. Axial filling is probably present, albeit weakly developed.

The relation of the specimens may be close to *Eowedekindellina*, *Verella* or *Profusulinella*. Unfortunately specimens of this species are rare and the thin sections available yielded only a central-oblique section, a sagittal section and a section of a young specimen. Ill-represented as the species may be, a description of it is included because of the importance it has for the establishment of the chronostratigraphic level of locality A 10-3.

Schubertella ex gr. *obscura*

2 specimens, Plate II, Fig. 43

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
19	2	76	235	8-13	0.98	126	0.92
21	3	82	377	12-21	1.09	205	1.00

The wall consists of a tectum and a lower less dense layer. Chomata are observed from the 1½ whorl; they are between 1/4 and 1/3 of the chamber height and symmetrical. The 1st whorl may be obliquely coiled.

The two specimens are transitional between *Sch. obscura* as described by Sheng (Sheng, 1958, pl. II, figs. 21-26) or *Sch. obscura* of Toriyama (Toriyama, 1958, pl. I, figs. 10-14) and *Sch.* ex gr. *obscura* in van Ginkel, 1965, pl. XXIII, figs. 13-16. The latter species from the Piedras Luengas Limestone (Loc. P 1) is larger and almost lacks chomata.

Schubertella obscura mosquensis Rauser-Chernoussova, 1951

6 specimens, Plate II, Figs. 44-49

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
13	3	52	361	12-13	1.05	210	0.90
52	3	57	298	10-13	1.06	157	0.92
72	2½-3	57	256	10-11	1.08	144	0.95
76	2½	67	344	8-17	0.83	191	0.72
78	2½	50	256	8-13	0.92	147	0.80
83	3½	67	312(3)	8-19	1.28(3)	181(3)	1.13(3)

The wall is homogeneous or more commonly comprises three layers.

Our specimens conform to the original description and illustration of *Schubertella obscura mosquensis* Rauser.

Schubertella cf. *toriyamai* (Ishii, 1962)

(ex gr. Sch. obscura)

1 specimen, Plate II, Fig. 50

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
8	2½	59	298	10-13	1.27	170	1.11

The wall is either homogeneous or shows locally a tectum underlain by a less dense layer. The chomata are wide, asymmetrical, and fairly low in inner 2 whorls; they are indistinctly developed in the 2½ whorl. The tunnel is rather narrow.

This specimen resembles *Schubertella toriyamai* in its over-all shape. *Sch. toriyamai* may have still less developed chomata. Our form is transitional between *Sch. toriyamai* and *Sch. obscura* or *Sch. obscura mosquensis*.

*) In Rauser-Chernoussova et al., 1951.

L O C A L I T Y A 11 - 1

Staffella (Parastaffelloides) ex gr. *pseudosphaeroidea*
2 specimens, Plate III, Figs. 1-2

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
31	6-6½	57	1490	37-50	0.81	804	0.76
63	6	65	1165	29-42	0.96	623(6)	0.90

The two specimens present have a low, relatively wide tunnel.

Similar species are: *St.(P.) keltmensis* (Rauser, 1949), *St.(P.) breimeri* van Ginkel, 1965 and *St.(P.) pseudosphaeroidea* Dutkevich, 1934. There is also a striking resemblance to specimens from the Cantabrian Piedras Luengas Limestone (vide *Staffella* ex gr. *pseudosphaeroidea* Dutk., pl. VI, p. 15 in van Ginkel, 1965) and perhaps even more to specimens from the lower part of the Lower Marine Group of NE Greenland (vide *Pseudostaffella?* ex gr. *pseudosphaeroidea* (Dutk.), pl. 2, pp. 15-17 in Ross & Dunbar, 1962).

Millerella (Pseudonovella) cf. *variabilis* (Rauser-Chernoussova, 1951)
(ex gr. *M.(P.) irregularis)*
1 specimen, Plate III, Fig. 3

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
77	3	32	252	6-7	0.37	130	0.32

Millerella variabilis differs in having more volutions (= 3½-4) and possibly a somewhat smaller diameter for corresponding whorls. Similar is also *M. aperta* (Grozd. & Leb., 1950). The latter, however, is more clearly evolute.

Millerella korobcheevi (Rauser-Chernoussova, 1951)
(ex gr. M. lepida)
1 specimen, Plate III, Fig. 4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
81	3	44	276	8-10	0.45	160	0.37

The Spanish specimen conforms to the original illustration and description of *Millerella korobcheevi* except for a slightly smaller diameter for corresponding whorls and a slightly larger number of whorls in Rauser's species. Also similar is *M. lepidaeformis minima* (Kireeva, 1949). Our specimen should be assigned to the latter if *M. korobcheevi* should turn out to be a synonym of Kireeva's subspecies.

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
1 specimen, Plate III, Fig. 5

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
49	6½	29	935	16-21	0.46	476	0.43

This specimen is somewhat similar to *O. leei* (Putrya, 1939) but differs in its less rhomboidal shape and deeper umbilical cavities in outer whorls. The last whorl in our form not fully embraces the preceding one and in this respect it is rather similar to *O. pseudoangulata* (Putrya, 1939). However, our specimen is smaller and has a more thickset rhomboidal outline.

Ozawainella cf. *vozhgalica* Safonova, 1951*)
(ex gr. *O. pseudoangulata* et *mosquensis)*
1 specimen, Plate III, Fig. 6

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
67	6	36	1100	15-17	0.37	558	0.37

The Spanish specimen differs from *O. vozhgalica* in its smaller L/D ratio.

Pseudostaffella cf. *umbilicata* (Putrya & Leontovich, 1948)
2 specimens, Plate III, Fig. 7; Plate IV, Fig. 16

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
50	6½	46	910	12-21	0.79	490	0.74	(Loc. A 11-1)
20	6½	55	935	9-29	0.91	507	0.81	(Loc. A 11-2)

The Spanish specimens resemble a specimen from Russia of Kashirian age referred to *Ps. umbilicata* (Putr. & Leont.) by Rauser-Chernoussova (Rauser-Chernoussova et al.,1951, pl. VII, fig. 9).

Profusulinella cf. *pseudorhomboides* Putrya, 1948
(ex gr. *Pr. pseudorhomboides)*
1 specimen, Plate III, Fig. 8

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
8	6	132	1295	21-36	1.95	672	1.90

*) In Rauser-Chernoussova et al., 1951.

The present specimen is inflated subrhomboidal in the outer whorls. The wall consists of a tectum and a lower less dense layer which is slightly more transparent than the chomata. Locally a third layer, the upper tectorium, may be observed. Chomata are of moderate height and extend to the poles in the inner 3½ whorls; in subsequent whorls they are fairly low and narrow close to the tunnel, and show a poleward continuation in the form of a thin sheet covering the lateral slopes. The tunnel is relatively narrow and its path slightly irregular. Septa are essentially straight in inner whorls and only slightly twisted at the poles from the 3rd whorl onwards.

Profusulinella pseudorhomboides has a slightly larger L/D ratio, more volutions and a smaller proloculum.

Profusulinella cf. *nibelensis* Rauser-Chernoussova, 1951
(*Pr. nibelensis* Rauser, 1951 = *Pr. rhombiformis* Brazhn. & Pot. var. *nibelensis* Raus, 1951 by bringing to species level the latter subspecies)
(ex gr. *Pr. rhomboides*)
1 specimen, Plate III, Fig. 9

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
11	4	139	902	19-29	1.65	492	1.52

The single specimen has a rhomboidal shell. The wall consists of a tectum and a less dense lower layer; locally an upper and lower tectorium may be present; the wall is homogeneous in the inner 2 whorls. The chomata are high or of medium height, and low only in the 4th whorl; they extend till the poles in the inner 3 whorls, but width is considerably reduced in the 4th whorl where a symmetric to subsymmetric shape is attained. The tunnel is narrow and its course regular. Septa are straight in the inner 1½ whorls; at the poles of the 3rd and 4th whorl a coarse meshwork of folded septa is observed.

Profusulinella nibelensis Rauser has a larger proloculum and a smaller number of whorls. Other similar species are *Pr. topiliensis* (Putrya, 1938), *Pr. wangyui* Sheng, 1958 and *Pr. wangyui yentaiensis* Sheng, 1958.

Profusulinella cf. *rhomboides* (Lee & Chen, 1930)
(ex gr. *Pr. rhomboides*)
1 specimen, Plate III, Fig. 10

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
5	5½	46	750	19-25	1.46	420	1.29

The rhomboidal-shaped specimen has a homogeneous wall in the inner 2½ whorls and a two--layered wall comprising a tectum and a lower layer in subsequent whorls. The lower layer is more transparent than the chomata. The chomata appear in the 2½ whorl, extend up to the poles in the 3½ whorl, remain wide and asymmetrical up to the 5th whorl, and become narrow and symmetrical in the 5½ whorl; they are of medium height or high. The tunnel is narrow and follows a regular path. Septa are straight in the inner 3½ whorls and are somewhat twisted at the poles in later whorls. The inner 1½ whorl is at a large angle to subsequent whorls.

This specimen may be considered to be intermediate between *Pr. rhomboides* (Lee & Chen, 1930) and *Pr. parva* (Lee & Chen, 1930) or *Pr. parva convoluta* (Lee & Chen, 1930). It resembles rather closely the smaller rhomboidal type of *Pr. rhomboides*.

Profusulinella ovata penduelesensis subsp. nov.
(ex gr. *Pr. ovata*)
22 specimens including 2 sagittal sections; Plate III, Figs. 11-19; Plate XI, Figs. 1-22.
The description of this new subspecies follows at the end of the chapter (p. 235).

Profusulinella ex gr. *prisca*
1 specimen, Plate III, Fig. 20

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
61	7	52	1295	23-38	1.46	690	1.37

The short rhomboidal specimen has a two-layered wall; in the outer 3 whorls the layer below the tectum is clearly more transparent than the chomata; in the 7th whorl a lower tectorium may be observed below the transparent layer which latter is to be considered the diaphanotheca; no differentiation of the wall is observed in the inner 2½ whorls. Chomata are inconspicuous in inner 2 whorls, wide and moderately high or low in the 3-4th whorl, and narrow, moderately high and symmetrical in subsequent whorls; they have a steep slope at the tunnel side. The tunnel is narrow and the tunnel path regular except for a deviation in the 7th whorl. Septa are plane in inner 3 whorls and weakly folded at the poles in the 4th whorl; in subsequent whorls the folding is rather intense and regular although septal loops are still absent.

The specimen conforms in its shape, dimensions, number of whorls and septal folding to *Pr. paratimanica* Rauser, 1951, *Pr. prisca timanica* Kireeva, 1951, and *Pr. prisca guebleri* van Ginkel, 1965. It differs from *Pr. prisca guebleri* and probably also from the other two species in the wider chomata in inner whorls. *Pr. fukujiensis* Igo, 1957 is similar as well but it is a somewhat smaller species.

Profusulinella cf. *fittsi* (Thompson, 1935)
(ex gr. *Pr. pararhomboides)*
2 specimens, Plate III, Fig. 21; Plate IV, Fig. 19

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
15	5	101	763	19-25	1.50	402	1.43	(Loc. A 11-1)
65	3½	117	525	16-21	1.69	279	1.59	(Loc. A 11-2)

Mature specimens are fusiform or rhomboidal and show in the outer 2-3 whorls a wall which comprises a tectum, an upper tectorium, and a layer below the tectum of less density than the upper tectorium. Wide chomata which may extend till the poles appear in the 2nd whorl; in the 5th whorl the chomata are seemingly symmetrical and narrow, although possibly extending till the poles as a very thin lining of the chamber floor; they are high or of medium height up to the 4½ whorl and lower thereafter. The tunnel is narrow and it follows a regular path. The septa are plane.

The Spanish specimens differ from *Profusulinella fittsi* by their larger proloculum, smaller L/D ratio, and even better developed chomata.

Profusulinella cf. *apodacensis* Thompson, 1948
(ex gr. *Pr. apodacensis)*
2 specimens, Plate III, Fig. 22; Plate IV, Fig. 20

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
73	6½	65	1260	± 30	2.49	640	2.45	(Loc. A 11-1)
37	6½	59	1100	19-25	1.91	607	1.73	(Loc. A 11-2)

The rhomboidal to elongate fusiform specimens show a three-layered wall typical of *Profusulinella*. The chomata persist till the poles in the inner 4 whorls, remain wide up to the 5-5½ whorl, are narrow and symmetrical in the 6th whorl and absent in the 6½ whorl; they are of medium height, but in the earliest and latest whorl low or absent; their slope at the tunnel side is steep. The tunnel is narrow and its path irregular. Septa are straight in inner 3-5 whorls and weakly and irregularly folded at the poles of later whorls. The 1st whorl is at a slight angle to subsequent whorls.

The Spanish specimens differ from the American species from New Mexico by their thicker wall, by the presence in the last half-whorl of folded septa spread well into the median area and on occasion a septal loop.

Aljutovella cf. *complicata* Safonova, 1951*
(ex gr. *Al. priscoidea)*
2 specimens, Plate III, Figs. 23-24

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
82	7½	38	1575(7)	55(7)	1.93(7)	860(7)	1.76(7)
76	5½	-	950	29	2.24	525	1.95

The adult stage shows a subrhomboidal shell with straight or more rarely concave lateral sides. The wall includes a tectum and a less dense lower layer. In outer whorls starting with the 3½ whorl, this layer below the tectum is slightly more transparent than the tectoria and the chomata. Tectoria are only locally present and quite thin. A diaphanotheca may be distinguished as such from the 5½ whorl onwards. Chomata in the inner 3-3½ whorls often extend to the poles; in subsequent whorls they are either rather wide, showing an abrupt decrease in height towards the poles, or are narrow; their height near the tunnel varies from moderately high to high; the slope at the side of the tunnel is steep. The tunnel is narrow and its path irregular. Septa are straight in inner 2-2½ whorls and weakly or rather intensely folded at the poles of subsequent whorls. The 1st whorl is obliquely coiled.

The Spanish form, though having almost a Fusulinella-type wall structure in outer whorls, not resembles such typical Lower Moscovian species of *Fusulinella* as are included in *Fusulinella* ex gr. *praebocki* and *Fusulinella* ex gr. *schubertellinoides*. Rather it resembles, and could be a further evolutionary development of *Aljutovella complicata* or *Al. artificialis* Leontovich, 1951. Both species are slightly smaller and in *Al. complicata* the L/D ratio apparently does not surpass 1.86. Moreover, the wall structure of both species of *Aljutovella* is more primitive because a diaphanotheca is only present in the ultimate whorl *(Al. complicata)* or is absent altogether *(A. artificialis)*.

Aljutovella ex gr. *priscoidea*
1 specimen, Plate III, Fig. 25

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
24	7	44	1640	29-36	1.74	900	1.58

The test is short fusiform to subrhomboidal with straight or slightly convex lateral sides (3-7th wh.). The wall is homogeneous in the inner 2 whorls; in the 3rd whorl a tectum and a lower layer which is less opaque than the chomata is observed; from the 4th whorl onwards this lower layer is quite transparent; tectorial deposits are very thin or absent. Chomata appear in the 2½ whorl; up to the 4½ whorl they are asymmetrical and wide but do not extend till the poles; thereafter, the relative width decreases rapidly and chomata are narrow and symmetrical in the 6½-7th whorl; relative height decreases from moderately high up to the 6th whorl, to low

*) In Rauser-Chernoussova et al., 1951.

in the outer whorl; they have a steep slope at the tunnel side in all whorls except the ultimate. The tunnel is narrow, especially in inner whorls; it follows a slightly irregular path. The septa are straight in inner whorls and somewhat irregularly folded in a narrow axial zone in outer whorls. Septal loops are absent, though in the outer whorls of mature specimens they do occur sometimes. The lenticular 1st whorl is obliquely coiled.

The systematical position of the present specimen is intermediate between *Aljutovella priscoidea* (Rauser, 1938) and *Aljutovella saratovica* (Putrya & Leontovich, 1948). The latter species has a thinner wall, a larger L/D ratio, more developed septal folding and less globose whorls. *A priscoidea* differs in its smaller size, less pointed and shorter inner whorls, and smaller L/D ratio which does not surpass 1.5.

*Aljutovella? (*cf. *Aljutovella cybaea* Leontovich, 1951*)* *)

1 specimen, Plate III, Fig. 26

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
36	5	111	1050	17-29	1.70	565	1.58

The subrhomboidal-shaped specimen has a homogeneous wall in the inner 2 whorls, and shows an indistinctly differentiated wall - tectum and lower less dense layer - in the succeeding whorls. The chomata are of medium height or high; they appear as early as the 1st whorl and extend till the poles up to the 2½ whorl; in outer whorls they are narrow, often symmetrical; in the last half-whorl chomata are absent; the slope at the side of the tunnel is steep. The tunnel is narrow. Septa are straight in inner 2½-3 whorls; in subsequent whorls folding is fairly regular but not intense, and extends some way onto the lateral slopes. Septal loops are present.

The systematic position is considered to be transitional between *Aljutovella* and *Profusulinella*. It differs from typical *Aljutovella* in the well-developed chomata in inner whorls. Our specimen resembles *Profusulinella wangyui* Sheng, 1958, but probably is more closely allied to *Aljutovella cybaea*.

Schubertella ex gr. *gracilis*

3 specimens, Plate III, Figs. 27-29

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
26	5½	36	410(4½)	17-22	1.60(4½)	246(4½)	1.37(4½)
35	4	46	377	12-17	1.48	214	1.30
80	4-4½	29	365	15	1.70	210	1.45

Mature specimens are short fusiform. The wall comprises 2-4 layers i.e. a tectum, a lower less dense layer and occasionally an upper and/or lower tectorium. Sometimes, as in the specimen of slide 35, the wall is homogeneous. The chomata which appear in the 3rd whorl attain a height of almost half the chamber height; they are asymmetrical and wide in the 3-4th whorl and become relatively narrower with growth; the slope at the tunnel side is generally steep. The inner 1-2 whorls are at a large angle to subsequent whorls. One or two large septal loops may be present at the poles of the 3-4th whorl.

The Spanish form resembles in particular two species from the group of *Sch. gracilis* i.e. *Schubertella elliptica* Putrya, 1956 and *Schubertella gracilis* Rauser, 1951. The former differs in having less whorls and a slightly larger proloculum; the latter shows similar differences, has moreover a smaller L/D ratio, and perhaps a more rhomboidal shape.

Beedeina cf. *bona lenaensis* van Ginkel, 1965
(ex gr. B. schellwieni)

5 specimens, Plate III, Figs. 30-32

Slide	Nr. of wh.	D. prol	D	W.th.	L/D	R.v.	F.r.	Septal count (1-5th whorl)
40	4½	126	951(4)	25-46	2.07	508(4)	1.94	
69	5	99	1435	29-42	2.51	810	2.23	
21	5	156	1605	25-38	-	869	-	10 14 19 20 28
41	5½	130	1425	17-31	-	762	-	10 14 15 19 22
66	5	153	1510	21-38	-	820	-	9 18 19 22 26

Mature specimens are subrhomboidal. The wall is fusulinellid, comprising four layers from the 3-4th whorl onwards. The chomata are wide in inner 1½-2½ whorls, narrow rounded or subquadratic in subsequent whorls, and occasionally absent in the 5-5½ whorl; they have usually steep slopes at the tunnel side. The tunnel is narrow and its path regular. Septal folding starts at the poles of the 2nd whorl; the high but somewhat irregular folding extends from pole to pole from the 4½ whorl onwards.

The present species differs from *Beedeina bona lenaensis* in its slightly larger form ratio, slightly larger proloculum and in not showing the sudden increase in height of the last whorl as is sometimes observed in *B. bona lenaensis*. The Pendueles specimens may be compared also with primitive members of *Beedeina* ex gr. *elegans*. Somewhat similar is *B. elegans* (Raus. & Belj., 1937) but this species is more advanced and differs in having more volutions, a larger size, a tighter spiral and more regular septal folding. Some primitive American species of *Beedeina* such as *B. kayi* (Thompson, 1934) and *B. casperensis* (Thompson & Thomas, 1953) are similar as well. *B. konnoi* (Ozawa, 1925) from China and Japan may be yet another species allied to our Spanish form.

*) In Rauser-Chernoussova et al., 1951.

Eofusulina paratriangula (Putrya, 1939)
9 specimens, Plate III, Fig. 33; Plate V, Figs. 1-3

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count
32	3	312	1310	-28	5.85	680	5.55	(Loc. A 11-1)
75	5	23	1250	-35	-	-	-	
86	1-1½	230	566	-	-	-	-	
9	3-3½	254	-	27-33	-	890	4.95	(Loc. A 11-2)
15	3	279	1360	29-37	5.55	705	5.35	
41	3	377	1265	31-42	-	656	-	(1-3rd whorl)
6	3-3½	260	1345(3)	29-42	-	770(3)	-	10 26 33
8	3-3½	252	1280(3)	25-34	-	722(3)	-	12 28 37

The test changes from triangular, subrhomboidal or fusiform in the inner 1-1½ whorls to elongate fusiform or subcylindrical in the succeeding whorls. The wall consists of a tectum and a less dense lower layer or is - more rarely - homogeneous; locally fine mural pores are faintly visible. In macrospherical specimens chomata are present only in the 1st whorl. The septal folding is high and regular, and the wave length is relatively small; from the 1½ whorl onwards the folding extends from pole to pole. Axial filling is absent or very weakly developed.

Fusulinella aravanensis Bogush, 1960
(ex gr. *F. praebocki)*
3 specimens, Plate III, Figs. 34-35

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
10	6	57	1025	25-34	1.86	558	1.71
22	6	34	1075	27-34	1.86	549	1.82
34	6	55	-	26-31	-	590	1.81

Mature specimens are fusiform with straight, slightly convex or slightly concavo-convex lateral sides. The wall consists of two layers of which the layer below the tectum is less dense than the chomata; an upper tectorium is only locally present and very thin; in outer whorls one may observe a not very transparent diephanotheca between the lower tectorium and the tectum; in inner 2-3 whorls the wall is apparently homogeneous. Chomata appear in the 1½-2½ whorl; up to the 4th whorl they are commonly low and wide; from the 4th whorl onwards they are of medium height and narrow, and in the 5-6th whorl occasionally symmetrical; they have a steep slope at the tunnel side. The septa are plain in the inner 3-4 whorls and are irregularly folded at the poles of the succeeding whorls. The first whorl is obliquely coiled.

The Spanish specimens conform well to the description and illustration of this species by Bogush. It is also similar to the form referred to *Aljutovella aljutovica* (Rauser, 1938) by Bogush (Bogush, 1963, pl. IV, fig. 6). *A. aljutovica* has a thinner and perhaps more primitive wall, besides having somewhat smaller dimensions. The lateral sides are slightly undular in our specimens and this is probably not so in *A. aljutovica*.

L O C A L I T Y A 11 - 2

Staffella (Parastaffelloides) cf. *expansa* Thompson, 1947
(ex gr. St.(P.) expansa)
1 specimen, Plate IV, Fig. 1

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
59	7	±41	1540	30-60	0.55	805	0.53

A conspicuous feature of this specimen is the very thick wall; tectum and diaphanotheca have a total thickness of 20-45 microns; tectoria have been observed only locally.

The present specimen in comparison with *St.(P.) expansa* has a much thicker wall. Very similar is also *Staffella (Parastaffelloides) heteromorpha* (Bogush, 1963) which has better developed umbilical cavities throughout growth, and a thinner wall. More remotely similar are *Staffella (Parastaffelloides) akagoensis* Toriyama, 1958 and *Staffella (Parastaffelloides) norwayensis* (Saurin, 1967).

Pseudoendothyra ex gr. *bradyi* (Möller, 1878)
3 specimens, Plate IV, Figs. 2-4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
33	6	49	1505	21-42	0.51	795	0.48
42	6	37	1310	29-42	0.56	656	0.56
74	5½	54	1425	≥25	0.64	754	0.64

The wall structure is obscure but locally one may observe a relatively thick protheca and a thin upper and lower tectorium. Chomata height ranges from 1/3 to 1/2 of the chamber height.

The Spanish specimens are best compared with *Pseudoendothyra rezwoi* Bogush, 1963 and *Pseudoendothyra holmensis* (Ross & Dunbar, 1962). The systematic position is considered to be intermediate between the two, though *Ps. rezwoi* is probably closer to the Spanish form.

Pseudoendothyra cf. *bradyi* (Möller, 1878)
2 specimens, Plate IV, Figs. 5-6

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D.	R.v.	F.r.
28	7	53	1285	16-21	0.52	665	0.50
48	6	147	1410(5½)	21-33	0.70	770	0.64

The yellow-brown wall does not show any differentiation. The chomata are fairly high, probably extend till the poles, and have a low slope at the tunnel side. The specimen in slide 48 may represent a macrosphere, and measurements of this specimen correspond to those presented by Möller.

A closely allied species from the Cantabrian mountains is *Ps. bradyi cantabrica* (van Ginkel, 1965).

Pseudoendothyra plummeri (Thompson, 1947)
(ex gr. *Ps. bradyi)*
5 specimens, Plate IV, Figs. 7-11

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
1	5	50	754	17-29	0.61	426	0.54
4	5½	45	1195	21-35	0.51	720	0.42
46	4½	37	752	16-25	0.50	394	0.48
49	5½	54	1085	21-29	0.66	574	0.63
60	6	29	1395	21-30	0.45	771	0.40

Specimens show flat or umbonate poles; umbilical cavities absent or very shallow; the periphery is bluntly pointed to rounded; the lateral sides are straight or slightly concavo-convex. The wall structure is difficult to discern, yet in some specimens a tectum and a diaphanotheca may be observed; tectoria are apparently absent. The chomata are usually narrow and low.

The present specimens are referred to *Pseudoendothyra plummeri* (Thompson) although this species has a somewhat thinner spirotheca.

Pseudoendothyra sp. 2
1 specimen, Plate IV, Fig. 12

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
17	5-6	-	1490	15-25	0.43	770	0.42

Inner whorls show a more or less acute periphery, the middle whorls are rounded, and the outer whorls are acute again. The outer whorl has concavo-convex lateral sides which at the poles are just in contact with the lateral sides of the previous halfwhorl. The spirotheca is tightly coiled and has well-developed umbilical cavities throughout growth.

The specimen cannot be referred to any of the species to which comparisons were made, and may represent a new species.

Ozawainella ex gr. *fragilis*
1 specimen, Plate IV, Fig. 14

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
12	5	40	1175	13-21	0.32	672	0.30

The single specimen is loosely coiled and has relatively few whorls which features distinguish it from species of the group *O. pseudoangulata* et *mosquensis*. Of all species of the latter group the most similar is *O. vozhgalica* Safonova, 1951. The Spanish specimen is closer to the group of *O. fragilis* and resembles such species as *O. convexa* Potievskaya, 1958 and *O. maximensis* Manukalova, 1950. Somewhat similar is also *O. adducta* Manukalova, 1950.

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
1 specimen, Plate IV, Fig. 15

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
64	5½-6	45	1295	16-28	0.47	689	0.43

The specimen is similar to *Ozawainella kumpani* Sosnina, 1951. The Spanish form has probably more slender inner whorls which possess small umbilical cavities. With respect to these properties our specimen is more similar to *Ozawainella vozhgalica* Safonova, 1951.

Pseudostaffella cf. *umbilicata* (Putrya & Leontovich, 1948)
See below the discussion of the species from locality A 11-1 (p. 215).

Pseudostaffella cf. *larionovae mosquensis* Rauser-Chernoussova, 1951
(ex gr. *O. parasphaeroidea* et *larionovae)*
2 specimens, Plate IV, Figs. 17-18

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
3	6	46	681	16-21	0.81	369	0.76
73	6	42	738	12-21	0.80	394	0.76

The Spanish specimens in comparison with *Pseudostaffella larionovae mosquensis* may have slightly higher chomata and in this respect are probably closer to the other subspecies: *Pseudostaffella larionovae polasnensis* Rauser & Safonova, 1951. Particularly the specimen in slide 73 resembles the latter subspecies.

Profusulinella cf. *fittsi* (Thompson, 1935)
See below the discussion of the species from locality A 11-1 (p. 217)

Profusulinella cf. *apodacensis* Thompson, 1948
See below the discussion of the species from locality A 11-1 (p. 217)

Profusulinella cf. *ovata* Rauser-Chernoussova, 1938
(ex gr. Pr. ovata)
1 specimen, Plate IV, Fig. 21

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
67	4½	53	590	17-21	1.92	320	1.75

The wall of this fusiform specimen consists of a tectum and a lower less dense layer; this lower layer in the ultimate half-whorl becomes fairly transparent and is here underlain by a tectorium. The upper tectorium can be distinguished only below the tunnel. The chomata reach the poles in the inner 2½-3 whorls, with the exception of the 1st whorl in which chomata apparently are absent; they stay wide after the 3rd whorl and extend about 1/2-3/4 of the distance to the poles along the lateral slopes; in the last half-whorl width has decreased to 1/4 of the possible maximum extension. The tunnel path is symmetrical and the tunnel angle 40° (4-4½wh.). Septa are straight or in the adult slightly twisted.

Because only a single specimen is available, one may expect that comparisons can be made with various species, bearing in mind the variability of each species and the overlapping values of parameters of closely related species. Apart from *Profusulinella* the present form might be compared also with some species of *Schubertella* or *Fusulinella*. Some resemblance to Permian species of the group of *Schubertella giraudi* (Deprat, 1915) such as *Sch. pseudogiraudi* Sheng, 1962 may be observed in shell shape, size, and in the chomata. This and other Permian species of *Schubertella* differ probably in the composition of the wall. Similar are also certain primitive groups of species of *Fusulinella* such as *F.* ex gr. *asiatica* et *jamesensis* or *F.* ex gr. *schubertellinoides* (e.g. *F. gerasimovi* Safonova, 1951). Presumably *Profusulinella ovata* and *P. ovata nytvica* Safonova, 1951 are more closely allied to the Spanish form. Very similar is also *Schubertella?* sp. from the nearby Ribadesella locality (loc. A 1) (van Ginkel, 1965, pl. XXIV, fig. 21).

Schubertella ex gr. *gracilis*
1 specimen, Plate IV, Fig. 22

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
19	4½	23	459	17-21	1.75	258	1.56

The fusiform specimen has a homogeneous wall. The chomata appear in the 2nd whorl; their height increases from 1/4 to almost 1/2 of the chamber height in the 2-4th whorl; they are fairly wide, but in the adult much narrower and almost symmetrical. The septa are weakly fluted at the poles; a single septal loop is of large size.

This specimen is obviously close to *Sch.* ex gr. *gracilis* from locality A 11-1. It differs in having a larger L/D ratio and a more fusiform shape. Some species of the group of *Sch. inflata* such as *Sch. acuta* Rauser, 1951 are similar as well. The latter species, however, possesses a somewhat inflated median region. A comparison with previously described species from the Cantabrians points to *Schubertella* sp. 4b from the Piedras Luengas Limestone (van Ginkel, 1965, pp. 92-94, pl. XXIII, fig. 21).

Schubertella cf. *gracilis znensis* Rauser-Chernoussova, 1951
3 specimens, Plate IV, Figs. 23-24; Plate V, Fig. 22

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
29	5	29	440	12-17	1.24	247	1.05	(Loc. A 11-2)
77	4	25	315	8-11	±1.00	168	-	
41	5-5½	25	517	14-19	1.30	279	1.21	(Loc. A 11-3)

The spherical or subrhomboidal specimens have an indistinct wall structure. The L/D ratio in the inner 3-3½ whorls is smaller than 1.00. The 1st whorl is at a large angle to subsequent whorls and the position of the axis is not wholly stable in later whorls. The chomata appear in the 2-3½ whorl; they are small but distinctly developed and attain a relative height of 0.25-0.35 in the outer whorl. The tunnel is low and relatively wide.

Comparison of the specimens from locality A 11-2 with *Schubertella gracilis znensis* shows that this subspecies has a larger L/D ratio, a larger proloculum(?), a narrower tunnel, and according to the illustrations presented, somewhat better developed chomata. Other somewhat similar species are *Pseudostaffella dissimilis* Saurin, 1970 which differs by its smaller L/D ratio, and *Profusulinella prisca* forma *asiatica* which is larger than our form.

The specimen from locality A 11-3 may be still closer to *Sch. gracilis* and *Sch. gracilis znensis* because of its better developed chomata and the more rhomboidal shape. The rhomboidal shape is reported to be more typical of *Schubertella gracilis* but the L/D ratio of this specimen points to *Schubertella gracilis znensis*.

Schubertella gracilis Rauser-Chernoussova, 1951
1 specimen, Plate IV, Fig. 25

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
79	3½	67	447	12-21	1.54	242	1.42

The wall of this short fusiform to oval-shaped specimen consists of a tectum and a less dense lower layer; presence of tectoria is doubtful. The height of the chomata is between 0.30 and 0.40 of the chamber height; they are fairly wide, often rectangular symmetrical, and with steep sides at the side of the tunnel. The tunnel is about twice as wide as high. The septa are straight in inner whorls and slightly twisted at the poles in the last whorl. The first whorl is at a large angle to subsequent whorls.

Taitzehoella cf. *taitzehoensis* Sheng, 1951
(ex gr. *T. librovitchi*)
2 specimens, Plate IV, Figs. 26-27

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
62	8	29	1165	21-25	1.86	656	1.65
76	6½	-	820	17-23	1.62	426	1.56

The inner two whorls have an L/D ratio smaller than unity, are of discoidal or nautiloid shape, and are coiled at a large angle to subsequent whorls; the 3rd whorl is almost spherical and the succeeding whorls are inflated rhomboidal. Chomata are more often asymmetrical in inner whorls, and tend to become symmetrical in outer whorls; their height varies from 1/4 to 1/2 of the chamber height and their width decreases from moderately wide in the 2½-3rd whorl to very narrow in the ultimate whorl; at the tunnel side, the slopes are generally steep. The tunnel path is symmetrical; the tunnel is low and narrow. Axial filling is absent. The septa are straight, or very slightly twisted at the poles of the 7-8th whorl.

Our specimens differ from *T. taitzehoensis* in having more whorls and a larger diameter but the diameter for corresponding whorls fits well. Moreover, the Spanish form has a larger L/D ratio and the elongation starts earlier. The chomata are possibly slightly lower. A similar species is also *Taitzehoella librovitchi* (Dutkevich, 1934) which differs mainly in having less volutions and a larger diameter for corresponding whorls.

Beedeina? sp.
See below the discussion of the species from locality A 11-3 (p. 225)

Beedeina ex gr. *schellwieni* (Staff, 1912)
1 specimen, Plate IV, Fig. 30

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
68	5½	-	1605	17-34	1.85	853	1.75

The short fusiform to fusiform specimen has a two-layered wall which consists of a tectum and a diaphanotheca; tectorial deposits are thin and only locally present; the wall structure in inner 3½ whorls is indistinct. The chomata are of moderate width up to the 3rd whorl; succeeding whorls have narrow and symmetric pseudochomata; from the 5th whorl they are absent. The folding of the septa is high and regular; folding starts at the poles of the 2nd whorl, extends up to the tunnel in the 3½ whorl, and is from pole to pole in the 5-5½ whorl. The tunnel is relatively narrow and its path slightly asymmetrical.

The single specimen present resembles *Beedeina postcitronoides* (Manukalova, 1956) and also *B. pseudoelegans* (Chernova, 1951).

Beedeina (Dagmarella) sp.
1 specimen, Plate IV, Fig. 31

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
55	6	147	1720	21-46	1.64	886	1.59

The rhomboidal specimen has a three-layered wall in the inner four whorls, and a four-layered wall including a wide but not very transparent diaphanotheca and thin tectoria in the succeeding volutions. The chomata are wide; in inner 3-3½ whorls they extend to the poles, in the succeeding whorls they rapidly decrease in width and are about as wide as high subquadratic - in the 5-6th whorl. The tunnel is semi-oval, rather high, and the tunnel path slightly asymmetrical; the tunnel angle is small. Septal folding starts at the poles of the 3rd whorl, spreads onto the lateral slopes in succeeding whorls, and extends from pole to pole in the 6th whorl.

The single specimen present may be considered to belong to *Dagmarella* Solovieva, 1955. In 1964, Thompson assigned the type species (= *D. prima* Solovieva, 1955) to *Fusulina*. If the reestablishment of *Beedeina* Galloway, 1933 is accepted, the genus *Dagmarella* becomes a synonym of *Beedeina* rather than of *Fusulina*. The taxon *Dagmarella* should perhaps be ranked as a subgenus of *Beedeina*. It comprises a particular group of primitive species of the genus *Beedeina* such as *Beedeina (Dagmarella) cadyi* (Dunbar & Henbest, 1942) and *B.(D.) gephyrea* (Dunbar & Henbest, 1942) both originally referred to *Fusulinella* (vide Solovieva, 1955). With regard to its morphological properties, the Spanish specimen is about intermediate between *B.(D.) prima* (Sol., 1955) and the more advanced *B.(B.) subdistenta* (Putrya, 1956). If compared with the American fusulinid fauna, our specimen is most similar to *B.(D.) cadyi* (Dunbar & Henbest).

Eofusulina paratriangula (Putrya, 1939)
See below the discussion of the species from locality A 11-1 (p. 219)

Eofusulina cf. *paratriangula* (Putrya, 1939)
1 specimen, Plate V, Fig. 4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
69	3½	246	1755	32	7.0	992	6.0

The single specimen present is triangular in inner 1½ whorls; it is elongate fusiform to cylindrical in subsequent whorls. The chomata are rudimentary in the 1st whorl and wholly absent in succeeding whorls. Axial filling is present but very weakly developed.

With respect to other more typical specimens of *Eofusulina paratriangula* from this locality it differs in having a larger radius vector, probably a slightly larger form ratio, a smaller proloculum and more regularly folded septa. A closely allied species is also *Eofusulina binominata* Putrya, 1956 which differs mainly in its better developed axial filling.

Fusulinella aff. *subpulchra* Putrya, 1938
(ex gr. F. pulchra et itoi)
6 specimens, Plate V, Figs. 5-10

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
5	6	151	1450	32-42	1.76	754	1.70
11	6½	118	1175(5½)	32-38(5½)	2.10(5½)	656(5½)	1.88(5½)
22	6½	103	1230	25-38	1.71	640	1.64
27	6	130	1425(5½)	29-50(5½)	-	795(5½)	-
34	7	105	1445	32-42	1.77	746	1.71
38	5½	132	1285	34-50	1.99	697	1.81

Mature specimens are inflated subrhomboidal. A diaphanotheca appears after the 2-4½ whorl; this layer is not very transparent but fairly thick in comparison with the secondary deposits such as the lower tectorium. The tectorial deposits are better developed in the median area than in the polar areas. The lower tectorium is either hardly developed or - locally - rather well developed, though always thinner than the diaphanotheca. An upper tectorium may be present below the tunnel but this layer may be considered also as the continuation below the tunnel of the chomata. The chomata are well developed and very wide except for the outer one or two whorls where the width may be much reduced. They usually extend till the poles in the inner 2-3½ whorls; more rarely specimens are encountered which have chomata extending to the poles up to the 6½ whorl. The relative height of chomata decreases from medium to high in inner whorls to medium to low in outer whorls; they appear as ribbons in the inner whorls and as asymmetrical mounds with drawn-out edges towards the poles beyond the 3-4½ whorl. The tunnel is relatively narrow throughout growth; tunnel angle in outer whorls is 20-30°; its path is symmetrical. The septa may be folded in a narrow zone along the axis starting at the poles of the inner 2½-5½ whorls; the folding does not reach the median area not even in younger whorls, although it may extend some way onto the lateral slopes.

The Spanish specimens are intermediate between *Fusulinella subpulchra* Putrya, 1938 and *Fusulinella subpulchra submesopachis* Putrya, 1956 with respect to proloculum size, number of volutions, diameter for corresponding whorls, and the degree of concavity of the lateral sides. The L/D ratio of *F. subpulchra* and its subspecies is higher on the average. *F. subpulchra submesopachis* is reported to have slight axial filling which fails entirely in the Spanish material. Other similar species are *Fusulinella itoi* Ozawa, 1925 and the more advanced *Fusulinella pulchra* Rauser & Beljaev, 1936. The most closely related species is *Fusulinella* ex gr. *pulchra* from Ribadesella (loc. A 1), only 40 km W of Pendueles (van Ginkel, 1965, pl. L, p. 162).

Fusulinella aff. *simplicata* Toriyama, 1958
See below the discussion of the species from locality A 11-3 (p. 226).

Fusulinella sp. 4 and 4A
3 specimens, Plate V, Figs. 14-15; Plate VI, Fig. 27

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
47	4	103	1050	25-29	1.80	541	1.74	(Loc. A 11-2)
70	5	97	1165	35-50	1.70	599	1.66	
33	4	86	787	27-46	2.83	410	2.72	(Loc. A 11-3)

The adult specimens are short fusiform (species 4: sl. 47, sl. 70) or elongate fusiform (species 4A: sl. 33). A diaphanotheca appears in the 2-2½ whorl; the upper and lower tectorium are of about the same thickness and approximately as thick as the diaphanotheca, although in the outer whorls the inner tectorium is usually thicker and in the inner whorls thinner than the diaphanotheca, whereas the reverse holds for the upper tectorium. The thickness of the protheca is 8-17 microns. The chomata may reach the poles in the inner 1½-4½ whorls; they are poorly developed in the 1st whorl, of medium height or high in the 2-4½ whorl and of medium height in the 5th whorl and have the shape of wide, occasionally subquadrate ribbons. The species 4A has axial filling, albeit very weak. The tunnel angle is about 20° in inner whorls and 30-40° in outer whorls. The tunnel path is slightly asymmetrical to almost symmetrical. Septal folding which starts at the poles of the 2½-5th whorl is weak and confined to the poles.

Similar species occur in *Fusulinella* ex gr. *paracolaniae* as well as *Fusulinella* ex gr. *mosquensis*. The Pendueles specimens differ from species of the former group in having less whorls, a larger proloculum, and more loosely coiled inner whorls. In spite of these differences they bear a resemblance to *F. vozhgalensis* Saf., 1951, *F. meridionalis* Rauser, 1951, *F. formosa* Raus. & Dalm., 1954 and *F. tokmovensis* Raus. & Dalm., 1954. With respect to the latter group, our specimens are most similar to *F. mosquensis* Raus. & Saf., 1951. That species, however, has slightly larger dimensions, a larger L/D ratio, and concavo-convex lateral sides in the last whorl. Somewhat similar is also the associated *F.* aff. *simplicata*. The more massive chomata and the weaker septal folding distinguish the present specimens from *F. simplicata* Toriyama, 1958.

L O C A L I T Y A 11 - 3

Ozawainella cf. *stellae* Manukalova, 1950
(ex gr. *O. stellae*)
2 specimens, Plate V, Figs. 16-17

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
6	5	±30	1380	13-21	0.25	739	0.23
52	5-5½	-	1935	21-25	0.20	1050	0.19

The species occurring in Pendueles is definitely close to *Ozawainella stellae* Manukalova. The latter species has fewer whorls, a larger proloculum, a slightly smaller diameter and a slightly thinner wall. Other similar species are *O. evoluta* Kireeva, 1949 and perhaps *O. nikitovkensis* (Brazhnikova, 1939).

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
2 specimens, Plate V, Figs. 18-19

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
2	6½	50	1270	12-17	0.41	672	0.36
46	7	59	1300	12-17	0.45	726	0.41

The specimens are close to *Ozawainella sandalina* Manukalova, 1956 and *Ozawainella kumpani* Rauser, 1951. Other related but less similar species are *O. kurachovensis* Manukalova, 1956 and *O. pseudoangulata* (Putrya, 1939).

Pseudostaffella cf. *compressa donbassica* Putrya, 1956
(ex gr. *Ps. compressa*)
1 specimen, Plate V, Fig. 20

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
5	4½	55	451(4)	12-17	0.98	246(4)	0.89

The wall comprises three layers including a thick upper tectorium; the upper tectorium is somewhat transparent and well delimited with respect to the chomata. The 1st whorl is at a large angle and the 2nd whorl at a fairly small angle to the succeeding whorls.

The single specimen present is best compared with *Ps. compressa donbassica*, particularly in the shape of the chomata which resembles the type of chomata found in species of the group of *Pseudostaffella praegorskyi* Rauser, 1949.

Pseudostaffella confusa (Lee & Chen, 1930)
(ex gr. *Ps. ozawai*)
1 specimen, Plate V, Fig. 21

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
9	5-5½	67	630(5)	8-27	1.00	350(5)	0.90

The present specimen may be referred to *Pseudostaffella confusa*. This species has a slightly larger proloculum and possibly somewhat higher chomata.

Schubertella cf. *gracilis znensis* Rauser-Chernoussova, 1951
See below the discussion of the species from locality A 11-2 (p. 221).

Schubertella ex gr. *inflata*
1 specimen, Plate V, Fig. 23

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
12	4	38	402	12-17	1.55	225	1.38

The wall is homogeneous. Chomata are very low and narrow and present from the 2nd whorl. Septa are straight.

The inflated median region points to species of the group of *Schubertella inflata*. *Sch. inflata* Rauser, 1951 is smaller and has better developed chomata. It has also a larger L/D ratio (= 1.7-1.8) although in the illustrations the ratio conforms to our specimen. Even more similar are *Schubertella acuta* Rauser, 1951 and *Schubertella paraobscura* Putrya & Leontovich, 1948. The former differs in its slightly larger L/D ratio, the latter in having a smaller length and diameter.

Taitzehoella taitzehoensis extensa Sheng, 1958
4 specimens, Plate VI, Figs. 1-4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
20	7-7½	38	1150	29-34	2.10	623	1.93
22	7	44	918	29-38	2.00	488	1.88
30	6½-7	46	1065	23-29	2.20	550(6½)	2.02
43	7½	38	1150	21-29	1.93(4)	590	2.41

The wall consists of two to three layers: a less dense lower layer and rarely a lower tectorium. The L/D ratio in inner 1½-2 whorls is smaller than unity; the 1st whorl is discoidal and obliquely coiled, the 2nd whorl is about spherical. In the succeeding whorls the shape changes from rhomboidal (3-4th wh.) to inflated rhomboidal (4-7½ wh.). Chomata are narrow but relatively wider in inner whorls; relative height varies between 0.20 and 0.50 and the higher values predominate in the 2½-5th whorl; in the adult stage they are symmetrical or subsymmetrical; at the side of the tunnel the slope is generally steep. The tunnel is low or of medium height; it forms a wide slit or is semilunate in outer whorls, and is circular in inner whorls. The tunnel path is usually regular. Septa are straight in the inner 3-4 whorls and slightly folded in a narrow zone along the axis in subsequent whorls.

The four axial sections are referred to *T. taitzehoensis extensa* in spite of the slightly thicker walls and the on average greater number of volutions in the specimen from Pendueles.

Beedeina? sp.
6 specimens, Plate IV, Figs. 28-29; Plate VI, Figs. 5-6; Plate IX, Figs. 19-20

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
32	2½	214	640	17-23	2.02	369	1.78	(Loc. A 11-2)
56	4	115	738	16-21	1.67	394	1.56	
1	3½	122	722	15-21	1.66	406	1.66	(Loc. A 11-3)
16	4	118	746	25-40	1.65	402	1.65	
6	3½	111	640	17-25	1.95	361	1.73	(Loc. A 12-3)
7	4½	99	918	19-25	1.50	492	1.40	

The present specimens are considered to belong to a single species ranging in age from the Upper Kashirian (locality A 11-2) up to and including the Podolskian (locality A 12-3). The specimen in slide 32 is probably a macrosphere. The specimen in slide 7 differs from the others in being not subrhomboidal but oval to short fusiform. All specimens have a three-layered Profusulinella-type wall in the inner whorls; the wall comprises four layers with the appearance of a diaphanotheca in the 1½-3rd whorl; in the macrospheric specimen the diaphanotheca is already present in the first half-whorl; the thickness of the tectoria is quite variable and these secondary layers can either be locally absent, or attain a thickness about equal to that of the diaphanotheca; the upper tectorium is relatively thick in the median region; wall thickness usually somewhat decreases towards the poles. Chomata are wide, often extending till the poles in inner 1½-3 whorls; they usually are relatively narrow, rounded or subquadrate, and subsymmetrical to symmetrical in succeeding whorls. The relative height of the chomata ranges from moderate to high and is more often high in the inner whorls; occasionally they are indistinct or absent in the outer whorl. The tunnel angle is small, up to 20° in outer whorls; its path follows a regular to slightly irregular course. Septa are plain in inner 1-2 whorls, folded at the poles up to the 2½ whorl, and along the lateral slopes up to the tunnel in subsequent whorls. Above the tunnel the septa are usually plain, even in outer whorls.

The present species is tentatively assigned to the genus *Beedeina* and in so doing it becomes one of the primitive members of it, related to certain non-typical species of *Profusulinella*, *Aljutovella*, *Fusulinella*, *Hemifusulina* and *Dagmarella*. The latter should perhaps be regarded as a subgenus of *Beedeina*. With respect to the small size, the large proloculum, few whorls and the high and fairly wide chomata in inner whorls, it resembles some species of *Profusulinella* such as *P. fittsi* (Thompson, 1935), *P. nibelensis* Rauser, 1951, *P. wangyui yentaiensis* Sheng, 1958 and *P. topiliensis* (Putrya, 1938). Moreover, many of these species show more or less regular folding, albeit less developed than in *Beedeina?* sp. Our species may be transitional between the mentioned species of *Profusulinella* and very primitive *Beedeina* such as the American species close to *Beedeina taosensis* (Needham, 1937) e.g. *B. pristina*

(Thompson, 1945), *B. problematica* (Thompson, 1934) or their Eurasian counterparts such as may be *B. rasdorica* (Putrya, 1938) and *B. ninensis* (Putrya, 1938). Other related species are presumably those referred to *Dagmarella* by Solovieva in 1955. Unlike *Dagmàrella prima* Solovieva, 1955, the genotype of this (sub)genus, our species lacks the very sudden passage of wide and high chomata in inner whorls to their reduction in the outer whorl where the high septal folds extend from pole to pole. If a somewhat less restricted, more widely drawn, definition of the (sub)genus *Dagmarella* would be accepted, primitive members of *Beedeina* such as the present species might be referred to that taxon. Superficially similar to our species is also *Hemifusulina* sp. 2 (ex gr. *H. dutkevitchi*) from the Central Basin of Asturias (van Ginkel, 1973).

Fusulina aff. *chernovi* Rauser-Chernoussova, 1951
13 specimens, Plate VI, Figs. 7-19

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count (1-5th wh.)
3	4	262	1395	33-50	3.00	754	2.77	
7	3	275	853	17-25	1.77	443	1.70	
10	3½	262	1195	17-29	2.04	681	1.80	
14	4½	254	1355	25-42	2.64	754	2.37	
34	3½	324	1310	25-32	2.15	738	1.91	
42	3	205	935	19-25	2.42	492	2.30	
49	3½	180	1065	15-25	2.75	607	2.42	
4	2½	168	771	21-35	-	459	-	12 17
25	5	238	1360(4½)	34-58	-	722(4½)	-	10 15 18 28 28
35	4	254	1395	21-33	-	738	-	10 21 27 29
37	5	127	1425	21-42	-	787	-	10 16 22 31 28
45	4½	262	1490	21-46	-	820	-	10 19 22 30
50	3	221	1025	17-29	-	582	-	10 18 21

The test changes from spherical, oval to subrhomboidal in the 1st whorl, to fusiform or (elongate) subrhomboidal in the 4th whorl. A diaphanotheca appears in the ½-3rd whorl. The lower tectorium is about as thick as the diaphanotheca; towards the poles it becomes thinner than the diaphanotheca. Chomata occur in the inner 1½-3 whorls; they are succeeded by pseudochomata which after the inner 2½-3½ whorls are absent as well. Chomata in the first half-whorl are low, symmetrical and rounded; they are high and moderately wide in the inner 1-2½ whorls and often somewhat angular; symmetrical, often subquadratic and narrow chomata or pseudochomata may appear as early as the 1½ whorl. The tunnel is relatively narrow, its path fairly regular. Septa are straight or weakly and irregularly folded at the poles of the 1st whorl; folding extends to the tunnel in the 1½-3rd whorl, and is from pole to pole in subsequent whorls; folding in outer whorls is very high even in the median region, fairly regular, and the wave length is relatively large; in sagittal sections septal loops appear in the 2-3½ whorl.

The similar *F. chernovi* (Raus., 1951) may have a slightly greater diameter, length and L/D ratio. The diameter for corresponding whorls is also slightly greater. The tunnel in outer whorls is probably wider. The wall is thinner and has four layers; the Spanish species has only three. *Fusulina chernovi* is close to species of the group of *Fusulina ozawai*, and the present population from Pendueles is about intermediate between *Fusulina chernovi* Rauser, 1951 and *Fusulina ozawai* Rauser & Beljaev, 1937. *Fusulina keltmensis (= F. pseudoelegans var. keltmensis* Raus., 1951*)* could be another close species. Some features of the Spanish species point to *Beedeina*. One of the most similar species of this genus is *Beedeina konnoi* (Ozawa, 1925). Ozawa's species has a smaller proloculum, a smaller diameter for corresponding whorls, and a smaller maximum value for the L/D ratio. A conspicuous difference is the presence of chomata throughout growth in *B. konnoi*. Less similar but possibly related are *Beedeina dunbari* (Chernova, 1951), *B. timanica* (Rauser, 1951) *(= Fusulina ielshanica timanica* Raus., 1951*)* and *Fusulina fallsensis* Thompson, Verville & Lokke, 1956.

Fusulinella aff. *simplicata* Toriyama, 1958
(ex gr. F. simplicata)
9 specimens, Plate V, Figs. 11-13; Plate VI, Figs. 20-25

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
42	5	78	1065	21-48	1.82	574	1.69	(Loc. A 11-2)
44	4	90	861	25-34	1.73	459	1.62	
78	4½	90	722(3½)	29-34	2.57(3½)	426(3½)	2.17(3½)	
17	5	100	1509	38-59	2.22(4½)	853	2.01(4½)	(Loc. A 11-3)
26	3½	118	590(3)	25-35	1.89(3)	344(3)	1.62(3)	
31	3½	122	566(3)	21-25(3)	1.78(3)	291(3)	1.73(3)	
38	4½	147	1165	31-55	2.56	607	2.46	
39	5	109	1295	29-54	1.94	722	1.74	
44	5	109	1345	23-42	2.15	746	1.89	

The test changes from nautiloid or spherical (1st wh.), over short fusiform or oval, to short fusiform or fusiform (4-5th wh.). A diaphanotheca appears in the 1½-3½ whorl; there is a difference however in this respect between the specimens from locality A 11-3 and A 11-2; specimens from the latter locality show a diaphanotheca from the 3-3½ whorl, whereas in the stratigraphically higher locality A 11-3 it appears in the 1½-3rd whorl; upper and lower tectorium are more or less as thick as or slightly thicker than the diaphanotheca; the latter is 6-13 microns. Chomata may extend to the poles in the inner 1½-4½ whorls; they are low in the 1st whorl, of medium height to high in the 1½-4th whorl, and moderately high to low in the ultimate whorl; they have a steep or low slope at the tunnel side, and may show a subquadratic shape in inner whorls. The chomata are on average somewhat lower in the A 11-2 than in the A 11-3 sampling locality. The tunnel is quite narrow in inner whorls; it follows a symmetrical or slightly asymmetrical path; the tunnel angle increases with growth and is 35-55° in the outer whorls. Irregular and loose septal folds are observed from the 2-3½ whorl onwards and are restricted to the poles; occasionally the folding is rather intense as may be observed at the poles of the outer whorl of some specimens from the A 11-3 locality.

The present species is considered to be closely related to *Fusulinella simplicata* Toriyama. The latter has on average a slightly larger diameter and length and also a slightly larger form ratio; the chomata seem to be less developed. In overall shape the Spanish form resembles species of the group of *Fusulinella praebocki* but these have their first whorl(s) obliquely coiled, and the diaphanotheca usually not appears before the last one or two whorls. Species of the group *F. praecolaniae* such as *F. kamitakarensis* Igo, 1957 or *F. haymondensis* Skinner & Wilde, 1954 are smaller and tighter coiled, besides having differently shaped and much lower chomata. Species of the groups of *F. mosquensis*, *F. paracolaniae* or *F. pseudobocki* have reached a more advanced evolutionary stage.

Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
See below the discussion of the species from locality A 12-1 (p. 228).

Fusulinella sp. 4A
See below the discussion of the species from locality A 11-2 (p. 223).

L O C A L I T Y A 12 - 1

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
1 specimen, Plate VII, Fig. 1

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
38	7½	57	1540(7)	15-18	0.42	772(7)	0.37

The present specimen resembles *Ozawainella magna* Sheng, 1958. The Spanish specimen differs in having more volutions, a slightly larger proloculum and diameter. The diameter for corresponding whorls, however, shows similar values. Our specimen with a diameter of over 1.5 mm is certainly among the largest of *O.* ex gr. *pseudoangulata* et *mosquensis*. Other somewhat similar species are *O. pseudoangulata* (Putrya, 1939) and *O. sandalina* Manukalova, 1956.

Taitzehoella sp. 1
3 specimens, Plate VII, Fig. 2; Plate VIII, Figs. 18-19

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count
29	6½	-	810	-	-	-	1.80	(Loc. A 12-1)
								(1-4th wh.)
26	7	48	902	19-25	1.83	476	1.74	(Loc. A 12-2)
9	6	31	640	19-25	-	344	-	10 13 16 17

The test is rhomboidal to inflated rhomboidal. The tunnel path is rather irregular. Axial filling is absent or weakly developed. The inner 1-2 whorls are at an angle to subsequent whorls and have an L/D ratio smaller than unity. Relative height of chomata is 0.25-0.60; in the last half-whorl chomata are lower or absent. The septa are straight in inner whorls and very slightly folded at the extreme polar ends of the outer two whorls. The wall consists of two layers i.e. a tectum and a less dense lower layer; in outer whorls also a lower tectorium is locally present.

The sagittal section in slide 9 is perhaps not of a *Taitzehoella* but of a *Fusiella* which at the locality A 12-2 occurs associated with *Taitzehoella* sp. 1. The present specimens are considered intermediate between *Taitzehoella taitzehoensis* Sheng, 1951 and *Taitzehoella prolibrovichi* (Rauser, 1951). They resemble the latter species in the bluntly pointed poles and overall shape. However, *T. prolibrovichi* is smaller and has less whorls on average. *T. taitzehoensis* is more inflated in the median region, has more acute poles, and possibly shorter inner whorls.

Fusulina aff. *aspera* Chernova, 1954
(ex gr. *F. kamensis*)
9 specimens, Plate VII, Figs. 3-11

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count
15	5	230	1590	21-42	2.67	968	2.45	(1-5th whorl)
20	4	279	1345	33-46	2.81	689	2.57	
21	4½	238	1395	29-33	3.50	722	3.15	

30	4½	254	1740	29-50	2.20	950	2.00	
34	5	238	1605	27-46	3.48	853	3.25	
1	5	197	1575	29-58	-	853	-	- 18 22 25 -
2	5	197	1655	25-54	-	869	-	9 17 24 26 29
5	5	260	1950	34-56	-	1050	-	10 24 31 33 37
10	4	230	1025(3½)	21-34(3½)	-	574(3½)	-	10 19 22 -

The test changes from oval, short fusiform or subrhomboidal in the 1st whorl, over fusiform or subrhomboidal (2-4th wh.), to elongate fusiform in the 5th whorl. The diaphanotheca already appears in the 1st whorl; the lower tectorium in inner whorls is about as thick as the diaphanotheca, in outer whorls it is often thinner; the thickness of the wall decreases in polar direction, notably by thinning of the lower tectorium; the upper tectorium is thin in inner 2½ whorls and absent in the succeeding whorls; in a single specimen faint indications of mural pores were observed. Chomata are present in the inner 2-2½ whorls, developed as pseudo-chomata in the 2½-3½ whorl, and absent in succeeding whorls; they are relatively wide and of moderate height in the first half whorl; relative height increases in the 1-2nd whorl whereas relative width decreases; their shape changes from asymmetrical in the ½-2nd whorl to symmetrical in the 1-2½ whorl. The tunnel is very narrow; its path is slightly irregular. Septa are plane, twisted or weakly folded at the poles in the 1st whorl; folding extends up to the tunnel in the 1½-2½ whorl and is from pole to pole in the succeeding whorls; the septal folding is somewhat irregular, high in the polar areas, and of medium height in the median region; the relative wave length is rather great; septal loops in sagittal sections appear in the 2-3½ whorl.

Fusulina aspera although close to the Spanish form, differs by its probably still less developed chomata. In the Spanish form true chomata are present in the inner 2½-3½ whorls. *Fusulina aspera* has also a larger proloculum on average, a slightly smaller diameter for corresponding whorls, and a slightly larger L/D ratio. The rugosity of the spirotheca seems to be more developed in *Fusulina aspera*. These differences may indicate a systematic position of the Spanish form intermediate between species of the group of *Fusulina kamensis* and the usually earlier occurring species of the group of *Fusulina ozawai*.

Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
(*F. meridionalis* Rauser, 1951= *F. colaniae* Lee & Chen, 1930 subsp. *meridionalis* Rauser, 1951 by bringing to species level the latter subspecies)
(ex gr. *F. paracolaniae*)
10 specimens, Plate VI, Fig. 26; Plate VII, Figs. 12-17; Plate IX, Figs. 8-9; Plate X, Fig. 5

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
24	4½	93	886(4)	32-44(4)	1.91(4)	492(4)	1.72(4)	(Loc. A 11-3)
4	4½-5	122	935(4½)	29-42(4½)	2.17(4½)	525(4½)	1.89(4½)	(Loc. A 12-1)
8	6	80	1115	29-50	2.18	582	2.08	
11	5½	107	1100(5)	31-36(5)	2.33(5)	607(5)	2.11(5)	
19	5½	92	-	25-38	-	754	1.79	
23	5½-6	118	1395(5½)	31-46	2.59	754	2.39	
32	5	90	1190	31-44	2.12	623	2.03	
14	5-5½	100	1310	31-58	2.48	722	2.24	(Loc. A 12-2)
43	5½	76	1080	25-38	2.48	607	2.22	
4	5½	92	1165	21-38	2.11	640	1.92	(Loc. A 12-3)

The test changes as follows: lenticular, nautiloid, usually spherical (1st wh.); spherical (2nd wh.); oval to short subcylindrical, usually short fusiform (2-3rd wh.); short fusiform, more often fusiform and occasionally slightly inflated in the median region (4-6th wh.). The periphery is usually broadly arched, occasionally nearly flat. The lateral sides are slightly convex, straight or weakly concave. A diaphanotheca appears in the 1½-3rd whorl; the tectoria are quite variable in thickness, both are better developed in the median area than in the polar areas, and the inner tectorium usually becomes relatively thicker with growth whereas the reverse holds for the outer tectorium; mural pores have been seen occasionally. The chomata may reach the poles in inner 2-3½ whorls, but in most specimens the chomata though usually wide in inner 4-5½ whorls do not extend fully to the poles. The relative width in the 4½-6th whorl is usually 1/3 to 2/3 of the maximum possible extension. The chomata are low in inner 1-2½ whorls, increase to medium height in subsequent whorls, and tend to decrease in the outer two whorls (5-6th wh.); they have low or steep - up to 90° - slopes at the tunnel side, and are often symmetrical in outer whorls. The tunnel path is almost symmetrical to slightly asymmetrical. The tunnel angle is small and either nearly constant throughout growth (25-35°) or rapidly increases in the 4½-6th whorl (40-70°). Septal folding starts at the poles of the 2-3½ whorl but usually not before the 3rd whorl. The septa form a loose or even rather intense, cellular meshwork at the poles beginning with the 4½-5th whorl. In outer whorls folding may spread some distance onto the lateral slopes, yet without reaching the median region. The axis of coiling is stable; in rare cases the first whorl is at an angle to the succeeding whorls.

The present species is quite variable with respect to tightness of spirotheca, height of chomata, and over-all shape. *Fusulinella meridionalis* is considered to be most similar to the Spanish form. It differs by the absence of short specimens with an L/D ratio as low as 2.1-2.2. Moreover, the proloculum may be smaller on average and the thickness of the wall apparently is also smaller. According to Rauser-Chernoussova the shape is plano-ovoid in the outer two or three whorls whereas in the Spanish material somewhat inflated fusiform specimens often occur. A second very similar species is *Fusulinella itadorigawensis* Ishii, 1962 from Japan. In comparison with Ishii's species, the Spanish form may have somewhat better developed chomata, a smaller number of whorls on average, and perhaps a more loosely coiled spirotheca. With respect to the Cantabrian fusulinids a closely related species is *Fusulinella* sp. 1 from the Cuenca de Beleño in Asturias (loc. A 8) (van Ginkel, 1965, p. 164, pls. L, LI).

LOCALITY A 12 - 2

Staffella (Parastaffelloides)? sp. (cf. *St.(P.) heteromorpha* (Bogush, 1963))
2 specimens, Plate VIII, Figs. 1-2

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
12	8	57	1575	19-33	0.54	820	0.51
32	7½	70	1215(6½)	25-32	0.52	656(6½)	0.55(6½)

Chomata are low or of medium height; in inner whorls wide, but in outer whorls rapidly decreasing in width; they are absent or indistinctly developed in the 8th whorl; the slope at the tunnel side is low.

The two specimens present conform in their juvenile and neanic growth stages to *St.(P.) heteromorpha* (Bogush, 1963). Contrary to more typical species of this subgenus, the adult stage of the Spanish specimens does not develop the broadly arched or even straight periphery. The persisting angular periphery points to the closely related genus *Pseudoendothyra*. The specimens are indeed similar to species of the group of *Pseudoendothyra bradyi* in particular *P. bradyi* (Möller, 1878) which latter species, however, has differently shaped inner whorls and straight or slightly convex lateral sides (Möller, 1878, fig. 2a). Of all previously described species of Staffellinae from the Cantabrian Mountains, it is most similar to *Staffella?* sp. from the Cotarazo limestone (van Ginkel, 1965, pl. IX, p. 19, fig. 6) which differs in its large size and in the clear yellow-brown typically Staffella-type wall, which in the present specimens is light grey.

Pseudoendothyra cf. *plummeri* (Thompson, 1947)
(ex gr. Ps. bradyi)
1 specimen, Plate VIII, Fig. 3

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
16	6	42	1245	21-27	0.46	632	0.45

Chomata are fairly wide, moderately high, and have a low slope at the tunnel side. The tunnel is relatively wide especially in outer whorls.

The single specimen present resembles *Ps. plummeri* and differs in the slightly smaller diameter for corresponding whorls, the somewhat thicker spirotheca, and the umbilical depressions which in the Spanish specimen are observed in an earlier growth stage. The original description of *Ps. plummeri* by Thompson is based on material from the Marble Falls limestone which is at a lower stratigraphic level than the A 12-2 Pendueles location.

Pseudoendothyra cf. *timanica* (Rauser-Chernoussova, 1951)
(ex gr. Ps. bradyi)
1 specimen, Plate VIII, Fig. 4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
17	5½	37	1115	21-25	0.60	590	0.57

Chomata are low and fairly wide. The tunnel is narrow in inner whorls and relatively wide in the outer whorl.

This specimen conforms to *Pseudoendothyra timanica* in the low and fairly wide chomata and in the loosely coiled spirotheca. Rauser's species may have deeper umbilical depressions, more whorls which are less umbonate and a larger proloculum on average. *Pseudoendothyra bradyi* (Möller, 1878) differs in having straight to convex lateral sides, whilst in the Spanish specimen they are concavo-convex. Moreover, diameters of proloculum and of corresponding whorls are greater according to Möller's data of *Ps. bradyi*. Möller obtained a value of 1/13-1/14 for the ratio diam. prol./diam. adult spiral, which is only 1/30 in the Spanish specimen. Similar is also *Pseudoendothyra subrhomboides* (Rauser, 1951) which conforms in its concavo-convex lateral sides of the outer whorls, but contains less volutions which - especially in inner whorls - are more distinctly rhomboidal-shaped.

Pseudoendothyra cf. *subrhomboides* (Rauser-Chernoussova, 1951)
(ex gr. Ps. bradyi)
2 specimens, Plate VIII, Figs. 5-6

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
10	6	-	1345	24-37	0.58	738	0.53
15	6-6½	82	1615	21-42	0.65	886	0.60

Chomata are indistinctly developed. The wall comprises tectum and a diaphanotheca. In comparison to *Ps. subrhomboides* the Spanish specimens are slightly larger, have more whorls, and possess better developed umbilical cavities. They resemble *Ps. subrhomboides* in the very weak development of the chomata. A specimen referred to *Ps. bradyi* by Rauser-Chernoussova is quite similar as well (Rauser-Chernoussova, 1951, pl. XII, fig. 11).

Pseudoendothyra cf. *holmensis* (Ross & Dunbar, 1962)
(ex gr. Ps. bradyi)
1 specimen, Plate VIII, Fig. 7

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
34	6½	50	1280	25-30	0.53	656	0.51

Chomata are weakly developed, very low but rather wide. The inner whorls are partly evolute.

The present specimen somewhat closely resembles *Pseudoendothyra holmensis*. Our form has a somewhat smaller diameter for corresponding whorls and has up to 6½ whorls whereas the maximum number is 6 in *Ps. holmensis*. Moreover, the chomata in our form are probably still lower and distinctly ribbon-shaped. *Pseudoendothyra holmensis* has been described from the Profusulinella priscoidea Zone (= Lower Moscovian) whereas the Spanish specimen is from the Fusulinella Zone, subzone B (= Upper Moscovian).

Ozawainella ex gr. *krasnokamski*
2 specimens, Plate VIII, Figs. 8-9

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
7	6½-7	44	1050(6)	8-13(6)	0.44(6)	556(6)	0.41(6)
48	6½	40	877(5½)	9(5½)	0.41(5½)	470(5½)	0.39(5½)

These slender, closely coiled specimens resemble species of the group of *Ozawainella krasnokamski* Safonova, 1951, although the rather well developed chomata point also to species of the group of *Ozawainella angulata* (Colani, 1924).

Ozawainella ex gr. *pseudoangulata* et *mosquensis*
3 specimens, Plate VIII, Figs. 10-12

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
27	7-7½	48	1230	10-13	0.41	623	0.40
28	6-6½	65	1115(5½)	10-15	0.45(5½)	599(5½)	0.43(5½)
33	6	49	1015	10-15	0.48	508	0.50

The present specimens are close to *Ozawainella pseudoangulata* (Putrya, 1939) differing only in having a slightly larger L/D ratio. Another quite similar species is *Ozawainella kumpani* Sosnina, 1951 which is reported to have a prominent keel. The absence of such a prominent keel distinguishes our specimens also from *Ozawainella vozhgalica* Safonova, 1951. *Ozawainella kurakhovensis* Manukalova, 1956 which resembles the Spanish form as well, is smaller and has less whorls.

Pseudostaffella rostovzevi Rauser-Chernoussova, 1951
(ex gr. Ps. rostovzevi)
2 specimens, Plate VIII, Fig. 13; Plate IX, Fig. 15

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	
30	8-8½	75	1575(8)	21-38	0.88(8)	820(8)	0.85(8)	(Loc. A 12-2)
25	8½	73	1655	21-29	0.91	853	0.87	(Loc. A 12-3)

The spirotheca under the tunnel consists of three layers i.e. upper tectorium, tectum, and a less dense lower layer. The tunnel path is very irregular.

The present specimens are wholly similar to the large-sized specimens of this species, which have been reported from the Myachkovian of the Moscow platform (Rauser-Chernoussova, 1951, p. 127, pl. IX, fig. 2).

Pseudostaffella ex gr. *paraozawai*
1 specimen, Plate VIII, Fig. 14

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
31	7	85	1090(6)	21-35	0.99	558(6)	0.90

The spirotheca below the tunnel consists of three layers: upper tectorium, tectum and a less dense lower layer. The 1st whorl is at a small angle to the 2nd and 3rd whorl which in their turn are at a small angle to the succeeding whorls.

The single specimen present is best compared with *Pseudostaffella compacta* Manukalova, 1950 *(= Pseudostaffella ozawai compacta* Man., 1950*)*. The latter species has more whorls (= 8-9), a slightly smaller proloculum (= 50-70 microns) and a smaller L/D ratio. In spite of these differences the similar juvenile growthstage suggests an affinity to *Ps. compacta*. A specimen of this species illustrated by Rauser-Chernoussova is very similar and is from the Podolskian of the Moscow platform (Rauser-Chernoussova, 1951, pl. VIII, fig. 2).

Pseudostaffella ex gr. *gorskyi*
1 specimen, Plate VIII, Fig. 15

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
49	4	65	640	10-21	0.87	353	0.90

The spirotheca under the tunnel consists of three layers i.e. upper tectorium, tectum, and a less dense lower layer. Mural pores, locally observed, are faintly expressed.

The presence of a specimen closely similar to species of the group of *Ps. gorskyi* is surprising, since in the Cantabrian Mountains these rather primitive types have been found only at stratigraphically lower levels. It somewhat resembles specimens of *Pseudostaffella gorskyi* (Dutkevich, 1934), *Pseudostaffella kimi* Cheong, 1973 and *Pseudostaffella subquadrata* Grozdilova & Lebedeva, 1950.

Schubertella ex gr. *obscura*
1 specimen, Plate VIII, Fig. 16

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
39	3½	82	442	25-29	1.27	246	1.17

The wall is thick for species of this genus, the protheca measures 14-15 microns; it has two layers in the 1st whorl, and three including a thick lower tectorium in the 3-3½ whorl. The asymmetrical to subsymmetrical chomata are wide and almost extend to the poles in the 3rd whorl; their height varies between 1/4 and 1/3 of the chamber height. The tunnel is semi-lunate and about three times as wide as high. In the last whorl very weak septal folding is observed, which is restricted to the poles.

The single specimen present resembles the specimens referred to *Eoschubertella obscura* by Toriyama (Toriyama, 1958, pl. I, figs. 10-14). Similar are also *Eoschubertella* sp. A described in the same paper (Toriyama, 1958, pl. I, figs. 15-16) as well as some species of the group of *Schubertella pseudoglobulosa* such as *Sch. texana* (Thompson, 1947). The Spanish specimen differs from the mentioned species by its thick wall, although the thickness rapidly decreases towards the poles. Moreover, the wall structure with its well-differentiated diaphanotheca and lower tectorium may be different.

Fusiella cf. *typica* Lee & Chen, 1930
1 specimen, Plate VIII, Fig. 17

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
6	6	52	737	14-26	2.70	388	2.56

The first whorl is nautiloid and at an angle to outer whorls; in the succeeding whorls the test changes from about spherical (2nd wh.), over rhomboidal (3rd wh.), to elongate and inflated rhomboidal. The chomata are narrow and low or of medium height. Axial filling is absent. Septa are slightly folded at the poles of the 5-6th whorl.

The present specimen is considered to be intermediate between *Taitzehoella* and *Fusiella* ex gr. *typica* differing from *Fusiella typica* by the absence of axial filling, the slightly intenser septal fluting at the poles, and the slightly larger shell size. A similar form has been described from the Brañosera limestone in Spain as *Profusulinella* ex gr. *librovitchi* (= *Taitzehoella* ex gr. *librovitchi* in this paper) (van Ginkel, 1965, pl. XXVIII, figs. 9-11, p. 121).

Taitzehoella sp. 1
See below the discussion of the species from locality A 12-1 (p. 227).

Fusulina ex gr. *kamensis*
8 specimens, Plate IX, Figs. 1-7

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count
4	2	312	738	20-27	1.71	402	1.57	
13	4	279	1360	33-54	2.36	722	2.23	
18	3½	238	1125	25-33	2.39	640	2.39	
46	3½	287	1295	25-42	1.84	705	1.69	
2	4	200	951(3½)	21-29	-	533(3½)	-	10 17 -
22	4½-5	271	1885(4½)	33-52	-	1015(4½)	-	11 20 25 26
36	3½	271	1180	25-46	-	664	-	8 19 22
47	3½-4	271	1180(3½)	25-42	-	607(3½)	-	8 21 27

The test changes from oval or short fusiform (1st wh.), over (short) fusiform or subrhomboidal (2-3rd wh.), to fusiform (4th wh.). A diaphanotheca appears in the ½-1½ whorl; the lower tectorium in the first whorl is as thick as the diaphanotheca, in the succeeding whorls it is often thinner or even absent; the upper tectorium may be present in inner whorls, it is absent in the third and subsequent whorls; the wall becomes thinner towards the poles by the thinning of both lower tectorium and diaphanotheca; faint indications for the presence of mural pores have been observed in two specimens. Chomata are present in the inner 2-3½ whorls and are developed as pseudochomata in the 2½-4th whorl; they are wide in the first 1½ whorls and narrow thereafter; relative height varies from moderate to high; the asymmetrical shape of the chomata in the inner 1½ whorls becomes symmetrical and sometimes angular in the succeeding whorls. The tunnel is very narrow; its width may increase rapidly in the 4th whorl;

the tunnel path is regular to slightly irregular. Septal folding is high at the poles and of medium height to high in the median area; it starts at the poles of the 1st whorl, extends to the tunnel in the 1½-2½ whorl and spreads from pole to pole in subsequent whorls.

The specimens from this locality conform in all important characters such as wall structure, septal folding, development of chomata, relative width and symmetry of the tunnel, to the specimens of this genus from the localities A 11-3, A 12-1 and A 12-3. The populations of *Fusulina* from these localities apparently belong to a group of related species close to *Fusulina kamensis*. The present species differs from most species of this group by its small L/D ratio, and only *Fusulina teilhardi* Lee, 1927 and *Fusulina keltmensis* Raus., 1951 come close in this respect. A related species is *Fusulina chernovi* Raus., 1951 which mainly differs by its larger L/D ratio. There are some species of the genus *Beedeina* such as *Beedeina konnoi* (Ozawa, 1925), *Beedeina timanica* (Raus., 1951) and *Beedeina dunbari* (Chernova, 1951) which are superficially similar to the short types of *Fusulina* ex gr. *kamensis*. The first species has a smaller proloculum, a smaller diameter for corresponding whorls, and better developed chomata which moreover are present up to the last whorl. Of the other two species of the group *B. schellwieni*, especially *B. dunbari* is rather similar to our present species. *B. dunbari* differs in having more volutions, a smaller proloculum, and a smaller diameter for corresponding whorls. Besides, the inner whorls seem to be rounder and less rhomboidal, and the wall structure may differ in the development of the outer tectorium which in the Spanish species is wholly absent in the outer whorls and at best rudimentary in inner whorls. *B. timanica* differs in its more rhomboidal shape, its smaller maximum value of the L/D ratio, and by possessing more whorls.

Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
See below the discussion of the species from locality A 12-1 (p. 228).

Fusulinella ex gr. *asiatica*
3 specimens, Plate IX, Figs. 10-12

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
5	4½	92	525(4)	19-25	1.94(4)	271(4)	1.88(4)
14	5	69	984	25-44	1.50	533	1.38
25	4	76	590	21-28	1.51	328	1.36

The test changes from nautiloid (1st wh.), over nautiloid to oval (2nd wh.), to oval or short fusiform (3-5th wh.). The diaphanotheca appears in the 2-3½ whorl and is thick relative to the tectoria but not very transparent; the upper tectorium in particular is thin, and developed only in the inner 3-4½ whorls. The chomata are very wide in the inner 3-3½ whorls but probably do not extend to the poles; their width decreases in the 3½-5th whorl to about 1/2-1/3 of the possible extension along the lateral slopes; they are low in inner 1½-2½ whorls, usually of medium height in subsequent whorls, and have a low to steep slope at the tunnel side The tunnel path is symmetrical or slightly irregular. The tunnel angle is 32-35°. Septal folding, if present, is irregular and weak; it starts at the poles of the 2-3rd whorl and may spread a short distance onto the lateral slopes in subsequent whorls. The axis of coiling is stable.

The systematic position of this small species of *Fusulinella* is believed to be intermediate between the still more primitive *Fusulinella minutissima* Ishii, 1962 of the group of *F. schubertellinoides* and the more advanced *Fusulinella asiatica* Igo, 1957 and *Fusulinella silvai* Petri, 1952.

Fusulinella sp. 5
2 specimens, Plate IX, Figs. 13-14

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
29	3½	126	771	17-27	1.58	451	1.35
44	5	74	902	29-37	1.67	492	1.53

The test changes from nautiloid or oval (1st wh.), spherical, oval or short fusiform (2-3rd wh.), to oval (4-5th wh.). A diaphanotheca appears in the 2½ whorl; the lower tectorium is about as thick as the diaphanotheca; the upper tectorium is more often thicker in inner whorls, and as thick as the diaphanotheca or thinner in outer whorls. Chomata extend to the poles in the inner 3-4 whorls and are still very wide in the 4½ whorl; they are massive and ribbon-shaped or even somewhat quadratical (sl. 29); their height relative to the chamber height ranges from low to high in the inner 3 whorls, moderately high in the 3-4½ whorl, and low in the 5th whorl; they have steep slopes - up to 90° - except for the inner and outer whorls, which often have low-sloping chomata at the tunnel side. The tunnel path is almost symmetrical to slightly asymmetrical; the tunnel angle is very small in inner whorls and increases to 27-30° in outer whorls. Septal folding starts at the poles of the 3-4½ whorl; the folding is weak and restricted to the extreme polar areas. The axis of coiling is stable.

The present species bears some resemblance to *Fusulinella* ex gr. *asiatica* of which *Fusulinella silvai* Petri, 1952 and *Fusulinella asiatica* Igo, 1957 are most similar to the Spanish form.

L O C A L I T Y A 12 - 3

Pseudostaffella rostovzevi Rauser-Chernoussova, 1951
See below the discussion of the species from locality A 12-2 (p. 230)

Pseudostaffella sp. 9
1 specimen, Plate IX, Fig. 16

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
26	4	67	476	12-23	0.93	262	0.81

The wall consists of three layers; locally mural pores are observed. The first whorl is at a large angle to subsequent whorls.

The single specimen present is similar to species of the groups of *Ps. praegorskyi* and *Ps. gorskyi*. At locality A 12-2 a somewhat similar specimen has been found which was compared with species of the group of *Ps. gorskyi* (p. 231). In other areas of the Cantabrian mountains species of both groups have usually been found at lower stratigraphic levels.

Schubertella ex gr. *obscura*
1 specimen, Plate IX, Fig. 17

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
29	3½	67	377	21-25	1.43	213	1.27

The wall consists of a tectum and a diaphanotheca of 14-18 microns; a lower tectorium is present, the upper tectorium is indistinctly developed; differentiation of the wall starts in the 2nd whorl. The wide and asymmetrical to subsymmetrical chomata appear in the 2nd whorl; their relative height is 1/4-1/3 of the chamber height; at the side of the tunnel the slope of the chomata is steep or low. The septa are straight, and in the outer whorl slightly curved at the poles.

The present specimen and *Sch.* ex gr. *obscura* from locality A 12-2 may be conspecific. Both have the same type of wall. A comparison with other species from the Cantabrian mountains points to *Schubertella* sp. form 1 from the Brañosera limestone (loc. P. 38) as well as a similar form from the Cuenca de Beleño (loc. A 8) both belonging to the group of *Sch. obscura* Lee & Chen, 1930 (van Ginkel, 1965; pl. XXIV, figs. 1-6, figs. 15-17, pp. 96, 99).

Taitzehoella sp. 2
1 specimen, Plate IX, Fig. 18

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
27	7	27	959	19-27	-1.5(?)	509	-1.35(?)

The wall consists of two layers: a tectum and a less dense lower layer. The L/D ratio in inner 3 whorls is smaller than unity; the 1st whorl is discoidal, and the 2-3rd whorl nautiloid to almost spherical. The inner two whorls are coiled at an angle to subsequent whorls. A rhomboidal shape, slightly inflated in the median region is observed from the 4-7th whorl. The narrow chomata are of medium height i.e. 0.25 - 0.45 of chamber height; they have steep slopes at the tunnel side and are symmetrical or asymmetrical. Septa are slightly twisted at the poles beginning with the 4th whorl. The tunnel is fairly high, semilunate.

The single, central-oblique specimen has an L/D ratio which in axial section would probably not surpass a value of about 1.5. This would make *Taitzehoella* sp. 2 one of the shortest species of this genus hitherto described. Somewhat similar is ? *Wedekindellina simplicata* Lee, 1937 which species is perhaps better referred to *Taitzehoella*. Lee's species differs from the Spanish specimen mainly in its tighter coiled spirotheca and probably somewhat larger L/D ratio

Beedeina ?
See below the discussion of the species from locality A 11-3 (p. 225).

Fusulina ex gr. *kamensis*
9 specimens, Plate IX, Figs. 21-25; Plate X, Figs. 1-4

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.	Septal count (1-5th whorl)
13	3½	275	1150	29-42	2.59	623	2.40	
14	4	254	1345	33-46	2.34	697	2.26	
16	3½	246	1100	25-42	2.19	590	1.90	
17	4½	250	1720	34-59	2.10	935	1.91	
19	5	286	2215	21-38	3.64	1165	3.47	
20	5	279	2000	27-40	3.32	1015	3.12	
21	5½	225	1920	29-46	3.56	1080	3.14	
22	5	239	1750	34-59	-	940	-	12 20 22 26 29
24	5½	206	1510(5)	38-59	-	795(5)	-	8 18 22 25 29

The test changes from spherical, oval, or short fusiform (1st wh.), short fusiform to subrhomboidal (2nd wh.), short fusiform - elongate fusiform, or fusiform to elongate subrhomboidal (3-4th wh.), to elongate fusiform or subcylindrical (5-5½ wh.). A diaphanotheca appears in the ½-2½ whorl; the relative thickness of the diaphanotheca and tectoria conforms to the wall structure of *Fusulina* ex gr. *kamensis* from the stratigraphically lower localities A 11-3, A 12-1 and A 12-2; mural pores have been observed in three specimens. Chomata are present in the inner 1½-4 whorls, developed as pseudochomata in the 2-4½ whorl, and absent in the outer whorl(s); they are wide in the ½-1st whorl and narrow in subsequent whorls; relative height increases from low to moderate (½ wh.) to medium or high (1-3½ wh.); in the inner 1-1½ whorl they are symmetrical or asymmetrical, rounded or more or less angular, tending to become rounded and symmetrical in subsequent whorls. The tunnel is narrow in the inner 3-4 whorls and shows an abrupt increase in width in later whorls, where it forms a relatively wide and low slit; the tunnel path is slightly irregular, which in inner whorls is caused by a slight angular shift of the axis. Septal folding, especially in inner whorls, is high, fairly regular, and shows a relatively large wave length; wide septal loops may appear already in the 1st whorl; the folding spreads onto the lateral slopes as far as the tunnel in the 1-2½ whorl, and extends from pole to pole in subsequent whorls.

Measurements and illustrations point to a large variability of the L/D ratio; there are long and slender cylindrical forms (sl. 19, 20, 21), thickly fusiform specimens (sl. 14, 17), as well as some specimens which may bridge the gap (sl. 13, 16). Assuming that these specimens belong to a single species, *Fusulina teilhardi* Lee, 1927 and *Fusulina chernovi* Rauser, 1951 may be most close to our Spanish form. Should we assume, however, that two species are represented, the cylindrical specimens may be considered allied to *Fusulina kamensis* Safonova, 1951 and *Fusulina aspera* Chernova, 1954, whilst the short fusiform specimens may be compared with *Fusulina teilhardi*. These short fusiform specimens are also somewhat similar to *Beedeina timanica* (Rauser, 1951) (= *F. ielshanica* var. *timanica* Raus., 1951) and *Beedeina dunbari* (Chernova, 1951) and it may well be that species of the group *F. kamensis* have evolved from species of *Beedeina* of the group of *Beedeina schellwieni* similar to those just mentioned. A comparison of the specimens in slide 14 and slide 17 with *B. timanica* shows that the latter has more volutions (= 5½-6 as against 4-4½ in the Spanish specimens), a thinner wall, and a more rhomboidal shape. In comparison with the same specimens *Beedeina dunbari* has more volutions, a smaller proloculum and a smaller diameter for corresponding whorls. The present population of *Fusulina* ex gr. *kamensis* corresponds in many characters with, and is certainly related to, *Fusulina* cf. *aspera* from locality A 12-1.

Fusulinella aff. *meridionalis* Rauser-Chernoussova, 1951
See below the discussion of the species from locality A 12-1 (p. 228).

Fusulinella ex gr. *bocki*
2 specimens, Plate X, Figs. 6-7

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
1	6	103	1805	42-55	1.93	960	1.81
5	5½	139	1625	32-61	2.14	870	2.00

The test changes from spherical (1st wh.), oval (2nd wh.), short fusiform (3-4th wh.), to slightly inflated fusiform (5-6th wh.). A diaphanotheca appears in the 1½-2nd whorl; the lower tectorium is usually thicker than the diaphanotheca in the outer whorls and as thick as the diaphanotheca or thinner in the inner whorls; this relation with respect to relative thickness is the reverse for the upper tectorium. Moderately high to high, ribbon-shaped chomata may extend to the poles in inner 4½ whorls; in outer whorls they are of medium height and one notes, moreover, an abrupt decrease in height towards the poles, resulting in a thin sheet of these deposits on the lateral slopes; at the tunnel side chomata are usually steeply sloping. Tunnel path is irregular; tunnel angle varies from 37 to 43° in the 5-6th whorl, but is much smaller - 15° to 25° - in inner whorls. Septal folding starts at the poles of the 3-4th whorl; an intricate meshwork of folds is observed at the poles of the outer one or two whorls of mature specimens.

The Spanish specimens may be compared with *Fusulinella bocki* Möller, 1878 in Rauser-Chernoussova et al., 1951 (vide figs. 7, 9; pl. XXXI). However, a topotype of *Fusulinella bocki* Möller illustrated by Thompson (M.L. Thompson, 1948, pl. 26, fig. 5) differs from the Spanish specimens in not showing the extended and somewhat twisted poles which characterize the two specimens from Pendueles. Moreover, *Fusulinella bocki* may have somewhat higher chomata and less folded septa. These differences distinguish *F. bocki* Möller also from *Fusulinella soligalichi* Dalmatskaya, 1961. Our specimens differ from the latter species in having less whorls and a larger proloculum. Similar is also Sheng's *F. bocki timanica* Raus., 1951 from China (Sheng, 1958, pl. VIII). It shows the sudden widening of the spiral in the last whorl which is observed also, albeit less marked, in one of the Spanish specimens (sl. 1). According to the original data on *F. bocki timanica* Rauser, 1951 this species has a smaller L/D ratio, a smaller proloculum and more volutions. Even closer to our Spanish form are probably *F. helenae* Rauser, 1951 and *F. pseudobocki* Lee & Chen, 1930. Both species possess an almost identical juvenile stage and differ mainly in having a smaller proloculum and a larger L/D ratio in the adult stage. *Fusulinella* ex gr. *bocki* and *Fusulinella* sp. 6 (see below) possibly constitute a single species. For an answer more material should be studied to examine the influence of the added specimens on the morphological gap between the two similar forms.

Fusulinella sp. 6

2 specimens, Plate X, Figs. 8-9

Slide	Nr. of wh.	D. prol.	D	W.th.	L/D	R.v.	F.r.
2	5½	126	1805	38-59	1.99	935	1.92
3	5	139	1475	32-80	2.49	780	2.36

The test changes from spherical (1st wh.), over short fusiform (2-3rd wh.), to fusiform (3-5th wh.). A diaphanotheca appears in the 2nd whorl; the wall has a thin upper tectorium, and in the outer whorls a thick lower tectorium with respect to the diaphanotheca. The chomata are very wide, often extending to the poles in the inner four whorls; in the 5th whorl the width is reduced to about half or less of the maximum possible extension along the lateral slopes; they are low or of medium height in the inner two whorls, of medium height or high in the 3rd whorl, and of medium height in the 3½-5th whorl; the slope at the side of the tunnel is steep. The tunnel path is slightly irregular; its narrow path abruptly increases in width in the last whorl; the tunnel angle in the last whorl is up to 70°. Septal folding starts in the 2nd whorl and stays very weak up to the 3rd whorl; in succeeding whorls the folding is irregular, moderately intense and remains restricted to the polar regions.

Related species are *Fusulinella bocki* Möller, 1878 and *Fusulinella mosquensis* Rauser & Safonova, 1951. The former differs in having a smaller L/D ratio, a smaller tunnel angle in the last whorl (= 5-5½ wh.), and in its narrow convex median area. The latter species differs by its slightly smaller dimensions, and the stronger flattening of the median area. Similar are also two specimens identified as *Fusulinella pseudobocki* Lee & Chen, 1930 by Rauser-Chernoussova (Rauser, 1951, pl. XXXII, figs. 8, 9). *Fusulinella pseudobocki* probably has a smaller proloculum, more compactly coiled inner whorls, and a smaller diameter, e.g. the diameter of the 4th whorl is 0.74 mm for one of Lee's specimens as against 1.00 mm in the two Spanish specimens.

2. PROFUSULINELLA OVATA PENDUELESENSIS, A NEW SUBSPECIES

Profusulinella ovata penduelesensis subsp. nov.
(Pl. III, Figs. 11-19; Pl. XI, Figs. 1-22)

Material. - 20 axial and 2 aequatorial sections.

Type specimen. - Specimen 11 (Pl. XI, Fig. 12) is designated as the type specimen.

Locality. - *Profusulinella ovata penduelesensis* subsp. nov. is from locality A 11-1 at the base of the Escalada Limestone in the Pendueles beach section (Asturias, Spain).

Description. - Number of whorls: 4-6.5 (generally 5-6)
Diameter of proloculum: 26-50 microns
Radiusvector (Rv): 240-600 microns (generally 300-500 microns)
Form ratio (H.L/Rv): 1.30-2.05

The following measurements are added to facilitate comparison to species of which diameter (D), length (L) and the L/D ratio have been reported.
Diameter = 425-1080 microns
Length = 755-2000 microns
L/D ratio = 1.40-2.30
Diameter 4th whorl (D_4) = 280-500 microns, average: 380 microns

From 1st to 6th whorl the test changes from thickly lenticular (1st wh.), nautiloid - spherical (2nd wh.), spherical - short fusiform (3rd wh.), short fusiform (4th wh.), to (short) fusiform or (sub)rhomboidal (5-6th wh.).

The axis of coiling in inner 1-2.5 whorls is at an angle (up to 90°) to subsequent whorls.

The septa are straight in inner 3-4.5 whorls, and are somewhat irregularly folded in a narrow zone along the axis of coiling of later whorls. Folding is generally weak, but sometimes rather intense at the poles of the 5-6th whorl.

Chomata are often absent or inconspicuous in inner 1.5-2 whorls; they are wide in inner 2.5-4.5 (5.5) whorls, and often extend to the poles; in outer whorls they usually are narrow and subsymmetrical or symmetrical. Relative height varies from low to moderately high. Slopes at the side of the tunnel are generally steep (- 90°) especially in outer whorls.

The tunnel angle is small; from 2-6th whorl the mean value increases from about 20° to over 30°. The tunnel path is almost symmetrical to weakly asymmetrical; average and range of the maximum deviation of symmetry is respectively 12° and 5-26°.

The wall structure is obscure in inner 1.5-3.5 whorls; in outer whorls a tectum and a less dense lower layer are commonly observed. The presence of tectoria could not be established with certainty. In the 5-6th whorl of larger specimens, the layer below the tectum is slightly less dense than the secondary deposits. Wall thickness in outer whorls is 15-32 microns, on average 22 microns.

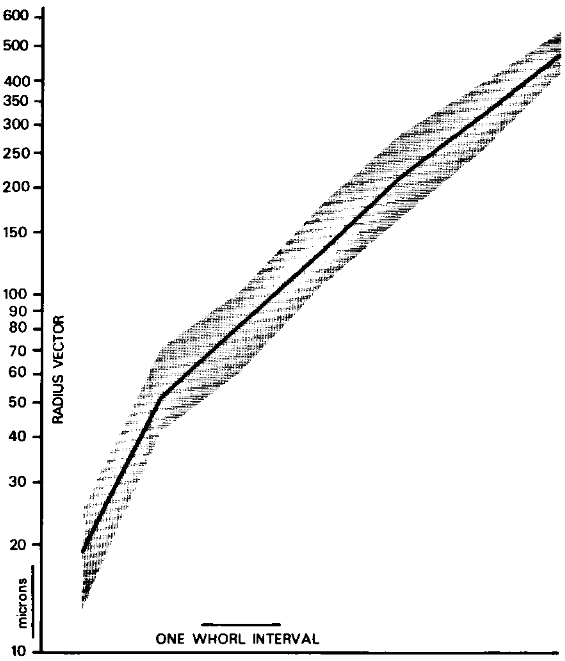


Fig. 4. Spiral curve of *Profusulinella ovata penduelesensis* subsp. nov.

Comparisons. - The new subspecies differs from *Profusulinella ovata ovata* Rauser, 1938 in having on average a slightly smaller proloculum, a smaller diameter for corresponding whorls, besides somewhat intenser septal folding in the polar areas. Moreover, the present form is more variable in shape and includes shells with a rather narrowly curved median region and more or less pointed poles, reminiscent of such species as *Pr. albasensis* van Ginkel, 1965 and *Pr. rhombiformis* Brazhnikova & Potievskaya, 1948. These latter species, however, are larger and have also a greater diameter for corresponding whorls. Moreover, *Pr. albasensis* has on average a smaller form ratio, more volutions and the lateral sides may show better expressed concavo-convex lateral sides. *Pr. rhombiformis* has higher chomata i.e. higher than half the height of the chamber. The weak septal folding which the present subspecies has in common with *Pr. rhombiformis* also indicates the rather close relation with *Aljutovella* Yet the folding may be too weak to justify its allocation in the latter genus. *Fusulinella? jamesensis* Thompson, Pitrat & Sanderson, 1953 from Canada is similar with respect to shell shape; moreover, the illustrations of *F. jamesensis* indicate a similar array of forms as observed in *Profusulinella ovata penduelesensis*. The Canadian species may be considered more advanced with respect to the Spanish form.

Measurements. - See Table I.

Biozone. - Base of Fusulinella Zone i.c. the base of Subzone A.

Correlation to the Moscow platform chronostratigraphic units. - Moscovian; Lower Moscovian; Kashirian; probably top of the Middle Kashirian (a Lower Kashirian age can be excluded).

Specimen in slide	nr: 39	17	83	45	55	48	1	2	18	58	78	4	42	25	14	62	85	11	30	57	Range	Average
Wh.nr. 0	21	15	17	19	20	25	-	13	21	15	17	19	23	16	18	19	19	23	17	23	13- 25	19
1	56	54	45	53	54	60	49	41	48	63	50	72	55	51	45	50	46	53	59	42	41- 72	52
2	78	81	77	84	103	73	78	61	85	88	79	97	91	77	70	76	78	84	103	70	61-103	82
R.v. 3	130	126	135	131	121	114	121	106	137	139	127	150	160	128	105	126	128	141	180	123	105-180	131
4	213	205	230	213	184	180	197	180	242	213	197	213	242	197	164	213	205	220	282	224	164-282	211
5	312	309	344	341	282	276	308	255	-·	319	269	324	345	299	251	336	315	330	392	360	251-392	314
6	385·	394·				-	-·	328·		394·	-		385·	435	377	500	361·	-	458·	546	435-546	465
7															-·	607·						
1	39	50	71	58	91	22	59	49	77	40	58	35	65	51	56	52	70	58	74	68	22- 91	57
2	67	56	75	56	17	56	55	74	61	58	61	55	76	66	50	66	64	68	74	75	17- 76	62
G.r. 3	64	63	70	63	52	58	63	70	77	53	55	42	51	54	56	69	60	56	56	82	42- 82	61
4	46	51	50	60	53	53	56	42		50	37	52	43	52	53	58	54	50	39	61	37- 61	51
5																						
1	0.65	<1	±1	<1	0.73	0.46	<1	<1	<1	0.54	<1	<1	0.71	<1	<1	0.93	0.73	0.58	0.70	-	0.46-0.93	0.70
2	1.08	0.81	1.47	0.89	0.69	1.12	1.17	1.13	1.10	1.21	0.94	1.00	0.98	1.17	<1	1.09	0.91	0.97	0.89	1.28	0.69-1.47	1.05
3	1.28	1.11	1.70	1.27	1.34	1.25	1.50	1.25	1.56	1.70	1.14	1.05	1.17	1.12	0.98	1.21	1.32	1.02	1.24	1.46	0.98-1.70	1.28
F.r. 4	1.67	1.65	1.90	1.58	1.41	1.40	1.93	1.44	1.66	1.84	1.45	1.39	1.25	1.17	1.26	1.38	1.45	1.36	1.30	1.45	1.17-1.93	1.50
5	1.50	1.51	1.92	1.56	1.75	1.30	2.00	2.11	-·	1.91	2.03	1.56	1.54	1.26	1.37	1.73	1.44	1.47	1.31	1.51	1.26-2.11	1.62
6	1.65·	1.57·				-	-·	1.90·		2.05·	-		1.54·	1.25	1.52	1.92	1.64·	1.61	1.67·	1.52		
7															-·	-						
2		-		-		-	-		-	-	15	-	-	23	15	-	-	-	13	-	13- 23	17
3		19		-		17	19		22	20	16	18	11	19	14	15	21	20	21	26	11- 26	19
T.a. 4		20		22		25	22		25	19	18	20	19	22	17	22	20	19	21	37	17- 37	22
5		21		20		19	23			32	29	33	20	24	23	19	21	26	24	-	19- 33	24
6						26								40	30	26		-		-	26- 40	32
M.d.s.	9	9	20	10	-	19	8	9	5	14	7	5	26	17	15	11	10	12	11	-	5- 26	12
T.h./T.w. 2		-		-		-	-			-	90		-	33	-	-	-	-	100		27-100	60
		-		-		-	-			48	50		-	75	-	-	27	-	-			
3		33		-		-	42			30	57		50	38	70	35	36	-	100		30-100	49
		27		-		47	48			-	72		40	48	38	44	40	44	-		27- 72	45
4		36		50		41	35			27	44		32	21	56	25	22	42	62		21- 62	38
		33		36		43	37			35	79		36	34	-	37	58	29	53		29- 79	43
5		-		37		54	-			-	32		-	43	38	33	-	35	20		20- 54	36
		-				-	-			-	-		-	-	33	48	-	56	-		24- 56	38
6						-					-			-	-			-				
T.h./H 2		-		-		-	-			-	-		-	29	-	-	-	-	24		17- 44	32
		-		-		-	-			33	44		-	40	-	-	17	-	-			
3		18		-		-	29			18	38		14	24	41	19	22	-	55		18- 55	28
		16		-		29	23			-	48		25	38	33	14	27	25	-		14- 48	28
4		22		37		32	25			21	38		22	19	30	17	15	28	44		15- 44	27
		25		31		30	27			-	50		33	26	-	34	48	22	36		22- 50	33
5		-		22		39	-			-	27		-	37	32	24	-	36	24		22- 39	30
		-				-	-			-	-		-	-	29	38	-	60	-		29- 50	42
6						-					50			41	33	-		-				
T.w./L 2		-		-		-	-			-	11		-	14	-	-	-	-	5		5- 15	11
		-		-		-	-			10	15		-	8	-	-	11	-	-			
3		10		-		-	7			6	11		5	11	10	9	9	-	9		5- 11	9
		10		-		10	6			-	10		10	13	11	8	9	8	-		6- 13	10
4		7		9		11	8			7	7		9	13	8	9	8	9	10		7- 13	9
		10		12		9	7			11	6		13	11	-	11	10	9	8		6- 13	10
5		-		7		10	-			-	11		-	12	10	7	-	11	12		7- 12	10
		-				-	-			-	-		-	-	12	9	-	10	-		9- 22	13
6						-					-			22	13	-		-				
W.th. 1	8	5	4	8	7	6	-	5	6	6	6	7	6	8	6	6	6	4	6	4	4- 8	6
2	10	6	7	12	8	7	12	7	10	9	11	8	11	15	7	6	10	7	11	8	6- 15	9
3	12	17	-	12	14	12	17	12	-	17	15	15	13	17	10	12	21	13	13	14	10- 21	14
4	15	19	18	19	15	19	23	18	19	17	21	19	24	23	16	23	23	15	18	19	15- 24	19
5	21	14	20	21	17	19	23	19	-·	27	16	17	21	-	24	29	19	19	20	21	14- 29	20
6	21·	17·				18		-·		25·	-		26·	25·	21	26	19·	21·	19·	-	18- 26	21
7															25	-·						
Ch.h./H 1.5		-		-		-	-	-	-	-	-	-	-	-	-	-	19	25	29	-	19- 29	24
2		19		50		53	-	-	-	-	-	27	31	-	17	-	21	38	41	-	17- 53	33
		17		40		44	27	18	40	36	29	40	24	22	24	27	38	33	33	44	17- 44	31
3		32		35		27	30	24	51	31	28	19	34	27	41	43	30	34	36	41	19- 51	33
		37		-		31	44	36	49	40	43	22	47	40	32	37	44	33	36	35	22- 49	38
4		36		42		46	34	27	51	33	37	25	35	34	38	33	38	49	41	32	25- 51	37
		37		37		47	29	-		38	-	-	21	33	31	26	42	54	43	25	21- 54	35
5		47		-		34	37	-		40	33	26	34	33	34	43	44	44	50	-	26- 50	38
		32				-	-	-		20	-		17	30	39	36	41	44	36	-	17- 44	33
6						-		-			-			31	50	37		-		-	31- 50	39
															-	26						

R.v.	radius vector
G.r.	ratio of radius of n^{th} to $n-1^{th}$ whorl
F.r.	ratio of half length to radius vector
T.a.	tunnel angle
M.d.s.	maximum deviation of tunnel path
T.h./T.w.	ratio of height to width of tunnel
T.h./H	ratio of heights of tunnel and chamber
T.w./L	ratio of width of tunnel to length of shell
W.th.	wall thickness
Ch.h./H	ratio of heights of chomata and chamber

All ratios with exception of the form ratio are expressed in percentage values.
Values of radius vector and wall thickness are given in microns.
Values with a dotted suffix apply to measurements of one-half of a whorl less than the row in which they are placed.

Table I. Measurements of *Profusulinella ovata* subspecies *penduelesensis* subsp. nov.

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P L A T E S

Unless indicated otherwise the enlargement of the illustrated specimens in the plates is as follows:

X 20 : *Profusulinella, Aljutovella, Fusulinella, Beedeina, Eofusulina, Fusulina*

X 25 : *Taitzehoella, Fusiella*

X 35 : *Pseudoendothyra, Staffella*

X 50 : *Ozawainella, Pseudostaffella, Schubertella*

X 100 : *Millerella, Eostaffella, Mediocris, Planoendothyra*

The scale is also indicated by bars - one for each genus - representing 500 microns.

P L A T E I

X 100		
Fig. 1.	*Planoendothyra* cf. *aljutovica* (Reitlinger)	p. 207
	1, slide 88	
Figs. 2- 4.	*Planoendothyra* cf. *spirilliniformis* (Brazhnikova & Potievskaya)	p. 208
	2, slide 82	
	3, 4	
	4, 45	
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	6, 66	
	7, 47	
X 35		
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	9, 28	
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	10,slide 26	
X 100		
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	18, 93 form 2	
	19,	
	20, 61 form 3	
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	22, 3	
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	29, 3	
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	40, 59	
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	43, 70	
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	45, 18	
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	47, 50	
Figs. 48-52.	*Millerella* cf. *transita* (Kireeva)	
	48, slide 63	
	49, 54	
	50, 18	
	51, 23	
	52, 75	
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	53, slide 7	
	54, 13	
Fig. 55.	*Millerella* cf. *umbilicata* (Kireeva)	
	55, slide 8	

A 10-3

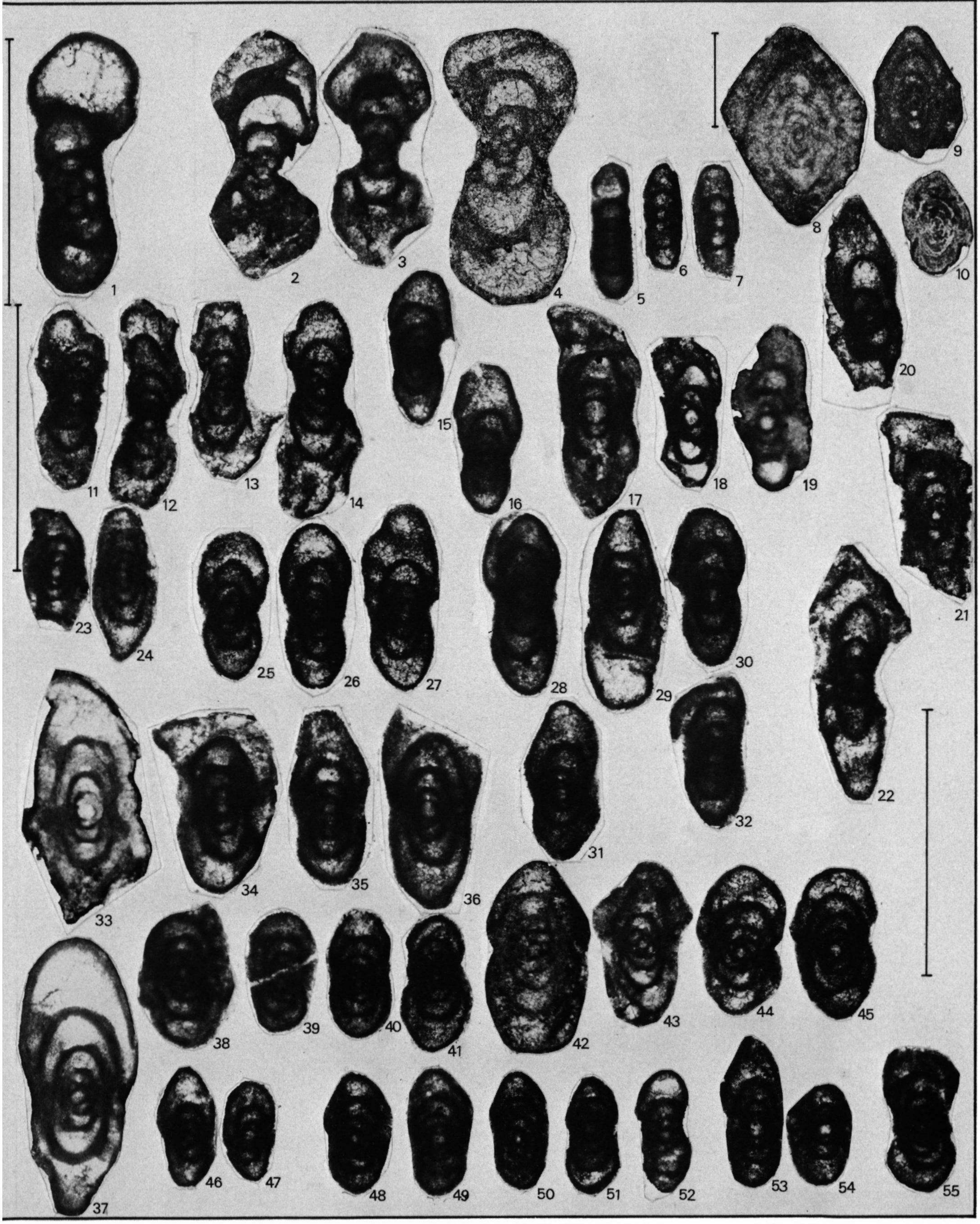

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PLATE II

X 100

Figs. 1- 2. *Millerella* cf. *marblensis* Thompson p. 211
1, slide 50
2, 88

X 50

Figs. 3- 5. *Ozawainella* ex gr. *umbonata* Brazhnikova & Potievskaya
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4, 70
5, 93

Figs. 6- 7. *Ozawainella* ex gr. *alchevskiensis* Potievskaya
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X 100

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14, 15
15, 66

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Fig. 17. *Eostaffella (Eostaffellina) vischerensis* Grozdilova & Lebedeva
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X 50

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20, 55
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Figs. 28-30. *Pseudostaffella antiqua* (Dutkevich) p. 213
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Figs. 33-34. *Pseudostaffella* sp. 8
33, slide 11
34, 17

X 20

Figs. 35-36. *Profusulinella* ex gr. *parva* (Lee & Chen)
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36, 35

Figs. 37, 37a. *Profusulinella* ex gr. *primitiva* Grozdilova & Lebedeva
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Figs. 38-39. *Profusulinella* cf. *staffellaeformis* Kireeva p. 214
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39, 70

X 75

Figs. 40-42. *Eowedekindellina?* sp.
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41, 66
42, 14

X 50

Fig. 43. *Schubertella* ex gr. *obscura* Lee & Chen
43, slide 21

Figs. 44-49. *Schubertella obscura mosquensis* Rauser-Chernoussova
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45, 13
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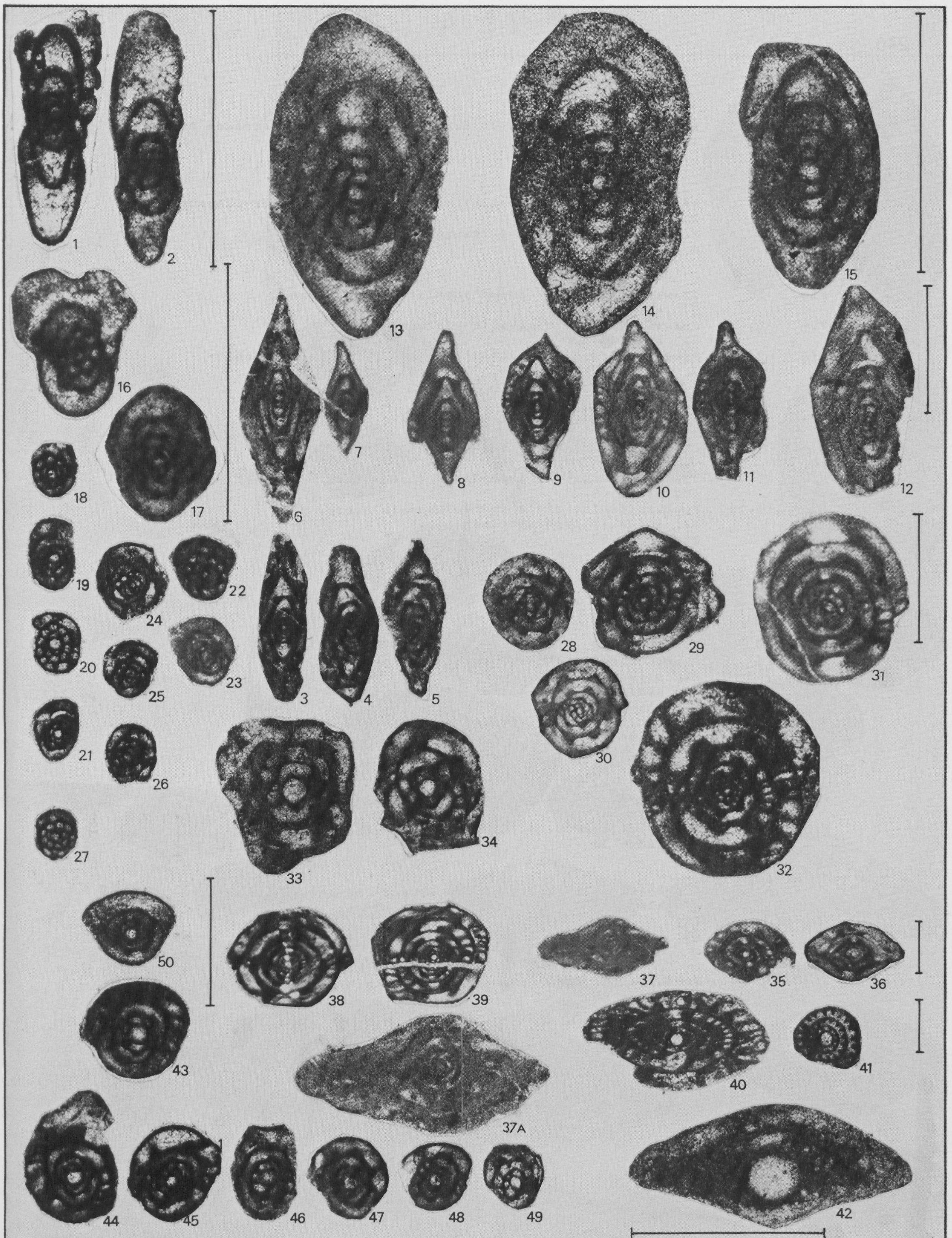
47, 52
48, 72
49, 78

Fig. 50. *Schubertella* cf. *toriyamai* (Ishii)
50, slide 8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P L A T E III

X 35
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X 50
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X 20
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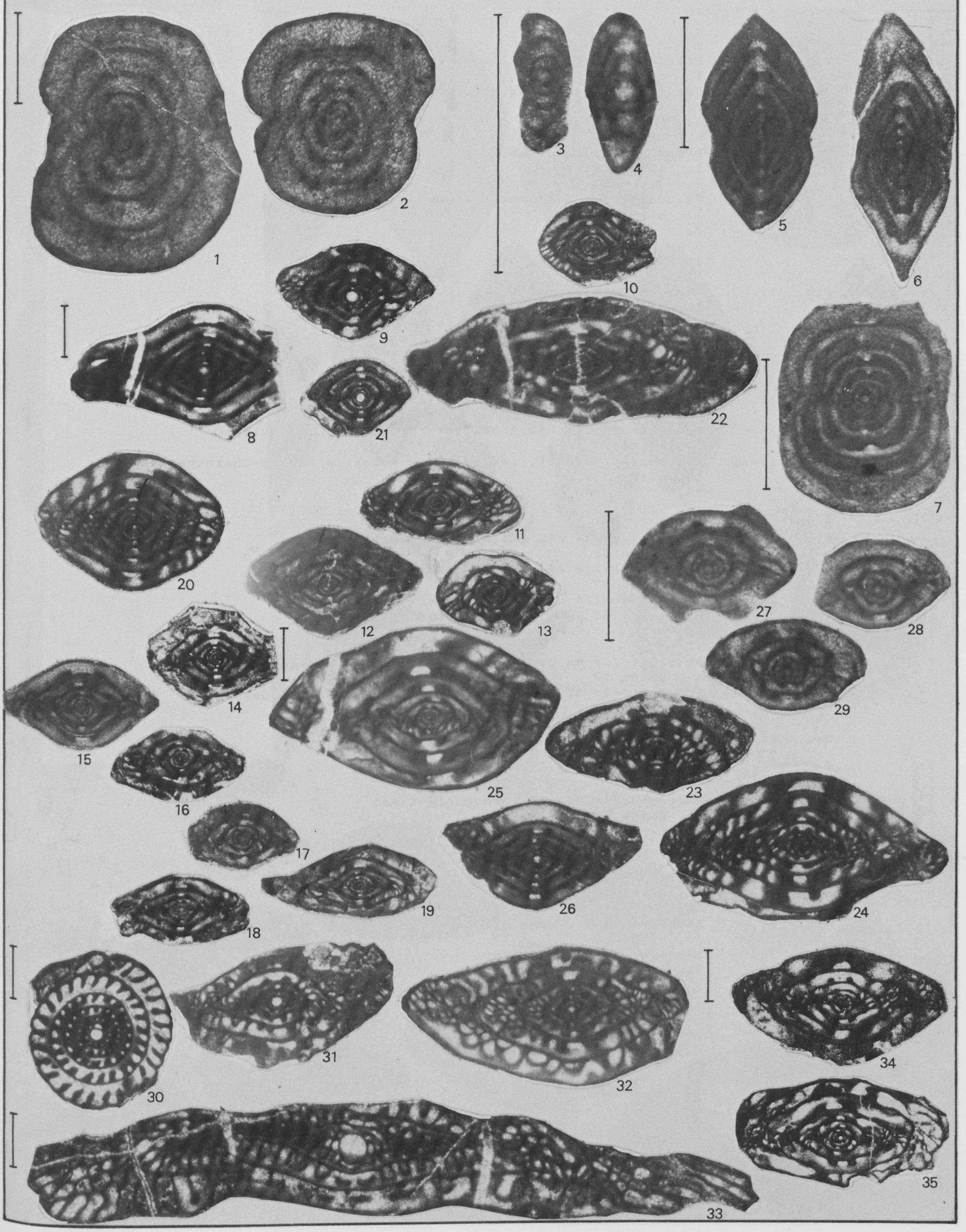
A 11-1



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P L A T E IV

X 35

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1, slide 59

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X 50

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X 20

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X 50

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X 25

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X 20

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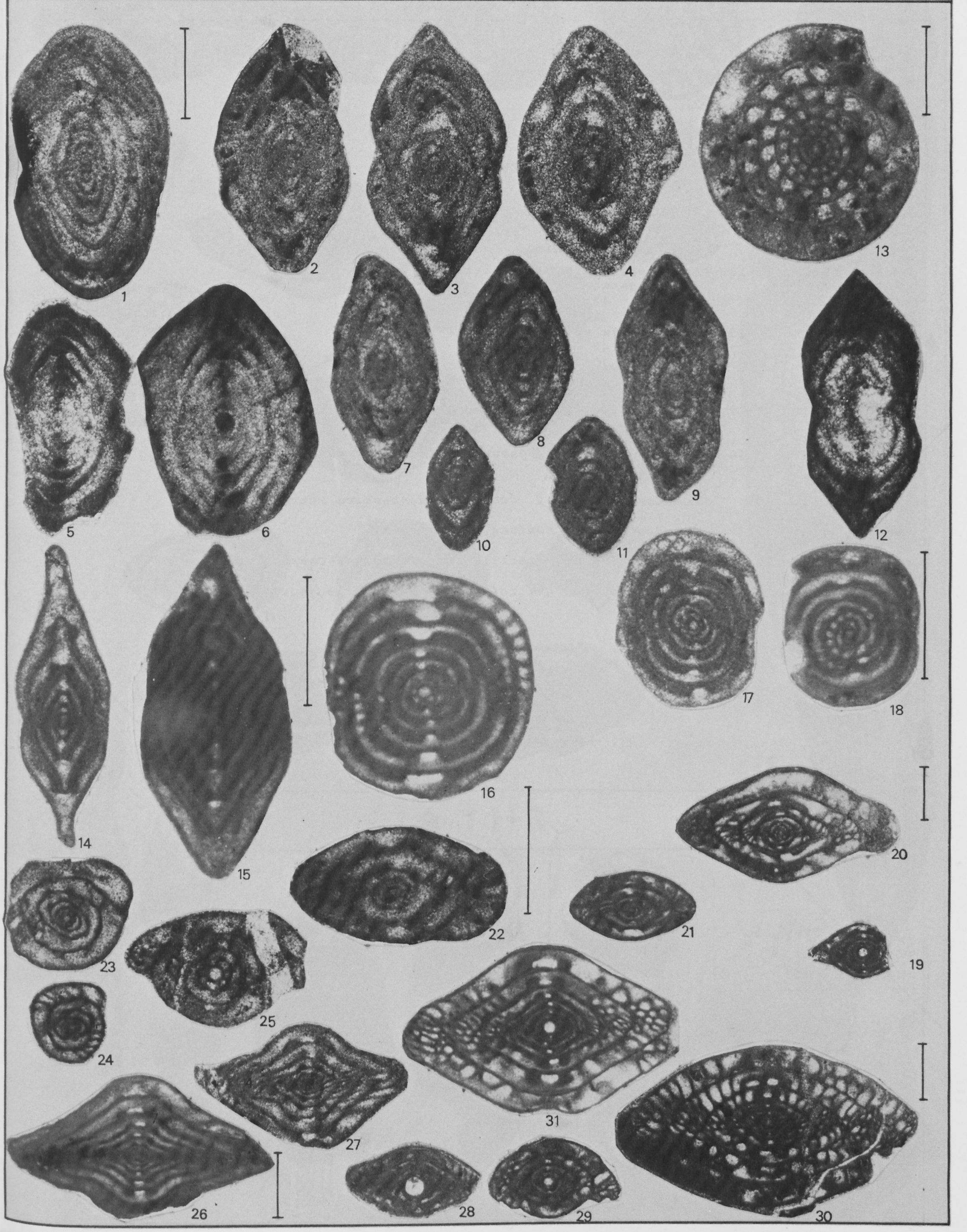
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PLATE V

X 20

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X 50

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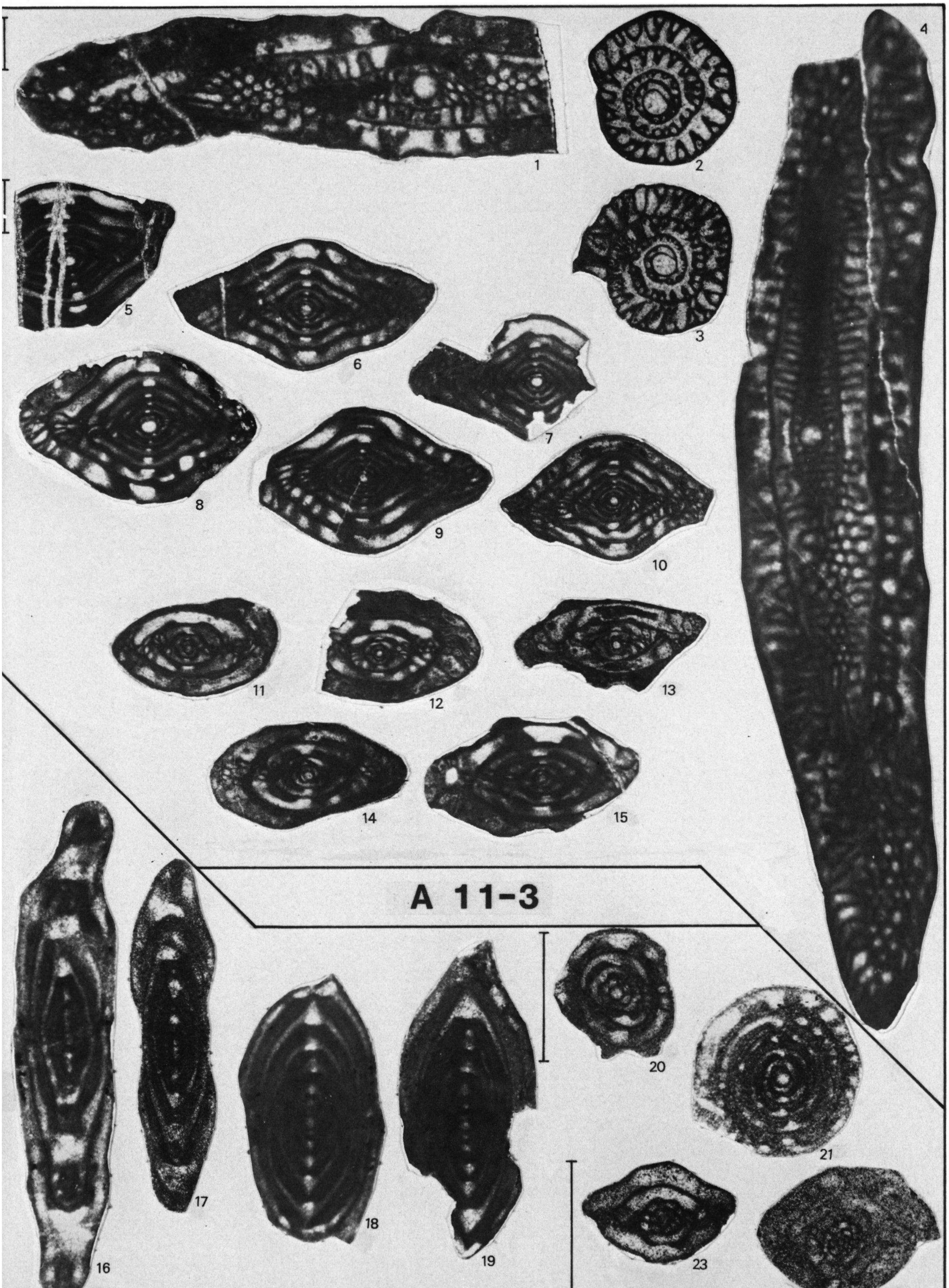
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A 11-3
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PLATE VI

X 25

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X 20

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14, 37
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18, 50
19, 4

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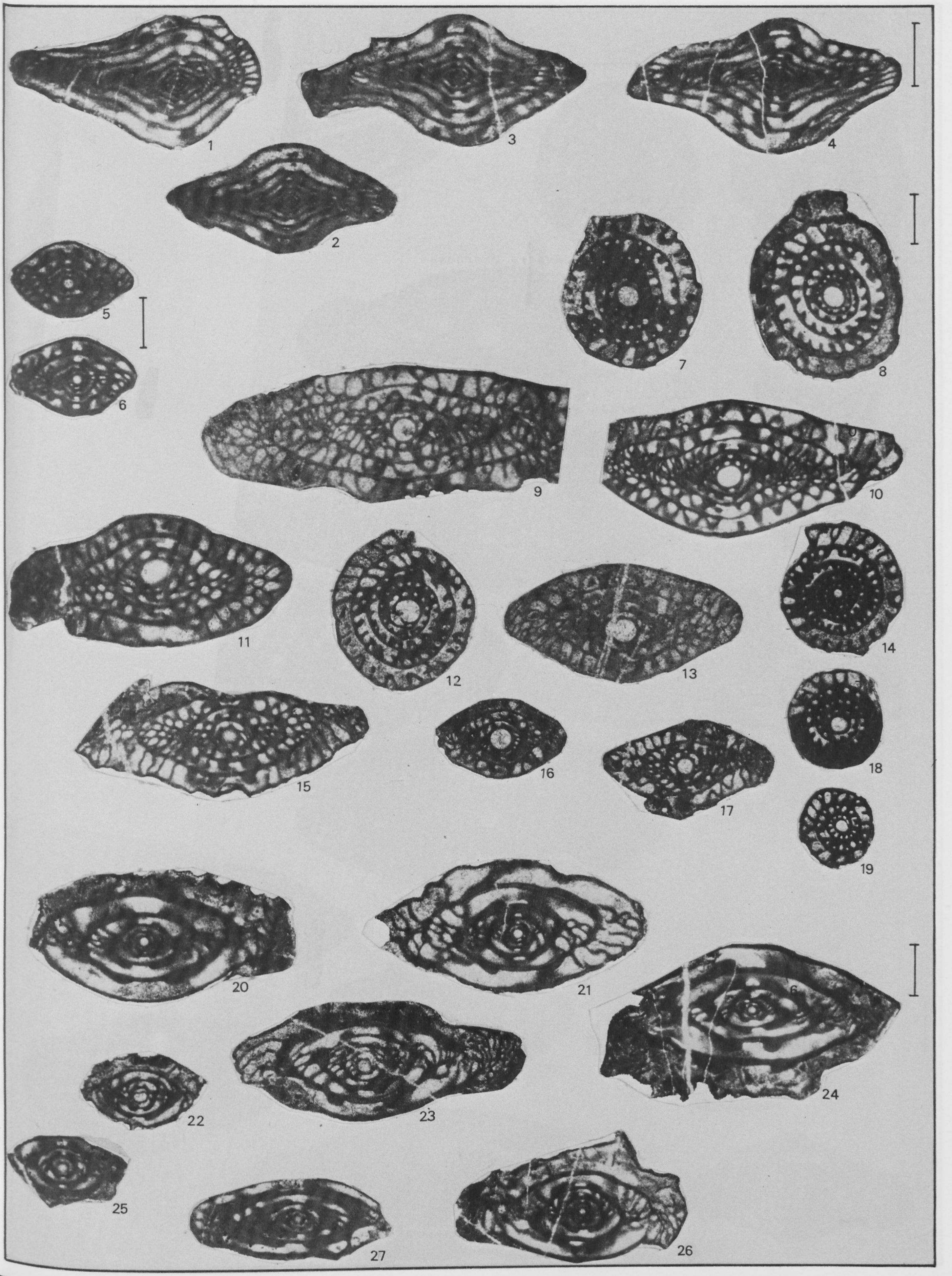
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P L A T E VII

X 50

Fig. 1. *Ozawainella* ex gr. *pseudoangulata* et *mosquensis* p. 227

1, slide 38

X 25

Fig. 2. *Taitzehoella* sp. 1

2, slide 29

X 20

Figs. 3-11. *Fusulina* aff. *aspera* Chernova

3, slide	2
4,	5
5,	20
6,	1
7,	34
8,	10
9,	15
10,	21
11,	30

Figs. 12-17. *Fusulinella* aff. *meridionalis* Rauser-Chernoussova p. 228

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14,	32
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17,	4

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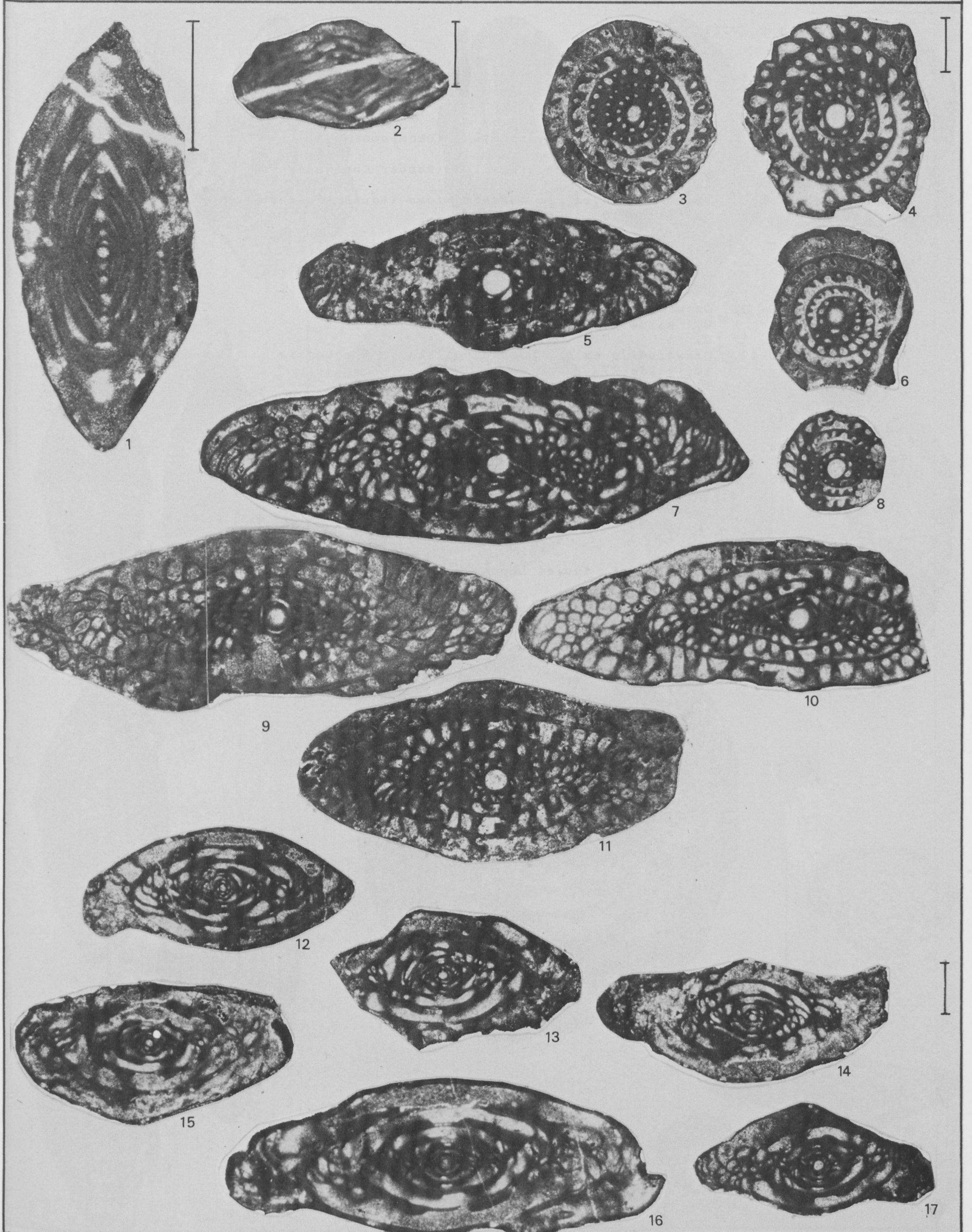

PLATE VIII

X 35

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X 50

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X 25

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A 12-2

P L A T E IX

x 20

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1, slide 13
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7, 22

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Figs. 10-12. *Fusulinella* ex gr. *asiatica* Igo
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11, 5
12, 25

Figs. 13-14. *Fusulinella* sp. 5
13, slide 44
14, 29

x 50

Fig. 15. *Pseudostaffella rostovzevi* Rauser-Chernoussova p. 233
15, slide 25

Fig. 16. *Pseudostaffella* sp. 9
16, slide 26

Fig. 17. *Schubertella* ex gr. *obscura* Lee & Chen
17, slide 29

x 25

Fig. 18. *Taitzehoella* sp. 2
18, slide 27

x 20

Figs. 19-20. *Beedeina?* sp
19, slide 7
20, 6

Figs. 21-25. *Fusulina* ex gr. *kamensis* Safonova
21, slide 24
22, 22
23, 16
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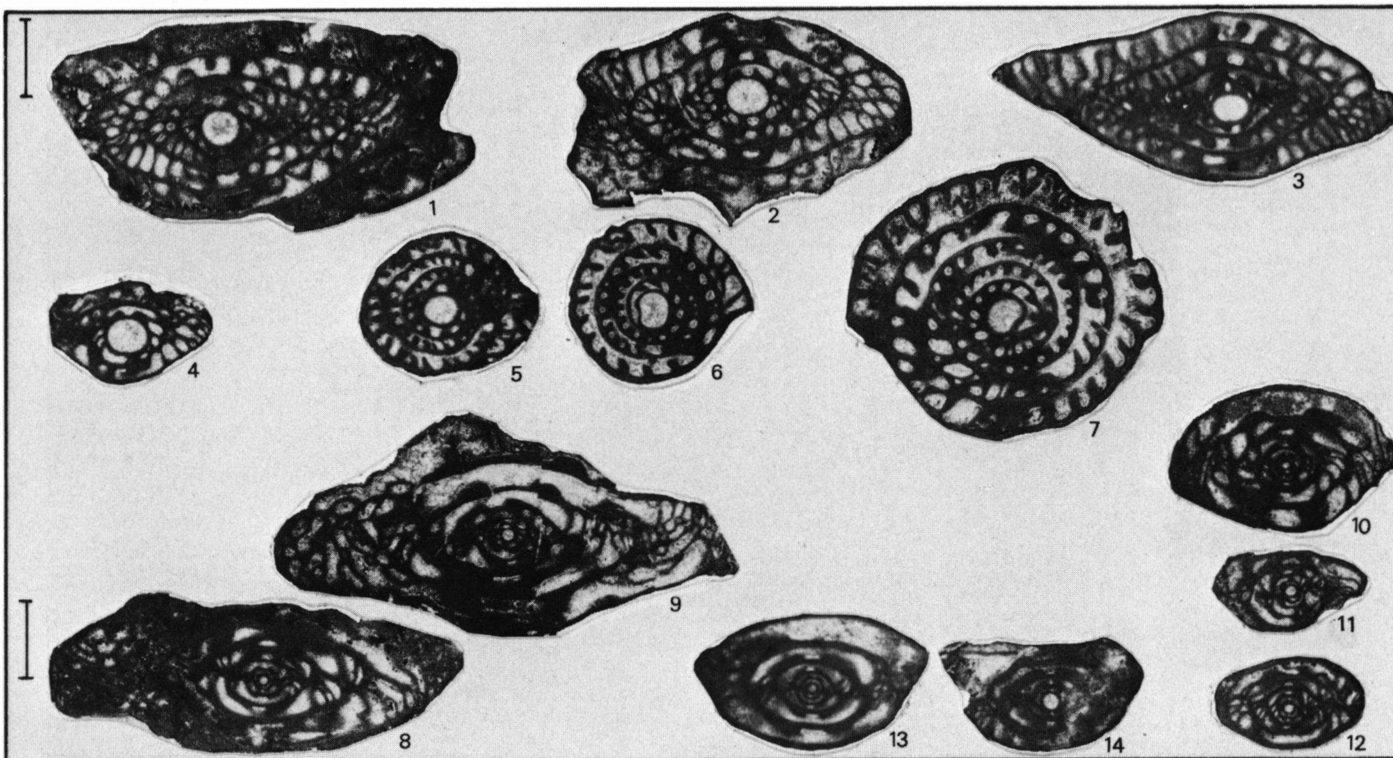

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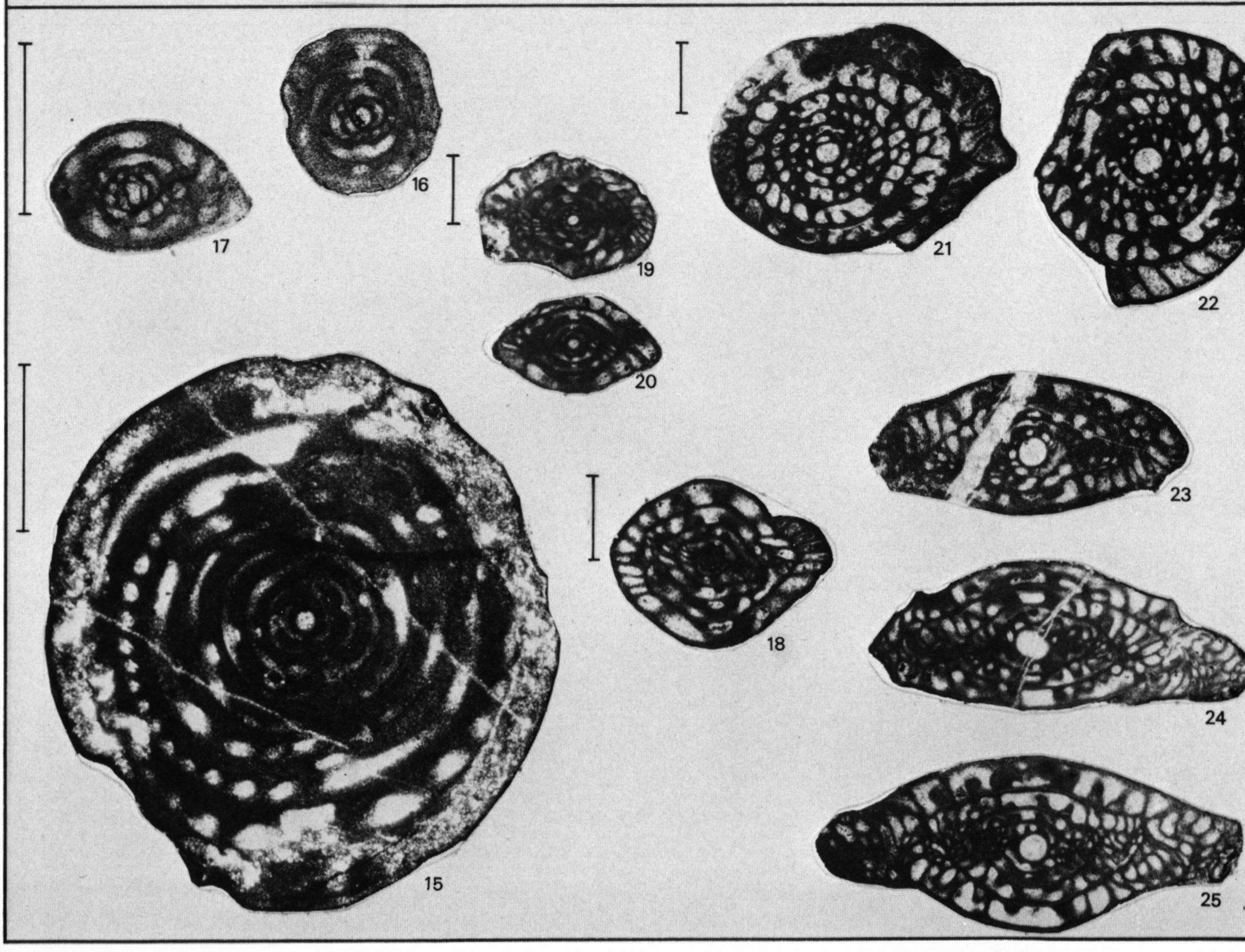

P L A T E X

x 20

Figs. 1- 4. *Fusulina* ex gr. *kamensis* Safonova p. 233
1, slide 17
2, 21
3, 20
4, 19

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7, 5

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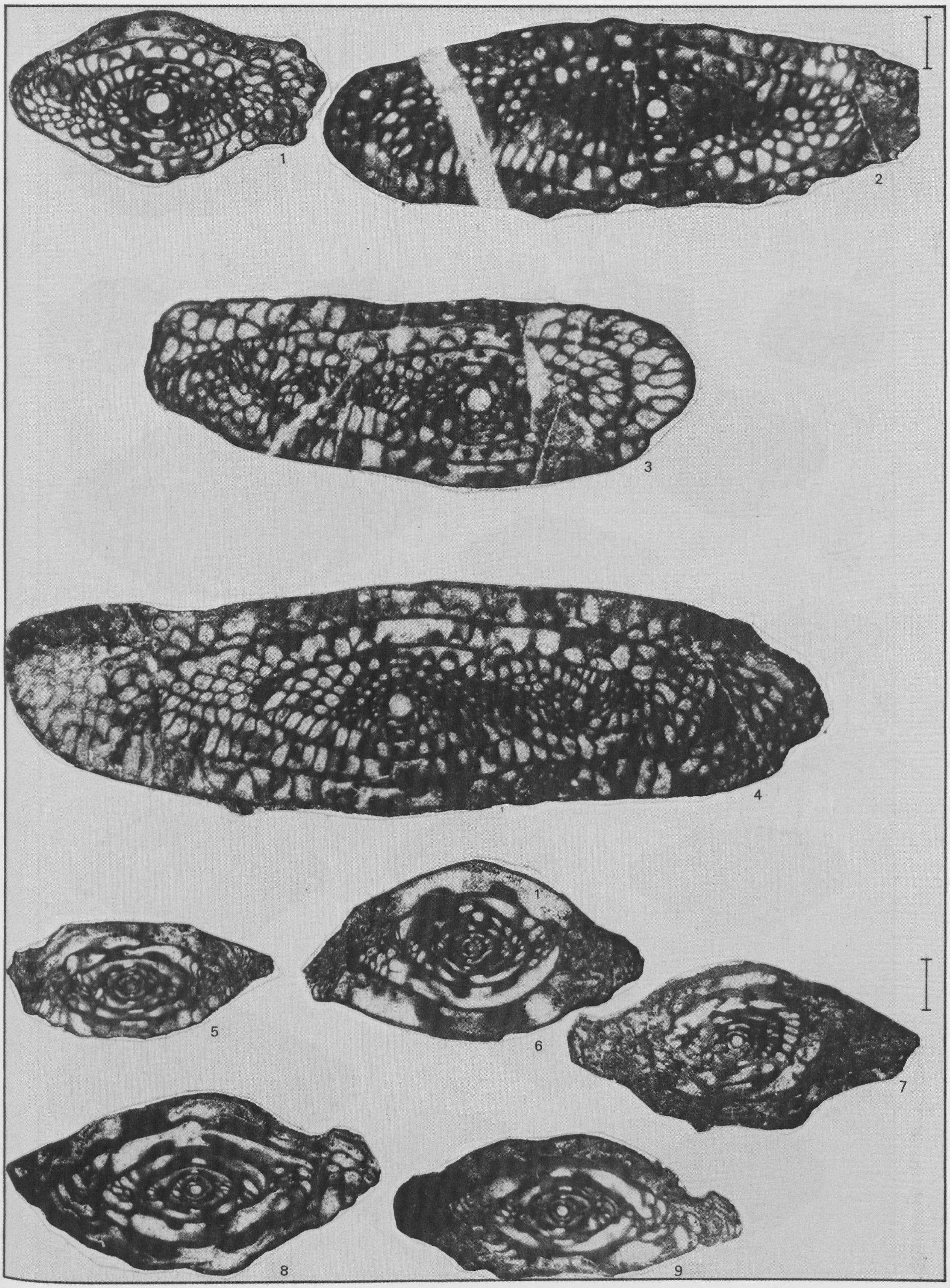
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P L A T E XI

X 36

Figs. 1-22. *Profusulinella ovata penduelesensis* subsp. nov. p. 235

1,	slide 1	
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4,	78	
5,	55	
6,	45	
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8,	62	
9,	2	
10,	39	
11,	20	
12,	11	type specimen
13,	85	
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22,	29	

Profusulinella ovata
pendueleseusis subsp.nov.

Locality **A 11-1** (x36)