

APPENDIX

Identification of Foraminifera from the
Borup Fiord and Canyon Fiord Formations

by

B. L. Mamet

Biota, Borup Fiord Formation

About 4,000 specimens of Foraminifera from recrystallized biomicrite were obtained from unit 3 in the type section of the Borup Fiord (see p. 00; GSC Cat No. C-266).

Ammovertella sp.

Archaediscus of the group A. chernousovensis Mamet, in Mamet, Choubert and Hottinger.

Archaediscus of the group A. krestovnikovi Rauzer-Chernousova.

Archaediscus of the group A. moelleri Rauzer-Chernousova.

Archaediscus paucillus Schlykova.

Astroarchaediscus sp.

Astroarchaediscus baschkiricus (Krestovnikov and Teodorovitch).

Biseriella parva (Chernysheva).

Bradyina sp.

Calcsphaera laevis Williamson.

Calcivertella sp.

Climacammina of the group C. patula Brady.

Climacammina of the group C. prisca Lipina.

"Cornuspira" sp.

Criborespira sp.

Deckerella? sp.

Diplosphaerina sp.

Earlandia elegans (Rauzer-Chernousova).

Earlandia clavata (Howchin).

Earlandia vulgaris (Rauzer-Chernousova and Reitlinger).

Endothyra of the group E. bowmani Phillips in Brown emend Brady.

Endothyranopsis sp.

Endothyranopsis sphaerica (Rauzer-Chernousova and Reitlinger).

Eostaffella sp.

Eostaffella of the group E. radiata (Brady) (= Eostaffella mosquensis of the Russian authors).

Eostaffella of the group E. ikensis Vissarionova.

Eostaffella sp. (umbilicated forms).
Eostaffellina sp.
Eotuberitina sp.
"Globivalvulina" sp.
Globoendothyra sp.
Globoendothyra globulus d'Eichwald.
Monotaxinoides sp.
Neoarchaediscus sp.
Neoarchaediscus gregorii (Dain).
Neoarchaediscus incertus (Grozdilova and Lebedeva).
Neoarchaediscus parvus (Rauzer-Chernousova).
Neoarchaediscus postrugosus (Reitlinger).
Neoarchaediscus subbaschkiricus (Reitlinger).
Palaeonubecularia sp.
Palaeotextularia of the group P. longiseptata Lipina.
Palaeotextularia of the group P. consobrina Lipina.
Planospirodiscus sp.
Planospirodiscus minimus (Grozdilova and Lebedeva OBJ).
Pseudoendothyra of the group P. kremenskensis Rozovskaia.
Pseudoendothyra cf. P. concinna Schlykova.
Pseudoendothyra sp.
Pseudoglomospira sp.
Radiosphaerina sp.
Tetrataxis sp.
Tetrataxis
Yanichewkina sp.
Zellerina discoidea (Girty).
About a dozen undetermined species.

Age: The forms Asteroarchaediscus baschkiricus and Biseriella parva indicate zone 18 of microfaunal assemblage zones, which is correlative with the upper part of the Eumorphoceras ammonoid zone. The fauna is early Namurian in age (Armstrong and Mamet, 1970).

Distribution of families and principal genera observed in sample (see Fig. 1).

- I Archaediscidae (Neoarchaediscus).
- II Eostaffellidae (Eostaffella).
- III Endothyridae (Endothyra).
- IV Attached forms (Apterrinellidae).
- V Palaeotextulariidae (Climacammina).
- VI Earlandiidae (Earlandia).
- VII Cornuspiridae ("Cornuspira").
- VIII Pseudoendothyridae (Pseudoendothyra).
- IX Primitive Eolasiodiscidae (Monotaxinoides).
- X Tetrataxidae (Tetrataxis).
- XI Primitive Bradyinidae (Yanichewkina).
- XII Biseriamminidae (Biseriella).

Biota I Canyon Fiord Formation; About 2,500 specimens of foraminifers that occur in weakly recrystallized biomicrite were obtained four feet above the base of formation shown in section 74 on figure 4 (see Pl. XVI; GSC Cat. No. C-264).

Ammovertella sp.
Asteroarchaediscus sp.
Asteroarchaediscus baschkiricus (Krestovnikov and Teodorovitch).
Biseriella parva (Chernysheva).
Bradyina sp.
Bradyina cribrostomata Rauzer-Chernoussova and Reitlinger.
Calcisphaera laevis Williamson.
Climacammina of the group C. patula Brady.
Climacammina of the group C. prisca Lipina.
"Cornuspira" sp.
Earlandia clavatula (Howchin).
Earlandia vulgaris (Rauzer-Chernoussova and Reitlinger).
Endothyra sp.
Eolasiodiscus sp.
Eostaffella oblonga Ganelina.
Eostaffella pseudostruvei (Rauzer-Chernoussova and Beljaev).
Eostaffella cf. E? rossica (Rosovskaia).
Globivalvulina sp.
Globivalvulina of the group G. bulloides (Brady).
"Globivalvulina" moderata Reitlinger.
Lipinella sp.
Millerella (Seminovella) sp.
Millerella (Millerella) sp.
Monotaxinoides sp.
Neoarchaediscus sp.
Palaeonubecularia sp.
Palaeotextularia of the group P. consobrina Lipina.

Palaeotextularia of the group P. longiseptata Lipina.

Pseudoendothyra sp.

Pseudoglomospira sp.

Tetrataxis sp.

Tuberitina sp.

About a dozen undetermined species.

Age: The forms Globivalvulina sensu stricto and Lipinella sp. indicate zone 20, which equates with the Reticuloceras ammonoid zone.

The fauna is early Bashkirian in age (Armstrong and Mamet, 1970).

Distribution of the families and principal genera observed in the sample (see Fig. 2).

- I Archæodiscidae (Asteroarchæodiscus).
- II Eostaffellidae (Eostaffella).
- III Endothyridae (Endothyra).
- IV Attached forms (Apterrinellidae).
- V Palaeotextulariidae (Climacammina).
- VI Earlandiidae (Earlandia).
- VII Cornuspiridae ("Cornuspira").
- VIII Pseudoendothyridae (Pseudoendothyra).
- IX primitive Eolasiiodiscidae (Eolasiiodiscus).
- X Tetrataxidae (Tetrataxis).
- XI Bradyinidae (Bradyina).
- XII Biseriamminidae (Globivalvulina).

Biota 2, Canyon Fiord Formation: About 1,000 specimens of Foraminifera were obtained from recrystallized, quartz-bearing, intraclastic biosparite and recrystallized quartzose biomicrite. The collection was taken from beds 360 feet above base of Canyon Fiord Formation shown in section 74 on figure 3 (GSC Cat. No. C-404).

Ammovertella sp.
Asteroarchaediscus sp.
Bradyina sp.
Calcisphaera sp.
Calcivertella sp.
Climacammina sp.
"Cornuspira"
Earlandia sp.
Endothyra sp.
Eolasiiodiscus sp.
Eoschubertella sp.
Eostaffella sp.
Globivalvulina of the group G. bulloides Brady.
trilayered Globivalvulina sp.
Globivalvulina granulosa Reitlinger.
Komia sp.
cf. Ozawainella sp.
Palaeonubecularia sp.
Palaeotextularia sp.
Profusulinella sp.
Pseudoendothyra sp.
Pseudoglomospira? sp.
Pseudostaffella sp.
Tetrataxis sp.
Tetrataxis of the group T. maxima Schellwien.
Tuberitina sp.

Age: The microfacies represents zone 23 of microfaunal assemblage zones, and is early Moscovian in age.

Distribution of families and principal genera, Zone 23 (see Fig. 3).

- I Archaediscidae (Asteroarchaediscus).
- II Eostaffellidae (Eostaffella).
- III Endothyridae (Endothyra).
- IV Sedentary attached forms (Pseudoglomospira?).
- V Palaeotextulariidea (Palaeotextularia).
- VI Earlandiidae (Earlandia).
- VII Cornuspiridae ("Cornuspira").
- VIII Pseudoendothyridae (Pseudoendothyra).
- IX primitive Eolasiiodiscidae (Eolasiiodiscus).
- X Tetrataxidae (Tetrataxis).
- XI Bradyinidae (Bradyina).
- XII Biseriamminidae (Globivalvulina).
- XIII Fusulinidae (Profusulinella).
- XIV Ozawainellidae (Ozawainella).

Biota 3, Canyon Fiord Formation; About 2,000 specimens were obtained from re-crystallized biomicrite collected 630 feet above base of formation shown in section 74 on figure 3 (GSC Cat. No. C-405).

Ammovertella sp.
Asteroarchaediscus sp.
Bradyina sp.
Bradyina eonautiliformis Reitlinger.
"Bradyina"? cf. B. pauciseptata Reitlinger.
Beresella sp.
Calcisphaera sp.
Climacammina sp.
Climacammina cf. ivanovae Reitlinger.
Climacammina of the group C. moelleri Reitlinger.
Deckerella sp.
Diplosphaerina sp.
Earlandia sp.
Endothyra sp.
Endothyra mosquensis Reitlinger.
Endothyranella sp.
Eolasiiodiscus sp.
Eostaffella du groupe E. parva Rauzer-Chernoussova.
Eostaffella postmosquensis Kireeva.
Eugonophyllum sp.
Globivalvulina sp.
Globivalvulina of the group G. bulloides Brady.
trilayered Globivalvulina sp.
Glomospirella sp.
Haplophragmina sp.

Haplophragmina kashirica Reitlinger.

Hemigordius sp.

Komia sp.

Lipinella sp.

Neoarchaediscus cf. N. postrugosus (Reitlinger).

Ozawainella sp.

Palaeotextularia sp.

Profusulinella sp.

Psuedobradyna sp.

Pseudoglomospira sp.

Pseudostaffella sp.

Tetrataxis of the group T. conica Ehrenberg emend von Möller.

Tetrataxis of the group T. maxima Schellwien.

Trepeilopsis sp.

Tuberitina sp.

Ungdarella sp.

Age: The presence of "Bradyina" cf. B. pauciseptata, Climacammina of the group C. moelleri, trilayered Globivalvulina, and abundant Haplophragmina kashirica indicates a middle Moscovian age.

Similar microfaunas are known in the Russian, Kashira and Podolsk horizons (Reitlinger, 1950). The microfauna is correlative with zones 24 to 26.

Distribution of families and principal genera observed in sample (see Fig. 4).

- I Archaediscidae (Asteroarchaediscus).
- II Eostaffellidae (Eostaffella).
- III Endothyridae (Endothyra).
- IV Attached forms (Apterrinellidae).
- V Palaeotextulariidae (Climacammina).
- VI Earlandiidae (Earlandia).
- VII Pseudoendothyridae (Pseudoendothyra).
- VIII Eolasiiodiscidae (Eolasiiodiscus).
- IX Tetrataxidae (Tetrataxis).
- X Bradyinidae (Bradyina).
- XI Biseriamminidae (Globivalvulina).
- XII Fusulinidae (Profusulinella).
- XIII Ozawainellidae (Ozawainella).
- XIV Fischerinidae ? (Hemigordius).

Biota 4, Canyon Fiord Formation; About 500 specimens are preserved in calcareous sandstone collected 640 feet above the base of the formation as shown in section 77 on figure 3 (GSC Cat. No. C-406).

Ammovertella sp.

"Cornuspira" sp.

Earlandia sp.

Endothyra sp.

?Eoschubertella sp.

Eostaffella of the group E. parva (Rauzer-Chernousova).

"Globivalbulina" of the group "G. " moderata Reitlinger.

Glomospirella sp.

Lipinella sp.

Monotaxinoides sp.

cf. Stacheoides sp.

Age: The precise age of the microfacies is uncertain. However, Lipinella sp. and the possible Eoschubertella suggest a late Bashkirian or early Moscovian age.

REMARKS

The Carboniferous microfacies of the Borup Fiord and Canyon Fiord Formations in Ellesmere Island are represented by abundant foraminifers and algae that suggest shallow-water environments. Moreover, recrystallization of the matrices is only slight to moderate. Because of these circumstances the collections identified herein are particularly useful for micropaleontological zonation.

The populations resemble most closely those of Siberia and Alaska which are transitional between the more typically Eurasian and North American realms.

Zone 18

Microfacies. The zone is characterized by the outburst of the early Namurian Asteroarchaediscus baschkiricus and "Biseriella" parva. The abundance of Asteroarchaediscus and of Neoarchaediscus and the presence of Eostaffellina provide additional indication of an early Namurian age (Mamet and Gabrielse, 1969, Armstrong, Mamet and Dutro, 1970, Armstrong and Mamet, 1970). Eostaffellina, although reported by Reitlinger (1963) from the Uppermost Viséan, is in the author's opinion, characteristic of the Namurian.

Population analysis. The populations contain many Late Viséan elements and is still "Lower Carboniferous" in many aspects, Archaediscidae, Eostaffellidae, Endothyridae and Palaeotextulariidae are the major components of the free vagrant benthonic foraminifers.

Zone 20

Microfacies. The zone is characterized by the appearance of Globivalvulina of the group G. bulloides, and Lipinella. Bradyina cribrostomata is also characteristic of this zone. The first representatives of Pseudostaffella antiqua ("Staffella" antiqua) occur in this zone throughout much of Eurasia, but have not been observed in the Arctic or North American realms (Armstrong, Mamet, and Dutro, 1970, Armstrong and Mamet, 1970).

Population analysis. Zone 20 has a distinct middle Carboniferous aspect. Indeed, the gradual decline of the Archaediscidae and Endothyridae, and the development of Biseriamminidae and non-vagrant forms that characterizes zone 20, is already evident in Namurian time.

Zone 21-22

This interval is poorly developed in Canadian Arctic microfacies, while it is well documented in the Central and Eastern Brooks Range, of the Arctic Slope of Alaska.

Correlations of the North American standard succession with the original European stages are difficult with regards to the Namurian-Westphalian boundary. Although it is generally accepted that the base of the Atoka Series (Zone 21) is correlative with the base of the Moscovian (Thompson in Loeblich and Tappan, 1964), recent work in the Dneipr-Donets region (Braznikhova et al., 1967), indicate that Zones 21 and 22 should in fact, be included in the Bashkirian. Unfortunately no recent foraminiferal description of the original Bashkirian of Bashkiria is available and Braznikhova et al., contention cannot be checked. However, if their view is correct, the basal Moscovian should be correlated with the Des Moines Series and the Atoka fauna should be considered as Bashkirian.

Zone 23

Microfacies. Zone 23 retains scarce Namurian endothyroids and witnesses the first appearance of Globivalvulina granulosa in association with abundant Eoschubertella and primitive Ozawainella. (The latter genus is used here in the sense of Rauzer-Chernoussova).

Population analysis. Population analysis indicates the numerical importance of such non-vagrant forms as Palaeotextulariidae and Fusulinidae. The early Moscovian is regarded by Reitlinger (1950) as the time of extinction of the Archaediscidae. However, this family is known in rocks as young as Asselian, and the writer has encountered it in association with Profusulinella and Triticites. Members of the Archaediscidae occur in zone 23.

Zone 24-26

Microfacies. Bradyina, exhibiting reduction of the keriotheca, extremely thick-walled, Climacammina of the group C. moelleri and trilayered Globivalvulina, are characteristic forms in the middle Moscovian. Moreover, the presence of abundant Haplophragmina kashirica and Bradyina eonautiliformis confirm this age, although it is not possible at this time to suggest precise correlation with the zonal scheme at the Russian Platform (Reitlinger, 1950).

Population analysis. The results of analysis are similar to those of zone 23; abundance of non-vagrant forms, Palaeotextularidae, Biseriamminidae and Fusulinidae. Archaediscidae are present also, though numerically negligible.

REFERENCES

Armstrong, A.K., Mamet, B., and Dutro, J.T. Jr.

- 1970: Foraminiferal zonation and carbonate facies of the Carboniferous (Mississippian and Pennsylvanian) Lisburne Group, Arctic Alaska. Am. Assoc. Petrol. Geol., Bull. vol. 54, No. 4, pp. 687-698.

Armstrong, A.K., and Mamet, B.

- 1970: Biostratigraphy and dolomite trends in the Lisburne Group, Proc. Geol. Sem. North Slope Alaska, Am. Assoc. Petrol. Geol., Pacific Section, pp. N 1-16.

Brazhnikova, N.E., Vakarchuk, G.I., Vdovenko, M.V., Vinniitchenko, L.V., Karpova, M.A., Kolomietz, Ia., Potievskaja, P.D., Rostovceva, L.F., and Chevtchenko, G.D.

- 1967: Main microfaunistic horizons of the Carboniferous and Permian in the Dniepr-Donets (in Russian) Nauk. Dumk., Kiev., pp. 1-224.

Mamet, B., and Gabrielse, H.

- 1969: Foraminiferal zonation of the type-section of the Nizi Formation (Carboniferous, Chesteran Stage), British Columbia Geol. Surv. Can., Paper 69-16, pp. 1-21.

Reitlinger, E.A.

- 1950: Foraminifera of the Middle Carboniferous formations of the central part of the Russian platform (in Russian). Akad. Nauk. U.S.S.R., Inst. Geol., trudy 126, Geol. Ser., 47, pp. 1-127.

- 1963: On the paleontological criteria of the Lower Carboniferous boundaries as determined by Foraminifers (in Russian) Voprosy Mikropal., No. 7, pp. 22-56.

Thompson, M.L. in Loeblich, A., and Tappan, H.

- 1964: Fusulinacea in Treatise of Inv. Pal., part C, Protozoa., pp. 359-476.