

# HOOFDSTUK I.

## ONZE PALAEOONTOLOGISCHE KENNIS VAN NEDERLANDSCH OOST-INDIË IN 1930.

### 1. PALAEOZOIC AND MESOZOIC FORAMINIFERA

BY

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#### INTRODUCTION.

Foraminifera are found in the Palaeozoic and Mesozoic deposits of the Netherlands East Indies. Palaeozoic forms have been described or recorded from Sumatra, Timor, Luang, and Letti, while Mesozoic ones are known not only from those islands, but also from Borneo, Java, Rotti, Halmaheira, Sula, Ceram, Great Obi, and New Guinea (?). All the Palaeozoic and Mesozoic forms, generically distinguished, are listed below, with citation of the localities and geological ages. In this list the genera except in the case of Family Fusulinidae, are arranged after J. A. CUSHMAN's system, set forth in his „Foraminifera, their Classification and Economic Use”, 1928. Regarding this family, we rather prefer the classification of C. O. DUNBAR and G. E. CONDRA (Bibl. 8a) to that of the late Y. OZAWA published in CUSHMAN's work, cited above.

## LIST OF SPECIES.

## FAM. REOPHACIDAE.

*Sub-fam. Reophacinae.*

- Nodosinella ? adhaerens Lange. — Permian Sumatra, Bibl. 14, p. 165. <sup>1)</sup>  
 „ digitata Brady. — Permian Sumatra, Bibl. 14, p. 161.  
 „ hydrocephalus Lange. — Permian Sumatra, Bibl. 14, p. 164.  
 „ minima Lange. — Permian Sumatra, Bibl. 14, p. 162.  
 „ padangensis Lange. — Permian Sumatra, Bibl. 14, p. 163.  
 „ perplexa Lange. — Permian Sumatra, Bibl. 14, p. 153.  
 „ perpusilla Lange. — Permian Sumatra, Bibl. 14, p. 161.  
 „ ? vauseptata Lange. — Permian Sumatra, Bibl. 14, p. 164.

## FAM. AMMODISCIDAE.

*Sub-fam. Ammodiscinae.*

- Glomospira milioloides Jones, Parker et Kirby. — Permian Sumatra, Bibl. 14, p. 194.  
 „ cf. milioloides J., P. et K. — Permian Sumatra, Bibl. 14, p. 195.  
 „ spec. Lange. — Permian Sumatra, Bibl. 14, p. 195.  
 Lituotuba ? rostellata Lange. — Permian Sumatra, Bibl. 14, p. 177.  
 „ ? rostellata Lange, var. parva Lange. — Permian Sumatra, Bibl. 14, p. 177.

## FAM. LITUOLIDAE.

*Sub-fam. Haplophragmiinae.*

- Endothyra cf. Bowmani Philips. — Permian Sumatra, Bibl. 14, p. 195.  
 „ minima Lange. — Permian Sumatra, Bibl. 14, p. 196.  
 „ — Permian Luang, Bibl. 7, p. 7; (Sumatra, Bibl. 37, p. 10. <sup>2)</sup>)

*Sub-fam. Lituolinae.*

- Pseudocyclammina cyclamminoides Silvestri. — Lower Cretaceous or Upper Jurassic Sumatra, Bibl. 36, p. 10. <sup>3)</sup>

## FAM. TEXTULARIIDAE.

*Sub-fam. Textulariinae.*

- Textularia eximia d'Eichwald. — Permian Sumatra, Bibl. 14, p. 181.  
 „ sumatrensis Lange. — Permian Sumatra, Bibl. 14, p. 180.  
 „ thorax Lange. — Permian Sumatra, Bibl. 14, p. 181.  
 Bigenerina cucumis Lange. — Permian Sumatra, Bibl. 14, p. 182.  
 „ Leonhardi Volz. — Permian Sumatra, Bibl. 34, p. 180. <sup>4)</sup>  
 „ Milchi Volz. — Permian Sumatra, Bibl. 34, p. 181. <sup>4)</sup>  
 „ perrodاتا Lange. — Permian Sumatra, Bibl. 14, p. 183.  
 „ sp. — Permian Sumatra, Bibl. 37, pp. 10, 12. <sup>2)</sup>  
 Monogenerina atava Spand. — Permian Sumatra, Bibl. 14, p. 185.  
 „ gradata Lange. — Permian Sumatra, Bibl. 14, p. 184.

- Geinitzina cf. *Chapmani* Schubert. — Permian Sumatra, Bibl. 14, p. 171.  
 „ *ovata* Lange. — Permian Sumatra, Bibl. 14, p. 171.  
 „ *postcarbonica* Spand. — Permian Sumatra, Bibl. 14, p. 170.  
*Lunucammina* ? *conica* Lange. — Permian Sumatra, Bibl. 14, p. 168.  
 „ ? *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 169.  
*Climacammina* *bicammina* Lange. — Permian Sumatra, Bibl. 14, p. 189.  
 „ *lagenalis* Lange. — Permian Sumatra, Bibl. 14, p. 188.  
 „ *sumatrensis* (Volz). — Permian Sumatra, Bibl. 34, p. 180. <sup>5)</sup>  
 „ *tudicla* Lange. — Permian Sumatra, Bibl. 14, p. 186.  
 „ *valvulinoides* Lange. — Permian Sumatra, Bibl. 14, p. 187.  
*Cribrogenerina* *climacamminoides* Lange. — Permian Sumatra, Bibl. 14, p. 190.  
 „ *elegans* Möll. — Permian Sumatra, Bibl. 34, p. 179. <sup>6)</sup>  
 „ *macillenta* Lange. — Permian Sumatra, Bibl. 14, p. 190.  
 „ *obesa* Lange. — Permian Sumatra, Bibl. 14, p. 192.  
 „ *permica* Lange. — Permian Sumatra, Bibl. 14, p. 193.  
 „ *Verbeeki* Lange. — Permian Sumatra, Bibl. 14, p. 193.  
 „ *vermiculata* Lange. — Permian Sumatra, Bibl. 14, p. 191.  
 „ *Wysogorskyi* (Volz.) — Permian Sumatra, Bibl. 34, p. 180. <sup>7)</sup>

## FAM. VALVULINIDAE.

- Valvulina angulata* Lange. — Permian Sumatra, Bibl. 14, p. 179.

## FAM. FUSULINIDAE.

- Schubertella terebra* (Lange). — Permian Sumatra, Bibl. 14, p. 198. <sup>8)</sup>  
*Fusulinella plana* (Lange). — Permian Sumatra, Bibl. 14, p. 199. <sup>9)</sup>  
 „ *renacea* Lange. — Permian Sumatra, Bibl. 14, p. 197.  
 „ *simplex* (Lange). — Permian Sumatra, Bibl. 14, p. 198. <sup>10)</sup>  
 „ sp. — Permian Sumatra, Bibl. 31, p. 289.  
*Fusulina aequabilis* (Lange). — Permian Sumatra, Bibl. 14, p. 203. <sup>11)</sup>  
 „ *alpina* Schellwien. — Permian Sumatra, Bibl. 37, p. 13; Bibl. 29, p. 36. <sup>2)</sup>  
 „ *granum-avenae* Roemer. — Permian Sumatra, Bibl. 9, p. 94; Bibl. 23, p. 4; Bibl. 34, pp. 107, 108, 110, 182; Bibl. 33, p. 1131 <sup>2)</sup>; Upper Carboniferous Timor, Bibl. 27, p. 53.  
 „ *japonica* Gümbel. — Upper Carboniferous Sumatra, Bibl. 22, p. 51.  
 „ *Molengraaffi* Schubert. — Upper Carboniferous Timor, Bibl. 27, p. 55.  
 „ *padangensis* (Lange). — Permian Sumatra, Bibl. 14, p. 199. <sup>12)</sup>  
 „ *pulla* (Lange). — Permian Sumatra, Bibl. 14, p. 204. <sup>13)</sup>  
 „ *Schuberti* (Lange). — Permian Sumatra, Bibl. 14, p. 203.  
 „ *Wanneri* Schubert. — Upper Carboniferous Timor, Bibl. 27, p. 54.  
 „ *Weberi* Schubert. — Upper Carboniferous Timor, Bibl. 27, p. 57.  
 „ — Permian Sumatra, Bibl. 31, p. 289; Bibl. 34, pp. 107, 108.

- Schwagerina princeps* (Ehrenberg). — Upper Carboniferous Sumatra, Bibl. 20, p. 51.
- Verbeekina Verbeeki* (Geinitz). — Permian Sumatra, Bibl. 1, p. 6; Bibl. 12, p. 39014; Bibl. 9, p. 94; Bibl. 23, p. 4; Bibl. 20, p. 33; Bibl. 21, p. 6; Bibl. 24, pp. 75, 277; Bibl. 28, p. 39915; Bibl. 14, p. 204; Bibl. 30, p. 476; Bibl. 12, p. 400; Bibl. 34, pp. 108, 110, 182. <sup>1)</sup>
- „ *Verbeeki* var. *Volzi* Staff. — Permian Sumatra, Bibl. 30, p. 507. <sup>4)</sup>
- Doliolina lepida* Schwager ?. — Permian Sumatra, Bibl. 14, p. 206.
- „ *lepida* Schwag. var. *lettensis* Schubert. — Lower Permian Letti, Bibl. 28, p. 125.
- „ *minima* Lange. — Permian Sumatra, Bibl. 14, p. 208.
- Neoschwagerina Buxtorfi* Lange. — Permian Sumatra, Bibl. 14, p. 211.
- „ *eraticulifera* (Schwag.). — Permian Sumatra, Bibl. 22, p. 51 <sup>4)</sup>; Bibl. 34, pp. 108, 110. <sup>16)</sup>
- „ cf. *Douvilléi* Ozawa. — Permian Sumatra, Bibl. 14, p. 214. <sup>17)</sup>
- „ *Staffi* Lange. — Permian Sumatra, Bibl. 14, p. 210.
- „ *sumatrensis* Lange. — Permian Sumatra, Bibl. 14, p. 213.
- „ *Tobleri* Lange. — Permian Sumatra, Bibl. 14, p. 209.
- „ cf. *Tobleri* Lange. — Permian Sumatra, Bibl. 14, p. 214.
- „ *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 214.
- „ *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 215.
- Sumatrina annae* Volz. — Permian Sumatra, Bibl. 34, pp. 108, 110, 182. <sup>4)</sup>
- „ *sp.* — Permian Sumatra, Bibl. 37, p. 12. <sup>2)</sup>

## FAM. MILIOLIDAE.

- Lacazina ? lamellifera* Silvestri. — Upper Cretaceous Sumatra, Bibl. 29, p. 315.
- „ *Wichmanni* Schlumb. — Upper Cretaceous (?) New Guinea, Bibl. 26, p. 296; Eocene (?) New Guinea, Bibl. 18, p. 90.

## FAM. OPHTHALMIDIIDAE.

*Sub-fam. Cornuspirinae.*

- Cornuspira spec.* Lange. — Permian Sumatra, Bibl. 14, p. 178.

## FAM. PLACOPSILINIDAE.

*Sub-fam. Polyphragminae.*

- Stacheia Verbeeki* Lange. — Permian Sumatra, Bibl. 14, p. 196.

## FAM. ORBITOLINIDAE.

- Tetrataxis conica* Ehrenberg. — Upper Carboniferous Timor, Bibl. 27, p. 5.
- Orbitolina concava* Lam. ? — Lower Cretaceous ? Sumatra, Bibl. 33, p. 1136 ? <sup>18)</sup>; Java, Bibl. 8, p. 33?; Bibl. 11, pp. 144, 145; Borneo, Bibl. 13, p. 140; Bibl. 19, p. 420. <sup>19)</sup>

- Orbitolina scutum-trochus* (Fritsch). — Upper Aptian ? Borneo, Bibl. 35, pp. 15, 17, 18, 19; Bibl. 16, p. 221.  
 „ — Lower ? Cretaceous Java, Bibl. 11, p. 8.

## FAM. LAGENIDAE.

*Sub-fam. Nodosariinae.*

- Nodosaria acantha* Lange. — Permian Sumatra, Bibl. 14, p. 165.  
 „ *sumatrensis* Lange. — Permian Sumatra, Bibl. 14, p. 166.  
 „ *tricammina* Lange. — Permian Sumatra, Bibl. 14, p. 167.  
 „ *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 168.  
*Dentalina spec.* Lange. — Permian Sumatra, Bibl. 14, p. 168.  
*Vaginulina ? Chapmani* Lange. — Permian Sumatra, Bibl. 14, p. 169.  
*Padangia perforata* Lange. — Permian Sumatra, Bibl. 14, p. 172.  
 „ *pulchra* Lange. — Permian Sumatra, Bibl. 14, p. 173.  
 „ *venosa* Lange. — Permian Sumatra, Bibl. 14, p. 174.  
*Pachyphloia multiseptata* Lange. — Permian Sumatra, Bibl. 14, p. 176.  
 „ *ovata* Lange. — Permian Sumatra, Bibl. 14, p. 175.  
 „ *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 177.  
*Cristellaria ? spec.* Lange. — Permian Sumatra, Bibl. 14, p. 178.  
 „ ? *spec.* Lange. — Permian Sumatra, Bibl. 14, p. 178.

*Sub-fam. Lageninae.*

- Lagena permica* Lange. — Permian Sumatra, Bibl. 14, p. 179.

## FAM. CAMERINIDAE.

*Sub-fam. Camerininae.*

- Nummulostegina padangensis* Lange. — Permian Sumatra, Bibl. 14, p. 215.  
 „ ? *parva* Lange. — Permian Sumatra, Bibl. 14, p. 216.  
 „ *Schuberti* Lange. — Permian Sumatra, Bibl. 14, p. 216.

## FAM. HETEROHELICIDAE.

*Sub-fam. Gümbelinae.*

- Pseudotextularia cf. globulosa* Ehrenberg. — Upper Cretaceous Halmaheira, Bibl. 6, p. 10; Rotti, Bibl. 4, p. 35.  
 „ — Cretaceous Ceram, Bibl. 25, p. 740; Cretaceous Timor, Bibl. 25, p. 694.

## FAM. ROTALIIDAE.

*Sub-fam. Discorbisinae.*

- Discorbina canaliculata* Reuss. — Upper Cretaceous Rotti, Bibl. 4, p. 35; Halmaheira, Bibl. 6, p. 10; Cretaceous Ceram, Bibl. 25, p. 740.  
 „ — Upper Cretaceous Sula, Bibl. 2, p. 19; Cretaceous Timor, Bibl. 25, p. 694.

## FAM. CHILOSTOMELLIDAE.

*Sub-fam. Allomorphinellinae.*

Pullenia. — Upper Cretaceous Rotti, Bibl. 4, p. 37.

*Sub-fam. Sphaeroidininae.*

Sphaeroidina. — Upper Cretaceous Rotti, Bibl. 4, p. 37.

## FAM. GLOBIGERINIDAE.

*Sub-fam. Globigerininae.*

- Globigerina aequilateralis Brady. — Upper Cretaceous Rotti, Bibl. 4, p. 35.  
 „ bulloides d'Orbigny. — Upper Cretaceous Rotti, Bibl. 4, p. 35;  
 Sula, Bibl. 2, p. 19.  
 „ cretacea d'Orbigny. — Upper Cretaceous Rotti, Bibl. 4, p. 35;  
 Cretaceous Ceram, Bibl. 25, p. 740.  
 „ Linnaeana d'Orbigny. — Upper Cretaceous Great Obi, Bibl. 5,  
 p. 15; Rotti, Bibl. 4, p. 36.  
 „ — Triassic or Jurassic Borneo, Bibl. 25, p. 263; Cretaceous  
 Timor, Bibl. 25, p. 694.

*Sub-fam. Orbulininae.*

- Orbulina ovalis Kaufmann. — Upper Cretaceous Rotti, Bibl. 4, p. 36.  
 „ sphaerica Kaufmann. — Upper Cretaceous Rotti, Bibl. 4, p. 36.

**ANNOTATIONS TO THE LIST OF SPECIES.**

1. All the species described in Bibl. 14 were thought to be of Middle Permian age. More recent investigations showed that we cannot restrict the age further than to the Permian.
2. Formerly described from the Permo-Carboniferous.
3. Formerly described as *Choffatella cyclamminoides* SILVESTRI from the lower Cretaceous of Sumatra, bibl. 29, p. 310.
4. Formerly described from the Upper Carboniferous.
5. Formerly described as *Bigenerina sumatrensis* VOLZ from the Upper Carboniferous of Sumatra.
6. Formerly described as *Bigenerina elegans* MÖLL from the Upper Carboniferous of Sumatra.
7. Formerly described as *Bigenerina Wysogorsky* VOLZ from the Upper Carboniferous of Sumatra.
8. Formerly described as *Fusulinella terebra* LANGE from the Middle Permian of Sumatra.
9. Formerly described as *Schubertella plana* LANGE from the Middle Permian of Sumatra.

10. Formerly described as *Schubertella simplex* LANGE from the Middle Permian of Sumatra.
11. Formerly described as *Schellwienia aequabilis* LANGE from the Middle Permian of Sumatra.
12. Formerly described as *Schellwienia padangensis* LANGE from the Middle Permian of Sumatra.
13. Formerly described as *Schellwienia pulla* LANGE from the Middle Permian of Sumatra.
14. Formerly described as *Fusulina Verbeeki* GEINITZ from the Carboniferous of Sumatra.
15. Formerly described as *Schwagerina Verbeeki* GEINITZ from the Carboniferous of Sumatra.
16. Formerly described as *Doliolina craticulifera* SCHW. from the Upper Carboniferous of Sumatra.
17. Formerly described as *Neoschwagerina cf. globosa* YABE from the Middle Permian of Sumatra.
18. Formerly described from the Cretaceous of Sumatra.
19. Formerly described from the Cenomanian of Borneo.

Palaeozoic Foraminifera: E. Lange made a number of new species of the genera *Fusulinella*, *Fusulina*, *Neoschwagerina*, *Doliolina* and others; but the specific distinction of some of them from the allied forms previously recorded is open to question. For instance, his *Neoschwagerina cf. globosa* is not a species of the subgenus *Yabeina* to which *Neoschwagerina globosa* really belongs; instead, it apparently resembles *Neoschwagerina* (s. s.) *Douvilléi* OZAWA. His *Doliolina lepida*, on the other hand, exhibits features somewhat different from the typical examples of the species. W. VOLZ mentioned *Neoschwagerina craticulifera* from the Padang Plateau but did not figur it, and the occurrence of this species in his material needs confirmation.

Opinions diverge concerning the geological age of the Sumatran limestones containing Fusulinids. W. VOLZ distinguished *Fusulina* limestone and *Doliolina* (*Neoschwagerina* in the present sense) limestone in the Padang Plateau and considered the lower, *Fusulina* limestone, containing *Fusulina granum-aveae*, to be Middle Carboniferous, and the upper, *Doliolina* limestone, containing *Fusulina granum-avenae* and *Verbeekina Verbeeki*, to be Upper Carboniferous. Lange, who studied foraminifera in material collected by the late Tobler from the same locality, claimed the Middle Permian age for the limestone containing *Fusulinella*, *Fusulina*, *Neoschwagerina*, *Verbeekina*, *Doliolina* and others; in this correlation he essentially followed H. DOUVILLÉ who once expressed the opinion that, in Indo-China and southeastern Asia, the Uralian is characterised by *Schwagerina princeps*, the Lower Permian by *Verbeekina Verbeeki*, *Doliolina lepida* and *Neoschwagerina craticulifera*, and the Upper Permian by *Verbeekina Verbeeki*, *Neoschwagerina globosa* (non *Neoschwagerina*

(*Yabeina*) *globosa*; = *Neoschwagerina* (s. s.) *Douvilléi*) and *Sumatrina annae*. On the other hand, L. RUTTEN regarded the *Fusulina* limestone of Sumatra to belong to the Permo-Carboniferous age, and OZAWA, who more recently found *Schwagerina princeps* in a limestone containing *Productus* of Tolik, Gedang, Sumatra, believed the limestone to be of the Upper Carboniferous age. The above information leads us to the inference that there are in Sumatra *Fusulina* limestones ranging from the Upper Carboniferous to the Upper Permian in age, *Schwagerina princeps* from the Upper Carboniferous, *Verbeekina Verbeeki*, *Doliolina* and *Neoschwagerina* from the Permian in general, and *Sumatrina annae* from the Upper Permian.

Mesozoic Foraminifera: A. SILVESTRI described *Choffatella cyclammnoides* and *Lacazina lamellifera* from Sumatra; the former is referable to *Pseudocyclammnina* as already pointed out elsewhere by YABE and HANZAWA, and may possibly be Jurassic in age, instead of being Cretaceous as first thought by SILVESTRI, since the other species of the genus now known from Japan and Switzerland are Jurassic. *Lacazina lamellifera* may give rise to a vexed question; of four figures given of it in thin section by SILVESTRI, Fig. 3 is a part of Fig. 2 in high magnification, and Figs. 1, 2 and 4 are all available for the restoration of the fossil form. Fig. 2 shows many volutions spirally wound, and such a figure, in our opinion, can not be obtained in any way from a form like *Lacazina* in section; it rather represents a form of foraminifera of the *Cyclammnina* type, and it is possible that either Fig. 1 or Fig. 4 shows the same form as Fig. 2, in section of different orientation. In our interpretation, there are two different forms, one complanate and the other swollen, of *Cylammnina*-like foraminifera. SILVESTRI ascribed the Upper Cretaceous age to the foraminiferous rock; but the geological age can hardly be settled from these foraminifera alone.

The genus *Lacazina* was established by MUNIER-CHALMAS on the genotype *Lacazina compressa* (D'ORBIGNY) from the Senonian of France. Two other forms, *Lacazina compressa* var. *galloprovincialis* MUN.-CH. et SCHL. and *Lacazina elongata* MUN.-CH., being also derived from Senonian deposits of France and Spain, *Lacazina* is usually regarded as a Cretaceous genus. Another species now known to us of this genus is *Lacazina Wichmanni* SCHLUMBERGER from the Netherlands New Guinea and is said to be found in association with *Alveolina*, *Orthophragmina* and *Nummulites*; if this association is true, then this species must be regarded as an Eocene form and the genus *Lacazina* as one extending its geological range to the Eocene; according to SCHLUMBERGER, however, *Lacazina Wichmanni* is closely allied to, if not identical with, *Lacazina elongata*.

*Orbitolina* is reported from the Cretaceous in Java, Sumatra and Borneo; but the occurrence of the Cenomanian species *Orbitolina concava* LAM. in the Netherlands East Indies is not yet confirmed. The foraminifera once described by MARTIN from Borneo under this specific name belong to the type *Orbitolina scutum* FRITSCH, a species which is found in Japan in association with Upper Aptian ammonites.



## STRATIGRAPHICAL REMARKS.

In the list, mentioned above, all the forms specifically undetermined are put under one entry in every genus, notwithstanding possible specific multiplicity in many cases. Treated in this way, there are at present known from the Palaeozoic and Mesozoic formations of the Netherlands East Indies. 115 species and 3 varieties of foraminifera, which are distributed in different families as follows: 8 species of Reaphacidae, 4 species and 1 variety of Ammodiscidae, 4 species of Lituolidae, 30 species of Textulariidae, 31 species and 2 varieties of Fusulinidae, 2 species of Miliolidae, 1 species of Ophthalmidiidae, 1 species of Placopsilinidae, 3 species of Orbitolinidae, 2 species of Heterohelicidae, 15 species of Lagenidae, 3 species of Camelinidae, 2 species of Rotaliidae, 2 species of Chilostomelidae and 7 species of Globigerinidae. The species, and especially those described as new, will, we believe, be somewhat reduced in number by revision, whereas it will of course, be multiplied by later studies of new materials.

It is well known that certain types of foraminifera, with complicated shell structure, serve as leading fossils for stratigraphical correlation; belonging to this category are for instance, most species of the family Fusulinidae and of the genus *Orbitolina*. *Lacazina Wichmanni*, „*Lacazina*” *lamellifera* and *Pseudocyclammina cyclamminooides* may be proved in future to be useful for the same purpose, although at present the geological ages of the rocks with these fossils are not yet definitely settled. The following is a synoptical table showing the geographical and stratigraphical distribution of the important types of the Palaeozoic and Mesozoic foraminifera in the Netherlands East Indies.

Synoptical Table showing the Geographical and Stratigraphical Distribution of the Important Types of the Palaeozoic and Mesozoic Foraminifera in the Netherlands East Indies.

Locality Age	Sumatra	Java	Borneo	Timor	Rotti	Letti	New Guinea	Luang	Sula, Ceram, Halmahera, Gr. Obi
Upper Carboniferous	Schwagerina princeps Fusulina granum-avenae			Fusulina granum-avenae, F. WANNERI F. MOLENGRAAFF					
Permian	Fusulina granum-avenae, Doliolina, Verbeekina Verbeeki, Neoschwagerina, Sumatrina annae					Doliolina lepida var. lettensis		Endothyra	
Triassic									
Jurassic	Pseudocyclamina cyclamminoides (?)		} ? Globigerina						
Cretaceous	Lacazina? lamellifera, Orbitolina	Orbitolina	Orbitolina scutum-trochus	Globigerina	Globigerina, Orbulina, Sphaeroidina, Pullenia, Discorbina, Pseudotextularia		Lacazina Wichmanni (?)		Globigerina, Discorbina, Pseudo-textularia

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