

ADDENDUM

February 2001

This document was prepared in 1992. Since that time there have been a number of published revisions to both the low- and middle-latitude radiolarian zonations. In particular, the reader should be aware of the following publications:

Low Latitude Biostratigraphy

Sanfilippo, A. and Nigrini, C., 1995. Radiolarian stratigraphy across the Oligocene/Miocene transition. *Mar. Micropaleontol.*, 24:239-285.

Abstract

Recently the International Union of Geological Sciences (Commission on Stratigraphy, Working Group on the Paleogene/Neogene Boundary) proposed that the Oligocene/Miocene boundary be placed at the base of Chron C6Cn2n at 23.8 Ma on the Cande and Kent (1992) magnetic time scale, where it is approximated by planktic foraminifera at the first occurrence of *Globorotalia kugleri*, and by calcareous nanofossils at the last occurrence of *Sphenolithus ciperoensis* and the first and last occurrences of *Sphenolithus delphix* and *S. capricornutus*. Herein we show that, in terms of radiolarians, the base of Chron C6Cn2n can be correlated with the upper part of the *Lychnocanoma elongata* Zone between the last occurrence of *Artophormis gracilis* (23.94 Ma) and the first occurrence of *Cyrtocapsella tetrapera* (23.69 Ma).

Since the proposed stratotype at Lemme—Carrosio (Italy) does not contain radiolarians at the boundary, we re-examined 13 DSDP sites and established the stratigraphic sequence of 29 first and last radiolarian occurrences and one evolutionary transition across the boundary. Nine of these sites contain both calcareous and siliceous microfossils and thus allow for an integrated biostratigraphy. Paleomagnetic stratigraphy is not available for any of the DSDP cores examined. However, use of Hodell and Woodruff's (1994) strontium isotope curve from DSDP Site 289 has permitted calibration of several low latitude microfossil datum levels against the geomagnetic polarity scale. Two new species, *Lychnocanoma apodora* and *Eucyrtidium plesiodiaphanes*, are described.

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Sanfilippo, A. and Nigrini, C., 1998. Code numbers for Cenozoic low latitude radiolarian biostratigraphic zones and GPTS conversion tables. *Mar. Micropaleontol.*, 33:109-156.

Abstract

Code numbers for the radiolarian zonation for the tropical Pacific, Indian and Atlantic oceans (RP1—RP22 for the Paleogene and RN1—RN17 for the Neogene) are standardized and introduced. Thirty-nine zones are recognized from the Lower Paleocene to the Holocene. Revision of previously separate upper Neogene zonations for the Pacific and Indian oceans, in which the same zonal names were applied to different stratigraphic intervals, resulted in a single tropical zonation. We change four upper Neogene Indian Ocean zones to subzones and refer to them simply by their code numbers (RN12b = *Pterocanium prismatium*, RN12a = *Anthocyrtdium jenghisi*, RN11b = *Stichocorys peregrina*, RN11a = *Phormostichoartus fistula*). We introduce the name *Lychnodictyum audax* Interval Zone (RN11) for the interval stratigraphically equivalent to the combined *Stichocorys peregrina* and *Phormostichoartus fistula* zones in the Indian Ocean, and to the *Anthocyrtdium jenghisi* Zone in the Pacific Ocean. Two Paleocene zones, *Bekoma bidartensis* (RP7) and *B. campechensis* (RP6), and two subzones, *Stylotrochus nitidus*—*Pterocodon* (?) *poculum* (RP6c) and *Orbula discipulus* (RP6b), are emended. Each zone is formally defined and we include a stratigraphically ordered list of radiolarian events falling within each zone. Mean numerical ages for zonal boundary events were culled from previous literature and converted to the geomagnetic polarity time scale (GPTS). References to the original description and concept herein applied of all included taxa, and tables which allow for accurate conversion in simple increments between the different published GPTSs are included in this paper.

Keyword(s): Radiolaria; Cenozoic; tropical zonation; biostratigraphy; numerical ages; code numbers

Middle Latitude Biostratigraphy

Morley, J.J. and Nigrini, C., 1995. Miocene to Pleistocene radiolarian biostratigraphy of North Pacific Sites 881, 884, 885, 886 and 887. In Rea, D.K., Basov, I.A., Scholl, D.W. and Allan, J.F. (Eds.). *Proc. ODP Sci. Results*, 145: College Station, TX (Ocean Drilling Program), 55-91.

Abstract

Ocean Drilling Program Leg 145 recovered sediments from seven sites in the North Pacific, all of which contained radiolarians. The northernmost sites, Site 884 on the eastern flank of the Detroit Seamount (Emperor Chain) and Site 887 on the Patton-Murray Seamount Platform (Gulf of Alaska), contained the oldest radiolarian-bearing sediments of lower Miocene age. Radiolarian sediments from the central (885 and 886) and western (881) North Pacific sites ranged in age from late Miocene to Pleistocene.

Based on their stratigraphic potential, we selected 39 radiolarian species and determined their abundance and preservation (entire radiolarian assemblage) in Leg 145 sediments. The high-latitude North Pacific Miocene through Pleistocene radiolarian population is described and classified in detail, with the identification of a new species, *Dictyophimus bullatus*, and subspecies, *Lychnocanoma nipponica sakaii*. This research provides the critical stratigraphic link in the previously disconnected Miocene and Pliocene siliceous faunal sequences from the western and eastern margins of the North Pacific. Because of the nearly complete sections recovered at the Leg 145 sites, many of which contain excellent paleomagnetic records, it is possible to estimate with a fairly high degree of accuracy the age of specific faunal events in the various regions of the North Pacific. The results of this comprehensive survey of the temporal and spatial distribution of radiolarians in high-latitude North Pacific sediments are compared with those reported previously from the North Pacific and other ocean regions, thereby refining and expanding the siliceous faunal stratigraphy.

Shilov, V.V., 1995. Miocene-Pliocene radiolarians from Leg 145, North Pacific. In Rea, D.K., Basov, I.A., Scholl, D.W. and Allan, J.F. (Eds.). *Proc. ODP Sci. Results*, 145: College Station, TX (Ocean Drilling Program), 96-116.

Abstract

Studies of radiolarian assemblages from holes drilled during Leg 145 have revealed the distribution pattern of species in the Miocene–Pliocene deposits of the North Pacific. A brief revision of the application of biostratigraphic zones *Stichocorys peregrina* (Riedel and Sanfilippo, 1970, 1978) and *Sphaeropyle langii* (Foreman, 1975) in the North Pacific has been conducted. A new Miocene–Pliocene zonation based on radiolarians is proposed, which is correlated with diatom biostratigraphic zones and paleomagnetic evidence. New species *Acrospyrus lingi* and *Cenosphaera coronataformis* are described.

Shilov, V.V., 1995. Eocene-Oligocene radiolarians from Leg 145, North Pacific. In Rea, D.K., Basov, I.A., Scholl, D.W. and Allan, J.F. (Eds.). *Proc. ODP Sci. Results*, 145: College Station, TX (Ocean Drilling Program), 117-132.

Abstract

During the cruise of ODP Leg 145 in the North Pacific Ocean, well-preserved Paleogene radiolarians had been obtained from Holes 883B, 883E and 884B. Their distribution pattern in these sections has been revealed and high-latitude radiolarian assemblages in the North Pacific are described. Biostratigraphic schemes proposed in low latitudes and other northern hemisphere regions are not applicable on these assemblages, because most zone marker species of other regions are absent in the North Pacific. Two new species, *Dictyomitra amygdala* and *Lithomitra micropore* have been described.