Locality descriptions : topographic, litho- and biostratigraphic data of studied radiolarian localites

Genus *Unuma* ICHIKAWA & YAO

Unuma ICHIKAWA & YAO 1976, p. 111.
Type species: Unuma typicus ICHIKAWA & YAO 1976.

Unuma echinatus ICHIKAWA & YAO

Data 2, range 4, pob 231, rk –, Pl. 10, Fig. 14–15

Unuma echinatus ICHIKAWA & YAO 1976, p. 112, Pl. 1, Fig. 5–6, Pl. 2, Fig. 5–7. YAO et al. 1982, Pl. 3, Fig. 5. MIZUTANI & KOIKE 1982, Pl. 2, Fig. 6. WAKITA 1982, pl. 3, Fig. 11–12. MATSUOKA 1982, Pl. 1, Fig. 21. NISHIZONO et al. 1982, Pl. 2, Fig. 19 (not Fig. 20 as indicated in plate caption).
Unuma sp. cf. *U. echinatus* ICHIKAWA & YAO, KIDO et al. 1982, Pl. 3, Fig. 10.

Genus *Xitus* PESSAGNO

Xitus PESSAGNO 1976b, p. 55.
Type species: Xitus plenus PESSAGNO 1977b.

Xitus sp. cf. *X. spicularius* (ALIEV)

Data 106, range 98, pob 295, rk –, Pl. 10, Fig. 16–17

?*Dictyomitra spicularia* ALIEV, 1965, Pl. 6, Fig. 9.
Dictyomitra sp. cf. *D. spicularia* ALIEV, FOREMAN 1973, p. 264, Pl. 9, Fig. 8–9. NAKASEKO et al. 1979, Pl. 3, Fig. 5.
not: *Xitus spicularius* (ALIEV), PESSAGNO 1977a, p. 56, Pl. 9, Fig. 7, Pl. 10, Fig. 5.
Novixitus normalis WU HAO-RUO & LI HONG-SHENG 1982, Pl. 2, Fig. 5.
Xitus transversus WU HAO-RUO & LI HONG-SHENG 1982, Pl. 2, Fig. 7, not Fig. 8.
Novixitus sp. KANIE et al. 1981, Pl. 1, Fig. 17.
Xitus sp. OKAMURA & UTO 1982, Pl. 5. Fig. 4–5.
Xitus spicularius YAO 1984, Pl. 4, Fig. 17.

Remarks. – The studied form is broader than ALIEV's illustrations and tends to have a constricted last and second last segment.

6. Locality descriptions: topographic, litho- and biostratigraphic data of studied radiolarian localities

6.1 Introduction

In this chapter the data pertaining to the studied radiolarian localities are presented. The localities include primarily own collections and examination of material collected by the workers cited below. A very minor part of the data is taken from the literature. In order to have an idea of the areal extent of the study a geographic/paleogeographic overview is given below grouping the localities in terms of paleogeographic or Alpine tectonic units from west to east, starting in the Atlantic. This overview is followed by a listing of the localities in the same numerical order as they appear in the database (see appendix).

6.2 Geographic/paleogeographic overview of studied localities

Atlantic

Western Central Atlantic

Blake Bahama Basin: Loc. 30. DSDP Leg 76, Site 534.

Cat Gap: Loc. 39. DSDP Leg 1, Site 5.

Eastern Central Atlantic

Cape Verde Basin: Loc. 29. DSDP Leg 41, Site 367.

Western Mediterranean Tethys

Betic Cordilleras, Spain

Subbetic Zone: Loc. 45. Sierra de Ricote.

Central Alps, Switzerland, "northern" margin of Liguria–Piemont Ocean

Ultrahelvetic: Loc. 38. Veveyse de Châtel-St-Denis.

Southern and eastern Alps, "southern" margin of the Liguria–Piemont Ocean, Switzerland, Italy and Austria

Lombardy Basin and neighbouring zones:

Loc. 22. Sangiano, loc. 23. Cava Rusconi, loc. 20. Valmaggiore, loc. 17. Besozzo II, loc. 21. Besozzo I, loc. 25. Saltrio, loc. 24. Breggia Gorge, loc. 18. Monte Generoso.

Trento Plateau: Loc. 6. Serrada, loc. 44. Ceniga.

Northern Calcareous Alps: Loc. 36. Glasenbach Gorge, loc. 43. Trattberg.

Liguria and Central Apennines, Italy

Ligurid Ophiolite Units – oceanic Western Tethys:

Loc. 46. Monte Campannello, Elba, loc. 47. San Felo, Elba, loc. 48, Roccetta di Vara, Liguria.

Tuscan Zone: Loc. 27. Monte Cetona.

Umbrian Zone: Loc. 26. Fiume Bosso.

Sicily, Italy

Loc. 28. Santa Anna near Caltabellotta.

Eastern Mediterranean Tethys

Carpathians, Romania

Drocea Mountains: Loc. 15. Gomielor Valley.

Rarau Mountains: Loc. 12. Pojorita, loc. 14. Piatra Soimului.

Haghimas Mountains: Loc. 13. Laen Rosu.

Sirinia Zone: Loc. 16. Svinita, Banat, S-Carpathians.

Hellenides, Greece

Pindos Zone: Loc. 10., loc. 11. Marathos, Central Greece.

Pelagonian (s.l.) *Zone:*

Adhami Basal Sequence, Argolis Peninsula: Loc. 5. Kandhia, loc. 8. Theokafta.

Dhidhimi–Trapezona Basal Sequence, Argolis Peninsula: Loc. 3. Prosimni, loc. 4. Taxiarchis, loc. 1. Dhimaina, loc. 2. Angelokastron.

Northern Evvoia Basal Sequence: Loc. 51. Near Achladi.

Asklipion Unit, Argolis Peninsula: Loc. 7. Koliaki Chert.

Migdhalitsa Ophiolite Unit, Argolis Peninsula: Loc. 9. Rhadon.

Ophiolites of northern Evvoia: Loc. 49.

Middle Eastern Tethys

Central Oman Mountains, Oman

Hawasina Nappes

"Halfa Formation": Loc. 42. OM 191, 200, near Sur.

Al Aridh Formation: Loc. 50. Jebel Al Hasi.

Far Eastern Tethys, Japan

Mino Belt, Central Japan

Inuyama Area: Loc. 40. near Unuma. IN 7.

Pacific

Northwest Pacific

Abyssal plain southeast of Japan: Loc. 34. DSDP Leg 20, Site 195, loc. 35. DSDP Leg 20, Site 196.

Shatsky Rise: Loc. 32. DSDP Leg 32, Site 306, loc. 33. DSDP Leg. 32, Site 307.

Central Pacific

Magellan Rise: loc. 31. DSDP Leg 17, Site 167.

Western North America

Californian Coast Range

Point Sal Ophiolite: Loc. 37. Point Sal.

South Central America

Pacific coast of Costa Rica

Nicoya Ophiolite Complex: Loc. 41. Guatemala, Santa Rosa.

6.3 Listing of localities included in the database

Remarks. – Under *Locality data* the exact geographic location and access to the locality are described. Many of the following radiolarian localities have been described as such in earlier papers and this information is not repeated here. Instead, *References* are given including page numbers and original locality designations. The authorship of a locality is ascribed to the first publication presenting radiolarian data. The collector(s) of samples is (are) cited if differing from the author(s).

Under *Lithology* and *sample location* samples and measured sections are located with respect to lithology or the reader is referred to Plate 12. Where possible, earlier lithologic descriptions are referenced. *Biostratigraphy* summarizes or references biostratigraphic information excluding radiolarians.

Radiolarian data provides reference to earlier radiolarian data of the locality and gives the source(s) of the data presented in this paper. *Zonal assignment* gives sequential sample number, original sample number and assignment to Unitary Associations (U.A.) of sample for those localities not illustrated in Plate 12. For many of the new localities additional samples are under study and will be presented at a later date.

Items of the format are omitted, where the references are the same as the first mentioned. The two most used references are abbreviated: BAUMGARTNER et al. 1980 (= BG. et al. 1980) and KOCHER 1981 (= KO. 1981).

1. Dhimaina, Argolis Peninsula, Peloponnesus, Greece: 9.
   References. – DE WEVER in VRIELYNCK 1978, p. 39, loc. T-13. BG. et al. 1980, p. 64, loc. a. Coll. B. Vrielynck.
   Lithology and sample location. – VRIELYNCK 1978, BG. et al. 1980. See Plate 12.
   Biostratigraphy. – BG. et al. 1980, p. 28.
   Radiolarian data. – Not: DE WEVER in VRIELYNCK 1978. BG. et al. 1980, DE WEVER in KO. 1981 and own observations.

2. Angelokastron, Argolis Peninsula, Peloponnesus, Greece: 8.
References. – BAUMGARTNER 1980, p. 314–316, loc. A–B. BG. et al. 1980, p. 65, loc. C0–C2. See Plate 12.
Biostratigraphy. – As loc. 1.
Radiolarian data. – Own observations: BAUMGARTNER 1980, BG. et al. 1980. in KO. 1981.
3. Prosimni, Argolis Peninsula, Peloponnesus, Greece: 3.
References. – DE WEVER in VRIELYNCK 1978, p. 36, loc. T-11. BG. et al 1980, p. 66, loc. d. Coll. B. Vrielynck. See Plate 12.
Biostratigraphy. – As loc. 1.
Radiolarian data. – Not: DE WEVER in VRIELYNCK 1978. BG. et al. 1980, DE WEVER in KO. 1981, own examination of DE WEVER's residues.
4. Taxiarchis, Argolis Peninsula, Peloponnesus, Greece: 3.
References. – BAUMGARTNER 1980, p. 316, loc. C. BG. et al. 1980, p. 64, loc. b.
Radiolarian data. – Own data: BAUMGARTNER 1980, BG. et al. 1980, in KO. 1981.
5. Kandhia, Argolis Peninsula, Peloponnesus, Greece: 2.
References. – BG. et al 1980, p. 66, loc. e.
Radiolarian data. – Own data: BG. et al 1980, in KO. 1981.
6. Serrada, Trento Province, northern Italy: 1.
Locality data. – New locality. The section was measured along the Serrada–Terragnolo–Rovereto road in the first hairpin curve at the entrance of Serrada (opposite to the road sign "Serrada"), about 300 m uproad from the section measured by D. Bernoulli & C. Sturani (unpubl. manuscript).
Lithology and sample location. – The section is floored by cream colored massive oolitic grainstones (San Vigilio Oolites), overlain by about 3 m of pelagic, *Bositra*-rich pink limestones topped by a Fe–Mn-crust. This hardground is overlain by a 3.7 m thick radiolarian-rich unit consisting of 3–6 cm-bedded, pink cherty limestones with thin greenish marly partings. Four soft, pale green bentonite layers are found at 1.30, 1.40, 1.60 and 1.70 m above the hardground. The radiolarian sample cited here, POB 1403, is located 3.50 m above hardground or 1.80 m above the highest bentonite. This unit is overlain by 30 cm of flat bedded beige pelagic limestone, then about 10 m of nodular marly limestone and then white *Calpionella*-bearing nannofossil limestones.
Biostratigraphy. – BERNOULLI & STURANI (unpubl. manuscript) concluded, based on a regional survey of ammonites found in the enclosing units an early Kimmeridgian age for the cherty limestones.
Radiolarian data. – Own data, POB 1403 is assigned to U. A. 8–10, Zones B to C2.
7. Koliaki Chert, Argolis Peninsula, Peloponnesus, Greece: 4.
References. – BAUMGARTNER 1981, p. 70–72, 88, Pl. 6, section A. See Plate 12.
Lithology and sample location. – The samples included under this locality are a composite of the cited section A, Koliaki Chert, Theokafta Subunit and one sample (POB 325) from the Koliaki Chert of the Main Asklipion Unit. Sample 1, POB 1263 was collected a few m above the brecciated top of the Adhami Limestone (Upper Liassic–?Middle Jurassic) in red, thinbedded siliceous mudstones and chert. Locality: 1.5 km north of Asklipion, along dirt road linking Asklipion limestone quarries with new national road (under construction in 1980), 30 m from entrance to new road, on east side of dirt road (x: 06.83.13; y: 41.63.75, topographic map of Greece 1:50,000, sheet Ligourion). Sample 2, POB 1262 was collected 100 m south of sample 1, 30 m north of last outcrops of Asklipion limestone olistoliths (x: 06.83.16; y: 41.63.55). Sample 3, POB 325 was collected in the Main Asklipion Unit, within a sequence of red siliceous mudstones and chert of at least 100 m thickness in the little valley below Koutroumbeika, between Trakhia and Bafi (x: 06.91.20; y: 41.59.00). Sample 4, POB 1261 was collected from the chert matrix of a breccia with conodont-bearing Triassic Asklipion Limestone fragments (BAUMGARTNER 1981, Fig. 35a) which borders the main body of Asklipion Limestone, just below the contact with the tectonically overlying keratophyric tuffs at the little col of the forementioned dirt road (x: 06.83.18; y: 41.63.40).
Radiolarian data. – Own data.
8. Theokafta, Argolis Peninsula, Peloponnesus, Greece: 1.
References. – BAUMGARTNER 1980, p. 316, loc. D. BG. et al. 1980, p. 66, loc. f.
Lithology and location. – BAUMGARTNER 1981, Pl. 2, 3, section F. See Plate 12.
Radiolarian data. – Own data, see also in KO. 1981.
9. Rhadon, Argolis Peninsula, Peloponnesus, Greece: 1.
References. – BAUMGARTNER 1981, p. 97–98.
Lithology and sample location. – The main road Trakhia–Kranidhi cuts across the Migdhalitsa Ophiolite Unit and has a culmination approximately 3.5 km west of Radhon, where the road cut exposes nice pillow

lavas with ocean floor characteristics (BAUMGARTNER 1981, samples POB 300, 301, Fig. 48, 49). 100 m south of the pass the road cuts through small outcrops of pillows, pillow breccias and overlying red radiolarian chert, siliceous mudstones and siliceous limestones (redeposited). Sample POB 926 was collected about 10 m above pillow breccias. See Plate 12.
Radiolarian data. – Own data.

10. Pindos, Central Greece: 3.
References. – BG. et al. 1980, p. 66, loc. g, coll. M. Baltuck.
Lithology and sample location. – BALTUCK 1982. See Plate 12.
Radiolarian data. – Own data: BG. et al. 1980; in KO. 1981.
11. Marathos, Central Greece: 6.
References. – BG. et al. 1980, p. 66, loc. h, coll. N. Lyberis, preparation: E. A. Pessagno.
Lithology and sample location. – LYBERIS 1978.
Radiolarian data. – Own data based on observations in PESSAGNO's residues: BG. et al. 1980, in KO. 1981.
12. Pojorita, Rarau Mountains, Romania: 2.
13. Laen Rosu, Haghimas Mountains, Romania: 1.
14. Piatra Soimului, Rarau Mountains, Romania: 1.
15. Gomielor Valley, Drocea Mountains, Romania: 1.
References. – DUMITRICA 1970, p. 45 (for locality 12.) BG. et al. 1980, p. 67, loc. i, coll. P. Dumitrica.
Biostratigraphy. – Discussed in BG. et al. 1980.
Radiolarian data. – Own data based on examination of DUMITRICA's residues. KO. 1981.
16. Svinita, Banat, Danube section, southern Carpathians, Romania: 9.
References. – BG. et al. 1980, p. 67, loc. k, coll. P. Dumitrica.
Lithology and sample location. – AVRAM 1976. See Plate 12.
Biostratigraphy. – Presented in BG. et al. 1980.
Radiolarian data. – Own data based on examination of DUMITRICA's residues and personal comm. P. Dumitrica: BG. et al. 1980, in KO. 1981.
17. Besozzo II, Prov. Varese, Lombardy, northern Italy: 3.
References. – BG. et al. 1980, p. 67, loc. l, KO. 1981, p. 38, loc. l, coll. R. Kocher.
Radiolarian data. – KO. 1981.
Zonal assignments. – Sample 1: RK 95: U.A. 1–5; sample 2: RK 92: U.A. 5; sample 3: RK 101: U.A. 8.
18. Monte Generoso, Ticino, southern Switzerland: 3.
References. – KO. 1981, p. 40, loc. t.
Radiolarian data. – KO. 1981 and own revision of KOCHER's residues.
Zonal assignments. – Sample 1: BB 1: U.A. 3–5; sample 2: A-2: U.A. 7–8; sample 3: A-1: U.A. 8–10.
19 Torre de Busi, Prov. Como, Lombardy, northern Italy: 9.
References. – BG. et al. 1980, p. 67, loc. n. KO. 1981, p. 39, loc. n, coll. R. Kocher, Sample 1: POB 1341, own collection.
Lithology and sample location. – Sample 1: POB 1341 was collected 4.10 m below sharp base of basal radiolarites in top part of Sogno Formation, in cherty, *Bositra*-rich limestones. Locality: Along road Torre di Busi–Sogno, several 100 m below Colle di Sogno, where road cuts again down into the Sogno Formation. See Plate 12.
Radiolarian data. – BG. et al. 1980, KO. 1981 and own revision of KOCHER's residues. POB 1341: own data.
20. Valmaggiore, Brenta, Prov. Varese, northern Italy: 4.
References. – BG. et al. 1980, p. 67, loc. o. KO. 1981, p. 39, loc. o. Coll. R. Kocher.
Radiolarian data. – KO. 1981.
Zonal assignments. – Sample 1: RK 1095: U.A. 4–5; sample 2: RK 1088: U.A. 6–8; sample 3: RK 1086: U.A. 8; sample 4: RK 1085: U.A. 9–10.
21. Besozzo I, Besozzo Sup., Prov. Varese, northern Italy: 5.
References. – BG. et al. 1980, p. 67, loc. p. KO. 1981, p. 39, loc. p. Coll. R. Kocher.
Radiolarian data. – KO. 1981.
Zonal assignments. – Sample 1: RK 106: U.A. 8, sample 2: RK 109: U.A. 8, sample 3: RK 110: U.A. 8–9, sample 4: RK 111: U.A. 8–9, sample 5: RK 115: U.A. 9.
22. Sangiano, Prov. Varese, northern Italy: 7.
References. – BG. et al. 1980, p. 68, loc. q. KO. 1981, p. 39, loc. q. Coll. R. Kocher. See Plate 12.
Radiolarian data. – KO. 1981.
23. Cava Rusconi, Cittiglio, Prov. Varese, northern Italy: 1.

References. – BG. et al. 1980, p. 68, loc. s. POB 1205. See Plate 12.
Radiolarian data. – Own data: BG. et al. 1980, and KO. 1981.

24. Breggia Gorge, Ticino, southern Switzerland: 24.
References. – BG. et al. 1980, p. 68, loc. r. KO. 1981, p. 40, loc. r. Coll. R. Kocher. Topmost sample 24: POB 1330: own collection.
Lithology and sample location. – KO. 1981 includes the entire outcrop back to the waterfall in the lower Breggia gorge with the basal radiolarites. The lower 20 m of his section (samples B 61 and B 100) are, however, marly and contain abundant *Bositra*. We include this part of the section with the Marne a Posidonia, an equivalent of the Sogno Formation. This is confirmed by the revised radiolarian zonation. Sample 24: POB 1330 was collected in the quarry of Maiolica Lombarda, 10.50 m above the top of the Rosso ad Aptici (steeply dipping bedding plane at entrance of narrow gorge), at the base of the second slump unit. See Plate 12.
Radiolarian data. – BG. et al. 1980, KO. 1981, this paper: reexamination of KOCHER's residues.
25. Saltrio, Prov. Varese, northern Italy: 12.
References. – BG. et al. 1980, p. 67, loc. m. KO. 1981, p. 38, loc. m. Coll. R. Kocher. See Plate 12.
Radiolarian data. – BG. et al. 1980, KO. 1981, this paper: reexamination of KOCHER's residues.
26. Fiume Bosso, near Pianello, Umbria, Central Italy: 17.
References. – KO. 1981, p. 41, loc. n (samples RK). Samples W79: Coll. E. L. Winterer. Sample POB BO230.8: own collection. See Plate 12. Earlier lithologic and biostratigraphic work includes CENTAMORE et al. 1971, MICARELLI et al. 1977 (Maiolica), MCBRIDE & FOLK 1979 (Radiolarites), BERNOULLI et al. 1979.
Radiolarian data. – KO. 1981, revision of KOCHER's residues and own data.
27. Monte Cetona, Tuscany, central Italy: 9.
References. – KO. 1981, p. 41, loc. v.
Lithology and sample location. – BERNOULLI et al. 1979.
Radiolarian data. – KO. 1981.
Zonal assignment. – Sample 1: RK 1038: U.A. 3–5, sample 2: RK 1039: U.A. 4–5, samples 3–8: RK 1043, 1045, 1046, 1047, 1048, 1049: U.A. 4, sample 9: RK 1051: U.A. 4–8.
28. Santa Anna, near Caltabellotta, Sicily, Italy: 4.
References. – RIEDEL & SANFILIPPO 1974, p. 774, WRE 67–74. BG. 1980, p. 68, loc. t1–t2. Samples 1–3: S1–S4: Coll. B. McGill.
Radiolarian data. – RIEDEL & SANFILIPPO 1974, BG. et al. 1980, KO. 1981 and own revisions of S1–S4 and WRE 67–74.
Zonal assignment. – Samples 1–4: S1–S4, WRE 67–74: U.A. 8.
29. DSDP Leg 41, Site 367, Cape Verde Basin, East Atlantic: 7.
References. – FOREMAN 1978, p. 739. See Plate 12.
Biostratigraphy. – Summarized in BG et al. 1980.
Radiolarian data. – FOREMAN 1978, BG. et al. 1980 and own revisions of FOREMAN's residues.
30. DSDP Leg 76, Site 534, Blake Bahama Basin, West Atlantic: 28.
References. – BAUMGARTNER 1983 (lithology and zonal assignment of samples).
Lithology and sample location. – See Plate 12.
Biostratigraphy. – HABIB & DRUGG 1983 (dinoflagellates), ROTH et al. 1983 and ROTH 1983 (nannofossils), GRADSTEIN 1983 (foraminifers), REMANE 1983 (calpionellids).
Radiolarian data. – Own data.
31. DSDP Leg 17, Site 167, Magellan Rise, Central Pacific: 6.
References. – RIEDEL & SANFILIPPO 1974, p. 773.
Radiolarian data. – RIEDEL & SANFILIPPO 1974, BG. et al. 1980, in KO. 1981, own observations in RIEDEL & SANFILIPPO's residues.
Zonal assignment. – Sample 1: 167-94-2-40: U.A. 10, sample 2: 167-93-2-22: U.A. 11, sample 3: 167-88-CC: U.A. 13-14, samples 4–6: 167-76-2-65, 167-74-2-65, 167-69-3-36: U.A. 14.
32, 33. DSDP Leg 32, Shatsky Rise, Northwest Pacific, Site 306: 7, Site 307: 6.
References. – FOREMAN 1975, p. 579.
Radiolarian data. – FOREMAN 1975, BG. et al. 1980, and own revision of FOREMAN's residues.
Zonal assignment. – Loc. 32, samples 1–4: 306-42-1-116, -42-1-103, -41-CC, -40-1-119: U.A. 11; samples 5–7: 306-21-CC, -16-CC, -14-CC: U.A. 11-14. Loc. 33, samples 1–2: 307-12-1-120, -10-1-119: U.A. 11–14; samples 3–6: 307-9-1-80, -8-CC, -7-1-75, -6-CC: U.A. 14.
34, 35. DSDP Leg 20, Southeast Japan Abyssal Plain, Northwest Pacific, Site 195: 4, Site 196: 3.

References. – FOREMAN 1973, p. 249.
Radiolarian data. – FOREMAN 1973, BG. et al. 1980, in KO. 1981, and own revision of FOREMAN'S residues.
Zonal assigment. – Loc. 34, samples 1–4: 195-B2-CC, -B1-CC, -5-CB, 4-CC, 3-CC: U.A. 14. Loc. 35, sample 1: 196-5-CC: U.A. 11, samples 2–3: 196-4-1-P3, 196-3-1: U.A. 14.

36. Glasenbach Gorge, near Salzburg, Austria: 2.
References. – KO. 1981, p. 42.
Lithology. – BERNOULLI & JENKYNS 1970.

37. Point Sal, Santa Barbara County, California, USA: 3.
References. – RIEDEL & SANFILIPPO 1974, p. 773: Pt. Sal, coll. C.A. Hopson and D.E. Karig, WR 73-4. PESSAGNO 1977, p. 102: samples NSF 900F–NSF 911.5 and own collection.
Radiolarian data. – Idem and own revisions of the above residues and raw samples.
Zonal assignment. – Sample 1: NSF 907: U.A. 7, sample 2: NSF 908: U.A. 7–8, sample 3: NSF 909: U.A. 7–8, Zone B.

38. Veveyse de Châtel-St-Denis, Cant. Vaud, Switzerland: 1.
Locality data. – New radiolarian locality. Earlier work includes CHAROLLAIS & RIGASSI 1961 (calpionellids, nannoconids and other microfossils), BUSNARDO et al. (in preparation, ammonite high resolution stratigraphy). Locality: 2.5 km southeast of the town Châtel-St-Denis, gorge of Veveyse river several 100 m upriver from motorway and road bridges in river bed.
Lithology and sample location. – The sequence spans the Kimmeridgian to Barremian with siliceous limestones, marly, partly turbiditic limestones and marls. The studied sample comes from the middle part of the section, and corresponds to bed 67-4 of BUSNARDO et al. (in preparation). Lithology: dark gray, mottled, clayey limestone, with abundant burrows in which radiolarians and other microfossil fragments are preserved as pyrite. Samples from other Lower Cretaceous levels are in preparation.
Biostratigraphy. – Bed 67-4 belongs to the *Callidiscus* Ammonite-zone of the terminal Valanginian (R. Busnardo, personal communication).
Radiolarian data. – Own data.
Zonal assignment. – Sample POB 1134: U.A. 14, Zone E2.

39. DSDP Leg 1, Site 5, Blake Bahama Basin, West Atlantic: 1.
References. – PESSAGNO 1971. Sample 5A-7-1-top.
Radiolarian data. – Own examination of PESSAGNO'S residue.
Zonal assignment. – U.A. 11, Zone D.

40. In 7, near Unuma, Inuyama area, central Japan: 1.
References. – YAO 1972, ICHIKAWA & YAO 1976, YAO 1979, YAO et al. 1980, YAO et al. 1982.
Radiolarian data. – Idem and own observations in residues prepared from a raw sample provided by A. Yao.
Zonal assignment. – Sample IN 7: U.A. 0, Zone A1.

41. Guatemala, near Santa Rosa, Nicoya Peninsula, Costa Rica: 1.
References. – New radiolarian locality. See KUYPERS 1979, Fig. 21. Locality: Lower part of Quebrada Triste, near Guatemala, 2.75 km east of Santa Rosa. Coll. E. Kuypers.
Lithology and sample location. – Dark brown Mn-rich chert sampled a few meters above contact with basalt.
Radiolarian data. – Own data, many other samples from Nicoya Peninsula are in preparation.
Zonal assignment. – Sample 2-18-1-79: U.A. 3–5, Zones A1–A2.

42. OM 191, OM 200, near Sur, Hawasina Complex, southeastern Oman: 2.
References. – TIPPIT 1981. Coll. R.G. Coleman.
Radiolarian data. – Own observations in TIPPIT'S residues.
Zonal assignment. – Sample 1: OM 191: U.A. 11, Zone D, sample 2: OM 200: U.A. 14, Zone E2.

43. Trattberg, Salzburg, Austria: 2.
Locality data. – New radiolarian locality. For geology: STEIGER 1981. Localities: Along road Hallein–Trattberg. Sample 1: above "Gletscherschliff" Natural Monument, sample 2: Quarry below Trattbergalp. Coll. P.O. B. and T. Steiger.
Lithology. – Light gray, clayey nannofossil limestones with gray replacement chert nodules and layers, "Aptychenschichten".
Radiolarian data. – Own data.
Zonal assignment. – Sample 1: U.A. 11, sample 2: U.A. 12, Zone D.

*44. Ceniga, near Arco, Trento, northern Italy: 4.

Locality data. – New radiolarian locality. Section described by FOGELGESANG 1975 (p. 29). From Arco follow small road on right side of Sarca river about 3.5 km northwards to little hill south of Ceniga. Outcrops in road cut and on slope of hill west of road. Coll. P.O. Baumgartner and E. L. Winterer.

Lithology and sample location. – See Plate 12. FOGELGESANG (1975) mentions 3 m of siliceous limestones and 1.5 m of Aptychus limestones. We observed 9 m of thinbedded pink siliceous limestones with lenses of red to reddishbrown replacement chert. The bentonites observed in other sections of the Trento swell (see loc. 6) have not been found – probably due to poor outcrops in the middle part of section.

Biostratigraphy. – FOGELGESANG (1975, p. 24) reports a late Oxfordian chaetetid species from a comparable section at Colme di Vignola, recovered from the Aptychus limestones, and concludes from his regional study on a late Oxfordian–early Kimmeridgian age for the siliceous limestones.

Radiolarian data. – Own data.

*45. Sierra de Ricote, Subbetic, Prov. Murcia, Spain: 3.

Locality data. – New radiolarian locality. Lithologic description: SEYFRIED 1978. Several detailed sections measured and collected after indications of H. Seyfried: Bathonian cherty limestones, green calcareous radiolarites, red siliceous marls and Late Jurassic–Early Cretaceous cherty limestones were collected 7 km southwest of the town Albaran, on the hill immediately west and southwest of Casas de Vite (Mapa Militar 26–36 "Mula" in the vicinity of x: 6-357, y: 42-247). An additional section of the red siliceous marls and overlying marly cherty limestone was collected in creek 400 m south of Cortijos de la Cuesta Alta (x: 6-379, y: 42-255):

Lithology and sample location. – See Plate 12.

Biostratigraphy. – Biostratigraphy given in Plate 12 after SEYFRIED 1978 (Fig. 20). SEYFRIED (1981, p. 342) mentions the recovery of *Ataxioceras* sp., basal Kimmeridgian, from the transition between the red siliceous radiolarian marls and the overlying white cherty limestones (see Pl. 12), recovered between the studied sections (x: 6-372.5, y: 42-254; H. Seyfried, pers. comm.).

Radiolarian data. – The presently studied samples are indicated on Plate 12, other samples from the entire section are in preparation.

*46. South of Monte Campannello near Volterraio, Elba, Italy: 2.

Locality data. – New radiolarian locality. Lithologic description by BARRETT 1979, 1982. The base of the section collected lies 300 m west of Le Panche, the col of the Rio nell'Elba–Magazzini road, at about 300 m altitude. Variolitic pillow lavas are overlain by Mn–Fe crusts and dark red ferrugineous siliceous mudstones. The lowest sample with determinable radiolarians was collected in the first cm-thick white radiolarian sands 80 cm above basement. Coll. P.O.B. and E. L. Winterer. See Plate 12.

Radiolarian data. – Presently studied samples are indicated on Plate 12. A sequence of samples, including the top of the radiolarites near Nisporto are in preparation.

*47. S. Felo–Namia, Elba, Italy: 1.

Locality data. – New radiolarian locality. Previous illustration of section in FOLK & MCBRIDE 1978 and BERNOULLI et al. 1979. The extremely reduced section of radiolarites is exposed in a small quarry located on the Porto Azzurro–Rio Marina road between the localities Namia and San Felo, on the north side of the road. Along the road on the east side of the quarry the base of the section is exposed: Sheared but fresh serpentinite is overlain by about 8 m of weathered serpentinite including large boulder-like bodies of fresh serpentinite. The following 16 m thickness to the entrance of the quarry include very altered serpentinite penetrated by abundant calcite veins and in the upper 10 m dikes of red to pink siliceous muddy sediment. On the east wall of quarry this is overlain along a very irregular contact by an ophiolite breccia containing basalt fragments of dominantly 2–10 cm size but also entire pillows, basaltic sandstone-clasts and rare gabbro fragments embedded in a shaly matrix of siliceous mudstone and overlain by mainly thinbedded siliceous mudstone. The sample POB 1615 is the lowest sample containing determinable radiolarians, 1.50 m above basalt breccia. Coll. P.O.B. and E. L. Winterer.

Radiolarian data. – See Plate 12; more samples in preparation.

*48. Rocchetta di Vara, Liguria, Italy: 2.

Locality data. – New radiolarian locality. Earlier descriptions of the locality include ABBATE 1969 and FOLK & MCBRIDE 1978. The section is along the Brugnato–Roccetta di Vara road, the overturned base of the section is exposed east of the first river bridge and on a gravel road (our lowest sample POB 1661) just west of the big radiolarite quarry (sample POB 1662) on the south side of the road. The lowest sample with determinable radiolarians (POB 1661) was collected 1.40 m above the graded top of the underlying gabbro breccia and 60 cm below a graded gabbroic sandstone poorly exposed on the east side of gravel road. POB 1662 was sampled 29.20 m above the gabbro breccia in the southeast corner of quarry. Coll P.O.B. and E. L. Winterer.

Radiolarian data. – See Plate 12, more samples of whole section in preparation.

*49. C 31, northern Evvoia, eastern Greece: 1.

Sample data. – Residue provided by J. Simantov, Geneva, described as interpillow sediment of the Pelagonian (s.l.) ophiolites of northern Evvoia.

Radiolarian data. – Own data: C31: U.A. 4–5, Zones A1–A2.

*50. DB 6214, Al Aridh Formation, Jebel al Hasi, Hawasina Nappes, Central Oman: 1.

References. – BERNOULLI & WEISSERT [manuscript]. The sample comes from bedded lime-free radiolarites and shales in the type area of the Al Aridh Formation (GLENNIE et al. 1974). Coll. D. Bernoulli.

Radiolarian data. – Own data: DB 6214: U.A. 0, Zone A0.

*51. DB 4575, near Achladi, northern Evvoia, eastern Greece: 1.

Reference. – BAUMGARTNER & BERNOULLI 1976.

Radiolarian data. – Own data: DB 4575: U.A. 7–8, Zone B (not early Neocomian as supposed in the reference).

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