38. NEogene AND Pleistocene ostracodes, Sites 959 AND 960, Gulf of Guinea

Claude Guernet

ABSTRACT

The Neogene from Sites 959 and 960 contains about 20 ostracode species, including Cytherella serrulata, Buntonia mackenziei, Bradylea dictyon, Agrenocythere haezela, Poseidonamicus major, Pseudobosquetina mucronalatum, Legitimocythere acanthoderma, and Henryhowella melobesioides. These species characterize the psychrosphere that was in place in the Gulf of Guinea by at least early Miocene time.

INTRODUCTION

A total of 103 Cenozoic samples from Ocean Drilling Program (ODP) Sites 959, 960, 961, and 962 were examined in this study. All samples were washed over 160- and 80-µm sieves, and oven dried at ≤65°C. Samples from the Paleocene through the Holocene from Site 961, located in 3300 m water depth (Section 159-961B-4R-3, and 4R-6, and Sections 961A-24R-1, 20R-1, 16R-1, 14R-1, 12R-1, 9R-1, 8R-1, 4R-1, 3R-1, and 1R-1) are devoid of ostracodes, although scattered benthic foraminifers were found. Seven Pliocene to Pleistocene samples from Hole 962B, located in a water depth of 4637 m (Sections 159-962B-7H-3, 6H-3, 5H-3, 4H-3, 3H-3, 2H-3, and 1H-3), were investigated; calcareous microfossils are generally badly preserved and ostracodes are absent. Only Sites 959 and 960 (respectively, 63 samples from Holes 959A and 959D and 21 samples from Holes 960A and 960C) yielded ostracode, and 19 species belonging to 13 genera have been recorded.

SITE LOCATION

Site 959 is located 220 km off the African coast (Fig. 1), in 2100 m water depth on a small plateau that extends just north of the top of the Côte d’Ivoire-Ghana Marginal Ridge, on the southern shoulder of the Deep Ivorian Basin (Mascle, Lohmann, Clift, et al., 1996). Therefore, Site 959 is today isolated from coarse continental sediment and from contamination by neritic ostracodes and foraminifers. Upper Oligocene to Calabrian sediments were recovered in Hole 959A, and Albian to middle Oligocene deposits were recovered in Hole 959D. In the present study (Table 1), only middle Eocene to Pleistocene samples from these holes have been analyzed. The Eocene consists of porcellanite and micrite chalk, commonly with radiolarians, of palygorskite claystone, and the middle Eocene to lower Miocene consists of chalky clay with abundant diatoms and radiolarians, are generally without ostracodes (one specimen of Cytherella was collected). Only middle Miocene to Pleistocene nanofossil ooze or clay contains some ostracodes (Table 1).

Site 960 is located 3 miles southeast of Site 959 (Fig. 1), 2050 m below sea level, on a small plateau that occupies the summit of the Côte d’Ivoire-Ghana Marginal Ridge (Mascle, Lohmann, Clift, et al., 1996). Consequently, as Site 959, it is today isolated from coarse continental sediment and from neritic ostracodes and foraminifers. Turonian or pre-Turonian to Calabrian sediments were recovered in Hole 960A, and only one core was recovered in Hole 960B and that core is Pleistocene in age. Turonian to middle Oligocene deposits were recovered in Hole 960C. In this study, lower Eocene to Pleistocene samples from these holes were analyzed. The lower Eocene consists of palygorskite claystone, and the middle Eocene to lower Miocene of porcellanite and micrite chalk, commonly with radiolarians, whereas the middle Miocene to Pleistocene sediment is comprised of ooze or chalk with clay or micrite. Only the Miocene to Pleistocene samples yielded ostracodes (Tables 2, 3).

SIGNIFICANCE OF THE OSTRACODES

The Cenozoic ostracodes at Sites 959 and 960 are usually absent or scarce, even where benthic foraminifers are common. Perhaps this infrequency is related to the micritic or clayey nature of the oozes or chalk; the food is too dispersed or too diluted for ostracodes, which are metazoans and relatively mobile compared with foraminifers. Particularly when food is thinly distributed, ostracodes are scattered and the discovery of a sexual partner becomes uncertain.

Despite their overall scarcity in the Miocene to Pleistocene samples of Sites 959 and 960, the following species are present: Cytherella serrulata, Buntonia cf. rosenfeldi, Buntonia mackenziei, Bradylea dictyon, Agrenocythere haezela, Poseidonamicus major, Pseudobosquetina mucronalatum, Legitimocythere acanthoderma, Henryhowella melobesioides, and others (see Tables 1–3; Plates 1–3). This fauna characterizes the psychrosphere, which is the water mass beneath the permanent thermocline (Table 4). More precisely, at least since the Miocene, it lies at a depth of about 2000 m (approximately the upper limit for P. mucronalatum, see Benson et al., 1983; Brady, 1880; Dingle and Lord, 1990; Van Harten, 1990). In addition, the Poseidonamicus-Pseudobosquetina-Cytherella serrulata assemblage is characteristic of North Atlantic Deep Water (Dingle and Lord, 1990).

The stratigraphic range of ostracodes from Sites 959 and 960 agrees with the general stratigraphic ranges of the same species in the Atlantic Ocean (Table 5). As off West Africa (ODP Sites 659, 664, and 667, see Guinet and Moullade, 1994), the lack of significant change observed in the composition of assemblages from the Miocene to the Pleistocene reflects the stability of the physical features, principally temperature, of the psychrosphere.

Remark: Three species are probably new, Gen. 1 sp. (Pl. 2, Fig. 8), Gen. 2 sp. (Pl. 3, Fig. 5) and Gen. 3 sp. (Pl. 3, Figs. 6, 7), but fur-
ther investigations are required before they can be formally described.

CONCLUSION

The limited assemblages of ostracodes do not allow a precise stratigraphic interpretation, but the presence of the same species since the early Miocene shows that the depth of the Côte d’Ivoire-Ghana Marginal Ridge was approximately the same in the Miocene as at the present. Furthermore, the composition of the assemblages suggests that, at least since Miocene time, the cold-water masses overlying the Marginal Ridge originated in the arctic region.

ACKNOWLEDGMENTS

Thanks to J.-P. Bellier and the other scientists and crew members of Leg 159 of the JOIDES Resolution for recovering the samples that made this study possible. I am greatly indebted to A. Rosenfeld, R.
Whatley, and the staff members of ODP Publications Services for their thoughtful reviews of the manuscript. This study was supported by ODP France.

REFERENCES


Table 3. Range chart for Cenozoic ostracodes from Hole 960C.

Table 4. Vertical distribution in the Atlantic Ocean of recent ostracode species from Sites 959 and 960.

Table 5. Stratigraphic distribution in the Atlantic Ocean of some deep-water ostracodes.

Note: Vertical bars after Benson (1972, 1977); Benson and Peypouquet (1983); Coles and Whatley (1989); Coles et al. (1990); Cronin and Compton-Goodin (1987); Guernet and Fourcade (1988); Guernet and Moullade (1994); Steineck (1981); Steineck et al. (1984); Whatley (1993); Whatley and Coles (1987, 1991) and Whatley and Arias (1993). Solid circles denote occurrence at Sites 959 and 960.
C. Guernet


Date of initial receipt: 22 July 1996
Date of acceptance: 30 April 1997
Ms 159SR-019

APPENDIX

Faunal Reference List

*Agrenocythere hazelaee* (van den Bold, 1946), see also Benson (1972)

*Agrenocythere spinosa* Benson, 1972

*Paranesiidea sp.* *Bradleya dactylon* (Brady, 1880), see also Puri and Hulings (1976), Benson (1972), Cronin (1984), and Guernet and Moullade (1994)

*Buntonia mackenziei* (Puri and Hulings, 1976)

*Buntonia rosenfeldl* Dingle, Lord and Boomer, 1990

*Cytherella cf. consueta* Deltel, 1964

*Cytherella serratula* Brady, 1880 (see also Puri and Hulings, 1976; Whatley and Coles, 1987; Dingle et al., 1990)

Gen. 1 sp.

Gen. 2 sp.

Gen. 3 sp.

*Henryhowella melobesioides* (Brady, 1869), see also Puri and Hulings (1976) and Dingle et al. (1990)

*Krithe cf. dolichodeira* van den Bold, 1946 (= *? capensis* Dingle et al. (1990))

Plate 2. Cenozoic ostracodes of Leg 159. 1. Agrenocythere hazelae, left valve, 20X, Sample 159-960C-9H-3, 69−71 cm. 2. Legitimocythere acanthoderma, right valve, 50X, Sample 159-960C-12H-3, 62−67 cm. 3. Xestoleberis abyssoris, Sample 159-960C-5H-3, 38−40 cm. 4. Henryhowella melobesioides, female left valve, 60X, Sample 159-959A-2H-4, 60−65 cm. 5. H. melobesioides, male right valve, 60X, Sample 159-959A-3H-4, 60−65 cm. 6. H. melobesioides, juvenile left valve, 115X, Sample 159-960A-12R-1, 62−67 cm. 7. Agrenocythere spinosa, right valve, 60X, Sample 159-959A-6H-4, 58−63 cm. 8. Gen. 1 sp., 60X, Sample 159-959A-1H-4, 60−65 cm. 9. Gen. 1 sp., same valve as Figure 8, 135X. 10. Poseidoanamicus major, left valve, 50X, Sample 159-959A-12H-3, 62−67 cm.
Plate 3. Cenozoic ostracodes of Leg 159. 1, 2. Buntonia mackenziei, left and right valves, 60×, Samples 159-959A-1H-4, 60–65 cm, and 159-960C-1H-4, 60–65 cm. 3. Buntonia cf. rosenfeldi, left valve, 60×, Samples 159-959A-1H-4, 60–65 cm. 4. Pseudobosquetina mucronalatum, left valve, 60×, Sample 159-959A-4H-4, 60–65 cm. 5. Gen. 2 sp., left valve, 50×, Samples 159-959A-15H-5, 62–67 cm. 6. Gen. 3 sp., left valve, 60×, Sample 159-959A-1H-4, 60–65 cm. 7. Gen. 3 sp., same valve as Figure 6, muscle scars, 250×. 8–10. Bradleya dictyon, female left and right valves, 52× and male right valve, 45×, Samples 159-960C-11H-3, 69–74 cm, 159-960A-10R-4, 21–26 cm, and 159-960C-10H-3, 69–73 cm, respectively.