where $\bar{d}_n$ and $\bar{D}_n$ are the arithmetic mean nominal diameters of thin section and loose grain sizes, respectively, on a number-frequency basis. The correlation equation for $\bar{p}$ and $\bar{B}$, using eq. 1, is

$$\begin{aligned}\bar{p} &= (\pi/4)\bar{B}[(\bar{D}_n/\bar{B})(\bar{p}/\bar{d}_n)] \\ &= (\pi/4)\bar{B}(\text{R.B.}),\end{aligned} \tag{2}$$

where R.B. is the residual bias which is equal to the terms under the third bracket. Linearizing eq. 2, by taking the phi-transform ($-\log_2$) of both sides,

$$\phi(\bar{p}) = 0.348 + \phi(\bar{B}) + \phi(\text{R.B.}). \tag{3}$$

In a similar way one can obtain nine linear correlation equations between $\phi(\bar{p})$ or $\phi(\bar{a})$ or $\phi(\bar{b})$, and $\phi(\bar{P})$ or $\phi(\bar{A})$ or $\phi(\bar{B})$. The correlation equation for $\phi(\bar{a})$ and $\phi(\bar{B})$ will be

$$\phi(\bar{a}) = 0.348 + \phi(\bar{B}) + \phi(\text{R.B.}) - \phi(\bar{p}/\bar{a}), \tag{4}$$

and that between $\phi(\bar{a})$ and $\phi(\bar{A})$ will be

$$\begin{aligned}\phi(\bar{a}) &= 0.348 = \phi(\bar{A}) = \phi(\text{R.B.}) \\ &= \phi(\bar{B}/\bar{A}) - \phi(\bar{p}/\bar{a}).\end{aligned} \tag{5}$$

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Scanning Electron Microscopy of Normal Pores in Cytheracean Ostracoda

Among cytheracean Ostracoda the normal pores, through which sensory receptors reach the exterior lateral surface of the valve, have been classified as simple or sieve-type. Although the function of the sensory receptors is only partly understood, the morphology of the normal pores through which they pass has been used as a taxonomic criterion at the generic and family levels. It is recognized that both sieve-type and simple normal pores may occur in the same family, but genera have been regarded as having one type or the other.

Scanning electron microscopy of normal pores of members of many cytheracean ostracod families has revealed that: (1) there is widespread polymorphism in both simple and sieve-type normal pores, related to differences in function of the sensory receptors passing through them, (2) both simple and sieve-type normal pores occur together on valves of species belonging to several families, and (3) although number and arrangement of normal pores seem to be diagnostic at the specific and generic levels, there are instances of extreme variations in both.

The initial temporary effect of these new data may be to decrease the usability of normal pores as a diagnostic character. However, preliminary results suggest that, as scanning electron microscope data become available for more ostracod genera and families, an even greater diversity of normal pore structure will be found. This diversity should make normal pore structure a much more useful criterion for systematic, phylogenetic, or paleoecologic inferences.

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Evolution of Continental Margin

In the past few years, new geologic and geophysical data from the continental margin and the ocean-basin floor have permitted a more detailed reconstruction of the evolution of the continental margin off the east coast of the United States. Application of the Vine-Mathews hypothesis of sea-floor spreading suggests that continental rifting in the North Atlantic began in Late Triassic or Jurassic time. Triassic redbeds of the Newark Series may represent the stage of rifting presently seen in the African Rift Valley. The continental block or coastal plain has prograded slowly seaward (15 km during Tertiary time) and its surface has subsided slowly (5 cm/1,000 years) but remained near sea level during Cretaceous-Tertiary time.

Seismic reflection profiles, bottom morphology studies, long sediment cores (more than 300), and bottom photographs (350 stations) demonstrate that southerly flowing deep-ocean currents have constructed and shaped the large margin sedimentary wedges of the continental rise and outer ridges. This southerly flowing North Atlantic deep water is—and has been—eroding, transporting, and depositing sediment parallel with the regional contours. The present sediment surface of the lower continental rise (0–10 m) is marked by a distinct sedimentary facies of current-produced alternating thin silt laminations with hemipelagic lutites.

Seismic reflectors horizon A (Upper Cretaceous) can be traced beneath the large (1–2-km thick) sedimentary wedge of the Blake-Bahama outer ridge and also beneath the continental rise on the north, and shows that these features have been lapped adjacent to the continental block in post-Cretaceous time. The initiation of this unique sedimentary process can be linked to the growth of a strong pattern of thermohaline circulation in the North Atlantic with the widening of a growing North Atlantic basin during the Cenozoic.

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Geologic Implications of Cenozoic Subsidence and Fragmentation of Continental Margins[1]

Lithified rocks are exposed or underlie a thin layer of Cenozoic deposits, at the sea floor at depths exceeding 2.0 km along major segments of the continental margin forming the northern and eastern flanks of the Pacific basin. For example, indurated and deformed sedimentary units of Mesozoic age underlie the surface of the shelf and continental slope off southern and southwestern Alaska, submerged plutonic and metamorphic rocks crop out on the margin off central California and central and southern Baja California, and they are the most likely rock type underlying the shelf and slope off northern and central Chile.

Because crystalline and metamorphic rocks do not form at the sea floor, their juxtaposition with seawater on continental slopes signifies that large masses of formerly superjacent crustal rocks have been removed to form the surfaces of these margins. Unless massive early Tertiary submarine erosion is invoked, stripping of the superjacent rocks could have been effected by (1) submarine *décollement* sliding, or (2) a more acceptable hypothesis (to the writers) of crustal uplift (including possible horizontal shifting of continental blocks), deep subaerial erosion, and subsequent submergence.

Studied segments of continental margins that are underlain by deformed and indurated sedimentary rocks appear also to have undergone a history of

[1] Publication authorized by the Director, U.S. Geol. Survey.