Olsen, P. E., 1985, Biological constraints on the formation of lacustrine microlaminated sediments: Geological Society of America, Abstracts with Programs, 14(1), 56.

BIOLOGICAL CONSTRAINTS ON THE FORMATION OF LACUSTRINE MICROLAMINATED SEDIMENTS

No 69843

Olsen, P.E., Lamont-Doherty Geological Observatory of Columbia University, Palisades, N.Y. 10964.

Neglecting microbial mats and purely physical factors, microlaminated sediments form today at two ends of the spectrum of lake primary productivity where bioturbators are excluded. Very low productivity excludes macroscopic bioturbators, as in Lake Brienz. At very high levels of primary production, bioturbators are excluded by lack of oxygen due to use by consumers being greater than supply, as in Fayetteville Green Lake. Benthic species diversity first increases with productivity then gradually drops as the tolerances of bioturbators to low oxygen are reached. The biomass of bioturbators, and hence the degree of bioturbation, also increases with productivity and lowered oxygen levels, rises or levels off where benthic diversity is very low, but then drops off dramatically when there is no oxygen. The modern oxygen tolerances of the available bioturbators thus limits them to the region between the two productivity extremes. For most of the Precambrian there was no bioturbation and all sediments deposited below wave base could be microlaminated. I hypothesize progressive colonization of sediments of increasingly lower oxygen levels through the Phanerozoic. This is supported by examination of broad suites of sediments of varying age which shows the increasing importance of bioturbation over turbulent disturbance as the major limiting agent of microlaminated sediments. Simple extrapolation from the modern conditions which limit bioturbation thus may lead to erroneous estimates of the frequency of ancient lakes with anoxic bottom waters.