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Reply to the comment by A. Cherchi and R. Schroeder on an article by J. Guex, Eclogae geol. Helv. 94 (2001) 321–328.

JEAN GUEX

Comment

I have known since 2002, thanks to a friendly communication of my colleague Michel Bilotte, that my choice of Hofker's (1963) marvellous Chart X showing his interpretation of the evolution of the embryonic apparatus of some Orbitolinids was not accurate. My intention was to take advantage of a future publication on ammonoids' evolutionary jumps related to environmental stress to correct myself my inaccurate interpretation of that beautiful figure but Cherchi and Schroeder (2004) did not give me the time to do so. Their paper appeals a few short comments.

Mathematicians often say that some ideas are "too pretty to be false". In the present case, the idea expressed by Hofker's synthetic figure is perfectly right, even if the details of his taxonomy, phylogeny and chronostratigraphy have been outdated "since decades" and if my tentative correlation with anoxic events is consequently false. The only goal of my use of Hofker's beautiful figure was to illustrate the widely observed fact that sporadic size decreases generated by moderate environmental stress do not disrupt the evolutionary trends towards size increase or towards morphological complexifications. Such trends are frequently observed in large foraminifera lineages (Hottinger 1963, 1982; Osawa 1975; Less & Kovacs 1996; Adams 1983). Comparable evolutionary trends are observed in many ammonite lineages showing a global increase in the degree of involution through time. Such trends are not reversed when a concomitant size decrease occurs.

The sole purpose of my 2001 paper was to propose a "catastrophic" model (in the sense of Thom) allowing descriptions and partial explanations of the complete resetting of evolutionary clocks (called proteromorphosis) during phases of extreme environmental stress generating major extinctions. The most spectacular examples of such resetting in ammonoids evolution are those of *Ophiceras* at the base of the Triassic, giving rise to all the Ceratitina and that of it's homeomorph *Psiloceras* at the base of the Jurassic, giving rise to the "Ammonitina" (including the Lytocerataceae). These two groups are smooth and serpenticone and show extremely simple morphologies, *Psiloceras* beeing clearly "atavistic" when compared with its remote ancestor *Ophiceras.* In the context of my 2001 paper, the evolution of Orbitolinids is just a little detail because no drastic or catastrophic changes occur during the evolutionary development of this group.

Similar problems of proteromorphosis (= appearance of primitive looking forms deriving from evoluated and complex ones during major environmental crises) could well exist among large foraminifera but at the moment this is totally unknown. This evolutionary problem is not addressed by Cherchi and Schroeder (2004) because they do not consider the evolution of the Orbitolinids within the more general framework of the basic evolutionary processes affecting large foraminifera.

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