PALEOPÓDIUM 68.

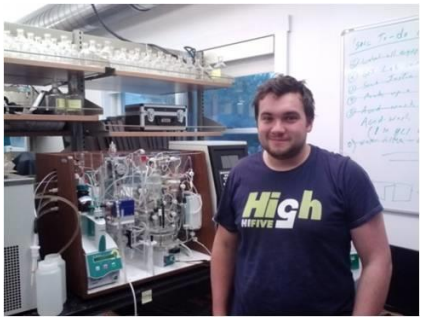
SYNTHESYS
Synthesis of systematic resources

MEGHÍVÓ

Az MTA–MTM–ELTE Paleontológiai Kutatócsoportja és az MTM Őslénytani és Földtani Tára félig formális, félig kötetlen, házi (de nyilvános) előadás-sorozatának hatvannyolcadik előadására

Tomasz BORSZCZ:

Experimental paleobiology: echinoids link geology, paleontology, ecology, chemistry and physics in the aquaria



Ideje: 2016. november 18. (péntek), 13:00

Helye: az Őslénytár könyvtára (Ludovika tér 2.)

Seawater Mg/Ca, pCO_2, temperature and predators or their combination are thought to influence shell formation within marine organisms. However, separating the impacts of these stressors on the evolution of calcifiers is difficult since these stressors often co-vary in nature and are not easy to be isolated in the fossil record. Interesting is for example how calcifiers flourished in the Cretaceous ocean given the carbon dioxide (pCO_2) has been several times higher than today and twice or so higher than predicted at the end of this century?

Together with my collaborators, Dr Justin B. Ries and Dr Isaac Westfield from Marine Science Center of Northeastern University (Nahant, Massachusetts, USA) we performed a nested, cross check (multifactorial) perturbation experiment (3 replicates/x/2 species/x/3-5 individuals/x/9 treatments) investigating calcification responses of two phylogenetically distant echinoid species (Eucidaris tribuloides, Echinometra lucunter) to various combinations of seawater temperature (21.5, 28.5 °C), pCO_2 (400, 750, 2850 µatm), seawater Mg/Ca ratio (1.7, 5.2) and presence/absence of predators (crab cues). Echinoids exposed to seawater with modern Mg/Ca (5.2) and elevated pCO_2 (2850 µatm) exhibited the most negative calcification response of all treatments. Importantly, however, the negative calcification response to elevated pCO_2 was mitigated under the low Mg/Ca treatment (1.7; elevated [Ca2+]), such as that existing during Cretaceous time. Furthermore, the treatment simulating climate change scenarios predicted for the next millenium—exhibited the most negative response of all of the treatments relative to the control. Results also demonstrate that calcification responses to environmental stress are strongly size dependent, with small/juvenile individuals (< 15mm) exhibiting more positive calcification reaction to stress than larger individuals.

Our experiment suggests that elevated seawater Mg/Ca ratio, but not temperature or presence of predator, mitigates effect of high pCO_2 on echinoid calcification. The small body size with high growth rates could be an advantage in the face of changing environmental conditions as these documented around Cretaceous/Paleogene mass extinction, with higher survival of smaller species. The other implications includes mariculturing, ocean acidification, warming, predator-prey interactions or calcite/aragonite seas transition.

Tomasz az Institute of Oceanology, Polish Academy of Sciences munkatársa (Powstancow Warszawy ,Poland), tudományos érdeklődésének tárgya a tengeri sünök (echinoids) kísérleti megfigyelése, amely a vázépítést vizsgálja különböző környezeti stresszhatások esetén (δT°C, δMg/Ca arány, ragadozók jelenléte).

Vendégünk a SYNTHESYS projekt keretében érkezett, házigazdája Dulai Alfréd.

Az előadásra minden érdeklődőt szeretettel várunk!