SHELL - LOSS DUE TO PREDATION. - EFFECTS ON AMMONOIDS BUOYANCY.

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The buoyancy regulation is one of the key functions for the evolutionary success of cephalopods. Ontogenetic and unexpected changes in buoyancy are dynamically adjusted by the osmotically driven hydrostatical apparatus. Evidences for its efficiency in buoyancy regulation in ammonoids are known from measurements of epizoans (HEPTONSTALL 1970) or from architecture of phragmocone/sipho (WEITSCHAT & BANDEL 1991). These investigations suggest that ammonoids had a much more effective buoyancy regulation than recent *Nautilus*. However, quantitative buoyancy calculations exist only for the compensation of an unexpected weight increase (HAPTONSTALL 1970). The compensation of sudden weight-loss, as occurring in context with shell-loss due to predation, may serve as an indicator for the buoyancy-apparatus efficiency. The current investigation focuses on the maximum of tolerable shell-loss in Mesozoic ammonoids. For this investigation, ammonites with significant shell loss were used that show later repair of the injury, thus indicating that the shell loss was not lethal and that the animal survived. On the basis of the volume equation of RAUP & CHAMBERLAIN (1961) after MOSELEY, the weight of the shell can be calculated. Knowing this, it is possible to calculate the relative weight-loss to the whole shell and therefore to compare the weight-loss. It can be shown that ammonoids tolerated sudden weight-loss 4 times more than the recent *Nautilus*.
To compensate weight-loss, both ammonoids and nautiloids had, after the recent understanding, to refill some liquid into the phragmocone. The amount of these liquid is shown in the table:

genus	max. shell loss in %	max. liquid refill in % phrag. – volume
Harpoceras	14	9
Dactylioceras	11	8
Nautilus	4*	2*

*data based on WARD (1986)

Although the emptying mechanism is basically understand (GREENWALD et al. 1982), we did not understand anything about the refill of liquid into the phragmocone. The results of the current investigation suggests a much higher ability to refill liquid into the phragmocone in ammonoids than in Nautilus.

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