

Cysteine Proteinases vs. Serine Proteinases: Traits of Protein Utilization in Crustaceans

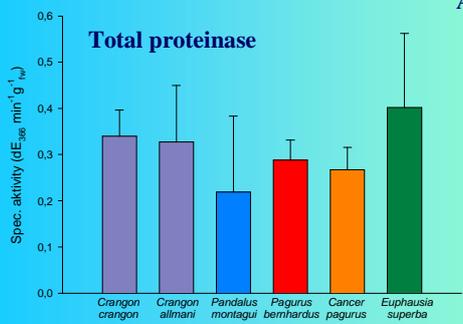


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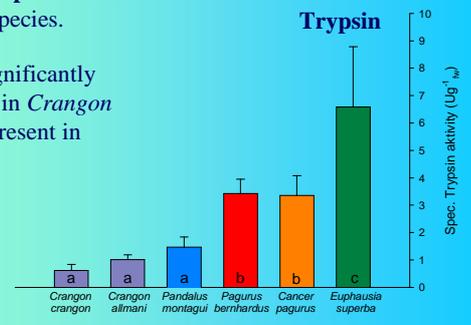


The utilization of dietary proteins is facilitated by a set of digestive peptide hydrolases. In crustaceans these are often dominated by „trypsin-like“ serine proteinases. In addition, highly active cysteine- and metallo proteinases were identified. However, the distribution of proteinases classes is diverse between species. In order to reveal possible traits in the preferences of digestive proteinases between crustaceans we investigated the distribution of serine- and cysteine proteinases in the midgut glands of a set of ecologically important species by activity measurements and inhibitor assays.

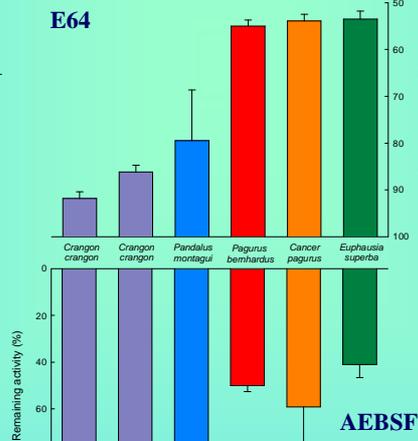


All investigated crustaceans showed high **total proteinase** activities which did not differ between species.

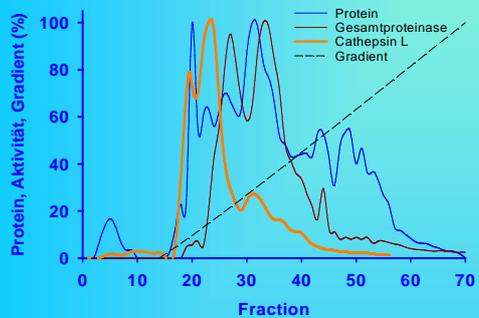
Trypsin activities, in contrast, differed significantly between species. Lowest activities appeared in *Crangon spec.* while highest trypsin activity was present in Antarctic krill.



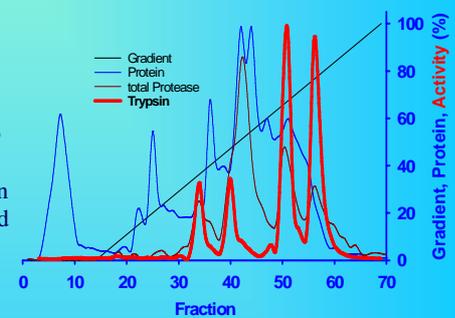
E 64, a specific inhibitor of cysteine proteinases suppressed total proteinase activity by more than 70 % in *Crangon spec.* In *P. bernhardus*, *C. pagurus* and *E. superba*, however, E 64 caused almost no loss of activity.



In contrast, the serine proteinase inhibitor **AEBSF** had only little effect in *Crangon spec.* but was most effective in *P. bernhardus*, *C. pagurus* and *E. superba*.



In FPLC-fractions of *C. crangon*- extracts we detected a broad activity-peak of the cysteine proteinase cathepsin L while simultaneously no trypsin activity was found. In contrast four distinct peaks of trypsin activity were detected in FPLC-fractions of *E. superba* which are matched closely with the elution profile of total proteinase activity.



CONCLUSIONS

The investigated set of crustaceans showed different preferences of digestive proteinase classes

The expression of proteinase classes could be related to the different life style and feeding habits of these species

Proteinase classes may reflect phylogenetic patterns: Caridea express predominantly cysteine proteinases, while Anomura, Brachyura and Euphausiacea prefer serine proteinases.