Sonderdruck: Verhandlungen der Gesellschaft für Ökologie, Wien 1975.

RELATIONSHIP BETWEEN THE TEMPERATURE PREFERENDA OF FISHES AMPHIBIANS AND REPTILES, AND THE SUBSTRATE AFFINITIES OF THEIR TRYPSINS

R. HOFER, H. LADURNER, A. GATTRINGER & W. WIESER

Summary

The apparent Michaelis constants of crude trypsin preparations of three fishes with stomach, four Cyprinidae, five amphibians and three reptiles were determined at 15°C, 30°C and at the temperature preferendum of each species. The affinity of the sum of all trypsin isozymes of a given species for DL-BAPA was correlated with the temperature preferenda (Tp) of the species. The affinity of trypsins in vertebrates with a high Tp is, as a rule, lower than in species with a low Tp. However, the agastric cyprinids possess trypsins with a much higher affinity than those of other vertebrates. Within species the relationship between K_m(app) and experimental temperature is different in different groups of vertebrates. In the terrestrial species there is a tendency for each species to have the lowest value of K_m(app) in its preferred range of temperature. On the other hand, in fish, and in tadpoles of *Rana temporaria*, K_m is independent of experimental temperature over a wide range.

The trypsin of three species of frogs (*Rana esculenta, R. ridibunda, R. temporaria),* of the tadpoles of *R. temporaria,* of two species of fish (*Salmo trutta, Tinca tinca*) and of the lizard, *Lacerta muralis*, were separated by agar gel electrophoresis, eluted and partly characterized.

Three isozymes were found in the frogs, one in the tadpole, three in the trout, four in the tench and two in the lizard. The isozyme pattern of the frogs is remarkably constant whereas those of the fishes and the lizard appear to be more variable under the influence of environmental factors. The single trypsin of the tadpoles does not resemble any of the adult trypsins of *R. temporaria.*

The affinity for DL-BAPA of all isozymes of trypsin examined varies by a factor of approximately 20 (Table 1,) but in most cases there is little dependence of K_m(app) on temperature and pH in the physiological range.

In amphibians and reptiles substrate affinity (expressed as K_m(app) and stability (expresses as the half life at pH 8.2 and 30°C) are negatively correlated, whereas the isozymes of fishes (with the exception of T_2 of the tench), despite their relatively high affinity, are stable at a pH of 8.2.

LITERATUR

HOFER, R., H. LADURNER, A. GATTRINGER & W. WIESER (1975): Relationship between the temperature preferenda of fishes, amphibians and reptiles, and the substrate affinities of their trypsins. *J. comp. Physiol.* 99: 345–355.

HOFER, R., W. SCHIESTL, A. GATTRINGER, H. LADURNER & W. WIESER (1975): Trypsin isozymes of some ectothermic vertebrates. *J. comp. Physiol.* 101: 111–119.

Anschrift der Verfasser:

Dr. RUDOLF HOFER, HERBERT LADURNER, ANGELIKA GATTRINGER und Prof. Dr. WOLFGANG WIESER, Institut für Zoophysiologie der Universität Innsbruck, Innsbruck, Austria.