ASPARTIC PROTEASE ACTIVITIES OF BLOODING FEEDING HELMINTH PARASITES CLEAVE MAMMALIAN HEMOGLOBINS IN A HOST-SPECIFIC MANNER

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Blood feeding helminth parasites including schistosomes and hookworms appear to employ aspartic proteases and cysteine proteases to digest haemoglobin (Hb) from ingested erythrocytes. In addition to describing recent findings that have characterized the role of key helminth proteases in the pathways of Hb proteolysis, findings that also support the hypothesis of Brinkworth et al., 2000 (*Int. J. Parasitol.* 30: 785-790) that substrate specificity of Hb-degrading proteases employed by blood feeding parasites influence parasite host species range will be discussed. For example, we examined the efficiency of digestion of Hb from four mammalian species, human, cow, sheep and horse by acidic extracts of mixed sex adults of *Schistosoma japonicum* and *S. mansoni*. Aspartic protease activities from *S. japonicum* cleaved haemoglobin from bovine, sheep, and horse blood more efficiently than did the activity from extracts of *S. mansoni*. These three species all are permissive hosts for *S. japonicum* but not for *S. mansoni.* In like fashion, we invested orthologous aspartic proteases from the gut of the dog hookworm *Ancylostoma caninum* and the human hookworm *Necator americanus*. Each protease digested Hb from its permissive host between twofold (whole molecule) and sixfold (synthetic peptides) more efficiently than Hb from the nonpermissive host, despite the two proteases having identical residues lining their active site clefts. The findings suggest that the paradigm of matching the molecular structure of the food source within a host to the molecular structure of the catabolic proteases of the parasite is an important contributing factor for host-parasite compatibility and host species range.

Key words: haemoglobinase, schistosomes, hookworms