

A Comparison of the Cellulolytic Activities of Rumen Ciliate Protozoa Grown Under Different Conditions

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ABSTRACT

Cell-free extracts of rumen Entodiniomorphid protozoa were prepared by gentle sonication (under conditions such that the associated bacteria were not disrupted) and centrifuged (5500g, 30 min) to produce a clear, bacteria-free supernatant fluid. These preparations contained enzymes that were active against a number of cellulose preparations. They released dye from cellulose azure, produced cellobiose from or loss of turbidity of phosphoric acid-precipitated cellulose, produced reducing material from and loss of viscosity of carboxymethylcellulose, and produced reducing material from microcrystalline cellulose. Unfortunately with all methods the relationship between product formed and enzyme concentration was a curve with steadily decreasing slope and activities were always expressed in terms of concentration of an extract from the rumen ciliate, *Epidinium ecaudatum caudatum*, a series of concentrations of which were always run in parallel with other samples. Results have been calculated as specific activities relative to that of rumen-grown *Epi. ec. caudatum* taken as 100.

Comparison has been made, where possible, between protozoa grown as a single species in the rumen of a sheep (ration 1000g hay and 100g oats/d) (referred to as R-grown), protozoa grown in culture on dried grass alone (CG-grown) and protozoa grown in culture on dried grass and ground wheat (CGW-grown) (Coleman, 1978).

With *Eudiplodinium maggii*, the highest activity (106–135%) was obtained with CG-grown, 23–65% with R-grown, and 5–8% with CGW-grown protozoa. With *Eremoplastron bovis* the values were 41–49% with R-grown, 26–43% with CG-grown and 16–23% with CGW-grown protozoa. With *Ostracodinium obtusum bilobum* the activities were 90–210% with R-grown, 92–134% with CG-grown, and 85–110% with CGW-grown. *Ophryoscolex caudatus* would not grow under condition CG but had activities of 54–125% under the other two conditions. *Diploplastron affine* also would not grow well under condition CG, but had

20–40% activity when R-grown and 100–110% when CGW-grown. These results show that there is no consistent pattern of enzyme activities under the growth conditions used and that there may be important species differences.

REFERENCE

1. Coleman, G. S. (1978), Rumen Entodiniomorphid Protozoa, in *Methods of Cultivating Parasites in Vitro*, Taylor, A. E. R., and Baker, J. R., eds., London, Academic Press, pp. 39–54.