Delicate adjustments of conditions must be established for satisfactory operation of the model, but fortunately they can be made readily and with ease as the equipment is being put into operation. For instance, the height of the reservoir above the heating chamber and the heat applied are variables that must be controlled. That is, under a given heat constant the reservoir can not be too high or proper siphoning action will not develop and continual steaming of the heating chamber will result. Conversely, if the reservoir is too low there may not be enough back pressure to cause an eruption through the orifice and a bubbling back into the reserve water may ensue. The adjustments can be made by raising or lowering the ring stand, or the heat may be increased or lessened, or both reservoir height and heat may be varied. The reservoir can not, of course, be elevated above the landscape in this model (see Fig. 1).

Since different atmospheric pressure conditions will govern the particular interrelations of heat, water supply, etc., no studies of the operating temperatures and gas consumption were made. These factors are largely dependent upon the altitude of the locality in which the model is operated, and, therefore, should be expected to vary somewhat.

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ORIGIN OF DIPEPTIDASE IN A PROTOZOAN

PARAMECIUM is apparently the sole diet of the ciliate *Didinium nasutum*. Dipeptidase extracts from both organisms show identical pH optima (7.4–7.6) for the hydrolysis of alanylglycine. When deprived of food Didinium continues to divide, but there is no change in the quantity of dipeptidase present. For example, a parent Didinium has exactly twice the enzyme content of each of its daughter cells and four times that of each of the cells produced by the succeeding division. *Paramecium multimicronucleatum*, which is somewhat larger than the largest Didinium, is entirely ingested by Didinium in about one minute. Immediately after ingestion a single large food vacuole is present in the Didinium and this vacuole divides into a large number of small ones in about twenty minutes. Morphological changes indicating digestion of the Paramecium occur rapidly.

High values for the dipeptidase content of *P. multimicronucleatum* were obtained by the addition of liberal quantities of dried brewer's yeast to a previously boiled hay infusion. The enzyme content of single individuals of *P. multimicronucleatum* was readily determined, but marked variations between individuals are usual. Thus, individual variations in physiological condition as well as in size make the selection of quantitatively uniform individuals infeasible.[1] Greater uniformity could be obtained with genetically pure strains of *P. aurelia* supplied by T. Sonneborn, but the enzyme content of these was too low for this work.

When single didinia were fed single paramecia and left for various time intervals up to four hours, the enzyme content was consistently found to equal the sum of that of predator plus prey within the range of individual variation of the paramecia (the enzyme content of the didinia can be predicted precisely). The dipeptidase content of groups of twenty-five organisms from single cultures of each species is quite constant. When twenty-five *Paramecium multimicronucleatum* were added to a drop containing twenty-five hungry didinia, the paramecia were all eaten in about one half hour, some didinia eating two and some none. When such didinia were left for four hours and the dipeptidase content then determined, it was found that the enzyme content was equal to that of the original didinia plus that of the ingested paramecia. Uniform extraction of the dipeptidase and sterility of the extract was obtained by repeated freezing and thawing with dry ice. This procedure does not impair the dipeptidase activity. It is to be borne in mind that the methods employed show the enzyme content of the cells and do not indicate the intracellular enzyme activity. In view of the digestion time allowed (about the duration of one cell-generation) one may conclude either that Didinium dipeptidase is synthesized at exactly the same rate that paramecium dipeptidase is being destroyed or else, and more probably, that paramecium dipeptidase is taken over quantitatively by Didinium.

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