Meeting: 1003, Atlanta, Georgia, MAA CP J1, MAA Session on Projects and Demonstrations that Enhance a Differential Equations Course

1003-J1-959 **Glenn Ledder*** (gledder@math.unl.edu), Department of Mathematics, 203 Avery Hall, University of Nebraska-Lincoln, Lincoln, NE 68588-0130. *A Mathematical Model for a Self-Limiting Population.*

We consider the dynamics of a population of microorganisms in a closed environment. The system is conceived of as a variation on the theme of the logistic equation. Instead of postulating a specific carrying capacity for the environment, we assume that the organism generates waste products that can build up to the point of making the environment unsuitable. A good practical example is a population of yeast in bread dough or beer. The mathematical model that one obtains from the conceptual model includes differential equations for the population and the waste with five parameters that represent various properties of system components. The model is nonlinear and cannot be solved analytically; however, it is conveniently analyzed by a variety of qualitative methods including nondimensionalization, nullcline analysis, and phase line analysis. (Received October 01, 2004)