

## G. J. BUTLER'S RESEARCH IN MATHEMATICAL BIOLOGY

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**ABSTRACT.** Dr. Butler's work in mathematical ecology and ecogenetics is discussed. In particular, his fundamental work in dealing with competition in the chemostat is examined in some detail. Other works of his include analysis of predator-prey systems and the dynamics of a population with different fertility frequencies among its genotypes.

**1. Introduction.** Geoff Butler became interested in mathematical biology in the same way that I did: through the influence of Paul Waltman.

Geoff spent the fall term of 1975 on leave visiting Paul at the University of Iowa. Anyone who spends time with Paul cannot help but succumb to his magic. Geoff was no exception, and, by the time he left Iowa, he had started a whole new line of investigations, occupying a large portion of his research time and energy from that moment until his untimely end.

In the pages that follow, I will try to describe some of Geoff's marvelous ideas in mathematical biology and the research that resulted. All references are to the publication list that appears earlier in this Proceedings.

**2. Predator-prey systems.** The first of Geoff Butler's research in mathematical biology to appear was a paper in the proceedings of a conference on "Modelling and Differential Equations in Biology" [25] in 1980 on predator-prey systems. Altogether, he published three papers on predator-prey systems [25, 28, 34], with the main results contained in [28].

In 1979, Geoff and I read some papers of Jim Cushing in which he considered Lotka-Volterra systems with periodic coefficients and obtained criteria for the existence of a positive periodic solution. We

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