

SEASONAL PERIODICITY IN THEORETICAL POPULATION ECOLOGY

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1. Introduction

1.1. *Biological populations and mathematics.* Biological populations, involving one or more species of animal or plant or disease producing organism, have been a source of inspiration to the mathematically minded for more than two centuries [4]. Today there can be little doubt that the study of mathematical population models helps to deepen our understanding of real population processes and to render intelligible many phenomena which would otherwise remain obscure (for example, (1) the stability of the age structure in a freely growing population, (2) the occurrence of distributions akin to the logarithmic in studies on the diversity of communities).

Even so, these advances have had much less impact on the consumer, the conventional ecologist, than they merit. The reasons are threefold:

(i) very few ecologists understand sophisticated mathematics couched in modern terms;

(ii) the mathematician's preoccupation with rigor often appears inconsistent with his somewhat superficial attitude to biological realities, often apparently dismissed as unwelcome complications best forgotten;

(iii) mathematical systems, because of their abstract beauty and austere elegance contrast sharply with the color and richness of animate nature.

Nevertheless, the biologist and the mathematician, despite their different attitudes, are both right, each in his own way. It is only proper for the mathematician to exercise a high degree of thoroughness in deducing the properties of the mathematical system *from which he starts*, and it is equally proper for the biologist to question the applicability of a model with just the same thoroughness, even to the point of asserting that no mathematical system can receive his *unqualified* approval unless it embodies the logical structure of a real system exactly. It is indeed paradoxical that when biologists adopt the unbending logic characteristic of mathematics and proceed to demand of applied mathematicians that they justify their formulations, the gulf between the two disciplines immediately widens.

The resolution of this paradox is perhaps a matter more appropriate to the field of scientific epistemology, but the causes underlying this regrettable dichotomy are clear. They arise in part from differences in the historical develop-