A Primer on Number Sequences. Shailesh Shirali. Universities Press (India) Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 2001. 240 pp. Price: Rs 290.

Students at the high-school level and even a general reader interested in mathematics can read this book and derive enjoyment. The first part of the book may be roughly described as experimental in nature. Here, the author introduces several types of sequences of numbers and points out patterns among them. The main focus is to observe and make a general guess at the pattern using the method of differences. Sequences given by polynomial or exponential expressions can profitably be dealt with by this method. In particular, the familiar formulae for sums like those of squares $1^2 + \ldots + n^2$ or of cubes $1^3 + \ldots + n^3$ learnt by students in school typically by rote or blindly, are shown to appear naturally in this discussion. Another such example is the formula $n(n-3)/2$ for the number of diagonals of a convex polygon with n sides.

The style is easy, but the author makes it clear that there is a distinction between observing or guessing a pattern and proving it rigorously. This was important because an unclear understanding of this distinction has been a major drawback even among mathematically talented students at the high-school level.

In the second part of the book, some special sequences are introduced and studied. Here, the methods vary quite diversely, although they are still reasonably elementary. The most advanced discussion here is an explanation of the notions of limit and convergence of sequences and series. This all-too-brief discussion could have done with a more detailed, leisurely treatment in keeping with the easy pace of the rest of the book.

Some of the prominent sequences dealt with are those of powers (squares, cubes, square roots, etc.), primes, polygonal numbers (triangular, pentagonal, etc.), Fibonacci numbers and reciprocals. The selection of the sequences clearly indicates the author's taste. He has been actively involved in the Mathematics Olympiad Programme in our country for several years. I cannot envisage the book being used as a textbook at any level, but it can be useful supplementary reading for students finishing high school or even for undergraduate students in any science discipline. It will surely be of use to students who intend to participate in the Mathematics Olympiads.

There are instances (for example, when primes are discussed) when one gets the feeling that a deeper probe could have been done. However, if the intention is to write an easily-paced, elementary-level book meant as much for the general reader interested in mathematics as for students participating in Mathematics Olympiads or similar competitions, the author has succeeded in this modest aim. The pricing seems pretty steep though.

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Stability in Model Populations. Laurence D. Mueller and Amitabh Joshi. Princeton University Press, Princeton, NJ 08540, USA. 2000. 319 pp. Price: US$ 29.95.

How living organisms maintain long-term orderly spatio-temporal distribution in the face of vagaries of nature has been one of the central questions in population ecology. Since multigenerational persistence is a prerequisite for any evolutionary change to take place, the question of how the biotic and abiotic processes can contribute towards the mechanisms that allow organisms to attain sustainability is also important for evolutionary ecologists. Traditionally both these areas, viz. population ecology and studies on life-history evolution, have been fancied by different sets of people and rarely have the two been considered together. The consideration of population as a group of individuals whose dynamics and persistence characteristics may contribute to the success/failure of the individual has gained importance in evolutionary thought only during the last few decades. Thus a combined approach to study population behaviour in conjunction with the species life history and their effect on each other should be an obvious choice if one wants to understand what causes species to inhabit this world and how they regulate themselves to maintain a semblance of balance in nature.

In general, stability is equated to equilibrium behaviour. In reality, populations have always shown ups and downs in their abundance and parasite/pathogen populations exhibit large population variations leading to epidemics. Though from a dynamical point of view there is no reason to consider such regular and irregular oscillations, such as chaotic oscillations, to be manifestations of an 'unstable' (in the "run-away" sense) system, yet evolutionary considerations indicate higher risk of extinction in populations that may show large fluctuations in their size in a single species population. Growth models of single species populations with non-overlapping generations (e.g. insects and annual plants) can show a variety of dynamics, from equilibrium to simple and chaotic oscillations, with increasing growth rates. This has led to a large body of theoretical work, both using mathematical modelling and time-series analysis, to demonstrate if populations really show chaotic oscillations. The theoretical explanations, unfortunately, have not been supported generally by either field or laboratory experiments in ecology. In the absence of empirical validation of predictions from models, this has remained a major lacuna in the understanding of the factors that affect/control stability in natural populations.

The book under review is a powerful document that argues for a laboratory-based approach to address such questions. In the authors' own words – 'Our intention in writing this book has been to review the work done on single-species population dynamics using model laboratory systems, and to highlight, through this review, the tremendous potential of such systems for testing and refining theory in population ecology.' The book has not only succeeded in doing what it intended, it has also covered an area in evolutionary ecology for which there was no easily accessible text until now. This is certainly not a textbook meant for those who are looking for a detailed theoretical analysis of single species continuous or discrete population models, nor is it a research monograph on insect life-history studies. There are many mathematical biology textbooks and research papers (referred in this book) for

those aspects. This book serves a major role by merging the two aspects and introduces a coherent picture to those interested in studying or working in this multidisciplinary area.

There are eight chapters in this book, of which two are exclusively devoted to theoretical analysis. Since the book deals with single species only, one of these chapters gives an overview and essential details of the difference and differential equation models representing populations of both non-overlapping and overlapping generations. It also introduces notions of age structure and stage-specific factors regulating density effects on population regulation. Most of the mathematical details are put in boxes for easy reading for those who are less theoretically inclined. This in fact is a major virtue of the book. It does the same when population stability is being assessed, not from the models but from data. The techniques involved can themselves be separate books, but they are introduced in a simple manner for those who may just want to have some basic understanding about the various methods that are used in this area. This book is surely not for those who require in-depth studies on time-series analysis of data.

There is a wealth of literature studying simple to complex models and their behaviour under a variety of ecological and evolutionary conditions. Many models actually predict non-equilibrium behaviour (e.g. simple and higher period oscillations and chaos) to be quite common. Some theoretical studies show that natural factors, such as dispersal and spatial extension (metapopulation) can have considerable influence in stabilizing fluctuating populations. However, how good are these theoretical approaches to describe real population dynamics or to test data? That brings us to the ways by which population data can be collected. Traditionally, field experiments have been the primary mode of assessing population variation – be it direct counting, sample collection or even assessing indirectly through 'catches' or 'fur' collections. Since a major question confronting ecologists is how population stability is regulated in nature, they spend considerable effort in trying to delineate the contributions of various known and unknown, direct and epistatic environmental and life history-specific factors regulating the population size. Chapter 7 discusses several examples of single population studies in nature and the methods adopted. The data gathered indicated much less instability in field populations and it is still an open question as to how different factors can contribute to stability in natural populations. Is stability decided by external spatio-temporal environment, or a product of the life-history evolution of the species? Addressing such questions obviously requires more controlled experiments, even though predicting the 'past' could have its own pitfalls.

The three chapters on blowflies (*Lucilia cuprina*), flour beetles (*Tribolium*), and fruit flies (*Drosophila*) are, in my opinion, the most important feature of this book. These three chapters bring together, under one cover, the three most popular laboratory organisms that have been used by ecologists for a very long time. They have been used to address many different types of ecological and evolutionary questions. It is really useful to have them together so that one can easily compare the differences in their behaviour *vis-à-vis* their specific life history. The authors have done a commendable job of reviewing and summarizing a large body of old and recent research papers (both theoretical and experimental) to present a compact and comprehensive account of the studies on population-regulating factors in these three species. The authors' own long-term research on *Drosophila* has also been reviewed here.

Who are the people who would find this book useful? The book can actually serve many different purposes. First, it is very useful to population ecologists in general. Theoretical modellers looking for both extrinsic and intrinsic nonlinearities in population growth processes would be grateful as the authors have presented the results in such a manner that one can actually start to identify which ecological or life-history phenomenon can give rise to what type of population dynamics. For experimentalists it offers a good introduction to other model systems and comparison among them. The scientific research findings are written in a lucid manner and hence it would be very useful to students of both ecology and evolution. The collection of references at the end of the book is quite comprehensive, and the subject index is reasonably good for quick referencing. Along with the authors, let us also hope that reading this book would motivate many researchers to take up studies on model laboratory populations to address questions relating to population ecology and life-history evolution. It certainly seems to be a possible way of testing the predictions of the models that theoretical ecologists generate in large amounts.

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The Biotech Century. Harnessing the Gene and Remaking the World. Jeremy Rifkin. Tarcher/Putnam Publishers. 272 pp. Price: US/$ 24.95. ISBN-0-87477-909-X.

Revolutionary scientific advances in biotechnology are redefining the meaning of life, liberty and equality as the world metamorphoses from the century of physics and chemistry into the 'biotech century'. The tremendous growth in capacities of the 'scientific establishment' and bioengineering MNCs like Du Pont, Novartis, Monsanto, Pfizer, Eri Lilly and Dow Chemical to isolate and recombine genes of plants, animals and humans and 'Play God', is being accompanied by a 'new supporting sociology', a 'eugenics civilization' and a 'new cosmological narrative' (p. 10). The essence of these sweeping economic and social forces is a new outlook towards humans, a commodification where 'the working unit is no longer the organism, but rather the gene' (p. 14) and respect and dignity shift from the individual to strands of manipulable chromosomal information. 'Cell by cell, tissue by tissue, organ by organ, we may willingly surrender our personhood in the marketplace' (p. 173). Ergo, when politicians, scientists and corporate leaders in the developed world sing paeans to the marvels of the biotech century, 'they are being disingenuous in their public pronouncements' (p. 36). Jeremy Rifkin's path-breaking book, although purporting to present data and leave to the reader the choice of deciding which side one is