# NEW BIOLOGICAL SOFTWARE

*The aim of this section is to evaluate the character, content, cost, and hardware requirements of new software programs in various fields of the biological sciences, and in appropriate related areas. All programs submitted to the* QRB *are given careful consideration, and competent and conscientious reviewers are selected to assess the software for originality, efficacy, and suitability of various applications by our readers. The price of a software program reviewed is the suggested list price of the publisher when the program is released for review.*

*Authors and publishers of biological software who wish to have their biological software programs considered for review should submit complete programs and documentation to The Editor, Biological Software, The Quarterly Review of Biology, State University of New York, Stony Brook, NY 11794–5275 USA.*

## GLOSSARY

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| CGA | IBM Color Graphics Adapter |
| EGA | Enhanced Graphics Adapter |
| MCGA | Multi-Color Graphics Array |
| MDA | Monochrome Display Adapter |
| VGA | Video Graphics Array |
| Apple | Includes Apple II, II +, IIe, IIc, and IIGS |
| IBM PC | Includes IBM PC, XT, AT, PCJr., PS/1, PS/2, and compatibles |
| MS | Microsoft |

EVOLVE. *A Desktop Laboratory of Evolution. The Computer Simulation of Natural Selection for a PC or PC Compatible Computer. Version 4.1.*
   By *James C. Ewin and James M. Ewin. Ewin & Ewin, Holmdel (New Jersey).* $169.00. 1988. *[Specifications —* IBM PC: memory 256K, manual included.]

Evolution is a complex phenomenon, one that requires the weaving together of many strands of biological thought for its proper analysis. This software package provides an entertaining, stimulating, yet in many ways frustrating tool for the illustration of evolutionary themes. The documentation ambitiously claims that this software can be used both for research and for teaching. Though this claim strikes us as a bit overblown, this menu-driven program does have many appealing features. The program envisages a spatially explicit "ringworld" — a circular array of up to 2000 sites, each potentially harboring a single individual. Each individual is characterized by six genetic loci (or characters), and each locus in an individual can exhibit any of ten possible states. The program tracks this array across generations, individual by individual, with rules (modifiable by the user) for

mutation, mating structure, fecundity, and survival. Fecundity and survival are both density dependent. Births require empty sites, and survival depends on the relationship between population size and composition and resource availability.

A unique feature of *Evolve* is that it gives the user a great deal of detailed control over how resources affect survival. One matrix defines resource availability, and another describes how the birth of an individual with a given genetic state depletes the resource pools. When resource availability is sufficiently depressed, averaged over loci of an individual, selection culls that individual from the population. This permits an almost limitless range of computer experiments. For instance, one can readily examine character displacement or convergence resulting from competition. By allowing entries in the resource depletion matrix to be negative, one can even explore the coevolution of mutualists. Moreover, a phenetic rule is included that mimics speciation, so the program can be used to watch an adaptive radiation unfold.

This flexibility is also the program's curse. Few tools are provided for synthesizing the detailed output of the simulations (e.g., changes in each

species' abundance over time), nor are the results clearly expressible in terms of standard population genetic variables (e.g., gene frequencies). Output can be printed, but not sent to a file for later inspection, and parameter combinations other than the default set provided cannot be saved and used *ab initio* in a later session. Some of the submodels that are incorporated into the simulation model seem naive or unnecessarily restrictive (e.g., all loci must have the same mutation rate; resource availability influences deaths, but not births). These flaws detract from an otherwise useful program.

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