

If population estimates were accurate by the early 1960s, then why is the present plight of whales so dismal, and what is being done to improve it? These questions are alluded to throughout the book, but are focused most clearly in J. L. McHugh's chapter on the historical roles of the IWC, and S. McVay's "Reflections on Management of Whaling." The picture that emerges is of an international "commons" (the Antarctic) exploited by increasingly efficient—but no more enlightened—"commoners." No legal restrictions were placed on whaling until the 1940s. Then the IWC was established by the International Whaling Convention to seek the opposing goals of whale management and whaler economics. It first disregarded the recommendations of cetologists and erred badly in favor of whalers, then almost dissolved in the mid 1960s as whaling interests struggled over sharply-reduced quotas. But whale populations were even more greatly reduced, and for several years the catch failed to reach even these new limits. Eventually the struggling interests resigned themselves to quotas below the s.y., and many went out of business or moved their operation northward. By 1972, hard-learned lessons had led to postmature change in the management of remaining stocks. Quotas were assigned by species in northern or southern hemisphere. International exchange of observers made the observance of quotas and size limits more likely. Quotas had been reduced to below s.y. on all major stocks. Evidence presented in the book suggested that populations of at least some protected species were slowly rebuilding, and that quotas and restrictions were being observed. Hopefully these changes will save the whales not only from extinction, but for future harvest, since they are apparently the best means that we have of using the zooplankton biomass. Clearly, Hardin's "tragedy of the commons" applies to oceans as well as to land use, but in oceanic exploitation the tragedy is magnified by international politics.

My reaction to this book is somewhat mixed. Many will find something useful in it: population biologists will be interested in seeing the application of tools of their speciality; preservationists will find numerical descriptions of whale exploitation and will be interested in the history of the IWC and factors that impeded it in bringing whale harvest in line with productivity; biology instructors wishing to objectively discuss the whale problem in class and cetologists will find international bibliographies and a description of the "state of cetological art." Unfortunately, this was the state of cetological art four years ago (except for McHugh's chapter which was written after the IWC meetings of 1972.) The book was remarkably free from errors: I found only 3 misspellings and one printing error. However, much of the

writing was tedious to read. There were long tables of raw whaling statistics that could better have been presented in graphs or appendixes, repetitious qualifications of data, and variable writing quality. A more complete glossary would have made this book more readable for the layman. Most of the authors expressed faith that once the whale take was reduced to below the s.y., whale populations would begin building back up to the m.s.y. and the whale problem would be solved. They did not discuss the possibility that (i) whale populations might have been reduced to the point that either their genetic diversity or social structure might have been irretrievably altered; (ii) their concept of m.s.y. was derived from fish, and might be inapplicable to marine mammals; (iii) there might be economically sounder management goals than m.s.y. (maximal interest, for example). My criticisms must be tempered with the fact that the book was intended primarily for research cetologists and that the value of individual expression may outweigh quality in symposia. I recommend this book to anyone who seriously wishes to understand the whale problem. Surely even though he might find only a part of the book of interest, its relatively low cost will make its purchase worthwhile.

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General Biology

LIVING SYSTEMS: PRINCIPLES AND RELATIONSHIPS, by James M. Ford and James E. Monroe. 2nd ed., 1974. Canfield Press, San Francisco. 541 p. \$11.50 (hardback).

This is a textbook well equipped to fulfill a complete semester of college instruction. The 12 modular units are well selected and include the study of science and biology; chemistry and life; cells; tissues, organs, and organisms; ecology and environment; energy relationships; metabolism and supporting processes; control mechanisms; behavior; reproduction; genetics; and evolution.

The excellent unit on behavior includes paragraphs on drugs and human sexual behavior. Both plant and animal reproduction are well done in the unit on reproduction. Enough historical information is included that should satisfy the traditionalist. Chemical principles are developed where appropriate in any unit and are quite detailed when necessary. The human organism is well correlated into the principles units.

The two-color contrast in part of the figures makes them more readable. Full-color plates in part of the book would have made it more appealing on first impression. Too much black-and-

white gives a drab appearance. It is a little awkward to have to refer to a credit page for the opening photograph captions in each unit.

A very good phylogenetic outline appears in the appendix and is adequately illustrated. A useful glossary is included as well as an index. Supplemental readings are indicated following the list of thought-provoking review questions at the end of each unit. Summarizing statements precede each list of questions. A unit outline introduces the unit.

The language of the book is descriptive, reads smoothly, and maintains a college level of understanding. Scientific accuracy is upheld. Unfortunately the mechanics of the book, its traditional aspect of presentation, and its use of chemical detail may make it unpalatable to many.

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HANDS ON BIOLOGY, by John M. White and Robert D. Barnes. 1974. Hamilton Publishing Co., New York. Price not given.

Hands On Biology is a series of scripts for an audiotutorial learning system. The scripts are organized into a comprehensive whole which is designed for beginning undergraduates or advanced high school students. They include typical freshman-biology titles and some not so typical ones as "Origin of Man" and "Human Sexuality."

The scripts may be used collectively or individually as part of an on-going audiotutorial system or to buy time for developing such a system.

Hands On Biology freely exercises the strong characteristics of an A-T system: short segments of information transmission punctuated by direct visual and manipulative activities and colorful and integrated visuals with "instant replay" capabilities to enhance meaningful processing by learners. Selected laboratory techniques are presented as they are needed rather than being separated in time from their application. Immediate (not interactive) feedback on data, observations, and calculations is not used to maximum advantage. The authors' attempt to develop units easily modifiable to fit individual instructors or instructional requirements has apparently been successful.

The structure of subject matter is sound and balanced, although some units (for example, ecology) were so superficially treated as to be in need of serious revision.

Some of the terminology appears to have come from a group lecture ("The next subject I want to take up is..."; "See, you are now studying evolution."). The scripts are basically didactic presentations of accumulated knowledge