Ecology and Other Subjects

The Kindly Fruits of the Earth. Recollections of an Embryo Ecologist. G. EVELYN HUTCHINSON. Yale University Press, New Haven, Conn., 1979. xiv, 264 pp., illus. $18.50.

This book by one of the founders of modern ecology is autobiographical without being an autobiography. Relying mainly on memory but aided at times by letters and other documents, Hutchinson attempts to reveal the persons and events that helped fashion his insatiable and catholic interests and at the same time guided him almost inexorably into his major field of study. Stimulated by younger colleagues to recount what training in biology was like 50 years ago in England, he organized the book partly for this purpose, including the inevitable comparison between Cambridge and Yale, and partly as a potpourri of scholarship, characteristically erudite and sometimes esoteric, presented in varying degrees of completeness, sometimes only as fleeting ideas or mere suggestions of them. The longest sustained passage in the book is a 12-page discourse, including play-by-play personal observations, on the liquefaction of the blood of Saint Januarius in Naples and the festivals and numerological activities that have grown up around it. Hutchinson records these varied incidents he has experienced out of concern that otherwise they might be forgotten.

After initial instruction by his parents in reading and numbers, Hutchinson and an equally young Christina Innes were tutored by her aunt, who gave them big doses of Greek and Latin mythology. Hutchinson graduated into the stern and strictly masculine world of Saint Faith's in Cambridge when he was nine, then attended Gresham's boarding school in nearby Holt, and in 1921 returned to Cambridge for university training in Emmanuel College. This also was chiefly a man's world. Women did attend Cambridge, but they were not considered fully legal students in Hutchinson's time, and they received only titular degrees. Hutchinson was awarded the Frank Smart prize for being the top male student in tripos II of zoology, but in retrospect he feels that Sydnie Manton was probably more deserving of the prize than he although ineligible because of her sex.

As a boy in Cambridge Hutchinson, after first trying moths and butterflies before he was eight, then beetles, finally settled on the Hemiptera, in part because of their relative neglect by amateur entomologists, and almost immediately began specializing in three families of aquatic bugs. This may well have provided his real preconditioning for limnology, for it brought him into contact with aquatic habitats wherever he went, even if only on Sunday afternoons dressed in his best clothes at ultrastrict Gresham's. Although he was self-taught, his interests in the insects were scarcely dilettante, as he was elected a fellow of the Royal Entomological Society while only in his second year at Cambridge.

Even today Hutchinson considers himself mainly an old-fashioned naturalist, an estimation that seems belied by his omnivorous intellectual activity and interests. The latter characteristic, which is apparent from his earliest recollections and undoubtedly was conditioned by growing up in an academic family in what was then the intellectual capital of the world, leads him to remark that his mental sustenance at Cambridge was "that of a hunter and gatherer rather than that of someone settled in the industrious pursuit of intellectual agriculture."

After a brief fellowship at the Stazione Zoologica in Naples, which was unrewarding in research accomplished but highly stimulating culturally, Hutchinson, against the advice of his parents, accepted a post as senior lecturer at Witwatersrand. Here he became acquainted with the Onycophora and the interesting problems of world distribution they pose, and he also accomplished extensive work on the aquatic Hemiptera of Africa. Lancelot Hogben from Cape Town suggested to Hutchinson that he look into the chemistry and biology of the nearby vleis. He did this, also investigating the Chrissie pans, and soon realized that at last he had found what he wanted to do.

As his parents had feared, Hutchinson did not get along well with the always difficult B. H. Fantham at Witwatersrand, who harrassed him and accused him of incompetence in teaching. A university court convened specially to investigate the dismissal charges heard the two protagonists in confrontation and acquitted Hutchinson completely. This incident is interesting in the context of discussion later in the book, where Hutchinson extols W. K. Brooks as a teacher, considering him greater even than Louis Agassiz in his overall impact on science through the persons he trained. Not the least of these persons was Ross Harrison, whose need for *Ambystoma* eggs governed the frenetic activities within the zoology department at Yale from March through midsummer. Hutchinson's own impact on science derives not only from his own meticulous and extensive scholarship but also from the pioneering contributions made and leadership exercised by the many exceptional students who studied with him at Yale. (These are arranged in an intellectual family tree in the March 1971 issue of *Limnology and Oceanography*, organized on the occasion of Hutchinson's retirement from Yale.) Closer comparisons are not necessary, but certainly such accomplishment as an educator is even greater exculpation from the charges made by Fantham.

While at Cambridge briefly on his way to Yale from South Africa, Hutchinson read Thienemann's first volume of *Die Binnengewässer* and also Elton's *Animal Ecology*, both of which had only recently been published. "I came to see . . . how all the ways of looking at nature that I had acquired in a random, disorganized way could be focused together on lakes as microcosms. I had, in fact, become a limnologist." Up to this point the variety of his interests had made Hutchinson feel that he was drifting and that his educational experience had been rather inadequate. Now his intellectual goals had finally been revealed, but his new school at first scarcely seemed a propitious place for pursuing them. As G. E. Nichols was the only professed ecologist at Yale then, Hutchinson's first-year seminar on the pans of the Transvaal went largely unappreciated.

Although the book is fascinating and generally well written, some anecdotes seem out of place or are strained. For example, Hutchinson tells us that prior to entering Saint Faith's he pushed Christina Innes into a pond in the Botanic Gardens "to see if she would float," claiming that this reflected "an early interest in the hydrodynamics of organisms."

Or, on learning that four mummified rats recovered from a wall in Christ's College were black rats, whereas this species in England subsequently was largely displaced by the Norway rat, Hutchinson states, even though he was not yet nine years when this happened, that his "interest in interspecific competition was first aroused at this time." Or, through a paper he wrote on masochism in mollusks he thinks he may have contributed unwittingly to the development of the "gay" movement, and he regrets the loss of the very useful original meaning of the word, for which no adequate substitute has been found. More minor distractions are nonetheless real, such as the propensity for trying to demonstrate personal connections with famous persons, sometimes by the most circuitous routes.

Hutchinson's chief role has been as a gatherer (with the additional function of synthesis implied), perhaps epitomized by the carrying-baskets on girls' bicycles, which his father didn't want him to use even for transporting field equipment. Gordon Riley, Hutchinson's first Ph.D. at Yale, remarked in the celebratory issue of *Limnology and Oceanography* (p. 178) that in the chemistry laboratory, where they worked together, Hutchinson's manipulative skill was rather deficient. If as a result and as compensation he left the laboratory to concentrate on synthesis and theory, science has been so much the better for it. Hutchinson's carrying-basket is enviably large, with many strange items in it reflecting the "extraordinary richness" of the academic environment in which he grew up, but the basket is developing holes. Memory is capricious.

Near the beginning of the book and again at the end, Hutchinson comments on the role of the serious amateur in science, particularly natural history. Some of the various societies and clubs in Cambridge, which played such a major role in his early development, were open to and attended by nonacademic persons. Now he sees a need for the resurgence of informed amateurism as people retire earlier, live longer, and remain active intellectually. I will second this.

The most recent issue of the *American Scientist* (vol. 67, No. 4) lists the book under the category "History and Philosophy of Science." This is appropriate, for Hutchinson discusses persons, places, events, and ideas, provides many personal insights into the lives of distinguished scholars and the genesis and development of major ideas, and roams comfortably through religion, folklore, psychoanalysis, and art in addition to science. The scholarship is generally intense but irregular and at times frustratingly truncated by the absence of additional material and ideas one senses are accessible, yet on the whole the book is fascinating to read.

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An Ecological Study

Pattern and Process in a Forested Ecosystem. Disturbance, Development and the Steady State Based on the Hubbard Brook Ecosystem Study. F. HERBERT BORMANN and GENE E. LIKENS. Springer-Verlag, New York, 1979. xiv, 254 pp., illus. $19.80.

This volume is the second in a trilogy on the Hubbard Brook Ecosystem Study, which began 15 years ago and whose name is rapidly becoming a household word among biologists, foresters, hydrologists, and others involved in the controversies and practical problems of forest and landscape management. The study is a rich source of quantitative data on the response of defined biogeochemical processes to clear-cutting and certain other perturbations within a temperate hardwood forest at Hubbard Brook, New Hampshire. More than this, the study provides in this second volume one of the few comprehensible attempts at modeling what the authors call "the ever mind-boggling complexity of natural ecosystems." The book is avowedly written for the reader interested in the ecology of ecosystems rather than for the ecosystem specialist. Instead of beginning, as most ecologists have, with plants or animals and then getting bogged and boggled in the modeling of species interactions that are thought to be ecosystems, Bormann and Likens and their many co-workers tackle ecosystem dynamics from the point of view of biogeochemical processes. The present book draws heavily on the first volume stemming from the project, *Biogeochemistry of a Forested Ecosystem* (1977), for data about flux, cycling, biomass accumulation, and nutrient budgets and aims to present "an integrated view of the structure, functions, and development of the northern hardwood ecosystems." It is concerned with change on different time scales, resulting from either endogenous or exogenous forces, in the relationships between animate and inanimate sides of ecosystem function.

To begin with the inanimate processes of a small watertight watershed as a delimited ecosystem, as Bormann and Likens and their co-workers have done at Hubbard Brook, enables fairly precise measurement of inputs and outputs, and a budget of these components can be used to estimate unknown parameters such as net weathering release or cationic denudation. Emphasis can then be placed on the role of biological processes in controlling destabilizing forces. Thus, each biological response and strategy discussed is highly pertinent. Total environmental effects and additive impacts are always kept in mind, so that the ecosystem models do not remain intellectual curiosities.

The book is well laid out, with a summary at the end of each chapter. The style is relaxed, sometimes even chatty, and in places somewhat repetitious, but this makes for easy reading and assimilation of the many complex, interlinked ideas. There is an abundance of diagrams or models scattered as figures throughout the text, and the captions often reach half a page.

The first five chapters are factual and pivot on the biomass accumulation model's four phases of reorganization, aggradation, transition, and steady state. Discussion of the results begins with the aggradation phase, characterized by storage of biomass and nutrients and by maximum biotic regulation over energy, nutrient, and hydrologic flux. The biogeochemistry and ecology of the other phases are best understood in terms of departure from the highly predictable parameters of the aggradation phase. For the development of vegetation after clear-cutting there is an extensive and stimulating discussion of the fundamental and often poorly understood processes of buried-seed storage, type of regeneration and seedling growth, and floristic responses via species richness and diversity.

Only in the sixth and seventh chapters do the authors permit themselves to move from observation and measurement of actual forest stands to the least verified aspects of the steady state. Can there be any absolute steady state, or only a system undergoing slow, long-term change? In the absence of drastic exogenous disturbance (fire, hurricanes), it takes several centuries for an all-aged condition, termed the shifting-mosaic steady state, to develop. The authors compare their interpretations of its mechanisms to those of Alex Watt, whose classic research "on the Breck" near Cambridge, England, was done over 30 years ago. They could have also invoked similar ideas developed for tropical rain forest dynamics that are well summarized in the Unesco state-of-