

remainder — two-thirds are water colour paintings and the balance — the graminoids — are black-and-white drawings. The photographs are superb in detail, colour, artistic composition, and show the entire plant growing in its natural habitat. A personal favorite is the photograph of *Moneses uniflora*. The inverted flower has a mosquito resting on it and on its head one can clearly make out a large pollinium of an orchid. The water colour paintings excel for the same reasons as the photographs, both show sufficient detail that they alone may be used for identification purposes. Most portraits are artistically complemented with a line sketch of substrate, landscape or surrounding plants.

The first fifty pages are divided into a number of short sections. Diane Erickson, "a grateful Churchillian", has written a short and encouraging foreword. Following this is a section on the natural and human history of the area which includes a description of each major plant community and ends with a double page diagram showing how the communities are related to land forms. The five pages of human history are interesting, but I am not sure how they relate to a wild flower study. A short botanical section follows, which arms the reader with sufficient floristic understanding and

terminology to be able to tackle the identification keys which follow. The back of the book has a brief reference section and an updated species list of native and introduced species. The list is co-authored with Dr. David White from the National Museum of Natural Sciences.

I have only one quarrel with *The Wildflowers of Churchill and the Hudson Bay Region* and that is its title. One question is — what is a wildflower? The book includes all kinds of vascular plants from horsetails to aspens and white spruce. We are also not sure how to interpret the extent of the "Hudson Bay Region". These are perhaps picky details — for consideration in the second edition!

This latest publication from the Manitoba Museum of Man and Nature matches the level of excellence achieved in other recent publications. Karen Johnson, Robert Taylor, and Linda Fairfield are to be congratulated for providing northern residents, naturalists, and biologists with an attractive identification guide at a very reasonable price.

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## Plantwatching: How Plants Remember, Tell Time, Form Relationships, and More

By Malcolm Wilkins. 1988. Facts on File, New York. 207 pp., illus. U.S.\$29.95; \$39.95 in Canada.

This is a superbly illustrated book. The photographs are outstanding. The text, unfortunately, is much less satisfactory.

There is no preface, and the author nowhere explains what kind of readers he had in mind for his book, which sets out to "describe and explain how plants live, work and behave." Presumably it is not aimed at naturalists since it dismisses some topics as belonging to "the province of ecology, . . . mentioned here for the sake of completeness." It may be intended for the educated layman in search of an authoritative exposition of what modern botany is all about, and some parts of the book do fulfil this goal. But it is doubtful whether anyone in this category really wants to read, for instance, that "the CO<sub>2</sub> released [during photosynthesis] in the bundle sheath cells is, however, fed straight into the Calvin cycle where it combines with ribulose biphosphate to form two molecules of the three-carbon phospho-glyceric acid, just as it does in C-3 plants."

This sentence is representative of a large fraction of the book, which is really a watered-down textbook. The profusion of exclamation marks at

the end of declarative sentences, presumably to show that they are interesting, does not turn a textbook into a popular book; it is merely ungrammatical and irritating. I would not describe the material as over the heads of educated laymen (who are at least as intelligent as professional scientists), but as unlikely to interest them; nobody enjoys learning things by rote.

In spite of the author's impressive qualifications, the book contains many misleading statements. Examples: He repeatedly writes of grasses and cereals as though cereals were not grasses. He describes a fern antheridium as a large [sic] spherical structure and a moss capsule as a large [sic] hollow structure; large relative to what? He implies that a high-powered microscope is required to see that the sporangia of *Lycopodium* are all alike; a hand lens is sufficient. Conifers are described as monoecious (but what about junipers and yews?) and as able to photosynthesize all year long (in arctic winter temperatures?) Oil as well as coal is said to be the fossilized remains of ancient pteridophytes; it is generally thought to come from marine microfossils. The cotyledons of all germinating dicots are said to become "hugely swollen as in peas and beans."; how about lettuces and



carrots? And what would a zoologist make of the statement that a "unique [*sic*] feature of plant cells is that each one contains the genetic code for the whole plant"? An error that may be only a slip is the statement that 1 Megapascal = 10 bars = 0.98 atmospheres; in fact, 1 Mpa = 9.8 atm.

The greatest lost opportunity was that of explaining to the uninitiated that a pollen grain is not equivalent to a sperm as so many non-botanists, even naturalists, mistakenly believe. The life cycles of cryptogams are described, and the part played in them by free-swimming sperms. The phanerogam lifecycle, however, doesn't even have a paragraph to itself but just one sentence, which states that "In the more advanced plants like the

conifers, and ultimately in the flowering plants, the sporophyte is the dominant generation and the gametophyte is much reduced in size, dramatically so in the case of flowering plants where the male gametophyte consists of just one or two cells within the pollen grain". Is the reduction less dramatic in the conifers? And where do the sperms come from? Not until two chapters later do we find out.

It is a great pity that so much potentially interesting material is so badly presented, especially when the illustrations are outstanding.

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## ENVIRONMENT

### **Guardian of the Wild: The Story of the National Wildlife Federation 1936-1986**

By Thomas B. Allen. 1987. Indiana University Press, Bloomington. viii + 212 pp., illus. U.S. \$18.95.

Who speaks for Earth? Carl Sagan's question was a good one. This book partly answers it, for in half of North America the strongest voice on behalf of Earth seems to be that of the National Wildlife Federation.

Here is a readable history presented with impressive candor, starting with the ideas of "Ding" Darling who successfully championed national conservation action in a number of viable organizations in the 1930s, and ending with Ronald Reagan's man in the Bureau of Land Management, James Watt, whose ideas on parks, wildlife reserves, wetlands, and other such priceless bits of Earth were a century out of date.

After a shaky start lasting many years in which lack of money constantly threatened survival, this American federation grew to have three million members, four full-colour magazines, and access to most of the nation's schools in an educational program which begins with pre-school children. It lobbies with success for sound conservation laws; it often has direct access to the nation's President; and with high frequency it sues corporations and government departments over projects destroying wildlife habitats. Fortunately for the budget, most of these confrontations are settled before reaching the courts, but a small percentage does involve the federation's dozen or so lawyers in lengthy court battles. Illegal projects are reported to this federation's head office in Washington through a nation-wide network of observers. Recently, regional offices have begun to locate legal help closer to the lands requiring legal confrontations.

Although I have known about this federation for decades, I was out of date in my views of it. Its scope and its many successes, even its guiding principles, were stunning surprises when revealed

by this book. In fact its pages were peppered with unexpected revelations, large and small. This is a powerful and active U.S. federation with wide-ranging experience in education, legislation, and litigation.

Perhaps this organization's greatest accomplishment is the impressive diversity of interests of its members. As in so many past conservation successes, this one began in hunters' clubs. Almost from the beginning, however, other kinds of clubs were members of the federation, ranging from garden clubs to organizations of hikers, naturalists, and other wild land savers. It was not easy to keep this mix together on all issues addressed by the federation, but through fifty years only the anti-hunters and anti-trappers seem to have been unable to join what must be the world's most successful citizen's crusade to prevent the unnecessary destruction of land, water, and the wild lives needing these for habitat. As stated by a Vice-President of the Federation: "Whether you are a hunter or a bird photographer, you have basically the same environmental interests".

There is much practical information in this book to take in and think about. It is a field-tested blueprint, U.S. style, for conservation action which puts effort where it will do the most good.

This history might be summed up as a success story about taking a motherhood cause to a nation with hard work and determination, first building a large membership to have monetary and political clout, then learning how to help people help themselves through education, politics, and the law.

This is not just a good read, but a reference book as well, useful no matter where you live.

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