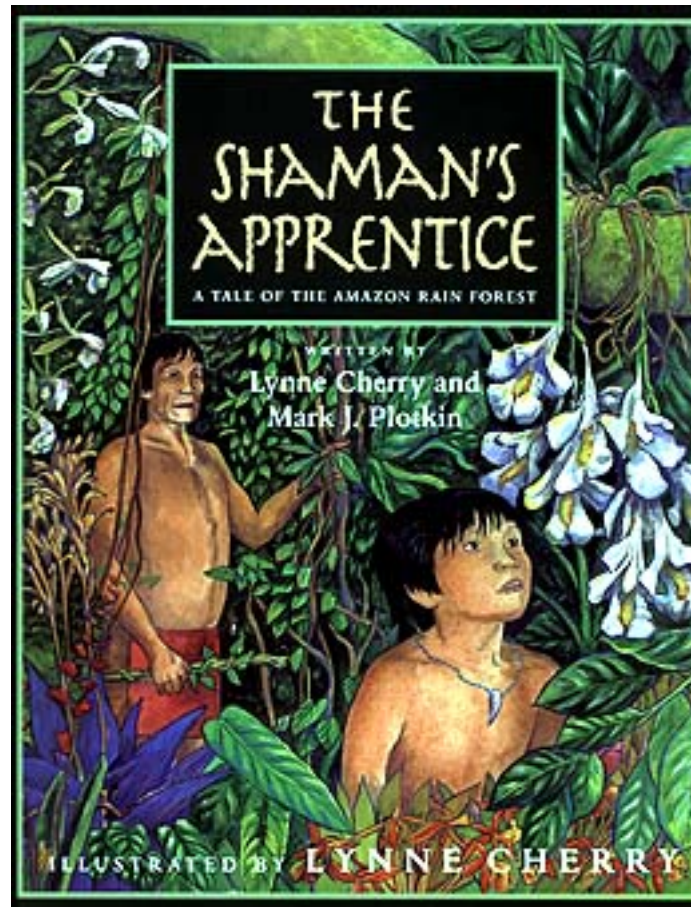


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Book Reviews

Associate Editor Aristotel Pappelis



Lynne Cherry and Mark J. Plotkin, 1998. *The Shaman's Apprentice: A Tale of the Amazon Rain Forest*. Illustrated by Lynne Cherry, and published by Harcourt Brace & Company (A Gulliver Green Book), 15 East 26th Street, New York, NY 10010, ISBN 0-15-201281-8. \$16.00.

This is a book for children, their parents and grandparents (their story-readers), their teachers, and for students interested in ethnobiology. Some readers may be interested in the artwork, text, and accompanying information on the title pages. Some may be more interested in the portrayed medicinal

plants. Others may wish information about the rain forests and the native Americans living in them. This book has something for all of us and more. There are questions that the book brings to our minds: some probably planted there at the desire of the authors; some planted there by our teachers; and, some embedded there by our continued self-studies beyond the academics. Let's explore the book, its involvement in the education of us all, and see the beauty that most of us must obtain by the creative efforts of artists and story tellers turned authors.

"Wow! What a beautiful book." The title seems to be a bill-board along a rain forest path. Look at the unusual flowers (at first glance you should see four or five kinds). The man is carrying a stick with a vine growing around it. Is it special? Is he special? He seems to be ready to gather a few leaves or show them to the boy. The boy seems more interested in the rain forest beyond. At first it appears that it is the flowers he's studying. Did the artist do that for us to notice and question? What is the chain around his neck? What is it made from? Will the authors tell us about these observations we have made? Since this is a story about a shaman and his apprentice in the Amazon rain forest, is it possible that the authors want us to make the inference that these are the main characters in the book? (We have made observations, inferences, used numbers, measured qualitatively, and classified items in the illustration in some crude way: human and plant; young and old; student and teacher; stem, leaf, and flower). By looking on the back cover we infer that this is one illustration showing us more species of plants. Can you find orchids? Common house plants we grow? Legumes?

We are not going to put this book down. We leaf through it and decide to buy it. It's going to be a collectors book.

Let's look inside. Wow again! Thirty-seven flowering plants and two kinds of fungi on the inside cover pages-- front and back. There are some names that we know and some phonetic spellings to help us say the name of these as the people of the rain forest say them. "Many Amazonian plants do not have English names." And, the authors continue, these are plants of the "Surinam rain forest." Do we know where that is? The authors left this up to the reader to do. (So, let's look up the location on a map. First, we get our map book and look up Suriname in the index. There it is. It's in South America, about latitude 5 degrees above the equator and longitude 55 degrees west of Greenwich.) It's a country with a coastline on the Atlantic Ocean. (The skill of communicating using maps, numbers, words, etc. is extended by the map makers who predict that we can read maps they make or someone we know can. There are instructions in the map book, too. This requires some skill of understanding time and space. I think the globe makers had such skills and expected us to develop them, too.)

According to Mark, my grandson, "Books like this should be part of our science classes. Its more interesting than other things we are asked to read. And besides, its based upon a true story." He went to say that he noticed that each plant and fungal species illustrated had a medicinal use listed and asked about how these were discovered.

Ugent described trial and error methods that could have been used, with the errors not being too good for the person trying the method (eating; drinking water extracts or soups; applying juices from them to the

skin or applying them in compacts, etc. as in ethnobiology books). Mark commented that some primates seem to know what to eat for their ills (a PBS program for children). Well, that put him in the game.

The title page seems to be set into the art: one page showing the rain forest through a window and the other page showing the book title as a framed hanging. What the wall was made of remained unknown but we inferred that it was branches from palm trees. What the vine was that was used to tie the "fronds" together wasn't discussed. A boy and two adults (the boy's parents?) could be seen walking towards the window. Mark had to say it. "They probably were "fronds" of the rain forest. Ha,ha." (Well, it is a book for children.)

The copyright, etc. page shows the village on the river bank (aerial view) with round and oblong huts. (Which hut has a cone-shaped roof? Here we are teaching time/base relationships.) Palm trees are in the illustration. Children and adults are in the village and in canoes. Can you see someone in a hammock? Can you see someone tending a pot over the fire? Can you guess what will happen to the fish being carried towards the pot?

A portion of the proceeds from the sale of this book is dedicated to the protection, preservation, and restoration of native forests. The people of the village Kwamala are thanked for their part in the story and illustrations. Other people are thanked and the book is dedicated to the memory of Al Gentry and Ted Parker. We are ready to turn the page and begin the book. Each time that we turn a page (15 times), we will see a double-paged illustration with a small information box set into the left page (one to three paragraphs of text). The illustrations are eye-catching and present great numbers of opportunities to ask open-ended questions that draw out the ideas of the authors in the text and illustration that goes beyond the text.

Kaymanya (the boy with the chain and shell --or seed) is in the hammock. His mother, not pictured, is fanning her feverish son. She tells his father (not pictured) to take Kaymanya to the shaman.

The next illustration shows the shaman (Yes, we guessed correctly. He was in the cover illustration.) sorting through plants and we must infer that he is making a boiling extract in the black pot on the fire. (Can you name the green animal in the illustration?) The shaman is chanting as he selects leaves, roots and bark for the pot. The cooled liquid will be poured into the boy's mouth (amount not specified). The chanting ends. The fever ends by morning and the boy will recall this night over the following years.

More village activities are in the next illustration. The village is on the banks of the Sipaliwini River. What kind of activities shown in the illustration can you infer are going on? The villagers grow cotton (which is spun and made into cloth). They grind achiote berries. (Why? Check the insides of the book covers. No. It isn't there.. But U-shuh is there --lipstick tree fruit--and its use is listed as cloth dye. Probably the color will be as shown; red.) The mother and daughter have harvested cassava roots. Cassava bread is being made. (Can you find it? Look on the roof. What's it doing up there?) The father is hunting for tapir. Some boys are fishing. Others are swimming.

Next pages. We were correct about the book cover. Lessons are going on. On the next pages we see healing rituals and village life. Is that a chicken? Are they native animals? Are those white geese? Are the feathers we see from those birds? The hut can now be seen from the inside. Is it palm fronds and posts? We see a dog. What is the other mammal that looks like a dog? Why do we know it is a mammal? What is the hammock made of? There's that black pot steaming away on the burning wood. What does the shaman have in his hands? Is that a throwing stick and spear in the onlookers hands or a bow and arrow? Do you see a basket made from some kind of plant material? The man in the hammock was from up-river and is sick with a disease brought to them by gold miners (strangers to their village). Could you write a hypothesis statement that we could use to help the shaman find out if the sick man was correct? The shaman was unable to heal the sick man. He "passed on to the spirit world." Others became ill. The shaman could not heal them.

The next illustration shows the village receiving information that "tall, white skin" people with hair of straw color and bodies covered with cloths (missionaries) gave white pills to the sick and made them well. The "quinine" controlled the "malaria." The new cloths (next page), reading and writing lessons, and study of the Bible (translated into Tiro) prepared the people for trading (metal pots and pans, rice, and plastic bottle in exchange for emerald tree boas, scarlet macaws, and poison frogs). And who knows what else is being taught. Can you find these in the illustration? Is that a man with a bow and arrow? What is in the cage? Can you find the monkey? Butterfly? What else? How long will they last in the forest under these conditions? Can you suggest a way to protect the wildlife from too much harvesting?

In the next illustration, we see a beautiful night scene. People around the fire. The natives now follow the new religion because the new medicine had greater power than their natural ways. The apprentice is trying to make the shaman feel better. (Look. Another necklace with a seed or shell.)

Four years pass. The missionaries leave. The next illustration shows the river and the village. A stranger (Gabriela) is coming in a canoe with a guide. Gabriela explains that she is an ethnobotanist seeking to learn the healing magic using the forest plants. She was asked to explain why she wanted to learn the ways of the shaman when the ways she knew to control malaria were so much better. Gabriela, being an honest botanist, explained that the quinine came from a Peruvian shaman! The source? The bark of the cinchona tree. The old shaman, dignity restored (next page) shows Gabriela what he knows. (Describe what you think is going on.) Now, Gabriella returns for a few months each year (summer session research project?) and has learned about the hundreds of plants used in the shaman's repertoire. Learning. Learning. Learning. (Next page.)

Gabriella sees the village from a plane. Five years have passed. Does the village look like it has changed? Her plane lands. She is given a joyous greeting. She speaks in the language of the village--telling that she has a special gift for them. It's a book. (Next page.) Wow. This is a beautiful illustration of the inside of a hut. Is the person in the hammock making cotton thread for weaving? Look at the variety of baskets. That must be cassava being prepared as a bread. Why the long spears? Are those special feathers? What did they use to dye the cloth blue? Green? Violet? The book on medicinal plants and the Bible; what else do the villages need? The whole world is now able to use the shaman's wisdom. (Next page.)

The shaman now will finish the training of the apprentice. Gabriela will return year after year. (Next page.) The shaman has passed on to the spirit world. The apprentice is now the shaman. He still wears his necklace with the shell or seed hanging down to his sternum. People have always used medicinal plants and fungi for healing their ills. The oral traditions still exist but are being lost. Are we relying too much on synthetic medicines?

This is based on a true story first told in the book *Tales of the Shaman's Apprentice* (Penguin,1994). The author of that highly acclaimed book was Dr. Mark J. Plotkin. Ms. Lynne Cherry is well known for her award-winning tales for children. Her book, *The Great Kapok Tree*, is highly recommended --an NSTA-CBC Outstanding Science Trade Book for Children. Together these environmentalists have enabled us to play-out a moving story with a compelling message to our children and grandchildren. We have had an opportunity to use the science process skills learned in elementary school and applied them to a new situation (transference). The message about the importance of plants to humans goes beyond that of the medicinal plants in the story. Look at the illustrations. Without plants and the collective knowledge maintained and added to over the great number of generations within tribal settings, around troubled ailments and the hungry of all ages, the partly clothed and the poorly sheltered, the collectors of fruit and berries, the fish in a basket or strung on a stripped branch, and the hunters--with wooded spears, arrows, bows, and poles for returning meat to the village, where would the Gabrielas of the world go to help the next generation survive? Don't ask whether someone should be a lawyer and business agent for the villager when reading this book. For that, read the 1998 newsletters from the Society for Economic Botany.

This illustrated review was prepared by Aristotel Pappelis (Professor, Department of Plant Biology, Southern Illinois University, Carbondale, Illinois 62901), Mark Franklin (Student, Fifth Grade, Ball-Chatham Elementary School District, Chatham, Illinois 62629), and Donald Ugent (Professor, Department of Plant Biology, Southern Illinois University, Carbondale, Illinois 62901).

A.J.P.

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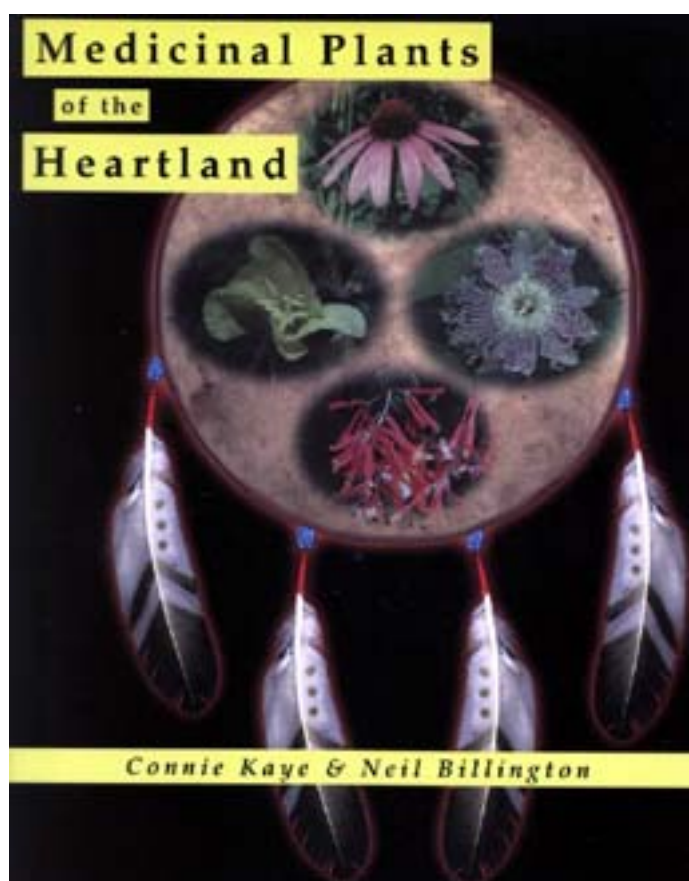
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Book Reviews

Associate Editor Aristotel Pappelis



Kaye, Connie and Neil Billington. 1997. *Medicinal Plants of the Heartland*. Cache River Press, Vienna, IL. 344 pp.

Dr. Connie Kaye worked 10 years as a medical technologist before specializing in botany (effect of plant growth regulators on expression of ribosomal cistrons). Two of her ancestors were Cherokee Indians and she obtained some interest in medicinal plants from them. Some of her other sources are listed in the bibliography (51 citations).

Dr. Neil Billington, presently a Southern Illinois University Cooperative Fisheries researcher began expanding his interest in medicinal plants through his work in a wholefood cooperative, in a culinary and medicinal plant garden in Shepshed, and eight years of study of the use of medicinal plants by Canadian Indians and Inuit.

The authors, now health-advice givers, describe the uses of plants as medicines, flavorings, preservatives, cosmetics, and others. Their book is an educational reference manual--everything one wanted to know about the heartland's medicinal plants. If seventeen Indian tribes used these plants, what have we got to lose by learning about these plants. So, they tell us of their medicinal actions. They list 37--from alternative to vulnerary.

Kaye and Billington begin their book with historical perspectives of human health preventatives and treatments: from the pagan and superstitious to the modern. They help us create our own apothecary if we wish to do so. Chapters three and four deal with collecting, drying and storing medicinal plants; their parts and preparations therefrom (remedies from compresses to tinctures). To help, an appendix contains information on 91 active compounds from ferns, grasses, cacti, wild herbs, cultivated herbs, etc. The book reviews about 250 plants and their active components (from alkaloids to tannins). Over 150 drawings and 90 color plates enhance the descriptions. Many photos are from the Walter Welch collection in the SIU Herbarium. Over 160 disorders (from ague to whooping cough)and the herbal treatments for each (medicinal functions) are given. Botanical names and medicinal terms abound.

Galen's recipes or the words of Druid songs describing treatments could not do more than this book to help heal us in times of need. Natures pharmacopoeia! Ancient treatments! Past secrets. Its economic botany. Its ayurved (the science of life). Maybe it won't replace surgery and like but many people will buy it in these times. In our opinion, it will interest many and make a fine gift to those who enjoy herbal health stores and economic botany at work.

A.J.P.

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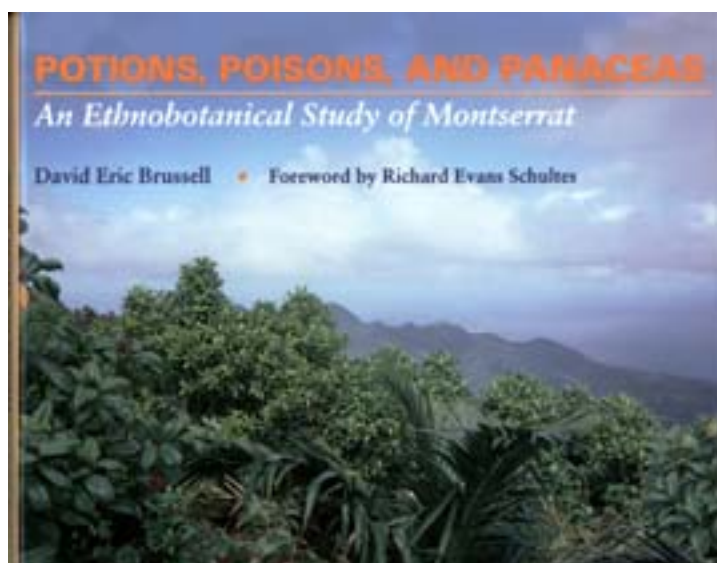
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Book Reviews

Associate Editor Aristotel Pappelis



David Eric Brussell, 1997. *Potions, Poisons, and Panaceas: An Ethnobotanical Study of Montserrat*. Southern Illinois University Press, Carbondale (and Edwardsville), IL 62901 ISBN 0-8093-1552-1, \$69.95, 167 pp.

Everything you ever wanted to know about the flora of the Caribbean island of Montserrat, and more, is in this book. More than a catalog of plants, Brussell has given us a view of how these plants have been and still are being used by the people of the island. Here we must make a space and fill it with a percentage figure that we think might be appropriate for the number of people who actually do what the informants have said they do with some of the plants they have identified or described since neither they nor Brussell makes such estimates for us. Although ethnobotany is a 50-year old, interdisciplinary specialty, the reliance on interviews with "informants" makes me wonder about the field as a science. Should an ethnobotanist or an anthropologist tell us about statistical things?

Richard Evan Schultes (Harvard University, Emeritus) wrote about ethnobotanical conservation in the Forward and reminded us that it has been recognized as an important and valuable adjunct of

environmental conservation. "The knowledge of the bioactive properties of plants amassed over the millennia by peoples in primitive societies, whether they be Indians or simple country folk, is fast disappearing with increasing 'westernization' in many, if not most, tropical regions." In Montserrat, the Amerindians (~50 AD), the more recent Arawaks (~400 - ~600 AD), and the Caribs (thus the name Caribbean Islands) were the first settlers. The fierce, cannibalistic Caribs had driven the Arawaks out of the island. There are no Caribs living on the island today. For various reasons, the original Indian peoples were systematically exterminated.

Christopher Columbus and his crew sighted the island (1493) and named it after a mountain in Spain (near Barcelona). The first Europeans to settle there were British (1631) and Sir Henry Colt has written of that experience:

"I have neuer felt soe moyst an ayre. All thinges rust, ye verye keys in our pocketts rust, and a nights ye clothes of our backs in touch is moyst, & stiff. We are moor drowsye and sleepy than accustomed, & full of dreams."

It felt that way when I first drove through Southern Illinois from St. Louis, on Highway 3, along the Mississippi River to Cairo, and from there on to Montgomery, Alabama. It was in 1951; a time of no air conditioned cars. Since 1960, when I became a member of the Department of Botany in Southern Illinois University at Carbondale, every summer day in Carbondale feels like the one Colt described.

In 1832, the British sent Irish Catholic dissidents from St. Kitts to Montserrat. Scotch settlers also were settled on the island but were far outnumbered by the Irish. In 1672, the first Africans were brought to the island as slaves to work in the sugarcane fields. They were emancipated in 1838 and began their own subsistence farms. After 1850, limes were an important export crop for the island (as tobacco and sugar had been earlier). The intermarriage between Caribs and Africans is believed to have occurred in the past. The present population on the island is of "black African descent. There is also a small minority of Caucasian expatriates from the United States, Canada, Great Britain, and other European countries. Some East Indians and Middle Easterners also now live on the island." This is no easy ethnological continuum to analyze. In 1973, about four years before the major collecting effort for the study was started, there were about 12,500 living on the island, about 3000 living in Plymouth, the capital. Thus, it is as Schultes has stated: "The publication of this book is a valuable contribution to the development of Caribbean ethnobotanical investigations."

Let us venture to meet the present inhabitants with Brussell. We will watch him use his methods of field research. We will begin to appreciate the breadth of his knowledge as he identifies the individuals in the flora. Then we will watch him complete his work on voucher specimens. Schultes refers to Brussell's "outstanding personality and unusually expert training in ethnobotanical investigation." He should be in the American tropics doing research! Where is Brussell? In Niigata, Japan teaching biology and gaining new experiences (adjunct assistant professor of plant biology at Southern Illinois University at Carbondale). J.-P. Theurillat, Conservatoire Botanique, Geneva, Switzerland states in the Preface that

Brussell has made a significant contribution because his informants "allowed him to locate and study a greater number of plants than would have otherwise been possible, gave him access to a mine of information about local medicinal and domestic uses of the plants, and also introduced him to folkloric aspects of Caribbean culture, such as voodoo."

While most of the plants that Brussell describes are from the tropics, some originate from the temperate regions of the Old and the New World. Brussell lists 378 species in his collection (see Appendix) with 1 to 10 specimens of a given taxon; 80 percent being three or less. Forty-three references were cited and the index of common names exceeds 500 entries. He uses 52 black and white photographs and 24 color plates in the book. The Introduction and Description of the Study Area is very interesting. Brussell backs away from recommending any ethnobotanical uses listed and refuses to be "held liable for the efforts of anyone who employs them." --- "Positive identification" of plants described in the book "should be made only with the aid of an expert." Theurillat continues: "---it is not the least merit of the book that the many plant utilizations it documents enliven the sometimes austere ways of systematic botany teaching."

Ethnobotanical Uses and Specific Discussion (pp. 15 - 132) makes up the bulk of the book. Here we go alphabetically from Acanthaceae through Zygophyllaceae. I'm always amazed at the number of plants people claim can be used to make a tea that is good for a person with a cold. I never doubt that this is so (in the presence of the informant). Yet of all the decoctions, etc. that I have tried, none seem to shorten the time to get back to normal. I have a concoction of lime juice (as in Brussell's book) that I use but I add a little bit of a popular cola soft drink and some rum to it. But like Brussell, I perform this for scientific purposes (dose response curve). In addition, due to the poisoning properties of some of the things that I have been told are good rums, and the possibility of adverse reactions of those with good flavor, I can not bring myself to divulge my recipe.

Brussell has the gift of getting people to tell him about the treatments they and their relatives use to get rid of their worms, to end an unwanted pregnancy, to induce temporary sterility, to cure "social diseases", to poison fish and friends, to put into someone's drink some potion that will make the imbiber love you, to be an antidote for eating bad fish, to treat diarrhea, and to make a grandfather able to pass "water" more easily when he wakes up in the middle of the night. As to the hallucinogenic properties of some of the plants mentioned, it should be said to musicians and singers alike in the ethnobotany class; if you go that route to improve your stage presentations, don't give up your day job at the local herb store.

Time can stand still while we prepare a manuscript for publication and wait for it to clear the printer (as did Brussell), but it doesn't stand still for the few people that know their plants, potions, poisons, and panaceas. The evils and diseases released into the world by Pandora, the first mortal woman, might be treated by "those in the know". Remember, it has been said that the last thing out of Pandora's box was hope. As long as people sit around and hope that some one is out there gathering data and saving the environment, the ones in the "know" are aging and dying. Ah. There is no cure for it. We need to conserve ethnobotanicals and the environment. We need people like Brussell to teach students how to do ethnobotanical research in the field.

Brussell presents an interesting book to us. Since his work on the island, it has experienced volcanic damages (due to pyroclastic flow), and its population has been dislocated. It may be that Schultes' remark about the need to study the American tropics should somehow be linked to a grant that sends Brussell and his talents back to Montserrat. To my knowledge, no ethnobotanist has had such an opportunity. A modern Vesuvius!

Thanks for the book David. Hope to hear from you soon -- from Plymouth. What will the next generation on the island use for medicines, fibers, poisons, dyes, rituals, and voodoo? You had about 73 percent of your listings as being medicines, 44 percent as being used for foods, 17 percent as being used for poisons, and 10 percent as being associated with voodoo and folklore! Will it, --has it changed?

You used Don Blandings poem to introduced your book. Let me select a few points:

---island of rumba and rum, ---mystery-cities and haunted seas,---witching moons,--- vanished people,---whisperings---valleys and swamps and groves---to the place I know I'm going to go.

This illustrated review was prepared by Aristotel Pappelis, Professor in the Department of Plant Biology, Southern Illinois University, Carbondale, Illinois 62901.

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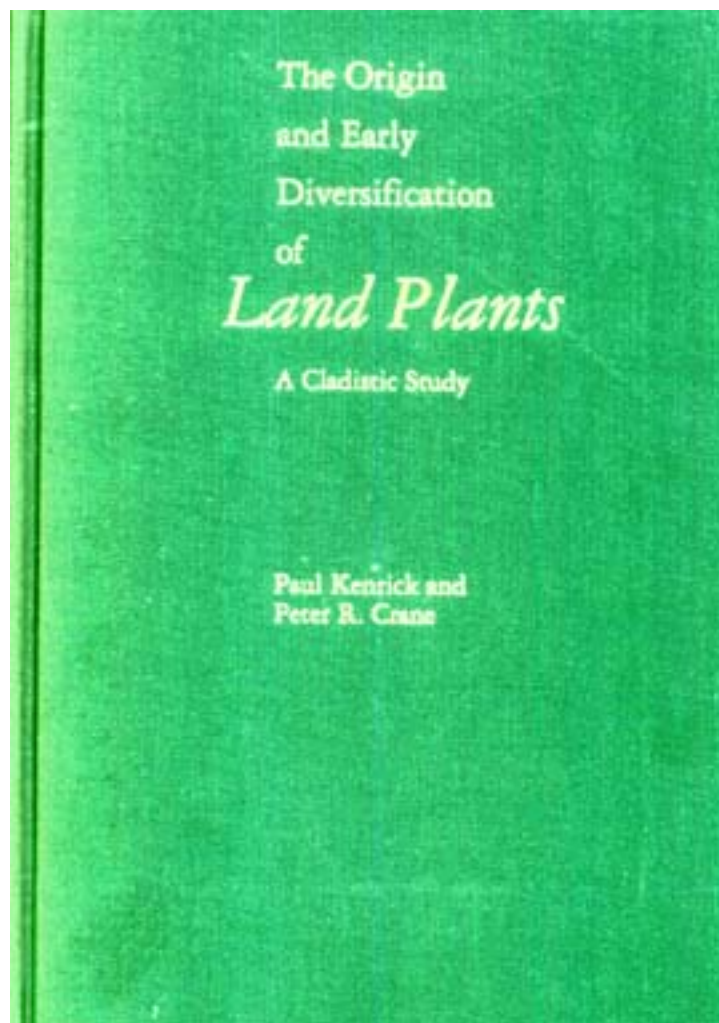
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Book Reviews

Associate Editor Aristotel Pappelis



Paul Kenrick and Peter R. Crane. 1997. *The Origin and Early Diversification of Land Plants: A Cladistic Study*. Smithsonian Institution Press, Washington. ISBN 1-56098-730-8 and ISBN 1-56098-729-4, \$27.50, 441 pp.

The bibliography cites over 880 publications. No wonder the authors dedicated their book to those

(botanists and paleobotanists) "whose data and interpretations provided the substance and inspiration" for their 441 pages. The book is divided into seven chapters: Introduction; Plants in the Hierarchy of Life; Embryobiota; Polysporangiophytes; Zosterophylloids and Basal Lycophytes; Lycopsidea; and, Perspectives on the Early Evolution of Land Plants. In addition, they include an Appendix to support each of the following areas: Summary Description of Fossil and Extant Taxa; Data for Analyses of Embryobiota; Data for Analyses of Polysporangiophytes; Data for Analyses of Zosterophylloids; and, Data for Analyses of Lycopsidea. The Bibliography is followed by Taxonomic Index and Subject Index.

In my opinion, every student can benefit from a careful reading of the first and second chapter. Since many ethnobotanists are trained in taxonomy, this background will assist you to carry on discussions with them on a wide set of topics, such as: the five kingdoms in a phylogenetic context. I follow the proposal of Woese et al. 1990: Domains Archaea, Bacteria, and Eucarya as modified by Pappelis and Fox 1995 (Pappelis, A. and S. W. Fox. 1995. Domain Protolife: The protocell theory, In *Evolutionary Biochemistry and Related Areas of Physiocochemical Biology*, B. F. Poglazov, B. I. Kurganov, M. S. Kritsky, and K. L. Gladilin, eds., Bach Institute of Biochemistry and ANKO, Moscow, pages 151-159; and, Pappelis, A. 1997. Study Guide for Individualized Learning Program History of Biology 315-2, Southern Illinois University at Carbondale, Carbondale, IL 62901, 200 pp.). "From an ecological perspective, the evolutionary patterns underlying the origin of a land flora are central to understanding the initial assembly of terrestrial ecosystems and therefore the evolution of those groups of animals that are characteristic of terrestrial environments (e.g., insects and tetrapods" (p. 1, par. 1). The aim of this book is the resolution of the evolutionary patterns among "basal" groups of land plants.

The pivotal events in plant evolution are the emergence of the green algae, the transition to land plants, and their early diversification (to bryophytes and pteridophytes). This enables us to appreciate the "monophyly of vascular plants" (p. 306, Systematics, line 14). The origin and early evolution of land plants extends many aspects of aquatic green algal ancestors (biochemistry; ultrastructure) into land plant morphology (supracellular homologies among the major organ systems).

More than a century of thought was required to develop the current theory on land plant phylogeny: Hogg, 1860; Haeckel 1868; Hofmeister 1869; Celakovsky 1874; Pringsheim 1878; Bower 1890; Haeckel 1894; Lignier 1903; Bower 1908; and, Fritsch 1916 (see Bibliography pages 387 - 422). "The most explicit early phylogenetic scheme for land plants is that of Haeckel (1868), --" beginning life in the Protophyta (Figure 1.1). Hogg had started the discussion with the term Protoctista ("organisms neither animal nor plant"). Haeckel (1966) subsequently recognized animals, plants, and "protists" (organisms that could not be classified as plants or animals) as the three main branches in his classification system ("tree of life"). The distinction made between prokaryotes and eukaryotes (Chatton, 1925) was incorporated into a four-kingdom system by Copeland (1956: Monera, --the prokaryotic organisms; Protoctista, --the protists, higher fungi, and algae except chlorophytes; Animalia; and, Plantae). Whittaker (1959) distinguished five groups: Monera; Protists; Fungi; Animalia; and Plantae. The evolutionary tree would begin with Monera from which Protista would emerge as nucleated organisms. From these, the plants, animals, and fungi would arise. Other schemes have been proposed but the only one that seems destined for wide adoption is that of Woese et al. (1990) that proposes three main branches to describe the tree of life: Archaea and Bacteria (prokaryotic cells) and Eucarya

(evolving from the Archaea and later supporting bacterial endosymbionts, mitochondria and chloroplasts).

The fast-moving field of molecular genetics is about to resolve most, if not all, of the phylogenetic problems we see in the plant literature. Whether one-celled plants will be classified in the plant kingdom or in the protists remains to be seen. The tendency is to classify multicellular organisms as fungi, animal, or plant kingdoms (although there are systems having great numbers of kingdoms). The authors suggest that green algae are more closely related to the embryophytes (ultrastructure and biochemical features) than to any other group. "Therefore, following Copeland (1956), we regard the plant kingdom as encompassing both groups. Cladistic relationships are presented (Figure 2.7). The reading is interesting and goes back to the time when the cell theory was being formulated (Harvey 1836).

Though we do not see one-celled plants as playing a big role in ethnobotany, their overall importance to the support of life is beyond description. Maybe we need to be more willing to be ethnobiologists.

The approach used to study the lower plants is similar to that used to study relationships among major groups of seed plants (e.g., Crane 1985; Doyle and Donoghue 1986, 1992; Nixon et al. 1994) "and is guided by the same basic philosophy of treating living and fossil taxa together as part of a comparative analysis using cladistic methods. Enjoy the chance to gain a good foundation for more interesting work in the field and for discussions around the many kinds of tables you will encounter in the years to come.

This review was prepared by Aristotel Pappelis (Professor, Department of Plant Biology, Southern Illinois University, Carbondale, Illinois 62901).

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