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Author

Renner, Susanne

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**Review: Amazon Pollen Manual and Atlas/Manual e Atlas
Palinologico da Amazonia**

By Paul Colinvaux, Paulo Eduardo de Oliveira, and
Jorge Enrique Moreno Patiño

Reviewed by [Susanne Renner](#)
University of Missouri-St. Louis, USA

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Paul Colinvaux, Paulo Eduardo de Oliveira, and Jorge Enrique Moreno Patiño.
Amazon Pollen Manual and Atlas/Manual e Atlas Palinologico da Amazonia.
Amsterdam: Harwood Academic Publishers, 1999. 322 pp. ISBN 90-5702-
587-6 (hardback). US\$90.00

Among the myriad ways to reconstruct past climates, pollen cores is one of the most powerful. As long as analogies to modern climate hold, pollen rain composition can reveal temperature and moisture changes as far back as the Cretaceous. Unfortunately, the skewed geographic provenience of the available analyses limits the utility of pollen cores for global climate reconstruction. A recent map showing the provenience of pollen cores worldwide (*Myriad ways to reconstruct past climate*, 2001, p.658) has only Europe, the United States, and a few places along the coasts of South America as thoroughly sampled. Eurasia, Australia, Asia, Africa, and the Amazon basin are almost devoid of pollen sites.

What little we know about past pollen composition in the Amazon is summarized in the first two chapters of the *Amazon Pollen Manual and Atlas* by Colinvaux, Oliveira, and Patiño. Amazon lake sediments consistently hold large concentrations of pollen, in spite of the surrounding flora being largely insect-pollinated and producing relatively little pollen. Pollen concentrations in a lake in lowland rainforest in Brazil are about 247,600 grains/cubic microliter and those in a lake in eastern Ecuador are about 100,000 grains/cubic microliter. These values compare favorably with pollen concentrations in lake sediments in the United States or Europe. Similar sedimentation rates may be due to tropical lakes having larger catchment areas than temperate lakes or to tropical rain torrents bringing more wash-off pollen. In any case, abundant pollen sediments exist. However, someone needs to identify the pollen in them.

The Amazon contains an estimated 80,000 species of vascular plants, and the *Amazon Pollen Manual and Atlas* illustrates fossil spores of just 421 species. Yet, analyses of the presence and abundance of these few pollen types contain significant signal of past forest communities and thus, climate. The authors, who have worked in neotropical palynology for most of their careers, chose the pollen types to be illustrated from their reference

collections of about 2,000 extant Amazonian pollen species. The illustrated pollen grains are the most abundant or decisive elements seen in Amazonian samples. By illustrating these 400+ key spores, this book opens up Amazonian palynology to others. Because most of the Amazon basin lies in Brazil, the book is bilingual, with all chapters (except the one with pollen descriptions) appearing in English and Portuguese. Following a historical introduction, the first half of the *Amazon Pollen Manual and Atlas* has chapters on piston coring in lake sediments; laboratory protocols for describing, handling, and storing pollen cores; and an illustrated introduction to pollen descriptive terminology.

The second half of the book presents a key to the 421 fossil pollen taxa and descriptions of each pollen genus or family. All photomicrographs of pollen or spores are reproduced on a scale of 1 millimeter to 1 micron, so that dimensions of the grains in microns can be read from the plates with an ordinary metric system ruler. A glossary, an extensive bibliography, two indices, and a list of international suppliers with their addresses and web sites complete the Atlas.

How pollen studies have contributed, and defined, our understanding of Amazonian vegetation history, is illustrated by the long-standing controversy about the extent of Pleistocene drying in the Amazon basin and the concomitant replacement of forests by savannas. Almost the only direct evidence for reduced precipitation in the Amazon basin at around 18,000 years ago comes from well-dated marsh sediments taken from a plateau in the east-central Brazilian Amazon basin. However, there are so few analyses and their distribution is so biased, that the controversy remains undecided. An extremely readable summary of the controversy by Colinvaux in this *Atlas* suggests that relatively few strategically placed pollen cores would settle the matter.

This book is the first published atlas of Amazon pollen types and as such is very important. Because it covers everything, from the history of Amazonian pollen coring to rubber boats to statistical analyses, this book is unusual. However, precisely because of its unusual breadth it will stand for a long time as an introduction to the literature of Amazonian palynological research as well as a research tool.

Reference

Myriad ways to reconstruct past climate. (2001). *Science*, 292(no. 5517), 658-659.

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Susanne Renner <renner@umsl.edu>, Professor of Plant Systematics,

Department of Biology, University of Missouri-St. Louis, USA.

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