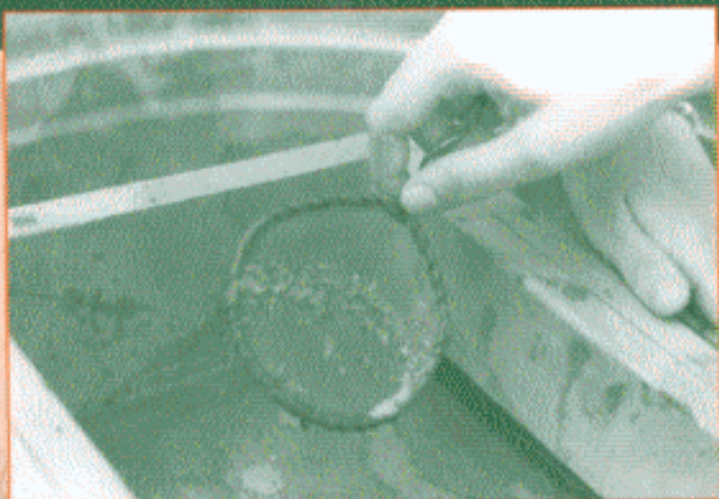


# Paleoethnobotany



## A HANDBOOK OF PROCEDURES

SECOND EDITION

Deborah M. Pearsall



# CONTENTS

**Preface to the Second Edition**

**Preface to the First Edition**

**List of Tables**

**List of Figures**

## **Chapter 1. The Paleoethnobotanical Approach**

**Introduction**

**Historical Overview**

**Nature and Status of Ethnobotany**

## **Chapter 2. Techniques for Recovering Macroremains**

**Introduction**

***In Situ* Collection of Material**

xiii

xix

xxv

xxvii

1

3

6

11

12

Screening Techniques	13
Water Recovery: Flotation Techniques	14
<i>Terminology</i>	15
<i>Development of Flotation in the New World</i>	19
<i>Development of Flotation in the Old World</i>	22
<i>Machine-Assisted Flotation in North America</i>	26
Building and Operating Flotation Systems: Sample Designs	29
<i>Manual Flotation</i>	29
<i>Machine-Assisted Flotation: Water Separators and SMAP Machines</i>	44
<i>Machine-Assisted Flotation: Froth Flotation</i>	59
Sampling for Macroremains	66
<i>Strategies for Sampling</i>	66
<i>Sampling Techniques</i>	69
<i>Hints for Good Sampling</i>	75
Issues and Directions in Recovery of Macroremains	77
<i>Choosing a Recovery System</i>	77
<i>Problem Soils</i>	88
<i>Chemical Flotation</i>	89
<i>Testing Flotation Recovery Rates</i>	93
<i>Saltwater Flotation</i>	96

### Chapter 3. Identification and Interpretation of Macroremains

Introduction	99
Initial Processing of Samples	100
<i>Basic Hand-Sorting Procedures</i>	100
<i>Subsampling Large Flotation Samples</i>	111
<i>Alternatives to Hand Sorting</i>	116
<i>Sorting Desiccated and Waterlogged Samples</i>	117
Building a Comparative Collection	119
<i>Plant-Collecting Procedures</i>	120
<i>Pressing and Drying Specimens</i>	124
<i>Identification of Comparative Materials</i>	127
<i>Preparing a Working Laboratory Collection</i>	128
Basic Identification Techniques	133
<i>Seeds</i>	133
<i>Fruits and Nuts</i>	140
<i>Wood</i>	144
<i>Roots and Tubers</i>	153
<i>Fibers, Leaves, and Non-Woody Stems</i>	162
<i>Cultivated Plant Material</i>	168
Specialized Identification Techniques	170
<i>Embedding, Sectioning, and Grinding</i>	170

<i>Electron Microscopy</i>	175
<i>Morphometric Analysis</i>	177
<i>Residue Analyses</i>	178
Presenting and Interpreting Results	188
<i>Qualitative Presentation</i>	191
<i>Quantitative Analysis</i>	192
<i>Reporting Results</i>	224
<i>Interpreting Macroremain Data: Case Studies</i>	227
Issues and Directions in Macroremain Analysis	239
<i>Sources of Seeds</i>	240
<i>The Meaning of Abundance Measures</i>	242
<i>Sources of Bias in the Paleoethnobotanical Record</i>	244
<i>Proof and Falsification</i>	245
<i>The Roles of Macroremain Analysis in Paleoethnobotany</i>	247

#### Chapter 4. Pollen Analysis

Introduction	249
Nature and Production of Pollen	251
<i>Formation of Pollen</i>	251
<i>Pollen Grain Structure</i>	251
<i>Pollen Representation</i>	258
History of Pollen Analysis	263
Field Sampling	270
<i>Sampling Strategies</i>	270
<i>Taking Soil Samples</i>	279
<i>Sampling Modern Vegetation</i>	288
Laboratory Analysis	289
<i>Sampling a Core</i>	290
<i>Soil Extraction Techniques</i>	290
<i>Processing Coprolites</i>	297
<i>Processing Floral Specimens</i>	300
<i>Mounting Slides</i>	301
<i>Counting and Identifying Pollen</i>	302
Presenting and Interpreting Results	311
<i>Presenting Data</i>	312
<i>Interpreting Sedimentary Data</i>	318
<i>Case Study: Identifying Human Influences on Vegetation,     An Example from the Pacific</i>	338
<i>Interpreting Archaeological Pollen Data</i>	344
Issues and Directions in Archaeological Pollen Analysis	348
<i>Preservation</i>	348
<i>Context and Sampling Issues</i>	349

<i>Methodological Concerns</i>	350
<i>The Roles of Pollen Analysis in Archaeology and Paleoethnobotany</i>	352

## Chapter 5. Phytolith Analysis

Introduction	355
Nature and Occurrence of Phytoliths	356
<i>What Are Phytoliths?</i>	356
<i>The World of Phytoliths</i>	360
<i>Identifying Plants Using Phytoliths</i>	375
<i>Phytolith Deposition</i>	392
Phytoliths and Archaeology: A Brief History	395
Field Sampling	399
<i>Sampling Soil and Sediments</i>	399
<i>Sampling Vegetation</i>	410
Laboratory Analysis	411
<i>Phytolith Laboratory</i>	411
<i>Soil-Processing Procedures</i>	416
<i>Processing Comparative Plant Material</i>	435
<i>Scanning and Counting Procedures</i>	444
Presenting and Interpreting Results	460
<i>Presenting Results</i>	460
<i>Interpreting Phytolith Data</i>	468
<i>Case Study 1: How Common Was Maize at Real Alto?</i>	473
<i>Case Study 2: Paleoenvironmental Reconstruction:</i>	
<i>Integrating Phytolith and Pollen Data</i>	483
Issues and Directions in Phytolith Analysis	491
<i>What Plants Produce Diagnostic Phytoliths?</i>	491
<i>How, and from What Sources, Are Phytoliths Deposited in the Samples We Study?</i>	493
<i>How Are Phytoliths Extracted, Scanned, Quantified, and Reported?</i>	493
<i>What Are the Roles of Phytolith Analysis in Paleoethnobotany? In Archaeology?</i>	494

## Chapter 6. Integrating Biological Data

### Part I: Indicators of Diet and Health

Introduction	498
Indirect Dietary Indicators	501
<i>Botanical Data</i>	501
<i>Faunal Data</i>	507

Direct Indicators	520
<i>Gut Contents and Coprolites</i>	520
<i>Stable Isotopes</i>	522
<i>Trace Elements</i>	535
<i>Skeletal Indicators of Nutrition and Health</i>	546
<b>Part II: The Interplay of Dietary Indicators</b>	
Predictions from Dietary Indicators	561
<i>Indirect Indicators: Botanical and Faunal Data</i>	561
<i>Coprolite Data</i>	562
<i>Isotopes</i>	562
<i>Trace Elements</i>	563
<i>Nonspecific Indicators of Stress</i>	564
Combined Indicators for Eight Neotropical Diets	566
<i>Diets 1 and 2</i>	566
<i>Diets 3 and 4</i>	569
<i>Diets 5-8</i>	572
From Model to Reality: Two Archaeological Case Studies	578
<i>Coastal Ecuador: Formative Period Diet</i>	579
<i>Paloma, Peru Case</i>	588
Conclusions	591
<i>References</i>	593
<i>Index</i>	695