Studies in Latin American
Ethnohistory & Archaeology

Joyce Marcus
General Editor

Volume I  

Volume II  

Volume III  
*Aztec City-States*, by Mary G. Hodge, Memoirs of the Museum of Anthropology, University of Michigan, No. 18. 1984.

Volume IV  

Volume V  

Volume VI  

Volume VII  

Volume VIII  

Volume IX  

Volume X  

Volume XI  

Volume XII  
Coastal Ecosystems and Economic Strategies at Cerro Azul, Peru

The Study of a Late Intermediate Kingdom

edited by

Joyce Marcus

Ann Arbor, Michigan
2016
I dedicate this book to María Rostworowski, a generous friend and co-directora of the Cerro Azul project. She was a brilliant and relentless advocate for the study of coastal señoríos and curacazgos. I miss her exceptional contributions, which shed so much light on coastal societies. Her much-needed coastal focus complemented the highland focus of John Murra and many others.

I was introduced to María in 1980 by Ramiro Matos Mendieta, who thought, unbeknownst to me, that she and I would make a good research team. I met her at the Instituto de Estudios Peruanos in Lima. She was at her desk and she said that we should talk at length about the 16th-century documents. She discussed her most recent publication, a study of the señoríos of Huarco and Lunaguaná in the Cañete Valley (Rostworowski de Diez Canseco 1978–1980), stressing that she was still interested in that document and wanted to find an archaeologist who would excavate Cerro Azul, a key site in the señorío of Huarco. With real enthusiasm in her voice she urged me to excavate Cerro Azul. She suggested that I visit the site the very next day, and I did. When I saw the site and its spectacular setting overlooking the Pacific Ocean, I was sold. I recognized that Cerro Azul’s excellent preservation would allow me to study prehispanic fishing and evaluate the extent to which ethnohistoric data could be projected into the past. María Rostworowski (1978–1980) had already done much of the ethnohistoric work; what remained to do was excavate Cerro Azul.
# Table of Contents

List of Illustrations viii  
List of Tables xvi  
Acknowledgments xix  

## Part I: An Introduction to the Kingdom of Huarco and its Ecosystems

1. The Ecosystems of the Kingdom of Huarco  
   Joyce Marcus 3  

2. Provenience and Context of the Plant and Animal Remains at Cerro Azul  
   Joyce Marcus 20  

## Part II: How Cerro Azul Made Use of Trophic Levels 2, 3, and 4

3. The Collection of Shellfish  
   Kent V. Flannery and Joyce Marcus 35  

4. The Collection of Crustaceans  
   Kent V. Flannery and Jeffrey D. Sommer 54  

5. Crayfish Trapping  
   Joyce Marcus and Ramiro Matos 65  

6. The Fish Resources of Cerro Azul in the 1980s  
   Kent V. Flannery and Joyce Marcus 72  

7. Fishing Strategies and Fishing Gear  
   Joyce Marcus 98  

8. The Drying of Fish for Export  
   Joyce Marcus 116  

9. The Archaeological Fish Remains from Cerro Azul  
   Jeffrey D. Sommer and Kent V. Flannery 120  

10. The Hunting of Birds and Mammals  
    Joyce Marcus 158  

11. The Bird Life of Cañete and the Avifauna of Cerro Azul  
    Joyce Marcus and Christopher P. Glew 172
List of Illustrations

front cover  Designed by John Klausmeyer and Kay Clahassey

1.1. Map of the lower valley of the Río Cañete, 4
1.2. An 1893 map of the Kingdom of Huarco, 5
1.3. The costa or cobble beach environment lying between Cerro Azul and the Río Cañete, 7
1.4. The playa or sandy beach environment of the Kingdom of Huarco, 8
1.5. Remnants of Cerro Azul’s defensive wall, 9
1.6. The peña, or rocky coast environment, of the Kingdom of Huarco, 13
1.7. The 15–20 year cycles during which anchovetas and sardines alternate as the dominant small fish, 15
1.8. Monthly ocean temperatures at Callao, Peru, during the years 1981–1987, 17
1.9. Cross-section of the Kingdom of Huarco, 18

2.1. Contour map of the ruins of Cerro Azul, 21
2.2. An artist’s conception of the southwest quadrant of Structure D, 22
2.3. Human fingernail and toenail clippings from Feature 6, 23
2.4. An artist’s conception of the southeast quadrant of Structure D, 24
2.5. An artist’s conception of the northeast quadrant of Structure D, 25
2.6. An artist’s conception of the northwest quadrant of Structure D, 26
2.7. An artist’s conception of Structure 9, 27
2.8. Profile of Squares N6 and N7 in Terrace 16, Quebrada 5, Cerro Azul, 29
2.9. Cross-section of Terrace 9, Quebrada 5a, Cerro Azul, 31

3.1. Desiccated chiton (Enoplochiton niger) from Feature 6, Structure D, 36
3.2. Two views of the keyhole limpet Fissurella crassa, 37
3.3. Two views of the keyhole limpet Fissurella limbata, 37
3.4. Two views of the keyhole limpet Fissurella limbata, 38
3.5. Two chanques (Concholepas concholepas), 38
3.6. A sample of the 26 chanques recovered from Feature 22, Terrace 16, Quebrada 5, 39
3.7. Two views of the sea snail Tegula atra, 40
3.8. Two views of the sea snail Calyptraea trochiformis, 40
3.9. Two views of the sea snail Thais chocolata (from archaeological debris), 40
3.10. The mussel Aulacomya ater used as pigment dish, 40
3.11. The giant Chilean mussel Choromytilus chorus used as pigment dish, 41
3.12. Four examples of the mussel Semimytilus algosus, 42
3.13. The mussel Semimytilus algosus, 42
3.14. The mussel Perumytilus purpuratus, 42
3.15. Perumytilus mussels below the pier, Cerro Azul Bay, 42
3.16. Two examples of the coquina clam Donax obesus (= peruvianus), 43
3.17. The coquina clam Donax obesus (from archaeological debris), 43
3.18. The clam Mesodesma donacium (from archaeological debris), 44
3.19. Two views of the clam Mulinia edulis from Late Intermediate specimens, 44
3.20. The clam Mulinia edulis (from Late Intermediate archaeological debris), 45
3.21. Two marisqueros from the upper fill of Room 8, Structure D, 52
4.1. Two species of crab caught at Cerro Azul in 1984, 55
4.2. Fragments of stone crab from Structure D, 56
4.3. Men searching for stone crabs with their bare feet, 57
4.4. Edgar’s harvest: a dozen stone crabs, the product of only 15 minutes of barefoot searching, 57
4.5. Two desiccated specimens of muy muy or mole crab (Emerita analoga) from Room 7, Structure D, 58
4.6. A pair of maruchas or ghost shrimp (Callianassa istagrande) from a sandy beach habitat at Cerro Azul, 59
4.7. A fisherman uses a metal piston to extract ghost shrimp from a sandy beach at Cerro Azul, 60

5.1. Cryphiops caementarius, the crayfish most frequently eaten at ancient Cerro Azul, 66
5.2. Fragments of large chelate hands (pincers) of Cryphiops caementarius from Feature 6, Structure D, 66
5.3. Portion of damaged chauchu (crayfish trap) from Collca 1, Structure D (Late Intermediate period), 67
5.4. The remains of an ancient canal near Cerro Azul, 68
5.5. Chauchu crayfish trap, 1986, 69
5.6. Simplified diagram of a chauchu, a traditional crayfish trap, 69
5.7. The embudo or funnel from a chauchu, 69
5.8. Heavy cobblestones alongside a chauchu, ensuring that it will not be moved by the current, 70
5.9. The chauchu is now secure, 70
5.10. Donning scuba goggles, Carlos searches for crayfish, 70
5.11. Two live crayfish, caught by Carlos while wearing scuba goggles, 70

6.1. The Capitanía del Puerto, Cerro Azul Bay, 74
6.2. The tollo or smoothhound shark, 75
6.3. The eagle ray, 75
6.4. Artisanal fisherman drying more than 100 eagle rays, 76
6.5. The pejegallo or plow-nosed chimaera, 77
6.6. Pacific sardine, one of the small fish dried for export at ancient Cerro Azul, 78
6.7. The anchoveta negra (Engraulis ringens), small fish dried for export at ancient Cerro Azul, 78
6.8. The anchoveta blanca (Anchoa nasus) visited Cerro Azul during the 1980s, 79
6.9. The sea catfish (Galeichthys peruvianus), 80
6.10. Two mullets, 81
6.11. The barbudo or threadfin (Polyneumus approximans), 81
6.12. The pejerrey or silversides (Odontesthes regia regia), 82
6.13. The ojo de uva (Hemilutjanus macrophthalmus), 83
6.14. The cabrilla or Peruvian rock bass (Paralabrax humeralis), 83
6.15. The jurel or Chilean jack mackerel, 83
6.16. The paloma pompano, 84
6.17. The cojinova or blackruff (Seriolella violacea), 84
6.18. The dorado or dolphinfish, 85
6.19. The chita or grunt, 86
6.20. The mismis, a member of the drum family, 87
6.21. The zorro (Menticirrhus rostratus), a relative of the mismis, 87
6.22. The coco (Paraluchthys peruvianus), a medium-sized member of the drum family, 88
6.23. The ayane (Cynoscion analis), another medium-sized member of the drum family, 88
6.24. The burro (Sciaena fasciata), another medium-sized member of the drum family, 88
6.25. The lorna (Sciaena deliciosa), 88
6.26. The róbalo (Sciaena starksi), 90
6.27. The corvina (Cilus gilberti), 90
6.28. The mojarrilla (Stellifer minor), 91
6.29. The pintadilla (Cheilodactylus variegatus), 91
6.30. Two species of blenny caught at Cerro Azul, 92
6.31. The caballa or Pacific mackerel (Scomber japonicus peruanus), 93
6.32. The Pacific bonito (Sarda sarda chilensis), 93
6.33. The sierra, a member of the mackerel family, 94
COPYRIGHTED MATERIAL

6.34. The pejesapo or clingfish, 94
6.35. The lenguado or left-eye flounder, 96
6.36. The merluza or Pacific hake, 96

7.1. A fisherman throws his circular net into the Pacific, 99
7.2. A fisherman of the peña zone retrieves a grunt from his atarraya, 99
7.3. Four types of fishing gear: the atarraya, the espinel, the red de cortina, and the chinchorro, 100
7.4. A caballito de totora, kept in the home of a Cerro Azul fisherman, 101
7.5. Close-up of the comienzo of an atarraya from Structure 5, Quebrada 5a, 103
7.6. Two sketches of the comienzo de atarraya shown in Fig. 7.5, 104
7.7. Lower border of a cotton trammel net from Structure 4, Quebrada 5a, 105
7.8. Stone weight from a trammel net, with cords still attached to both ends, 105
7.9. Eighteenth-century fishermen using a chinchorro, 106
7.10. Lower border of a trammel net from Terrace 9 of Quebrada 5a, 107
7.11. Fragment of trammel net with sherd attached as weight, Structure 12, Quebrada 5-south, 108
7.12. Pot sherd used as a weight for a trammel net, Structure 12, Quebrada 5-south, 108
7.13. Carrier net from Colica 1, Structure D, Cerro Azul, 109
7.14. Pottery vessel from a burial at Qurna, Egypt, inside its carrier net, 109
7.15. Close-up of a net found in Room 7 of Structure D, 110
7.16. Two views of Net 1 from a looted burial on Terrace 9 of Quebrada 5a, 111
7.17. Net 1 from a looted burial near Structure G of Cerro Azul, 112
7.18. Close-up photograph of the sheet bend knots used in the net seen in Fig. 7.17, 112
7.19. The border of the net seen in Fig. 7.17. Such a border is typical of an atarraya, 113
7.20. Close-up of square knots used in Net 2 from a looted burial near Structure G, 113
7.21. Close-up of Net 2 from another looted burial on Terrace 9 of Quebrada 5a, 114
7.22. Two malleros, templates for standardizing the spacing of knots in netmaking, 115

8.1. Remains of dried fish from Room 1, Structure 9, 117
8.2. Clay floor of Room 11, Structure 9, showing remains of fish, 118
8.3. Remains of dried fish sticking to the floor of Room 11, Structure 9, 118
8.4. Vertebrae from a corvina resting on the clay floor of Room 11, Structure 9, 119

9.1. Bones of Pacific sardine (Sardinops sagax) from Feature 6, Structure D, 122
9.2. Bones of Pacific sardine from Feature 6, Structure D, 123
9.3. Cleithrum and pectoral fin rays of Pacific sardine from Feature 6, Structure D, 124
9.4. Remains of anchoveta from Feature 6, Structure D, 124
9.5. Remains of dried anchovetas from Feature 6, Structure D, 124
9.6. Lenses from the eyes of anchovetas from Feature 6, Structure D, 124
9.7. Bones of grunt (Anisotremus scapularis) from Feature 6, Structure D, 125
9.8. Bones of grunt from Feature 6, Structure D, 126
9.9. Fish of the drum family display occasional exostoses or abnormal swellings, 127
9.10. Articular of ayanque (Cynoscion analis) from Feature 6, Structure D, 128
9.11. Articular of burro (Sciaena fasciata) from Feature 6, Structure D, 128
9.12. Bones of the lorna (Sciaena delicosa) from Feature 6, Structure D, 128
9.13. Still-articulated preopercular, hyomandibular, quadrate, symplectic, and metapterygoid of lorna from Feature 6, Structure D, 129
9.14. Articular and dentary of large róbalo still articulated, from Room 3, Structure D, 133
9.15. Maxilla of large róbalo from Late Intermediate refuse, Structure D, 134
9.16. Premaxilla of corvina (Cilus gilberti) from Feature 6, Structure D, 135
9.17. Premaxilla of mojarrilla (Stellifer minor) from Feature 6, Structure D, 135
9.18. Drum otoliths from Feature 6, Structure D, 135
9.20. Bones of the scaleless blenny (Scartichthys gigas), 136

x

COPYRIGHTED MATERIAL
COPYRIGHTED MATERIAL

9.21. Bones of the scaled blenny (*Labrisomus philippii*) from Feature 6, Structure D, 137
9.22. Bones of the Pacific bonito (*Sarda sarda chilensis*) from Feature 6, Structure D, 138
9.23. Bones of the pejesapo or clingfish (*Sicyases sanguineus*) from Feature 6, Structure D, 139
9.24. Premaxillae of left-eye flounders showing size range of specimens caught at Late Intermediate Cerro Azul, 139
9.25. Bones of the left-eye flounder from Feature 6, Structure D, 140
9.26. Fish bones displaying cut marks, all from Feature 6 of Structure D, 141

10.1. Complete sling with webbed cradle from Structure 5 on Terrace 9, Quebrada 5a, 160
10.2. Complete sling with slit cradle from Zone A of Terrace 9, Quebrada 5a, 161
10.3. Agave fiber sling from Tomb A-16 at Cerro del Oro, Cañete, 162
10.4. Webbed cradles from Late Intermediate slings, 162
10.5. Slit cradles from Late Intermediate slings, 163
10.6. Components of Late Intermediate slings, 164
10.7. Tassel of vegetal fiber, possibly part of a ritual sling, from Structure 5, Terrace 9, Quebrada 5a, 165
10.8. Two-stone bolas from Structure 6, Terrace 9, Quebrada 5a, 167
10.9. Close-up of the bolas from Figure 10.8, showing repair to one of the stone-carrying loops, 168
10.10. Two-stone bolas from Structure 6, Terrace 9, Quebrada 5a, 169
10.11. Close-up of bolas from Structure 6, 170
10.12. Close-up of a bolas from Collca 1, Structure D, 171

11.1. This Humboldt penguin (*Spheniscus humboldti*) died during the El Niño of 1982–83, 173
11.2. Patch of skin from a Humboldt penguin. Found in Feature 6, Structure D, 174
11.3. A paloma del cabo (*Daption capensis*) on Structure D, Cerro Azul, 174
11.4. A starving guanay cormorant (*Phalacrocorax bougainvillii*) rests on a cobble beach at Cerro Azul, 175
11.5. A chuita or red-legged cormorant (*Phalacrocorax gaimardi*) sits on the rocky ledge at Cerro Azul, 175
11.6. Cranium of guanay cormorant from Terrace 11, Quebrada 6, 175
11.7. Bones of guanay cormorant from Feature 6, Structure D, 176
11.8. Sternum of red-legged cormorant from Feature 6, Structure D, 177
11.9. A group of piqueros or Peruvian boobies (*Sula variegata*) resting on the cliffs of Cerro del Fraile, 178
11.10. Peruvian pelicans (*Pelecanus thagus*) flying low over Cerro Azul Bay, 178
11.11. Bones of the Peruvian pelican from archaeological refuse, 179
11.12. The zarcillo or Inca tern (*Larosterna inca*) frequently rests on the sea cliffs at Cerro Azul between dives, 180
11.13. The cranium of an Inca tern from the Northeast Canchón, Structure D, 180
11.14. Inca tern that died in the ruins of Structure 1 and became completely mummified, 180
11.15. Gulls on the beach at Cerro Azul Bay, 180

12.1. This rocky island near the Cerro Azul lighthouse is a favorite “haul out” locality for sea lions, 187
12.2. A young sea lion (*Otaria byronia*) resting on a beach boulder at Cerro Azul, 187
12.3. Two humeri from sea lions (*Otaria byronia*), illustrating sexual dimorphism, 188
12.4. Abandoned juvenile sea lion that died of starvation, 189
12.5. Right mandible of sea lion (*Otaria byronia*) from Feature 22, Terrace 16, Quebrada 5, 190
12.6. Left femur of sea lion from Stratigraphic Zone A, Terrace 16, Quebrada 5, 190
12.7. Phalanx and innominate of female sea lion, from the surface of Cerro Azul, 191
12.9. The bottlenosed dolphin (*Tursiops sp.*) and the Pacific white-sided dolphin (*Lagenorhynchus sp.*), 192
12.10. Heads of butchered dolphins (*Tursiops sp. and Lagenorhynchus sp.*) discarded on beach at Cerro Azul, 193
12.11. Vertebrae from two genera of dolphins eaten at Late Intermediate Cerro Azul, 194

13.1. A seed from the cherimoya fruit (*Annona cherimolia*) found in Feature 20, Structure 9, 202
13.2. Achira (*Canna edulis*) is still grown in the Cañete Valley, 202
13.3. Leaf, probably achira, from Room 4, Structure D, 203

COPYRIGHTED MATERIAL
COPYRIGHTED MATERIAL

13.4. The contents of a “medicine bundle” from Structure 12, a looted burial cist in Quebrada 5-south, 203
13.5. Mass of coca leaves from the interior of an amphora from Stratigraphic Zone A of Terrace 9, Quebrada 5a, 205
13.6. Two seeds of ciruela del fraile (Annona cherimolia), found in Terrace 11, Quebrada 6, 205
13.7. A sample of Phaseolus pods and valves from the floor of the South Corridor, Structure D, 205
13.8. Pod and seed of common bean (Phaseolus vulgaris) from Structure 12, Quebrada 5-south, 206
13.9. Seed of lima bean (Phaseolus lunatus) from Feature 6, Structure D, 206
13.10. Three seeds of Canavalia beans, found on the west side of “Room 2,” Structure D, 206
13.11. Erythrina pod from Structure 5, Quebrada 5a, 206
13.12. Both elite families and commoners at Cerro Azul enjoyed peanuts (Arachis hypogaea), 207
13.13. A pacay leaf (Inga feuillei), found in Terrace 11, Quebrada 6, 208
13.14. Three stems of butternut squash (Cucurbita moschata), 208
13.15. Two squash seeds from the Southwest Canchón, Structure D, 208
13.16. Desiccated fruit of ya ca monte (Apodanthera sp.) from Collca 1, a storage cell in Structure D, 209
13.17. Ruptured pod of achiote (Bixa orellana) from Room 4, Structure D, 209
13.18. Lúcuma (Pouteria lucuma) from Room 4, Structure D, 210
13.19. A sweet potato (Ipomoea batatas) from the northeast corner of the Southwest Canchón, Structure D, 211
13.20. A white potato (Solanum tuberosum) found near Structure 5, Quebrada 5a, 211
13.21. Stems and seeds of chile pepper (Capsicum sp.) from Feature 6 of Structure D, 212
13.22. Four stems of an unidentified plant, each bearing a wasp gall, found in Room 4, Structure D, 212
13.23. Unidentified plants from Feature 6, Structure D, 213
13.24. Unidentified nuts from the fill of Room 4, Structure D, 213
13.25. Squash stems from Feature 6, Structure D, 214
13.26. Two incomplete squash seeds from Feature 6, Structure D, 214
13.27. Two views of a dried chile pepper from Feature 6, Structure D, 214
13.28. A sample of bean pods from Collca 1, Structure D, 216
13.29. Five of the 13 lúcuma seeds from Collca 1, Structure D, 217
13.30. Eleven seeds of Canavalia sp. from Room 7, Structure D, 218
13.31. Sample of Phaseolus pods from Feature 4 in “Room 2” of Structure D, 218
13.32. Four pods of common bean (Phaseolus vulgaris) from Feature 4, “Room 2,” Structure D, 218
13.33. Eight seeds of Canavalia sp. from Feature 4 in “Room 2” of Structure D, 218
13.34. Lúcuma from Feature 4, “Room 2,” Structure D, 219
13.35. Beans from Feature 20 of Structure 9, the midden left by a commoner household, 220
13.36. Seeds of what appears to be butternut squash, 220
13.37. Dried fruit and seed of lúcuma from Feature 20, Structure 9, 220
13.38. Fifty-one Canavalia beans from Room 2, Structure 11, Quebrada 5-south, 222
13.39. Food plants from Room 2, Structure 11, a storage facility in Quebrada 5-south, 223
13.40. Plants associated with a kincha house, Room 3, Structure 11, a storage facility in Quebrada 5-south, 223
13.41. Three lúcuma seeds from Structure 12, a burial cist in Quebrada 5-south, 223
13.42. Canavalia seeds from a refuse deposit in Terrace 11, Quebrada 6, 223
13.43. Leaves of pacay (Inga feuillei) used to line the interior of burial cist, Structure 6, Quebrada 5a, 225
13.44. Structure 1 of Cerro Azul, 227
13.45. Two seeds of cherimoya (Annona cherimolia) from 16th-century A.D. refuse, Room 9, Structure 1, 228
13.46. Pods, valves, and seeds of vetch (Vicia sp.) from 16th-century A.D. refuse, Room 9, Structure 1, 228
13.47. Herbs used as seasonings by 16th-century squatters in Room 9, Structure 1, 229
13.48. Nine seeds of common beans (Phaseolus vulgaris) from 16th-century refuse in Room 9, Structure 1, 229
13.49. Crop plants used by 16th-century squatters in Structure 1, 229
13.50. Barley (Hordeum sp.) from 16th-century refuse in Room 10, Structure 1, 230

14.1. Remains of hatun maccma, a chicha storage vessel with a capacity of nearly 2000 liters, North Central Canchón, Structure D, 233
14.2. Maize ears still bearing kernels from Terrace 9 of Quebrada 5a, 234
14.3. An immature maize ear still in its husk, from Structure 12, a burial cist in Quebrada 5-south, 235
14.4. An empty maize husk found near Burial 4, Quebrada 5a, 235
14.5. Maize cobs found near burials in Quebrada 5a, 236
14.6. A badly frayed maize stalk and husk from a midden deposit on Terrace 11, Quebrada 6, 237
14.7. A maize tassel found near Burial 9, Quebrada 5a, 237
14.8. Four cobs each of Maize Types 1 and 2 from Feature 6, Structure D, 238
14.9. Four cobs each of Maize Types 1 and 2 from the South Corridor, Structure D, 239
14.10. Four cobs each of Maize Types 4 and 5 from Feature 6, Structure D, 241
14.11. Four cobs of Maize Type 6 and one cob of Maize Type 7 from Feature 6, Structure D, 242
14.12. Two cobs of Maize Type 2a, two cobs of Maize Type 3, and four cobs of Maize Type 4 from the South Corridor, Structure D, 243
14.13. Four cobs each of Maize Types A and B from Collca 1, Structure D, 244
14.14. Four cobs each of Maize Types C and D from Collca 1, Structure D, 245
14.15. Four cobs of Maize Type E and one cob of Maize Type F from Collca 1, Structure D, 246
14.16. Six cobs from Feature 20, Structure 9, 247
14.17. Examples of Maize Types 1, 2, 4, 5, 6, and 7 from Room 4, Structure 9, 248
14.18. One maize tassel and six cobs from a midden on Terrace 11, Quebrada 6, 250
14.19. Six cobs from Structure 10, a storage cist on Terrace 12 of Quebrada 6, 251
14.20. Three cobs from Structure 5, a looted burial cist in Quebrada 5a, 252
14.21. Six cobs from Structure 6, a burial cist in Quebrada 5a, 253

15.1. Sample 001, a pod of *Phaseolus lunatus* carrying two seeds, found in Feature 6 of Structure D, 255
15.2. Sample 002, five of six dark red-brown *Phaseolus vulgaris* seeds, from Feature 6 of Structure D, 255
15.3. Sample 003, nine dark red-brown *Phaseolus vulgaris* seeds found in Feature 6 of Structure D, 256
15.4. Sample 004, eight dark red-brown *Phaseolus vulgaris* seeds found in Feature 6 of Structure D, 256
15.5. Sample 005, two curved and elongate *Phaseolus lunatus* seeds with yellow seed coats and spotted dark areas, from Feature 6, Structure D, 257
15.6. Sample 006, *Phaseolus vulgaris* seeds found in Feature 6 of Structure D, 257
15.7. Sample 007, a pod of *Phaseolus lunatus* containing four seeds, from Feature 6 of Structure D, 258
15.8. Sample 008, three *Phaseolus lunatus* seeds found in Feature 6 of Structure D, 258
15.9. Sample 009, seven *Erythrina* seeds found in Feature 6 of Structure D, 259
15.10. Sample 010, one *Phaseolus vulgaris* pod and one dark red-brown seed, found in Structure 12, Quebrada 5-south, 260
15.11. Sample 011, seven large *Phaseolus vulgaris* seeds, Room 9, Structure 1, 261

16.1. Stem of sacuara or cattail from a refuse deposit, Terrace 11, Quebrada 6, 263
16.2. Totora or bulrushes (*Scirpus californicus*), 264
16.3. Bulrush and cattail growing intermixed, 264
16.4. Bundle of totora from Structure 4 in Quebrada 5a, 265
16.5. Braided rope from Feature 20, Structure 9, 266
16.6. Twilled mat from Zone A of Terrace 9, Quebrada 5a, 267
16.7. Junco or sedge (*Cyperus* sp.), 268
16.8. Inflorescence of sedge (*Cyperus* sp.) from Terrace 11, Quebrada 6, 268
16.9. Carrizo or caña hueca (*Phragmites australis*), 268
16.10. Carrizo or caña hueca (*Phragmites australis*), 268
16.11. A sample of monocotyledonous plants from Feature 6, Structure D, 269
16.12. A sample of reeds and canes from Feature 20, Structure 9, 269
16.13. Three specimens of caña hueca from the remains of a kincha house, 270
16.14. Two views of a fragment of kincha wall, found on the central platform of Structure 9, 270
16.15. Three fragments of kincha wall from the Feature 4 squatters’ house in “Room 2,” Structure D, 271
16.16. Caña brava (*Gynerium sagittatum*), 272
16.17. Two litter poles made from caña brava, Structure 6, a burial cist in Quebrada 5a, 273
16.18. Deliberately cut section of caña brava found in Room 4, Structure D, 273
16.19. A bundle of willow twigs from Structure 6, Quebrada 5a, 274
16.20. Three broken huarango or algarrobo spines from Feature 20, Structure 9, 274
16.21. The bottle gourd (*Lagenaria siceraria*) at Cerro Azul, 275
16.22. A shallow gourd bowl found with Burial 2, Quebrada 5a, 276

xiii
COPYRIGHTED MATERIAL

16.23. A shallow gourd bowl found with Individual 1 of Burial 6, Quebrada 5a, 277
16.24. Two large spines of the prickly pear (Opuntia sp.) found with Individual 2, Burial 4, Quebrada 5a, 278
16.25. Large spine of prickly pear found in “Room 2,” Structure D, 278
16.26. Unmodified cactus spines and needles made from cactus spines from workbasket in Burial 4, Quebrada 5a, 278
16.27. Boll of cotton (Gossypium barbadense) from Terrace 11 of Quebrada 6, 279
16.28. Segment of cotton boll (Gossypium barbadense) from the South Corridor, Structure D, 279
16.29. Seeds of cotton (Gossypium barbadense) from Feature 6, Structure D, 280
16.30. Cotton seeds from Feature 20, Structure 9, 280
16.31. Two locks of kidney cotton found with Burial 8, Quebrada 5a, 280
16.32. A seed of suirucu or soapberry from Room 2, Structure 11, Quebrada 5-south, 280

Color plates following page 284

Plate I. Cañete’s rocky coast supports hundreds of species of molluscs, crustaceans, fish, sea birds, and marine mammals.
Plate II. Cerro Azul’s nobles imported Choromytilus chorus to use as a cosmetic pigment palette.
Plate III. The embudo, or funnel, from a crayfish trap.
Plate IV. The burrowing of Callianassa islagrande has a profound effect on sandy beach environments at Cerro Azul.
Plate V. The arched blue crab expands its range to Cerro Azul during El Niño years.
Plate VI. A fisherman on Cerro Centinela launches his atarraya, or cast net, into the Pacific.
Plate VII. A cast net found in a burial cist at Cerro Azul.
Plate VIII. The most common member of the grunt family captured at Cerro Azul is Anisotremus scapularis.
Plate IX. The largest member of the drum family captured at Cerro Azul is Sciaena starksi.
Plate X. The Peruvian booby lives in colonies on the sea cliffs at Cerro Azul.
Plate XI. During the El Niño of 1982–83, many Humboldt penguins died of starvation.
Plate XII. Mummified Inca tern that died in the ruins of Cerro Azul during the 1850s.
Plate XIII. Sacuara or cattails are among the “industrial” plants harvested near Cerro Azul.
Plate XIV. Some elite burials at Cerro Azul were provided with litters combining caña brava and totora.
Plate XV. One ear of dent corn and two ears of imbricated purple corn from burials at Cerro Azul.
Plate XVI. Many of the lima beans at Cerro Azul featured brown seeds.
Plate XVII. A white potato from a looted burial at Cerro Azul.
Plate XIX. Guinea pig with its mouth stuffed with coca leaves, buried in the ruins of Structure 1, Cerro Azul.

17.1. Pellets of camelid dung from Feature 6, Structure D, 289
17.2. Two views of the right innomininate of adult camelid, found near Features 15 and 16, North Central Canchón, Structure D, 291
17.3. Drawing of the same camelid innomininate shown in Fig. 17.2, 292
17.4. Right innomininate of adult camelid, found near Features 15 and 16, North Central Canchón, Structure D, 293
17.5. Complete right scapula of camelid, found in the fill of Structure D’s Northwest Canchón, 294
17.6. Right and left mandibles from the same camelid, found in Room 4, Structure D, 295
17.7. Left metacarpal of a camelid, found in fill of Room 4, Structure D, below the level of Feature 5, 296
17.8. Two views of the right innomininate, adult camelid, Room 4, Structure D, below the level of Feature 5, 297
17.9. Complete right radius and ulna of camelid, found in Stratigraphic Zone A1 of Terrace 16, Quebrada 5, 301
17.10. Right metacarpal of llama, found in midden between Structures 11 and 12 in Quebrada 5-south, 302
17.11. Distal metapodial of llama, found on the surface of Cerro Azul, 302
17.12. Measurements of scapula, humerus, radius, ulna, cervical vertebra, and innomininate used to establish Wing’s “decision rule,” 304
17.13. Measurements of the calcaneum, astragalus, first phalanx, femur, metapodials, and tibia used to establish Wing’s “decision rule,” 305
17.14. Anterior end of llama cervical vertebra, showing signs of arthritis, found in Room 7, Structure 9, 307
17.15. First phalanx of a llama from Feature 6, Structure D, showing arthritic calcification, 307
17.16. The relative abundance of bones from seven anatomical regions in Structure D, Structure 9, and a complete llama skeleton, 308

COPYRIGHTED MATERIAL
17.17. Two proximal tibiae of adult llamas, butchered in much the same way, from Structure D, 309
17.18. Fused proximal radius and ulna of a llama, showing cut marks, from Structure D’s Northeast Canchón, 309
17.19. Distal end of llama metacarpal displaying a cut mark, from Room 4, Structure D, 310
17.20. Left calcaneum of a llama with cut marks from Feature 6 of Structure D, 310
17.21. Llama vertebra, displaying cut marks, from Southwest Canchón, Structure D, 311
17.22. Llama atlas vertebra displaying numerous cut marks, 311
17.23. Sacrum of llama from Feature 6 of Structure D, showing cut marks, 312
17.24. Vertebra of a llama from Feature 6 of Structure D, displaying cut marks, 313
17.25. Cervical vertebra of llama, displaying cut marks, found in Burial 2 of Quebrada 5a, 313
17.26. Cervical vertebra of llama, displaying cut marks, found in Room 7 of Structure 9, 314
17.27. Pigment pouch made from what appears to be a camelid bladder, 314
17.28. On this drawing of a llama skeleton, the bones present in the Feature 6 midden are indicated, 315
17.29. On this drawing of a llama skeleton, the bones present in the Feature 20 midden are indicated, 316

18.1. The cranium from a dog associated with Burial 1, Quebrada 5a, 320
18.2. Two views of dog cranium, Zone A, Terrace 9, Quebrada 5a, 321
18.3. Two views of dog cranium, Zone A, Terrace 9, Quebrada 5a, 322

19.1. Guinea pigs were kept in Room 9, while Room 10 was used as a place to store bedding and food, 325
19.2. Pellets of guinea pig dung from the floor of Room 9, Structure D, 326
19.3. This gourd vessel, found with Individual 2 of Burial 7, contained the remains of a guinea pig, 330
19.4. Cranium and mandible of guinea pig from a burial in Zone A, Terrace 9, Quebrada 5a, 331
19.5. This vessel, Gourd 2 from the floor of Structure 12, contained a guinea pig, 332
19.6. Guinea pig wrapped in bandana as an offering in the ruins of Structure 1, 333

21.1. Wooden agricultural implements found in the Chincha Valley, 341
21.2. Pyroengraved gourd, found with Individual 1 of Burial 7 (Terrace 9, Quebrada 5a), 346
21.3. Pyroengraved gourd bowl found near Structure 4, a burial cist on Terrace 9 of Quebrada 5a, 347
21.4. Working model of the sociopolitical hierarchy in the Kingdom of Huarco, 349

A.5. A comparison of the monthly catches of grunt and morwong at Cerro Azul, 1984–86, 358
List of Tables

3.1. Marine molluscs from archaeological contexts at Cerro Azul, 35
3.2. Chitons from archaeological contexts at Cerro Azul, 36
3.3. Shellfish from the Feature 6 midden (Structure D), 46
3.4. Shellfish from the Feature 20 midden (Structure 9), 48
3.5. Shellfish from Stratigraphic Zone B, Terrace 9, Quebrada 5a, 49
3.6. Shellfish from the mortar used in the building of Structure 5, 50
3.7. Shellfish from Stratigraphic Zone A of Terrace 9, Quebrada 5a, 50
3.8. Estimated weight of meat present in each species of shellfish at Cerro Azul, 51
3.9. Comparison of Features 6 and 20, based on estimated amount of meat provided by each genus of mollusc, 52
3.10. Estimates of the weight of meat provided by each genus of mollusc in Stratigraphic Zone B, Terrace 9, Quebrada 5a, 53

4.1. Crustaceans from Feature 6 of Structure D, 60
4.2. Crustaceans from Feature 20 of Structure 9, 63

5.1. Archaeological occurrences of crayfish at Cerro Azul, 71

6.1. Fish species observed by the University of Michigan Project, 73

9.1. Taxa of identified fish from archaeological contexts at Cerro Azul, 121
9.2. Fish bones from Feature 6, Structure D, 130
9.3. Fish bones from Room 3, Structure D, 142
9.4. Fish bones from Room 8, Structure D, 143
9.5. Fish bones from Feature 20, Structure 9, 144
9.6. Comparison of Features 6 and 20 at Cerro Azul, 149
9.7. Fish bones from the layer between Floors 1 and 2 of Room 3, Structure 11, 151
9.8. Fish bones from Terrace 11 of Quebrada 6, 155

11.1. Birds identified from archaeological contexts at Cerro Azul, 173
11.2. Bird bones from Feature 6, Structure D, 181
11.3. Bird bones from Feature 20, Structure 9, 183
11.4. Bird bones from Upper Zone B of Terrace 9, Quebrada 5a, 184
11.5. Bird bones from Zone B below Structure 5 on Terrace 9, Quebrada 5a, 185

12.1. Marine mammal bones from Feature 22, Terrace 16, 196
12.2. Marine mammal bones from Stratigraphic Zone A2, Terrace 16, 196
COPYRIGHTED MATERIAL

13.1. Edible, ritual, and medicinal plants from Late Intermediate contexts at Cerro Azul, 201
13.2. Edible, ritual, and medicinal plants from Feature 6 of Structure D, 213
13.3. Edible, ritual, and medicinal plants from Feature 20 of Structure 9, 220
13.4. Food plants from Terrace 11 of Quebrada 6, 226
13.5. Food plants from 16th-century Colonial refuse at Cerro Azul, 226

16.1. Industrial plants from Late Intermediate contexts at Cerro Azul, 263
16.2. Industrial plants from Feature 6 of Structure D, 281

17.1. Camelid bones from Feature 6, 288
17.2. Camelid bones from Feature 20, 298
17.3. Measurements of camelid bones from Cerro Azul, 306

19.1. Guinea pig bones from Feature 6 of Structure D, 326
19.2. Guinea pig bones from Feature 20 of Structure 9, 328

20.1. Proveniences of the Cerro Azul coprolites, 335
20.2. Macrofossil component analysis of the coprolites from Cerro Azul, 336
20.3. Fish bone from the Cerro Azul coprolites, 337
20.4. Results of the Cerro Azul coprolite sample pollen analysis, 338

xvii

COPYRIGHTED MATERIAL
Acknowledgments

From 1982 through 1986 the University of Michigan conducted five seasons of work at Cerro Azul. In addition to my co-director Maria Rostworowski, the project included Ramiro Matos Mendieta (archaeologist), Kent V. Flannery (archaeologist and zooarchaeologist), Sonia Guillén (physical anthropologist), Charles Hastings (cartographer), Lawrence Kaplan (bean specialist), C. Earle Smith, Jr. (ethnobotanist), Jim Stoltman (petrographic analyses), Dwight Wallace (textiles), John G. Jones (analysis of coprolites), and Linda Perry (starch grains and phytoliths). We also received outstanding contributions from two zooarchaeologists, Jeffrey Sommer (crustaceans and fish) and Christopher Glew (birds and mammals). All these specialists made Cerro Azul’s ecology and economy come alive.

I used a University of Michigan Faculty Fund Grant to complete the preliminary mapping of Cerro Azul. This 1982 season was vital because it supplied us with the kinds of data we needed to write a detailed grant proposal to secure external funding from the National Science Foundation.

Following the 1982 mapping season came the seasons dedicated to excavation, more detailed mapping, and artifact analyses. The four seasons from 1983 to 1986 were generously supported by the National Science Foundation (BNS-8301542). I appreciate not only the funding but the excellent advice offered by Charles Redman, Mary Greene, John Yellen, and Craig Morris throughout the project.

Permission to excavate Cerro Azul was granted by Peru’s Instituto Nacional de Cultura (Credencial No. 102-82-DCIRBM, Credencial No. 041-83-DCIRBM, Credencial No. 018-84-DPCM, and Resolución Suprema No. 357-85-ED).


In the town of Cerro Azul we found informants, friends, and industrious people who wanted to work for us, either in town or at the archaeological site. I want to thank all the residents of Cerro Azul, but especially Diomides Aguidos, Edalio Aguidos, Marcelina Aguidos, Urbano Aguidos, Zenobio Aguidos, Pedro Álvarez, Alberto Barraza, Adolfo Casella, don José Chumpitaz y su familia, Emilio Cordero, Rosa Cordero, Ruperto Corral, Cirilo Cruz, Victor de la Cruz Álvarez, Pablo Cubillas, Victor Cubillas, Ramón Espinosa, César (Chinaco) Francia, Iván Francia, Roberto García, Luis Gómez, José Huaratapaira, Ramón Landa, Carlos Manco Flores, José Antonio Manco Flores, Rufino Manco Flores, Francisco Padilla, Camilo Quispe, Edgar Zavala, and Pedro Manuel (Pato Loco) Zavala.

I want to end this acknowledgment section by thanking three very talented people—Elizabeth Noll, our Museum editor, as well as John Klausmeyer and Kay Clahassey, two wonderful artists who make all my archaeological reports come to life.