



The Cave of the Cyclops

Mesolithic and Neolithic Networks in the
Northern Aegean, Greece



Volume II

Bone Tool Industries, Dietary Resources and the
Paleoenvironment, and Archaeometrical Studies





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The Cave of the Cyclops

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Volume II

Bone Tool Industries, Dietary Resources and the
Paleoenvironment, and Archaeometrical Studies

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Table of Contents

List of Tables.	vii
List of Figures.	xi
List of Abbreviations.	xvii
Introduction.	xix
PART I. TOOL INDUSTRIES	
1. The Mesolithic and Neolithic Bone Implements, <i>Antiklia Moundrea-Agrafioti</i>	3
PART II. DIETARY RESOURCES AND THE PALEOENVIRONMENT	
2. From Mesolithic Fishermen and Bird Hunters to Neolithic Goat Herders: The Transformation of an Island Economy in the Aegean, <i>Katerina Trantalidou</i>	53
Appendix 2.A. Avian measurements.....	102
Appendix 2.B. <i>Cervus elaphus</i> measurements.....	110
Appendix 2.C. Suid measurements.....	110
Appendix 2.D. <i>Capra</i> sp. measurements.....	112
Appendix 2.E. <i>Ovis aries</i> measurements.....	120



3. Non-Vertebral Fish Bones, <i>Judith Powell</i>	151
Appendix 3.A. Complete List of Identified Diagnostic Non-Vertebral Fish Bones.	177
4. Fish Vertebrae, <i>Dimitra Mylona</i>	237
Appendix 4.A. Trench CWest Context Description by Level in Relation to Fish Remains. . .	257
Appendix 4.B. Trench CWest Fish Vertebrae Recording.	257
5. Malacological Material, <i>Lilian Karali</i>	267
6. Palynological Evidence, <i>Chryssanthi Ioakim</i>	289
7. Charcoal Analysis, <i>Maria Ntinou</i>	297
8. Archaeobotanical Seed Remains, <i>Anaya Sarpaki</i>	315
 PART III. ARCHAEOMETRICAL STUDIES	
9. Neolithic Pottery: A Characterization Study, <i>Konstantina Papakosta</i>	327
Appendix 9.A. Petrographic Description of the Fabrics.	349
10. Sequential Radiocarbon Dating and Calculation of the Marine Reservoir Effect, <i>Yorgos Facorellis</i>	361
11. Clastic Sediments, <i>Katie Theodorakopoulou and Yannis Bassiakos</i>	373
12. Stable Isotopic Analysis of the Mollusk Shells, <i>Androniki Drivaliari, Ioannis Liritzis,</i> <i>and Adamantios Sampson</i>	385
Index.	391



List of Tables

Table 1.1.	Distribution of bone implements by trench.	4
Table 1.2.	Distribution of bone industry by trench, level, and chronological period.	5
Table 1.3.	Distribution of bone implements by trench and stratum.	6
Table 1.4.	Distribution of the industry by the principal categories of raw material used.	7
Table 1.5.	Distribution of bone tools by animal size and chronological period.	8
Table 1.6.	Distribution of the industry by the principal categories of animals represented.	8
Table 1.7.	Bone tool groups by tool categories.	14
Table 1.8.	Distribution of hooks and hook preform by strata.	15
Table 1.9.	Descriptive statistics of hooks.	23
Table 1.10.	Descriptive statistics of bipoints.	28
Table 1.11A–D.	Bipoints: descriptive statistics by group.	34
Table 1.12.	Correlation of chronological levels and the groups of bipoints.	36
Table 1.13.	Pointed implements by anatomical categories and blank morphology.	42
Table 2.1.	Fauna from the Cave of the Cyclops.	124
Table 2.2.	Distribution of avifaunal remains throughout the chronological sequence of the cave. . .	124



Table 2.3.	Identifiable bones of <i>Puffinus puffinus</i> by period.	125
Table 2.4.	Identifiable bones of <i>Phalacrocorax aristotelis</i> by period.	127
Table 2.5.	Identifiable bones of <i>Otis tarda</i> from all periods.	129
Table 2.6.	Identifiable bones of <i>Phalacrocorax carbo</i> from all periods.	130
Table 2.7.	Identifiable bones of <i>Larus audouinii</i> by period.	130
Table 2.8.	Identifiable bones of <i>Calonectris diomedea</i> from UM deposits.	131
Table 2.9.	Identifiable bones of <i>Corvus corax</i> by period.	131
Table 2.10.	Identifiable bones of Accipitridae by period.	131
Table 2.11.	Identifiable bones of Phasianidae from all periods.	131
Table 2.12.	Identifiable bones of Strigidae by period.	132
Table 2.13.	Identifiable bones of indeterminate larger birds by period.	132
Table 2.14.	Identifiable bones of indeterminate medium-sized birds from all periods.	133
Table 2.15.	Identifiable bones of indeterminate small-sized birds by period.	134
Table 2.16.	Total number of ribs, fragmentation pattern, and modification in the caprid and suid category by period.	136
Table 2.17.	Frequency of Suidae vertebrae (fragmentation pattern and age classes) by period.	137
Table 2.18.	Sus: anatomical representation, fragmentation, modification, and MNI by period.	137
Table 2.19.	Isolated teeth of Suidae by period.	139
Table 2.20.	Suids: determination of the sex based on the morphological differences in the form of the canine teeth.	140
Table 2.21.	Caprinae: anatomical representation, fragmentation, and modification by period.	140
Table 2.22.	Caprinae: total number of long bone fragments, fragmentation pattern, and modification of bones in the unidentifiable category by period.	144
Table 2.23.	Caprinae by period: total number of vertebrae, fragmentation pattern, modification of the bones, and age classes.	145
Table 2.24.	Distribution of sheep and goat (NISP) by period based on morphological criteria: mandibular teeth (mainly D ₄), horn cores, scapulas, humerus, and metapodials.	146
Table 2.25.	Ovicaprids: quantifying male and female animals based on common morphological differences in the form of the skull, the horn core, the atlas, the epistropheus, the innominate, and the talus.	147
Table 2.26.	Caprinae teeth.	147
Table 2.27.	Caprinae age at death based on dental evidence.	149
Table 2.28.	Age at death based on post-cranial evidence (after Silver 1969).	150
Table 3.1.	Fishing areas of Greece.	152
Table 3.2.	Weight of non-vertebral fish bones by chronological period.	155



LIST OF TABLES

ix

Table 3.3.	<i>Epinephelus</i> sp. dentary measurements (no. 2).	163
Table 3.4.	Sparidae species represented in the Youra fish bone assemblage.	164
Table 3.5.	NISP figures for major species of Sparidae.	166
Table 3.6.	<i>Oblada melanoura</i> , angular measurements (no. 1).	166
Table 3.7.	<i>Oblada melanoura</i> , dentary measurements (no. 2).	166
Table 3.8.	<i>Diplodus vulgaris</i> , premaxilla measurements (no. 1).	166
Table 3.9.	<i>Diplodus vulgaris</i> , dentary measurements (no. 1).	166
Table 3.10.	<i>Diplodus vulgaris</i> , angular measurements (no. 1).	167
Table 3.11.	<i>Pagrus coeruleostictus</i> , premaxilla measurements (no. 1).	167
Table 3.12.	<i>Pagrus coeruleostictus</i> , dentary measurements (no. 1).	168
Table 3.13.	NISP figures for selected sparids.	168
Table 3.14.	<i>Scomber japonicus</i> , hyomandibular measurements (no. 1).	169
Table 3.15.	Scorpaenid premaxillae measurements (no. 4).	171
Table 3.16.	Taxonomic diversity for Trench CWest. NISP by family and stratigraphic level.	172
Table 3.17.	Taxonomic diversity for Trench CEast. NISP by family and stratigraphic level.	173
Table 3.18.	Key months for modern catches of ροφοί, φαγγρία, μελανούρια, σκορπιοί, and σαργοί in Greek waters.	173
Table 4.1.	Sub-sampling from contexts of Trench CWest.	238
Table 4.2.	The identified fish vertebrae assemblage from Trench CWest.	239
Table 4.3.	Trench CWest: preservation trends observed in the fish vertebrae assemblage.	240
Table 4.4.	Catalog of fish families, genera, and species represented in the fish vertebrae assemblage of Trench CWest.	241
Table 4.5.	Size and anatomical part representation for all families through time.	243
Table 4.6.	Trench CWest: species representation by period.	244
Table 4.7A.	Trench CWest: LN/Roman species representation by level.	245
Table 4.7B.	Trench CWest: EN–MN distal species representation by level.	245
Table 4.7C.	Trench CWest: FM–EN species representation by level.	246
Table 4.7D.	Trench CWest: UM species representation by level.	247
Table 4.7E.	Trench CWest: LM species representation by level.	248
Table 4.8.	Cranial and post-cranial bone representation for selected levels and families.	249
Table 4.9.	Species representation according to habitat by period.	250
Table 5.1.	Total amounts and percentages of mollusk species with information about habitat (excavation seasons 1992–1995).	280



Table 5.2.	Stratigraphical distribution of the molluscan material.	282
Table 5.3.	Sums of the most frequent mollusk species according to periods.	286
Table 6.1.	Grain counts of pollen observed in the Cave of the Cyclops.	290
Table 7.1.	Correlation between charcoal assemblages, cultural periods, and radiocarbon dates. . .	301
Table 7.2.	Presence and distribution of the identified plant taxa in the charcoal assemblages from the Mesolithic–Neolithic sequence.	302
Table 7.3.	Absolute and relative frequency of the taxa identified in the charcoal assemblages from the Mesolithic–Neolithic sequence.	305
Table 8.1.	List of sample contexts.	316
Table 8.2.	Results of the studied archaeobotanical samples.	317
Table 8.3.	Seed remains from Trench CEast, Rectangle 1.	318
Table 8.4.	Seed remains from Trench CEast, Rectangle 2.	319
Table 8.5.	Seed remains from Trench CEast, Rectangle 3.	319
Table 8.6.	Seed remains from Trench CEast, Rectangle 5.	319
Table 8.7.	Seed remains from Trench CEast, Rectangle 6.	319
Table 8.8.	Seed remains from Trench CEast, Rectangle 7.	320
Table 8.9.	Seed remains from Trench CEast, Rectangles 8, 9, and 10.	320
Table 8.10.	Seed remains from Trench CEast, Rectangle 11.	320
Table 8.11.	Seed remains from Trench CEast.	320
Table 9.1.	Summary of the SEM results.	335
Table 10.1.	Summary of radiocarbon dates of samples from the Cave of the Cyclops.	363
Table 10.2.	Radiocarbon ages of pairs of samples of contemporaneous terrestrial and marine mollusk shells collected together in undisturbed anthropogenic layers.	366
Table 10.3.	Calculation of the marine reservoir effect (local constant ΔR) in the Aegean Sea using pairs of terrestrial and marine samples collected together in undisturbed anthropogenic layers.	367
Table 11.1.	Section CWest. Total depth of section 3.10 m.	375
Table 11.2.	Section CEast soil samples.	375
Table 11.3.	SEM/EDX analyses from Section CWest.	380
Table 11.4.	SEM/EDX analyses from Section CEast samples.	381
Table 12.1.	Stable isotope data of mollusk shells in their archaeological context.	387





List of Figures

Figure 1.1.	Relative frequency of bone implements by trench.	4
Figure 1.2.	Relative frequency of bone implements by trench and chronological period.	5
Figure 1.3.	Relative frequency of bone tools by animal size and chronological period.	9
Figure 1.4.	Bone industry profile: proportion of major tool groups by chronological period.	14
Figure 1.5.	Hooks (BH2, BH4, BH7, BH9–BH13, BH15, BH16, BH18, BH19, BH21–BH25).	16
Figure 1.6.	Hooks (BH26–BH31).	17
Figure 1.7.	Hooks (BH32–BH35).	18
Figure 1.8.	Hooks (BH2, BH4, BH6–BH13, BH15–BH19, BH22, BH25–BH31, BH33–BH35). ...	19
Figure 1.9.	Distribution of hook length and width by chronological period.	23
Figure 1.10.	Hook length to width ratio.	24
Figure 1.11.	Distribution of hooks by measurements.	24
Figure 1.12.	Bipoints (BB1–BB7, BB9–BB12, BB14, BB16, BB17).	29
Figure 1.13.	Bipoints (BB18, BB20, BB22, BB23, BB25, BB27–BB32, BB35, BB36, BB38, BB39). ...	30
Figure 1.14.	Bipoints (BB3, BB7, BB11, BB14, BB18, BB21, BB23, BB24, BB28, BB29, BB32, BB35–BB41).	31
Figure 1.15.	Bipoints: frequency distribution by length.	32



Figure 1.16. Bipoins: frequency distribution by width.	32
Figure 1.17. Bipoins: frequency distribution by thickness.	32
Figure 1.18. Bipoins length.	33
Figure 1.19. Bipoins: techno-morphological groups.	33
Figure 1.20. Bipoins: length dispersion by morphological group.	33
Figure 1.21. Bipoins: dimensions by shape groups.	35
Figure 1.22. Bipoins: frequency by chronological period.	36
Figure 1.23. Points (BP10–BP13, BP15, BP16).	40
Figure 1.24. Points (BP17, BP22, BP25, BP28).	41
Figure 1.25. Pointed tools by chronological period.	42
Figure 1.26. Pointed tools by blank category.	42
Figure 1.27. Pointed tools: dimensions.	43
Figure 1.28. Pointed tools: length by blank category (mean values and standard deviation).	43
Figure 1.29. Varia (BV4, BV6).	44
Figure 1.30. Varia (BV3, BV9, BV16).	45
Figure 2.1. Map of the Northern Sporades and zones A and B of the Maritime National Park (23,000 hectares), after Hau and Hutter 1998, 31.	54
Figure 2.2. Cave of the Cyclops faunal assemblage: species relative abundance based on the number of identified fragments.	57
Figure 2.3. Main bird species present at the Cave of Cyclops.	67
Figure 2.4. Preserved elements of <i>Puffinus puffinus</i>	67
Figure 2.5. <i>Puffinus puffinus</i> : location and percentages of traces of dismembering and filleting (right) and fire (left).	68
Figure 2.6. <i>Phalacrocorax aristotelis</i> bones (axial skeleton, pectoral girdle, wings, and legs).	69
Figure 2.7. Preserved elements of <i>Otis tarda</i>	69
Figure 2.8. Preserved elements of <i>Corvus corax</i>	70
Figure 2.9. Vertebrae of an adult animal from the order Cetacea.	73
Figure 2.10. <i>Sus scrofa</i> maxillae.	78
Figure 2.11. Typical modification (short, deep cuts, and striated cuts indicated by small arrows and breakage) observed on the radii and ulnae of caprinae, mainly sheep elements in this figure.	79
Figure 2.12. Modifications observed on the radii and ulnae of caprinae.	80
Figure 2.13. Fragmentations and modifications observed on the proximal end of radii of caprinae.	81
Figure 2.14. Fragmentations and modifications (gnawing) on the radii of caprinae.	83



LIST OF FIGURES

xiii

Figure 2.15. Goat horn cores.....	85
Figure 2.16. Caprin distal extremity of the humerus.....	87
Figure 2.17. Caprin distal extremity of the humerus.....	87
Figure 2.18. Evidence of traumatic fractures on caprin ribs.....	87
Figure 2.19. Radiography of the previous ribs.....	87
Figure 2.20. Ventral view of a caprine scapula bearing a hole, possibly exhibiting a localized non-specific infection of the periosteum.....	87
Figure 2.21. Ventral view of caprine innominate, showing abnormal bone formation.....	88
Figure 2.22. Radiography of two caprin hip bones (ox coxae).....	88
Figure 2.23. Proximal extremities of large caprin metapodials presenting osteophytes (possibly enthesopathies).....	88
Figure 2.24. Fragments of caprin metapodials.....	88
Figure 2.25. Radiography of whole proximal (upper row) and distal extremities of fused metapodial bones.....	89
Figure 2.26. Radiograph showing healthy caprin mandible (top) and mandible of another individual with poor oral health (bottom).....	89
Figure 3.1. Bone measurements.....	156
Figure 3.2. Premaxillae (left to right) of <i>Diplodus vulgaris</i> , <i>Sarpa salpa</i> , Labridae, and <i>Trachurus trachurus</i>	157
Figure 3.3. Hyomandibular (left to right) of Mugilidae: <i>Scomber japonicus</i> , <i>Scorpaena notata</i> , and <i>Sparus aurata</i>	157
Figure 3.4. <i>Muraena helena</i> dentary (top) and quadrate (bottom) from Trench CWest, Level 7, Rects. 1–4 (1993).....	160
Figure 3.5. Epinephelid bones. From left to right: quadrate (CWest, Level 7, Rects. 1–4), hyomandibular (CEast, Level 6), palatine (CEast, Level 6), and maxilla (Trench B, Level 6, Rects. 1–4).....	162
Figure 3.6. <i>Dentex dentex</i> bones: dentary (CEast, Level 18, Rect. 6) and palatine (CEast, Level 17, Rect. 2).....	165
Figure 3.7. <i>Oblada melanoura</i> bones: premaxillae, angular, and maxilla.....	165
Figure 3.8. <i>Sarda sarda</i> bones: angular (left: CWest, Level 7, Rects. 1–4) and premaxilla (right: CWest, Level 8, Rects. 1–4).....	170
Figure 3.9. Scorpaenid bones: ceratohyal (left: CWest, Level 7, Rects. 1–4) and preopercle (right: CWest, Level 10, Rects. 3–4).....	171
Figure 5.1. Amounts of each of the most frequent mollusk species according to period.....	270
Figure 5.2. Worked shells (S1–S4, S6–S11).....	276



Figure 6.1.	Palynological diagram: composition by pollen type.	291
Figure 6.2.	Palynological diagram: aboreal pollen (AP).	292
Figure 6.3.	Palynological diagram: non-aboreal pollen (NAP).	293
Figure 6.4.	Palynological diagram: spores and varia.	294
Figure 7.1.	The island of Youra from the southwest.	298
Figure 7.2.	<i>Phrygana</i> (Euphorbiaceae and Labiatae) on the eastern slopes of the island.	298
Figure 7.3.	<i>Pistacia lentiscus</i> (left) and <i>Sarcopoterium spinosum</i> (right).	298
Figure 7.4.	Plant formations on the western side of the island.	299
Figure 7.5.	The vegetation near the cave.	299
Figure 7.6.	The effect of prevalent winds on the vegetation.	299
Figure 7.7A.	<i>Arbutus</i> sp., radial longitudinal section, x990.	303
Figure 7.7B.	<i>Cercis siliquastrum</i> , transverse section, x130.	303
Figure 7.7C.	<i>Cercis siliquastrum</i> , tangential longitudinal section, x500.	303
Figure 7.7D.	<i>Ephedra</i> sp., radial longitudinal section, x2500.	303
Figure 7.7E.	<i>Phillyrea-Rhamnus</i> , transverse section, x81.	303
Figure 7.7F.	<i>Pistacia terebinthus</i> , transverse section, x150.	303
Figure 7.7G.	<i>Pistacia terebinthus</i> , tangential longitudinal section, x500.	303
Figure 7.8.	Charcoal diagram showing the frequency and distribution of taxa in successive charcoal assemblages from the Mesolithic–Neolithic sequence.	307
Figure 8.1.	Trench CEast seeds per rectangle by time period.	321
Figure 9.1.	Painted pottery with Red-on-White decoration.	328
Figure 9.2.	Petrographic samples from the Cave of the Cyclops.	330
Figure 9.3.	Petrographic samples from the Cave of the Cyclops.	331
Figure 9.4.	Petrographic samples from the Cave of the Cyclops.	332
Figure 9.5.	SEM samples from the Cave of the Cyclops.	333
Figure 9.6.	SEM samples from the Cave of the Cyclops.	334
Figure 9.7.	Fabrics represented in the EN II–MN periods.	336
Figure 9.8.	Fabrics and ware distribution in the EN I–MN periods.	336
Figure 9.9.	Fabrics represented in the LN I period.	339
Figure 9.10.	Fabric and ware distribution in the LN I period.	340



LIST OF FIGURES

xv

Fig. 10.1.	Stratigraphy of Trench CEast showing consecutive layers of hearths, as well as layers rich in seashells and land snails deposited as food remains.....	365
Fig. 10.2.	Food residue found during the excavation of the cave. Land mollusks of the species <i>Helix cincta</i> (Müller).....	365
Fig. 10.3.	Food residue found during the excavation of the cave. Marine mollusks of the species <i>Patella ulyssiponensis</i> (Gmelin).....	365
Fig. 10.4.	Calculation of the marine reservoir effect (local constant ΔR) based on the third pair of terrestrial/marine samples in Table 10.3.....	368
Fig. 10.5.	Calendar dates of samples from the cave sorted by trench and depth from surface.....	370
Figure 11.1.	Element variation in Trench CWest by layer.....	377
Figure 11.2.	Calcium variation in relation to depth in Trench CWest.....	378
Figure 11.3.	Sulfur variation in relation to depth in Trench CWest.....	378
Figure 11.4.	Phosphorus variation in relation to depth in Trench CWest.....	379
Figure 11.5.	Iron variation in relation to depth in Trench CWest.....	379
Figure 11.6.	Manganese variation in relation to depth in Trench CWest.....	380
Figure 12.1.	Stratigraphical section of the south balk of Trench C. Layers 1–12.	386
Figure 12.2.	Stable isotope data for marine shells (<i>Patella ulyssiponensis</i>).....	389
Figure 12.3.	Stable isotope data for terrestrial shells (<i>Helix cincta</i>).....	389



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List of Abbreviations

Bibliographic abbreviations follow the conventions suggested in the *American Journal of Archaeology* 111.1 (2007), pp. 14–34.

A	Trench A (originally Trench Alpha)	DEM	sample from Laboratory of Archaeometry (Institute of Materials Science, NCSR “Demokritos”) in Athens.
AP	aboreal pollen		
B	Trench B (originally Trench Beta)	diam.	diameter
Byz.	Byzantine	dim.	dimension
C	Trench C (originally Trench Gamma)	dims.	dimensions
ca.	approximately	dist.	disturbed
cal.	calibrated	DOL	Dark-on-Light
cat. no.	catalog number	DOR	Dark-on-Red
CEast	Eastern division of Trench C	E	Trench E (originally Trench Zeta)
cm	centimeter	EDX	energy dispersive x-ray
cont.	continued	EH	Early Helladic
corresp.	corresponding	EM	Early Mesolithic
CWest	Western division of Trench C	EN	Early Neolithic
D	Trench D, extension of Trench A (originally Trench Delta)	f.	form/ <i>forma</i>



F	Trench F	pers. comm.	personal communication
FM	Final Mesolithic	pers. obsv.	personal observation
g	gram	PPL	plane-polarized light
GRP	global rachidian profiles	PPN	Pre-Pottery Neolithic
h.	height	PPNA	Pre-Pottery Neolithic A
ha	hectare	PPNB	Pre-Pottery Neolithic B
indet.	indeterminate	PPNC	Pre-Pottery Neolithic C
km	kilometer	pres.	preserved
kyr B.P.	thousand years before present	r	rounded
L.	length	Rom.	Roman
LM	Lower Mesolithic	ROW	Red-on-White
LN	Late Neolithic	S	south
LOD	Light-on-Dark	s	standard deviation
m	meter	s ²	sample variance
masl	meters above sea level	sa	sub-angular
mg	milligram	SE	southeast
μm	micrometer	SEM	scanning electron microscopy
mm	millimeter	sp.	species
max.	maximum	spp.	species (plural)
max. dim.	maximum dimension	sr	sub-rounded
Mes.	Mesolithic	SW	southwest
MH	Middle Helladic	th.	thickness
MN	Middle Neolithic	UM	Upper Mesolithic
MNI	minimum number of individuals	var.	variety
N	north	W	west
NAP	non-aboreal pollen	w.	width
NE	northeast	WOR	White-on-Red
NISP	number of identified specimens	XP	cross-polarized light
nm	nautical miles	yr	year
no.	number	yrs	years
NW	northwest		



Introduction

The archaeological material presented in the first volume has demonstrated the importance of the Cave of the Cyclops, which unquestionably constitutes a byword in the prehistory of the Aegean. The information set out in the second volume mainly comes from the archaeological material, organic residues, and the archaeometric studies that complete the image of this significant archaeological site. Organic residues form a vast amount of material, and its systematic study proved necessary in order to ascertain the significance of the cave.

Particularly important is Prof. A. Moundrea-Agrafioti's study of Mesolithic bone hooks, which are unique. Their typology cannot be compared to any of its parallels, and the uniqueness of this material may have been responsible for the delayed submission of the study, which naturally should have been integrated in the first volume. The 55 bone hooks recovered comprise a body of material that so far is unique in the Aegean, adding to the importance of the archaeological research in the cave. The impressively wide variety of types and sizes from among the earlier to the more recent Mesolithic levels suggests a specialization in the fishing activities of these Mesolithic groups that settled in the northern Aegean. The variety of sizes, analogous to the hooks seen today, allows for a detailed typology. Consequently, it is highly likely that during the Mesolithic period the cave was used as a base and refuge during regular missions of fishing by exceptionally specialized fishermen.

Animal bones abound among the higher Neolithic levels of the cave. Animal bones were expectedly scarce among the Mesolithic levels, but the detailed study by Dr. K. Trantalidou proves an early domestication of sheep and goats that is contemporary to domestication in Anatolia, reflecting either an early provenance

from the east or a contemporaneous autochthonous domestication in the Aegean and broader contacts with Anatolia. At the end of the 9th and the beginning of the 8th millennium B.C., goats and sheep started to be domesticated at Youra. During the 8th millennium these became fully domesticated, but they had not made their appearance on the Greek mainland yet.

It is not my intention to emphasize the Aegean or downgrade the role of Anatolia, but I strongly believe that by highlighting the analogies rather than the immediate contacts, Anatolia may be described not only as a point of reference for the Greek neolithization, but also as another parallel area of activity. Irrespective of the birthplace, the intermediate sites, and the periphery as necessary constituents of a historical moving of people, now it is more important to abandon the theory of one nuclear zone and instead adopt the theory of multiple centers of neolithization that sprang up at the same time under social circumstances that facilitated this turn. It follows that the Aegean—according to recent studies on its reserves of wild fauna and flora—could be one of these centers. The theory of “multi-focus neolithization,” which is put forward here, can account for the contemporaneous development of the neolithization of sites in Iran, southeastern Turkey, Syro-Palestine, and Cyprus.

The economy of the Mesolithic is featured in meticulous studies on fish bones by Dr. J. Powell and Dr. D. Mylona. The cave at Youra is the only site so far that yielded so many fish finds and such a variety of species. All the species identified in the archaeological assemblage continue to exist today, and the same families predominate. Marine exploitation during the Mesolithic and Neolithic periods concentrated on coastal demersal species and only a few large pelagic species. It is explicitly suggested that marine exploitation dramatically declined toward the end of the Mesolithic, as at Franchthi. Scombridae, Mugillidae, Scorpionidae, and Serranidae dominate in the earlier levels, but there is a discrepancy in the number of vertebral and cranial remains. Sparidae and Serranidae are the most common species in later Mesolithic strata; and in the EN and MN, Sparidae dominate, and the Scombridae species is the second most important group, including medium-sized fish.

The Mesolithic fishermen of Youra exploited two major fish sources, the plentiful migratory fish (i.e., Scombridae and Carangidae) that appeared only seasonally, and the coastal fish available on a year-round basis (e.g., Sparidae, Serranidae, Scorpaenidae). The practice of net fishing resulted in numerous fish of exceptionally small size. While most of the coastal species could arguably be caught from the coast, the fishing of the migratory species presupposes the use of boats. Generally, there is no special interest in the fishing of migratory species, a common practice today in the area of the Northern Sporades.

According to Powell, the Late Neolithic (LN) people seem to possess more skill in targeting desirable species such as *Epinephelus* sp. (ροφοί), and thus they are thought to have developed specific strategies that suggest more sophisticated fishing methods—specialized hooks for particular species and perhaps gill nets—and also a better understanding of the environmental conditions. However, the cave has not provided evidence of these skilled fishing activities for the LN period, and it is probable that another site in the Northern Sporades served as a base for specialized fishing.

The vertebral assemblage in the cave suggests the systematic processing and conservation of fish through drying, salting, or smoking processes. Hearths are commonly associated with floors, and the connection between the burned fish remains and floors is obvious. The cured fish could be stored deep in the cave, where the conditions for preservation were excellent. The preservation of fish was extensively practiced only in some periods, one probably being the Lower Mesolithic (LM).

Concerning Franchthi Cave, the studies on its fish assemblage have not been completely published yet, but the evidence is analogous to that from Youra. Sparidae is the dominant family, and individuals are generally small to medium in size. What differs is the presence of large tuna in Upper Mesolithic (UM) levels at Franchthi. The fish bone assemblage of Mesolithic Kythnos is still under study, but the presence of large tuna is evident.

The intense fishing activities in this area during the Mesolithic can be accounted for in more than one way. The Northern Sporades—specifically the Deserted Islands—is one of the best fishing places in the Aegean. In Mesolithic times the channels between islands were narrower, but their crossings did not pose serious problems for the local population. In the 9th millennium B.C. the island of Youra was much bigger, and it most likely was attached to Psathoura, the northernmost island of the archipelago complex. In some places, such as banks, the shallow sea may have been rich in nutrients for the fish. The Mesolithic inhabitants of the northern Aegean likely experienced dramatic changes of the environment, and they had to deal with all the adversities without being able to use older, alternative practices such as hunting. It is very probable that the new climatic conditions of the Holocene created different microenvironments in the Aegean, greatly affecting the population, maybe to a greater extent than in western Europe.

The need to exploit the marine resources for food and the search for proper raw material for the production of tools should account for the development of seafaring in the Northern Sporades. A large exchange network is suggested by the presence of Melian obsidian, as well as flint and bone material for the fabrication of bone hooks. At the same time, on Youra we observe that a systematic collection of shells and terrestrial mollusks took place that could prove significant. The whole material has been studied by Prof. L. Karali of the University of Athens. The numerous snails found in every Mesolithic level attest to the systematic consumption of terrestrial mollusks, a practice also noted in the Mesolithic levels of the caves at Franchthi and Kythnos.

Unfortunately, the paleobotanic residues have not shed enough light on the issue of plant domestication, a practice that one would expect to accompany the early animal domestication. Despite meticulous water sieving, which was hindered by the scarce water resources on the deserted island of Youra, the natural residues were rare. Aside from this, it was quite unfortunate that only a small part of the material was put under study; the majority of the material, which, even though it was entrusted to the hands of Dr. A. Sarpaki by Dr. S. Katsarou, was mysteriously lost. Thus, the scarce vegetal samples—which possibly are examples of early domestication compared to the rest of the nutritional remnants—lead to unsound conclusions regarding plant domestication. This has been quite an unfortunate incident, because the extensively discussed issue of the neolithization of southeastern Europe could only benefit from archaeobotanical finds from the Mesolithic or the Neolithic levels. However, considering the morphology and the arid environment of the island, the cultivation of plants as early as the Neolithic is quite unexpected, even though certain wild cereal would not be unlikely.

Dr. M. Ntinou's thorough examination of the carbon material has given sufficient evidence of the environment of Youra and the broader area concerning every phase of the cave's settlement. This information was also complemented and verified by the palynological study of samples from Mesolithic and Neolithic levels of the cave by Dr. Ch. Ioakim. During the LM, the vegetation was dominated by herbaceous plants belonging to the Cerealia-type, Poaceae, Ranunculaceae, and Rosaceae families. This type of vegetation, found in Philippi (central Macedonia), befits cold and dry climatic conditions. In the UM the herbaceous vegetation clearly replaced a mixed woodland

dominated by *Quercus* and *Pinus*. The rich herbaceous vegetation suggests that the woodland was not dense. Similarities are seen among Youra and other early Holocene sites in Greece such as Giannitsa, Ioannina, Lake Xinias, and Argos.

Archaeometric research on the dating of Mesolithic strata was carried out by Dr. Y. Facorellis. Trial ^{14}C dates on animal and fish bones, shellfish, and land snails were performed by the Laboratory of Archaeometry at the Institute of Materials Science, NCSR “Demokritos,” in Athens, and further certified by $\delta^{13}\text{C}$ measurements performed by the University of Heidelberg, Germany. The results were associated with the charcoal ^{14}C dates from the very same strata. Dates from the above materials appear to diverge regularly by some hundreds of years from the charcoal samples due to the different quantities of oxygen absorbed by plants (charcoal), shellfish, land snails, and mammals. The correlations can be very useful for sites where no charcoal is found, and they are necessary for the estimation of the local marine reservoir effect in every region. Using terrestrial and marine samples from a site in conjunction with the latest issue of the marine calibration curve one can obtain the local constant (ΔR). And, when used together, the local marine reservoir effect and the local constant (ΔR) allow for reliable absolute dating.

Particularly important are the archaeometric analyses of pottery samples from every Neolithic phase that show that the Middle Neolithic (MN) inscribed pottery of exceptional quality found in the cave is not linked to the respective pottery of the same era in Thessaly but instead belongs to a pottery group that proliferates in the Northern Sporades. Samples from the later Neolithic, which were studied by the archaeologist Ms. K. Papakosta, showed that during this period the cave’s pottery was strongly attached to Thessaly, Euboea, and the rest of the Aegean.

The study of the stable isotopic data from marine mollusks found at the cave was carried out by Dr. A. Drivaliari and Prof. I. Liritzis. Even though the study was based on few samples and the margin of error is quite large, the results show that during the early Holocene climatic changes took place every 1,000–1,200 years. At the Cave of the Cyclops, a warmer climatic period during the LM (8500–7700 B.C.) was traced, which was followed by a colder phase during the UM (7700–6900 B.C.). A rise in temperature was noted in the Final Mesolithic (FM, 6900–6500 B.C.), and the LN (5300–4300 B.C.) featured a cool transitional stage.

Finally, the study by Ms. K. Theodorakopoulou and Dr. I. Bassiakos on the clastic cave sediments of anthropogenic origin have helped to shed light on the paleoenvironment and paleoclimate of the early Holocene. Chemical elements such as potassium, aluminum, and silicone could indicate cold temperatures and intense solifluction. The significant rise of these elements during the start of the UM attests to a cold period that probably led to the limited usage of the cave; this is in accordance with the readings of phosphorus, which suggest human activity. The readings of magnesium, which indicates warm and humid climatic conditions, coincide in some layers with the levels of calcium—another indicator of a warm and humid climate.

Even though we still have a long way to go until the riddle of Mesolithic occupation in the Greek area is solved, we can distinguish the main characteristics of the Mesolithic culture in the Aegean basin. These include: intense exploitation of sea resources, limited hunting activities, collection of grains and land snails, attempts at animal domestication by isolated island communities, and cave inhumations or open cemeteries. The presence of Melian obsidian, the flint, and the raw material for the manufacture of grinders and bone hooks suggests a large network of exchange for this period. The sea route via the Euboean gulf—known since the



INTRODUCTION

xxiii

Bronze Age and the historical periods—was probably in use during Mesolithic times despite the difficulties posed by primitive means of seafaring.

The considerable distance between Youra and Melos reveals a complex network of trade activities and large-scale movements present in the Aegean since the 9th millennium B.C. These activities in the Mesolithic northern Aegean probably were deeply rooted in an Upper Paleolithic tradition, because the sudden development and the specialization in fishing (given the perfection of the tool equipment) seen at the beginning of the Mesolithic are unusual. The resemblance of the lithic industry of the four Mesolithic settlements at Kythnos to the three recently unearthed Mesolithic sites of Ikaria, and the sets of microliths found at the Öküzini and Belbidi caves in Antalya (10,000–7800 yr B.P.) might suggest voyages in the Aegean and contact between Aegean cultures and southwestern Anatolia since this early period.

Adamantios Sampson





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