A Consideration of the Earliest Neolithic Culture in Switzerland

By

C. F. W. HIGHAM

Department of Anthropology, University of Otago

Introduction

The earliest well documented evidence for the presence of farmers in Switzerland is found at Egolzwil 3, Canton Lucerne [1]. The purpose of this paper is to present the results of a detailed study of the fauna from that site, and discuss their economic implications*.

Egolzwil 3, the type site of the Egolzwil culture, was occupied for approximately forty years, during the early part of the third millenium B. C. [2]. It was situated in a sheltered position on the northern shore of the Wauwyl Lake, backed by hills rising to a height of 700 metres. Its aspect was thus southerly, and the hillside behind the settlement would have been well insolated. The natural vegetation on such southward facing slopes today changes markedly with altitude [3]. The narrow shore belt supports waving reeds, waterplants, willow and alder. On drier land, and up to a height of approximately 600 metres, mixed-oak forest flourishes, together with luxuriant green herbacious undergrowth. Above 600 metres however, the mixed-oak forest gives way to gloomy beechwoods supporting little or no green undergrowth, while above 900 metres, silver fir mixes with beech in quantities increasing with altitude. The tree line is reached at 2200 metres, the nearest region above the tree line being 30 kilometres from Egolzwil.

The pollen analysis for Egolzwil 3 reveals that the trees growing within the vicinity of the settlement correspond to those found under natural conditions today in the Swiss Lowlands [4]. A sudden decline in the relative proportions of arboreal to non-

* I wish to acknowledge my gratitude to Professor E. Vogt, not only for making the material available to me, but also for his constant encouragement and advice. My thanks are also given to Professor H. Burla, Director of the Zoological Museum of Zürich University, who welcomed me as a visitor to his museum, where the material is housed, and provided me with every assistance during my stay in Zürich.

arboreal pollen, and presence of weeds of cultivation and cereal pollen however, attest the effect of the Egolzwil 3 farmers upon the natural vegetation cover. Striking evidence for the method of forest clearance is to be found in the number of wooden axe hafts, and stone axe heads, which have been recovered during excavations [5]. Forest clearings appear to have been given over to hoe-agriculture.

Material

1. Mammalian Fauna

The 381 species-identified mammalian bone fragments represent at least thirteen species, of which only sheep and goats must have been introduced to the Egolzwil region. It is not easy to obtain an accurate estimate of the ratio of sheep to goats on the basis of the small sample available from Egolzwil 3. The single horn core appears to derive from a caprid, while the ratio of the minimum anterior/posterior to minimum transverse diaphysial width of the three metacarpals suggests that one comes from a goat, one from a sheep, and a third coming from either species [6]. Two of the mandibles represent animals under one year of age at death, six represent animals between 12 and 24 months of age at death, and two are derived from fully adult animals. The size of the caprovine bones available corresponds to that for later Swiss Neolithic cultures [7].

Since the bones of wild swine at birth may well be as small as those of domesticated animals, it is not possible to distinguish between the bones of wild and domestic animals on a size basis until either the epiphyses have closed, or an immature wild swine bone has exceeded the presumed observed size range for corresponding bones in domestic animals. Even when fully adult bones are available, the distinction between wild and domestic specimens is commonly carried out on the assumption that bones smaller than modern European wild swine come from domestic animals, and conversely, that bones equivalent in size to modern wild swine come from hunted animals.

The observed ranges of certain dimensions for Swiss Neolithic domestic swine have therefore been collected [8] to permit a comparison with corresponding dimensions for the Egolzwil 3 material. Thus the largest presumed domestic radius from Seeberg Burgäschisee-Süd [9] has a proximal width of 31.0 mm, the corresponding dimensions for the Egolzwil 3 material being 31.1, 32.0 and in an immature specimen, 37.5. A domestic suid scapula from Obermeilen [10] has a minimum neck breadth of 28.0 mm, the corresponding measurements for Egolzwil 3 being 18.4, 25.5, 27.1, and 29.3. Clearly the first two bones are of domestic size, and it is emphasised that the third, with a minimum neck breadth of 27.1, is towards the extreme upper end of the range of variation for this dimension in presumed domestic specimens. Both astragali are larger than in any assumed Swiss Neolithic domestic suid, but that with a maximum length of 46.2 mm is less than 2.0 mm longer than a presumed

domestic specimen from Eschner Lutzengüetle (Liechtenstein) [11]. The smallest wild suid patella from Seeberg Burgäschisee-Süd has an estimated length of 40.0 mm, compared with 38.0 and 39.5 mm for the two Egolzwil 3 suid patellae [12]. Both fragments of pelvis from Egolzwil 3 are larger than in any presumed domestic swine from the available Swiss comparative material.

While some of the Egolzwil 3 suid bones are larger than in any known domestic specimens from Swiss Neolithic settlement sites, others could come from either very large domestic, or small wild, animals. The possibility that swine were being domesticated locally cannot, therefore, be ruled out on the basis of the material available.

The two bovine teeth and fragment of radius all appear to belong to Bos rather than Bison. Moreover, all three bones are too small to be derived from the Auroch.

The wild mammalian fauna may be divided into four main groups: the members of the deer family, small woodland animals, the species inhabiting the margins of lakes and streams, and the rare exotic forms, such as the lynx and bear. With the exception of the lynx, all are represented at the Younger Cortaillod culture settlements on the Burgäschisee.

All three of the cervids native to Switzerland are represented. Of these, both the elk and roedeer are at home in the marshy lake shore zone: indeed roedeer were observed feeding in the marshy reed-swamp which flanks the northern shore of the Pfäffikersee in the summer of 1964. Red Deer would have come to the lake edge to drink, and may well have attempted to feed off the ripening grain in field plots [13].

Small woodland species are represented by the squirrel, hedgehog and martin. The abundance of squirrel bones at Egolzwil 3 is unusual for Swiss Neolithic settlements, the remains of four individuals having been found close together, as if the animals had been skinned but not eaten. The hedgehog is represented by one bone fragment, but bones of the martin are relatively numerous. Like the squirrel, martins would have been valued for their pelts rather than for meat.

Beaver and otter bones are scarce. Both species are nearly always represented at Younger Cortaillod culture settlements. The Egolzwil 3 otter femur is slightly larger than that for Burgäschisee-Süd, while the beaver material is well within the expected size range for Swiss Neolithic finds. Lynx is represented by one fragment of the acetabular region of the pelvis, while five bones of the fore-limb of a small immature bear were found within close proximity of each other.

2. Avifauna

I am indebted to Mr. ULRIK MØHL, of the Universitets Zoologiske Museum, Copenhagen, for identifying and commenting upon the avifauna from Egolzwil 3. His report is included as appendix two to this article.

The twenty-six fragments represent nine species. Of these, the commonest is goosander, with eight fragments of bone from two individuals. There are seven bone fragments from the pochard, three from the mallard, two each from crane and coot, while the teal, pintail, shoveler, and white eyed pochard are represented by one bone apiece.

Discussion

The prevalence of caprovines at Egolzwil 3 is unexpected: neither animal would have been at home in the wooded environment held to have surrounded Egolzwil 3. Sheep in particular, do not thrive in the damp conditions which prevail on low-lying lake margins. The presence of caprovine dung within the settlement area however, offers some clues as to the method of husbandry practised [4].

Now the plant communities represented by the pollen contained in the dung might clearly reflect contamination rather than the animals' diet. Yet the pollen spectrum differs so markedly from those typical of the culture level as a whole, that it is held to deserve further study. The non-arboreal pollen in the dung, which is considerably more abundant relatively, than that in the culture level, represents the plant communities of two distinct micro-environments: rushes, marsh parsley and meadowsweet prefer a damp subsoil, while *Campanulaca* sp. and raspberry prefer a woodland habitat. Either plants might have been brought from the woodland and lakeside to feed tethered animals, or caprovines could have been taken from the settlement for feeding, and returned within the same (8/9 hour) digestive cycle.

Further reference to the Egolzwil 3 pollen spectrum reveals that some plants represented in the dung do not recur in the sample representative of the culture level. Consequently, the latter alternative seems the more likely.

The scarcity of pasture indicators in the Egolzwil 3 pollen spectrum suggests that the area under pasture during the occupation phase was either minimal in extent, or even wholely absent. Exploitation of grassy glades within the mixed oak forest, and the marshy lake margins thus appears the most likely method of caprovine husbandry at Egolzwil 3.

As has been shown, it is not possible to distinguish between the bones of wild and domesticated swine unless adult specimens, in which the epiphyses have fully closed, are available. Even under such favourable circumstances, the distinction between the wild and domesticated specimens has been based on the *a priori* assumption that the latter are always the smaller. On the basis of that assumption, the hunting of wild swine was part of the economy at Egolzwil 3, while some domestic swine were maintained. Swine would have found the oak and beech forests particularly favourable for feeding, and the assumed comparative rarity of domesticated animals emphasises the role of choice in the method whereby a particular society exploited its environment. The subsequent Swiss Neolithic cultures appear to have developed more logical methods of exploiting the prevailing woodland habitat.

The rarity of bovine bones is even more marked than is that of domesticated swine, the available material comprising two teeth and a fragment of an adult radius. Assuming that the bones were not derived from trade in foodstuffs, bovine husbandry at Egolzwil 3 was of minimal significance in the economy as a whole.

Hunting, trapping, fowling and fishing persisted as economic activities alongside agriculture and stock rearing at Egolzwil 3. Indeed, seven out of every ten mammals represented were wild, a figure only once exceeded at subsequent Neolithic settlements on the Alpine Foreland.

Egolzwil 3 is a key site in any consideration of the introduction of agriculture into

Switzerland. The economy was a blend of Mesolithic hunting and intrusive methods of stock rearing and agriculture. More than one interpretation may be advanced to account for this situation: the whole economy may have been introduced from some outside region. Alternatively, the inhabitants of Egolzwil 3 may have included both local hunter-fishers and intrusive agriculturalists. Finally, the local Mesolithic hunter-fishers may have adopted and adapted the way of life of farming communities with whom they were in contact.

As yet, no convincing evidence has been produced for the location of a foreign source for the Egolzwil culture. The presence at Egolzwil 3 of sherds similar to those found at Rössen culture settlements in South Germany [14] supports the second alternative. Nevertheless, the individuality of the basic Egolzwil culture ceramic tradition argues more in favour of the third possibility.

Culturally, the situation in Switzerland is similar to that in the corresponding earliest Neolithic settlement in Denmark, where the status of Muldbjerg I has yet to be satisfactorily resolved [15]. Yet the similarity between the first evidence for the Neolithic way of life in both regions suggests the possibility that similar forces were at work: a fully developed Neolithic society, be it the Funnel-Necked Beaker or the Rössen, could have had important and far reaching economic repercussions among the less well developed hunters and fishers within its orbit. Moreover, modern ethnographic parallels reveal how rapidly, under favourable environmental conditions, an economically undeveloped people can adopt the way of life of more advanced peoples with whom they are in contact. In assessing the first well documented Neolithic culture in Switzerland, therefore, the adaptability of the indiginous hunter-fishers should not be underestimated.

Table 1. Egolzwil 3, Canton Lucerne: The Faunal Spectrum

Species	No. of bone fragments	No. of individual animals	% of total no. of individuals
Ovis aries / Capra hircus	94	14	28.0
Sus scrofa (domestic)	22	4	8.0
Sus scrofa ferus	23	4	8.0
Bos sp.	3	1	2.0
Sciurus vulgaris	107	4	8.0
Capreolus capreolus	25	4	8.0
Cervus elaphus	19	3	6.0
Martes martes	18	4	8.0
Ursus arctos	5	1	2.0
Castor fiber	4	2	4.0
Alces alces	3	1	2.0
Lutra lutra	2	1	2.0
Erinacious europaeus	1	1	2.0
Lynx lynx	1	1	2.0
Sus scrofa (domestic or wild)	54	5	10.0
Total	381	50	100.0

Appendix one: The Animal Bones from Egolzwil 3

A. *Ovis aries* or *Capra hircus*

Bone	Number of Specimens	Number of Animals Represented
Astragalus	4	3
Calcaneum	2	2
Femur	1	1
Tibia	2	2
Humerus	7	4
Scapula	2	2
Ulna	3	3
Radius	5	4
Hyoid	4	2
Metacarpal	4	4
Phalanx 1	2	2
Upper teeth	21	
Lower teeth	14	
Incisors	2	
Mandibles	15	14 (with teeth)
Horn Core	1	1
Cuboid Navicular	1	1
Skull Fragment	2	1
Metatarsal	2	1

Dimensions (all dimensions are in millimetres and fractions of millimetres)

Bone	Dimension					
Scapula	Minimum neck width	17.7	19.6			
	Length of Glenoid Fossa	25.0	26.2			
	Breadth of Glenoid Fossa	21.0	22.0			
	SRN.*	508	514			
Humerus	Maximum distal width	33.4	31.3			
	Minimum height of trochlea	31.0	30.0			
	SRN.	445	499			
Humerus	Maximum distal width	29.1	27.8	30.6	30.0	
	Minimum height of trochlea	27.1	27.0	29.5	28.8	
	SRN.	509	515	508	490	
Radius	Maximum proximal width	23.3	30.6	28.5	26.1	—
	Maximum distal width	—	—	—	—	27.0
	Maximum proximal anterior/ posterior width	13.2	16.7	15.1	14.2	—
	SRN.	491	508	490	515	515
Ulna	Width of articulating surface	17.0	—	18.3		
	Maximum width of olecranon	8.2	7.1	—		
	SRN.	508	508	222		

* Abbreviation of «Square Reference Number». The excavations at Egolzwil 3 were subdivided into a grid of numbered squares each 1 square meter in extent. Thus each species-identified bone may be localised to within 1 meter of its find-spot. For plan, vide Vogt [1].

Bone	Dimension				
Metacarpal	Maximum length	114.0	—	—	—
	Maximum proximal width	25.5	22.1	23.5	—
	Minimum diaphysial width	17.2	15.0	15.2	13.0
	Maximum distal width	29.5	—	—	—
	Minimum anterior/posterior diaphysial width	10.6	9.0	10.6	11.0
	SRN.	Unter herd Profil 1 Feld 1	311	507	220
Phalanx 1	Maximum length	47.2	—		
	Maximum proximal width	15.0	12.1		
	Maximum distal width	13.1	—		
	SRN.	272	187		
Femur	Maximum distal width	34.0			
	SRN.	590			
Tibia	Maximum distal width	31.0	27.1		
	Breadth of distal articulating surface	28.0	24.7		
	Square reference no.	249	—		
Astragalus	Maximum outer length	36.0	26.3	25.9	25.8
	Maximum inner length	35.1	24.1	24.0	24.0
	Maximum breadth	24.0	18.0	17.2	—
	SRN.	227	506	210	579
Calcaneum	Both immature fragments SRN. 527, 587				
Mandible	1. Length from Pm. 2—4	30.3	30.0	—	24.2
	2. Length of molar row	—	—	—	—
	3. Height of mandible at M 1	23.6	21.1	23.5	25.1
	4. Breadth of mandible at M 1	12.0	11.3	11.4	12.1
	5. Right or left hand specimen	R	R	R	L
	6. SRN.	583	248	154	525

1.	—	—	24.2	21.4	—	—	—
2.	—	—	50.0	47.0	46.9	—	—
3.	19.6	—	23.5	22.0	—	19.1	19.1
4.	11.0	—	12.5	10.3	10.4	10.6	11.5
5.	L	L	L	L	R	L	R
6.	500	—	256	523	550	501	248

Upper Dentition	1. Tooth	M 3	M 3	M 3	M 3	M 2	M 2
	2. Right or left hand specimen	L	L	L	R	R	L
	3. SRN.	488	484	493	493	496	491

1.	M 2	M 2	M 2	M 1	M 1	M 1	M 1	M 1	M 1	PM 4	PM 4	PM 3	PM 3
2.	R	L	R	R	R	L	R	R	R	R	L	L	R
3.	484	484	455	494	455	484	484	493	496	484	484	484	484

PM 2 Fragment
2. L?
3. 484 —

Lower Dentition	1.	M 3	M 2	M 2	M 2	M 2	M 2	M 2	M 2	PM 4	PM 3	Dec. PM 4	Dec. PM 4
	2.	R	R	L	R	R	L	L	L	R	R	L	R
	3.	501	493	493	61	493	493	601	61	61	61	477	493

1.	Dec. PM 2	Dec. PM 3
2.	R	L
3.	415	509

Bone	Dimension	
Horn Core	SRN. 551	
Cuboid/Navicular	SRN. 514	
Orbit	SRN. 508	508
Metatarsal	SRN. 311	579

B. *Sus scrofa* (Domestic)

Mandible	Length of first molar		15.0	14.3	14.9	14.2		
	Length of second molar		18.9	19.5	19.0	19.5		
	Right or left hand specimen		R	R	R	L		
	SRN.		234	600	126	528		
Scapula	Minimum neck width		18.4	25.5				
	SRN.		500	599				
Tibia	SRN.		H 181					
Humerus	SRN.		489					
Astragalus	Maximum length		35.3					
	Maximum width		20.5					
	SRN.		500					
Teeth	1. Type		UM 2	Lower Incisor, SRN. 226,				
	2. SRN.		544	224	528	186	118	118
	1. U. canine	L. canine	LM 2	LM 2	LM 1	LM 1		
	2. 200	118	600	600	600	600		

C. *Sus scrofa? ferus*

Radius	Maximum proximal width	37.5	31.1	—	32.0*
	Maximum proximal anterior/ posterior width	27.0	21.8	—	—
	SRN.	490	488	687	500
Scapula	Minimum neck width	27.1	29.3		
	SRN.	112	221		
Astragalus	Maximum length	50.6	46.2		
	Maximum breadth	48.0	43.1		
	SRN.	471	528		
Ulna	SRN.	507	528		
Pelvis	Length of acetabulum	40.6	39.9		
	SRN.	530	455		
Patella	Maximum length	39.5	38.0		
	SRN.	530	—		
Tibia	Maximum proximal width	52.5*			
	SRN.	223			
Humerus	SRN.	515			
Metacarpal	Maximum distal width	19.2			
	SRN.	652			
Metacarpal 3	Maximum proximal width	20.2			
	SRN.	527			

* Denotes a juvenile specimen.

Bone	Dimension				
Teeth	Type	L M 3	U M 2	U. canine (n = 2)	
	Maximum length	38.9	20.5	—	—
	SRN.	137	134	505	498/9

D. *Sus scrofa domestic* and/or *ferus*

Bone	No. fragments	No. individuals represented	SRN.
Metacarpal	3	2	189, 527, 528
Skull fragments	3	1	498, 498, 498
Humerus	8	4	552, 573, 552, 555, 508, 183, 508, 520
Femur	5	5	523, 514, 506, 187, 498
Pelvis	8	4	499, 528, 527, 508, 127
Scapula	1	1	506
Ulna	6	5	499, 528, 527, 508, 127, 174
Calcaneum	4	4	500, 508, 498, 498
Maxilla	1	1	—
Mandible	2	2	127, —
Radius	8	5	499, 452, 183, 508, 508, 518, 599, 528
Tibia	5	4	689, H2, 506, 499, 520

E. *Bos* sp.

Bone	Dimension	
Radius	Maximum distal width	est. 64.1
	SRN.	448
Teeth	Upper second molar, SRN.	486
	Upper third molar, SRN.	491

F. *Alces alces* Elk.

Magnum	Maximum breadth	40.6
	SRN.	215
Cuboid/Navicular	Maximum breadth	59.6
	SRN.	—
Metacarpal	Maximum distal anterior-posterior width	37.5
	SRN.	498

G. *Ursus arctos* Bear

Humerus	Maximum distal width	75.5	—
	SRN.	499	499
Radius	Maximum proximal anterior-posterior width	33.6	
	SRN.	508	
Metacarpal	SRN.	500	500
Ulna	Maximum breadth of articulating surface	33.1	
	SRN.	499	

H. *Lutra lutra* Otter

Bone	Dimension	
Femur	Maximum length	82.2
	Maximum proximal width	23.2
	Maximum distal width	22.2
	Minimum diaphysial width	8.6
	SRN.	491
Humerus	SRN.	240

I. *Erinacious europaeus* Hedgehog

Ulna	Breadth of proximal articular surface	5.4
	SRN.	—

J. *Lynx lynx* Lynx

Pelvis	Length of acetabulum	23.0
	Breadth of acetabulum	22.5
	SRN.	—

K. *Castor fiber* Beaver

Femur	Maximum length	116.4	—
	Maximum distal width	39.0	—
	SRN.	459	—
Ulna	SRN.	588	
Tooth	lower molar		
	SRN.	—	

L. *Capreolus capreolus* Roedeer

Scapula	Minimum neck width	18.2			
	SRN.	506			
Patella	Maximum length	27.5			
	Maximum breadth	18.2			
	SRN.	508			
Femur	Proximal anterior-posterior width	45.3			
	SRN.	508			
Mandible	SRN.	222,	222		
Phalanx 2	Maximum length	27.0			
	Maximum proximal width	9.6			
	SRN.	222			
Antler	Shaft fragment, SRN.	687			
	Basal fragment, unshed, SRN.	28			
Metatarsal	Maximum proximal width	20.3			
	SRN.	498			
Astragalus	Maximum length	30.0	28.2	27.0	30.4
	Maximum breadth	19.1	17.1	16.4	18.9
	SRN.	508	689	501	559

Bone	Dimension			
Ulna	Breadth of articulating surface	15.5	13.4	—
	SRN.	H 2	H 7	528
Radius	Maximum proximal width	24.0	26.3	—
	Maximum distal width	—	—	26.5
	SRN.	528	H 2	508
Tibia	Maximum distal width	21.4	25.0	—
	SRN.	210	501	126
Humerus	Maximum distal width	26.1	29.2	—
	Maximum proximal width	—	—	33.0
	SRN.	525	508	508

M. *Martes martes* Martin

Pelvis	Length of acetabulum	9.5	9.0
	Breadth of acetabulum	8.9	8.8
	SRN.	508	523
Mandible	SRN.	507	
Humerus	Maximum distal width	14.1	—
	SRN.	508	523
Tibia	Maximum proximal width	12.0	—
	Maximum distal width	—	10.6
	SRN.	528	523
Ulna	Breadth of olecranon	3.6	
	SRN.	518	
Radius	Maximum proximal width	6.0	
	SRN.	523	
Femur	1. Maximum distal width	14.0	12.4	—
	2. Maximum proximal width	—	—	15.2
	3. SRN.	523	528	508
	1. — — —			
	2. — 14.4 —			
	3. 514 523 514			
Scapula	Maximum length	44.4	42.0	—
	Maximum length of glenoid fossa	8.2	—	8.1
	Maximum breadth of glenoid fossa	6.6	—	6.1
	Minimum neck breadth	9.3	9.1	9.6
	SRN.	515	523	523

N. *Sciurus vulgaris* Squirrel

Pelvis	1. Length of acetabulum	5.8	6.3	5.6	5.4	5.8	5.9
	1. 5.9						
Scapula	Minimum neck breadth	4.6					
	Breadth of glenoid fossa	3.3					
Humerus	Maximum distal width	9.5	—	9.4	—	—	—
	Maximum proximal width	—	—	—	—	5.7	5.7

Bone	Dimension						
Tibia	1. Maximum proximal width	9.3	9.0	8.8	—	—	—
	2. Maximum distal width	—	—	—	5.3	5.2	5.4
	1. —						
	2. 5.3						
Femur	Maximum proximal anterior-posterior width	9.5	—	—	—		
	Maximum distal width	—	8.6	8.7	8.4		
Ulna	Breadth of proximal articulating surface	4.1					
Radius	Maximum proximal width	4.3	4.2	3.8			
	Maximum proximal anterior-posterior width	2.9	3.0	3.2			
Mandible	Length of tooth row	9.4	—				
Cranium	Bi-parietal breadth	24.6	23.5				
	Length of maxilliary tooth row	10.5	9.2				
Phalanx 3	eight specimens						
Fibula	five specimens						
Metapodials	twenty-seven specimens						
Phalanx 1	fourteen specimens						
Phalanx 2	thirteen specimens						
Calcaneum	four specimens						
Astragalus	three specimens						

O. *Cervus elaphus* Red Deer

Humerus	Maximum distal width	52.1	52.9	—
	SRN.	303	295	454
Radius	Maximum proximal width	52.0	—	
	Maximum distal width	—	56.4	
	SRN.	303	547	
Dentition	One lower third molar, SRN.	419		
Tibia	Maximum distal width	42.5		
	SRN	593		
Scapula	Minimum neck breadth	31.0		
	Length of glenoid fossa	39.2		
	Breadth of glenoid fossa	36.0		
	SRN.	294		
Astragalus	Two fragments, SRN.	538,	192	
Phalanx 2	One fragment			
Pelvis	Three fragments, SRN.	294,	210,	318
Magnum	One fragment			
Cuneiform	One fragment			
Lunate	One fragment			
Lateral cuneiform	One fragment			

Appendix two: The Egolzwil 3 Avifauna

U. MØHL
Universitets Zoologiske Museum, København

The following species have been identified:

1. *Anas platyrhynchos*, Mallard. Ulna, left. upper end fragmented. SRN. 500. Humerus, left and right, two proximal ends. SRN. 515.
2. *Anas crecca*, Teal. Coracoid, right, distal end fragmented.
3. *Anas acuta*, Pintail. Coracoid, right, maximum inner length 41 mm, SRN. 515.
4. *Spatula clypeata*, Shoveler. Coracoid, right, maximum inner length, 42 mm, SRN. 551.
5. *Athya ferina*, Tufted Duck. SRN. for all specimens, 251. Scapula, left and right, fragmented. Coracoid, right lower end fragmented, maximum inner length, 45.8 mm. Humerus, left and right. Right hand specimen, maximum length, 86 mm. Ulna, left. Radius, right.
6. *Aythya nyroca*, White-eyed Pochard. Humerus, right, maximum length, 74.3 mm. SRN. 565.
7. *Mergus merganser*, Goosander. Humerus, female, left, SRN. 524. Humerus, female, left, SRN. 507. Humerus, female, right, SRN. 509. Ulna, female, left, SRN. 515. Coracoid, female, right, SRN. 508. Carpometacarpus, female, left, SRN. 507. Carpometacarpus, female, left, SRN. 516. Tibiotarsus, female, right, SRN. — Humerus, dimensions. No. 524 Max. length 91.0, Max. prox. width, 20.5. No. 509 Max. length 90.5, Max. prox. width, 20.0.
8. *Grus grus*, Crane. Ulna, left, fragmentary. SRN. 212. Tarsometatarsus, left. SRN.
9. *Fulica atra*, Coot. Tibiotarsus, left. Maximum length, 92.0 mm, SRN. 529. Tibiotarsus, right, SRN. 508.

As regards no. 515 *A. acuta* and no. 551 *Sp. clypeata*, it should be noted that the identification is not certain, the individual variation being in several cases so great that the indistinct morphological characteristics which might be used as diagnostic criteria, and which with reservation form the basis of the above identifications, are not completely valid.

In concluding, the few bird bones from Egolzwil 3 represent a large number of species, all of which are freshwater birds. Some are permanent residents, such as Mallard or Coot, while others are migratory, such as Crane, White-eyed Pochard and Shoveler.

The bone material however, is far too small to judge the season of settlement; pronouncedly juvenile bones do not occur, whereas bones of migrant species are found. Were the total to represent a particular season, autumn appears to be the most likely.

List of Works Referred to in the Text

1. VOGT, E.: Das Steinzeitliche Uferdorf Egolzwil 3 (Kt. Luzern). Zeit. f. Schweiz. Arch. u. Kunstg., Band 12, Heft 4, 193—215, 1951.
2. HUBER, B., and JAZEWITSCH, W.: Jahrringuntersuchungen an Pfahlbauhölzern. Flora, Band 146, 445—471, Regensberg, 1958.
3. GUTERSOHN, H.: Geographie der Schweiz, Band 1, Jura. Bern, 1958.
4. TROELS-SMITH, J.: Pollenanalytische Untersuchungen zu einigen Schweizerischen Pfahlbauproblemen. In Guyan, W., Das Pfahlbauproblem. Mon. z. Ur- u. Früh. d. Schweiz, XI, 11—57, Schaffhausen, 1954.
5. VOGT, E.: 1951, op. cit.
6. This method has been considered in more detail in «Stock Rearing in Prehistoric Europe», Unpublished Ph. D. thesis by C. F. W. Higham, University of Cambridge.
7. Details of the size of Swiss prehistoric caprovines are contained in «Stock Rearing in Prehistoric Europe», unpublished Ph. D. thesis by C. F. W. Higham, University of Cambridge.
8. BOESSNECK, J., JEQUIER, J.-P., and STAMPFLI, H.: Seeberg Burgäschisee-Süd: Die Tierreste. Acta Bernensia II, Teil 3, Bern, 1963.

9. BOESSNECK, J., JEQUIER, J.-P., and STAMPFLI, H.: 1963, op. cit.
10. KUHN, E.: Die Fauna des Pfahlbaues Obermeilen am Zürichsee. Viertel. Natforsch. Ges. Zürich, 80, 65—154, 1935.
11. HARTMANN-FRICK, H.-P.: Die Tierwelt des Prähistorischen Siedlungsplatzes auf dem Eschner Lutzengüetle, Fürstentum Liechtenstein. Jahrb. Hist. Ver. f. d. Fürst. Liecht., Band 59 (1960), Vaduz.
12. BOESSNECK, J., JEQUIER, J.-P., and STAMPFLI, H.: 1963, op. cit.
13. JENSEN, P.: 1957, Stomach Contents of Danish Red Deer. Danish Review of Game Biology, Vol. 3, Part 3, Copenhagen, 1958.
14. VOGT, E.: Der Stand der Neolithischen Forschung in der Schweiz. In Actes du Symposium Consacré aux Problèmes du Néolithique Européen, 459—488, Prague, 1961.
15. TROELS-SMITH, J.: Ertebølle Kultur — Bondekultur. Aarb. f. Nor. O. og. H., Copenhagen, 1953. BECKER, C.: Stenalderbebyggelsen ved Stora Valby i Vestsjælland. Aarb. f. Nor. O. og. H., Copenhagen, 1954.