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**EXCAVATIONS AT MONTE COVOLO, VILLANUOVA SUL CLISI,
BRESCIA (1972-73)**

Part II

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Introduction

This report comprises the second part of the final report on the excavations at Monte Covolo, Villanuova, Brescia, which were carried out between 1972 and 1973¹. The contributions include the remainder of the material culture, the environmental, economic and dating evidence and the final discussion and conclusions. The collaborators with director of the excavation, Dr. L.H. Barfield of Birmingham University, are Dr. A. Voorrips and Dr. J.P. Pals of the University of Amsterdam, and Dr. G.W.W. Barker and Dr. J.T. Chesterman of the University of Sheffield.

1) Part I was published in the "Annali del Museo" di Gavardo, no. 12, 1975-76, 7 - 149.

CHAPTER I

CERAMIC, BONE, STONE AND METAL ARTIFACTS

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a - SPINDLE WHORLS AND OTHER CERAMIC ARTIFACTS

(figs. 1 and 2)

A total of sixteen clay spindle whorls were recovered and can be attributed to the main phases of settlement as follows: White Ware - 2, Bell Beaker - 5, Early Bronze Age - 9².

The whorls, ordered, by period, are listed as follows:

White ware

- F1 - Small fragment, probably from a spindle whorl, flattened section, buff-red clay, flint filler, S3 E1 (12).
- F2 - Large, thick whorl, originally about 5 cm. in diameter, flattened section, buff grey ware, S3 E1 (15).

Beaker

- F3 - Large biconical whorl, c. 6 cm. diameter, grey brown clay with white rock filler, N3 W2 (6).
- F4 - Biconical whorl, brown-buff clay, white filler, Site B, (3).

2) All artifacts are from site A unless otherwise stated.

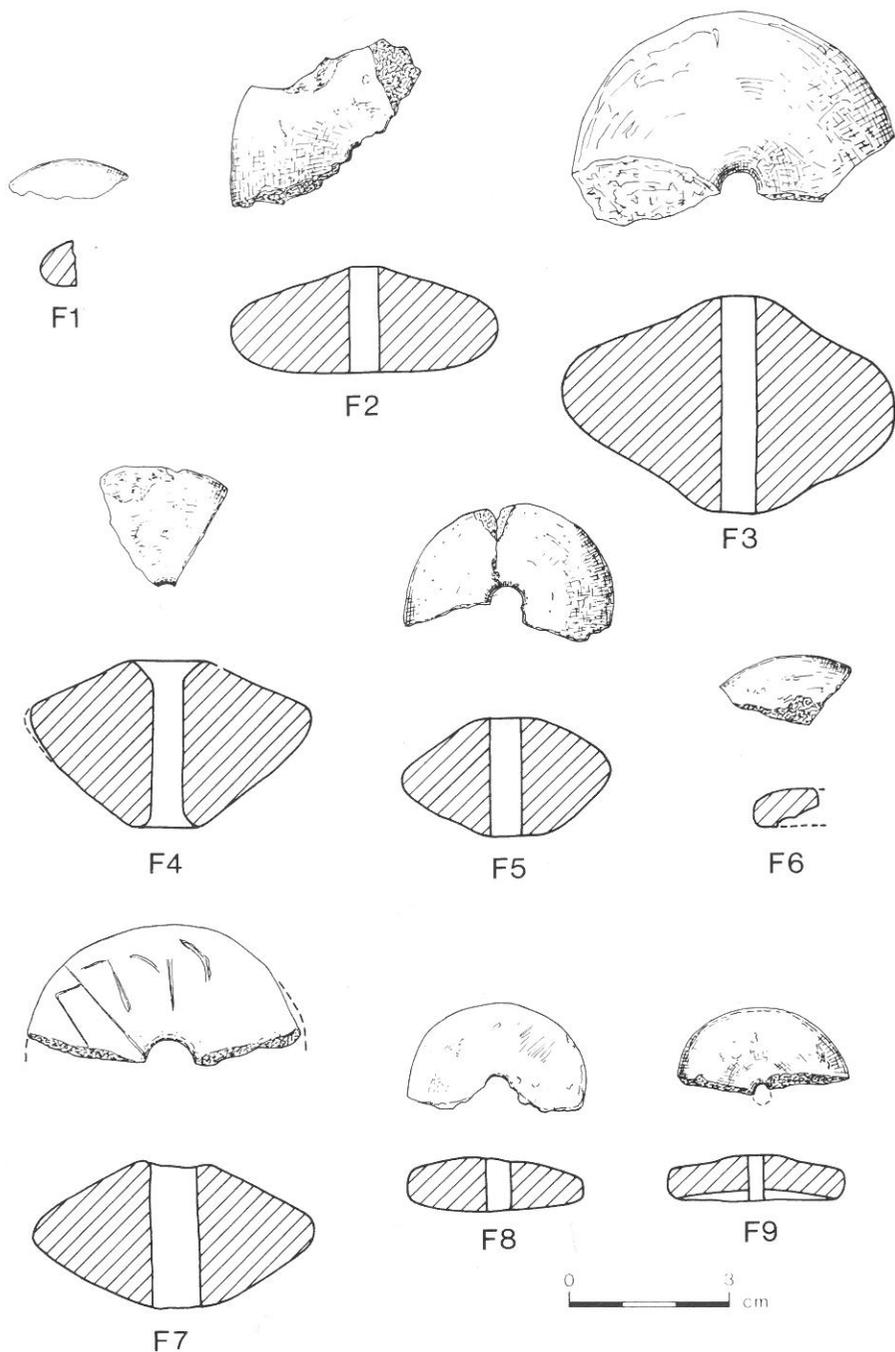


Fig. 1 - Monte Covolo. Spindle whorls: F1 and F2, White Ware; F3 - F7, Bell Beaker; F8 and F9, Early Bronze Age.

- F5 - Biconical whorl, c. 4 cm. diameter, brown-buff ware, white rock filler, N4 W1 (10).
- F6 - Flat whorl with slightly angular section, grey brown clay, diorite filler, S2 E2 (6).
- F7 - Large, biconical whorl, surface roughly incised, red-buff clay, diorite and flint filler, S2 W3 (8).

Early bronze age

- F8 - Flat sectioned whorl, black-brown clay, white rock filler, N1 E2 (4).
- F9 - Whorl with slightly convex, flattened section, dark grey clay, white rock and flint filler, S2 E4 (5).
- F10 - Whorl with bell-shaped section, brown-black clay, white filler, S2 E2 (4).
- F11 - Flat sectioned whorl, red black clay, mica filler, S3 E2 (6).
- F12 - Large, thick, flat-conical whorl, surface shows grass impressions, buff clay, flint filler, N3 W1 (2).
- F13 - Whorl made from potsherd with angular outline, buff brown clay, N2 W2 (2).
- F14 - Flat sectioned whorl, black and red brown clay, N2 E2 (4).
- F15 - Fragment of small whorl, buff-brown clay, flint filler, S2 E2 (5), (not illustrated).
- F16 - Thin flat whorl, brown grey clay, flint filler, SW (2)/(3).
- F17 - Unperforated disc, made from a potsherd, S1 E (3).

Discussion

One of the two White Ware whorls is distinguished by being large and thick, in fact larger than any of the known Italian Neolithic whorls such as those from Rivoli, (Barfield and Bagolini 1976 fig. 50a) and other sites (Cornaggia Castiglioni 1955).

Of the five Beaker whorls, four are large and biconical and only one flattened in section. This predominance of the biconical form contrasts again with the known range of Neolithic spindle whorls (e.g. Barfield and Bagolini 1976; Cornaggia Castiglioni 1954-55), which are flat and lenticular in section. It can be suggested therefore that the biconical whorl represents the appearance of a new type in the cultural development. A Beaker whorl from the site at Sant'Ilario d'Enza (RE), is the only other Beaker whorl from Italy (Barfield *et al* 1975 fig. 7, 11). This has a thick rounded section, and shows some affinity with the Monte Covolo whorls. On other Beaker settlements in Western Europe we can recognise similar thick, biconical whorls as for example at Saint-Come-et-Maruejols (Gard) in Southern France (Roudil *et al.* 1974 fig. 36).

The Early Bronze Age whorls from Monte Covolo are all flat or lenticular in cross-section conforming to the dominant type in other Polada settlements. Thicker

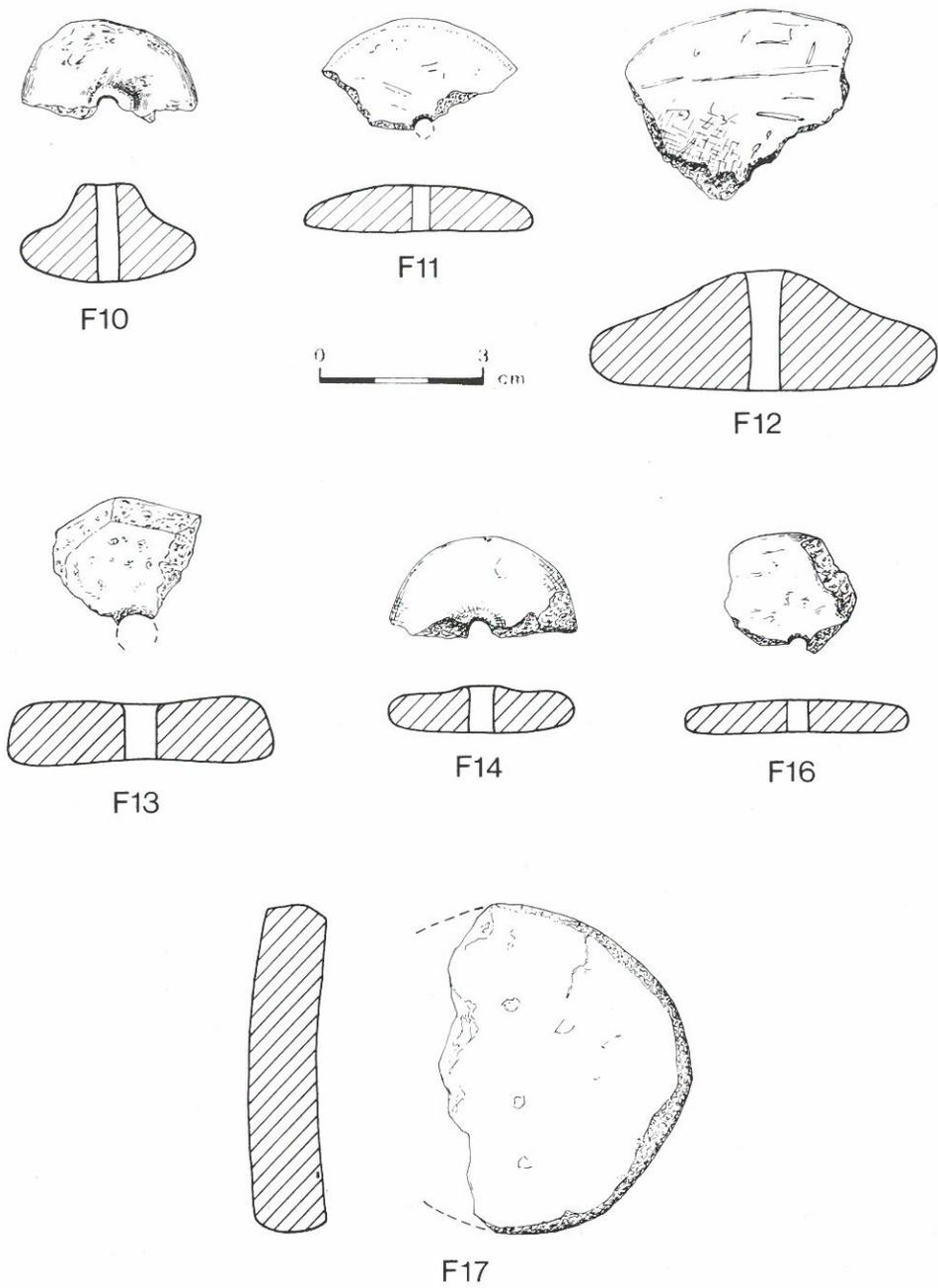


Fig. 2 - Monte Covolo. Spindle whorls and other ceramic artifacts: all Early Bronze Age.

and biconical forms are however sometimes also present on other sites of this period, e.g. Ledro (Rageth 1974). One of the Bronze Age whorls F13, has been made from a potsherd.

The potsherd disc. F17, may have been a counter or lid.

b - PERFORATED TEETH, BONE BEAD AND PENDANT (fig. 3)

A fine bone pendant was found in the Neolithic levels and three perforated teeth and a bone bead were recovered, from Bell Beaker levels.

Neolithic

B1 Bone pendant. This is very finely carved and consists of a globular extremity, three pronounced central rings and a round perforated head. The surfaces are well polished and smooth. It was found in the lower levels of the Neolithic deposit, S3 E2 (19).

Beaker

B2 Canine tooth of dog or wolf; S3 E1 (10).

B3 Canine tooth of dog or wolf; N4 W2 (10).

B4 Molar of dog; 2 W3 (6).

B5 Bone bead made from the leg bone of a bird showing superficial cut marks; N2 W1 (8).

The pendant can be compared with a number of pendant types which occur over a wide area of south-western Europe in the third millenium B.C. During the Late Neolithic period in Northern Italy similar, but much cruder, segmented pendants are known from other Lagozza settlements, as for example at Lagozza itself, in stone (Cornaggia Castiglioni 1957). Grooved antler pendants are also typical of Late Cortailod and Chamblandes sites in Switzerland (Sauter and Gallay 1969 fig. 12 and 22). Closer parallels for the Monte Covolo pendant are however found in Copper Age contexts at the end of the third millenium. Closely comparable, especially as regards the high quality of workmanship, are grooved pendants, *pendeloques à pointe*, from Copper Age burials in the south of France. Examples from dolmens in the department of Hérault have been found associated with pottery of Ferrières type (Audibert 1962 fig. 4, 7-8) and they are also present in the Cévennes (Lorblanchet 1968 fig. 2 (7) and 3 (2)). These, although similar, are not however identical.

In spite of these similarities with pendants of the Copper Age, the Monte Covolo

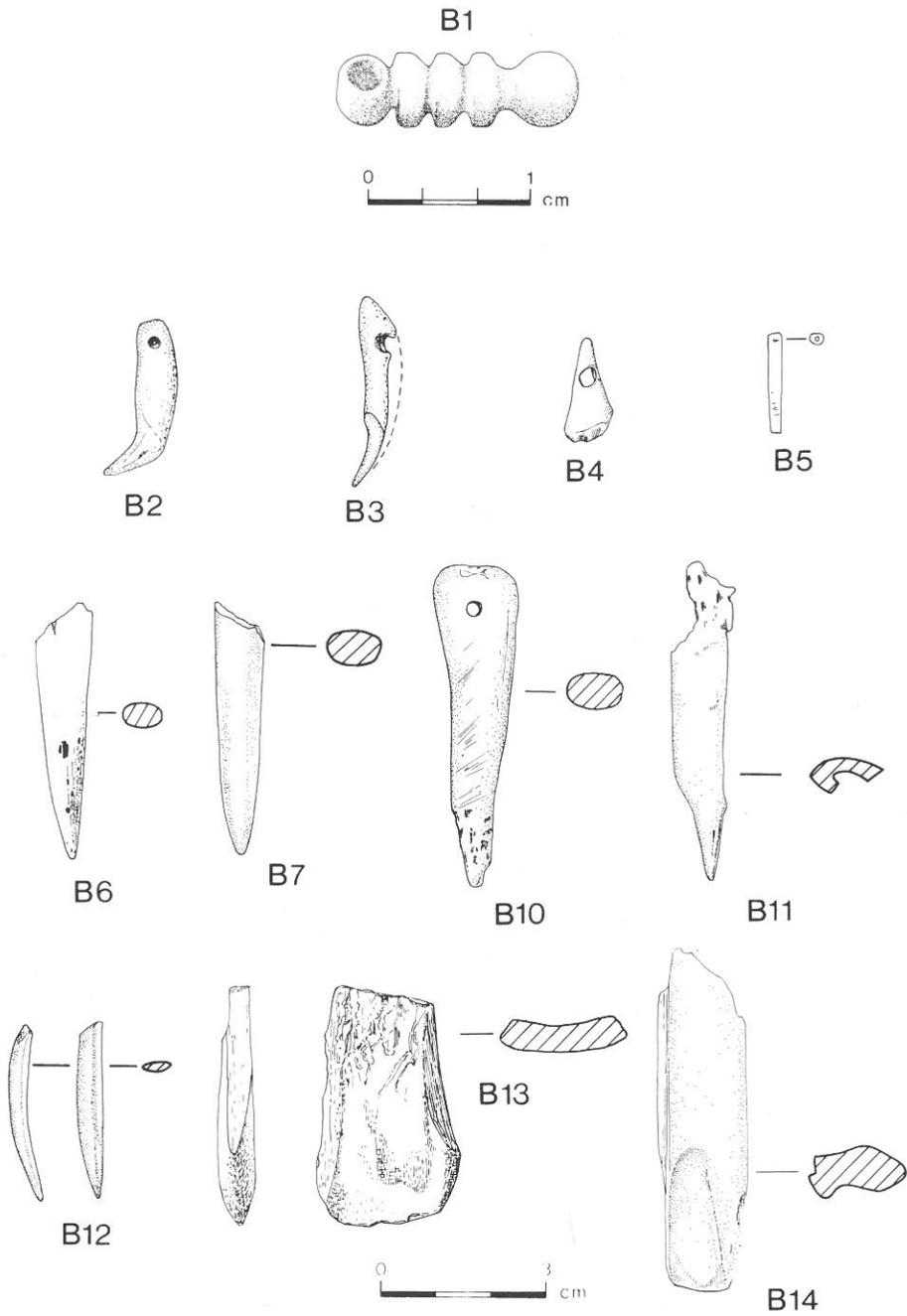


Fig. 3 - Monte Covolo. Tooth and bone artifacts: B1, Neolithic; B6-B14, White Ware; B2-B5, Bell Beaker.

example would appear to be earlier, since its stratigraphical position deep in the Neolithic levels suggests that it was not intrusive.

Although perforated teeth occur in Neolithic contexts, these ornaments are especially abundant in the period from Copper Age to Early Bronze Age on sites along the alpine fringe in Italy (Barfield 1978). It should also be noted that the only remains of bear from the site were in the form of teeth, one from Neolithic levels and three from the Bell Beaker horizon. Most probably these were hunting trophies or else used as ornaments.

c - BONE AND ANTLER ARTIFACTS (figs. 3 and 4)

Numerous complete and fragmentary bone tools were found in White Ware, Beaker and Early Bronze Age levels. The majority of these are points; the other artifacts include bone chisels, a pin, and an antler ring.

White ware

- B6 Broken bone point, S3 W1 (9a).
- B7 Broken bone point, S3 E2 (14).
- B8 Tip of bone point, S1 W2 (10) (not illustrated).
- B9 Tip of point, S2 W2 (9a) (not illustrated).
- B10 Point made from long bone with perforated distal end, tip very worn, S1 E4 (6).
- B11 Point made from long bone fragment, S1 W3 (11).
- B12 Small point made from split tooth or tusk, N2 W3 (11).
- B13 Bone chisel made from large long bone (*Bos?*) highly polished, S3 E1 (11).
- B14 Bone chisel made from metapodial bone (*Bos?*), N1 W3 (12).

Bell beaker

- B15 Point made from long bone, S2 E4 (6).
- B16 Rough point made from long bone fragment, N3 W2 (6).
- B17 Broken point with rounded section, S3 E3 (10).
- B18 Bone point made on long bone, sub-rectangular section and surfaces worked all over and polished, S3 E4 (9).
- B19 Point made on long bone, sub-rectangular and rounded section, surfaces worked all over, S3 W3 (8).
- B20 Point made from long bone, sub-rectangular section, wear over whole surface, S3 E4 (6).
- B21 Tip of point, S2 E2 (12) (not illustrated).

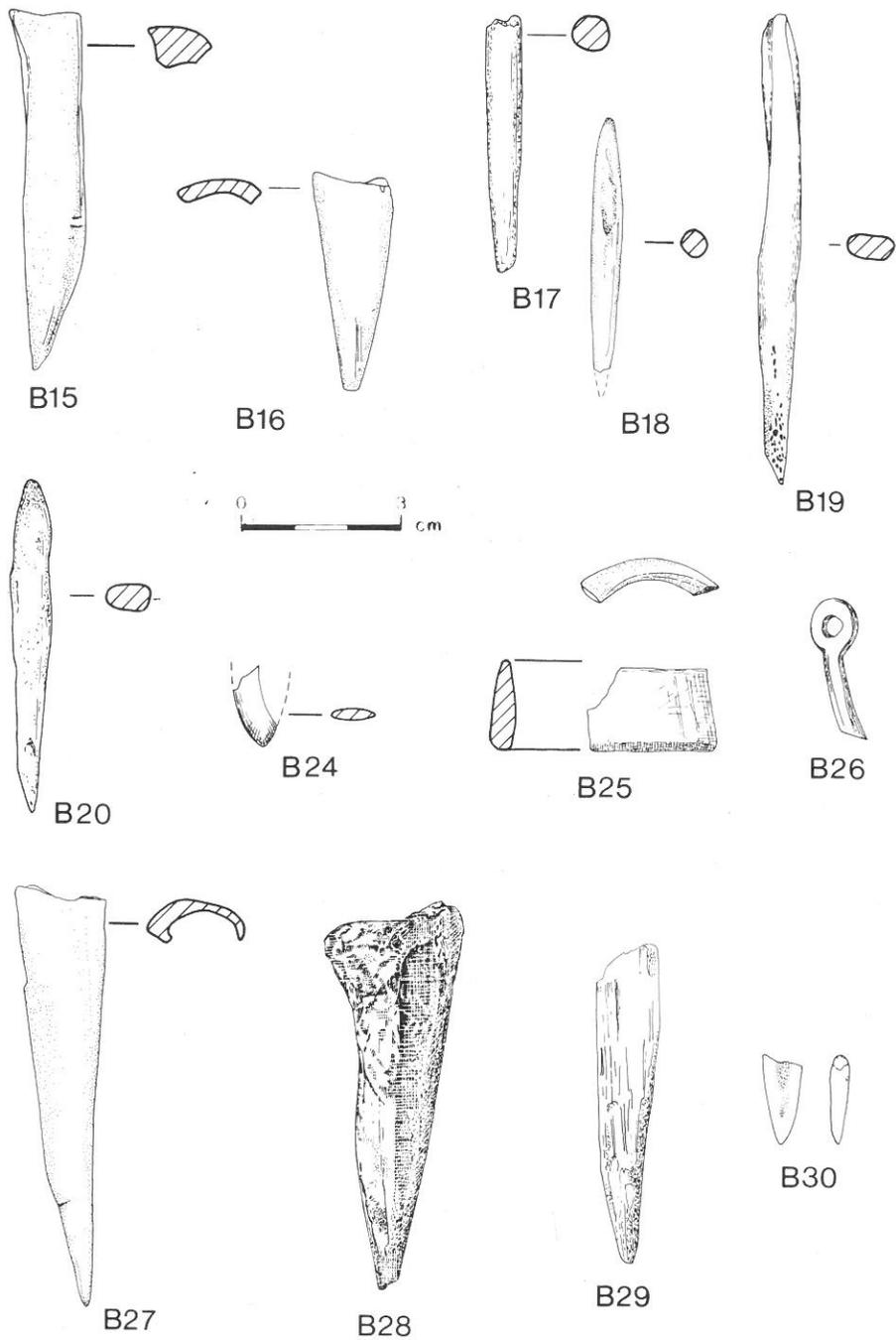


Fig. 4 - Monte Covolo. Bone artifacts: B15 - B25, Bell Beaker; B26 - B30, Early Bronze Age.

- B22 Tip of point, S3 E1 (9), (not illustrated).
- B23 Tip of point, S2 W3 (8a) (not illustrated).
- B24 Tip of large point, highly polished, S3 E4 (6).
- B25 Fragment of ring of bone or antler, diameter 4 cm., N1 W3 (6).

Early bronze age

- B26 Pin with perforated, flat, disc head and curving shaft, NE (4).
- B27 Point made from long bone, N2 W1 (4).
- B28 Point made from metapodial bone, S1 E1 (3).
- B29 Large point made from long bone, N3 W2 (2).
- B30 Tip of bone point, N2 W2 (4).

Discussion

Bone tools are absent from the Neolithic levels.

The only two "chisels" of bone from the site were found in the White Ware layers (B13, B14); these are a type which occur in Late Neolithic contexts, e.g. Rivoli (Barfield and Bagolini 1976 fig. 119, B27 - B31) and may have been used for skinning animals. It is not a tool type characteristic of later contexts and is not found on the Bronze Age site of Ledro.

Points make up the main bulk of the bone equipment from the White Ware to Early Bronze Age levels. These are nearly all made from large long bone fragments and it would appear to be significant that points made on split metapodial bones of small animals, sheep or goat, are absent. The latter tool type is very distinctive of Neolithic sites in Italy, being used until at least the latest phase of the square mouthed pottery culture, as at Rivoli (Barfield and Bagolini 1976 fig. 118, B9 - B18). It is a type that is unusual on Early Bronze Age sites and is not present for example at Ledro.

The points, worked over most of their surfaces, on long bone fragments in the Beaker layers can be compared with those from the Beaker settlement of Sant'Ilario (Barfield *et al.* 1976 fig. 7,6 - 8).

The perforated point, B10, from the White Ware levels can be compared with a point from the Copper Age site of Le Colombare (Zorzi 1960 fig. 22).

The bone or antler ring from N1 W3 (6), the main Beaker horizon, can be compared with rings found in Polada, Early Bronze Age contexts, as for example at Ledro (Rageth 1974 Taf 94 (21 - 24)). This is generally regarded as an Early Bronze Age type in Central Europe where it is held to be characteristic of the A1 phase of the Early Bronze Age (e.g. Gally and Gally 1968). They have been found also in Beaker contexts in Western Europe at Págo de la Pevia in Spain (Malaquer de Motes 1960) and Collonges-Bévy in France. In the latter case Treinen interpreted the find as evidence of the

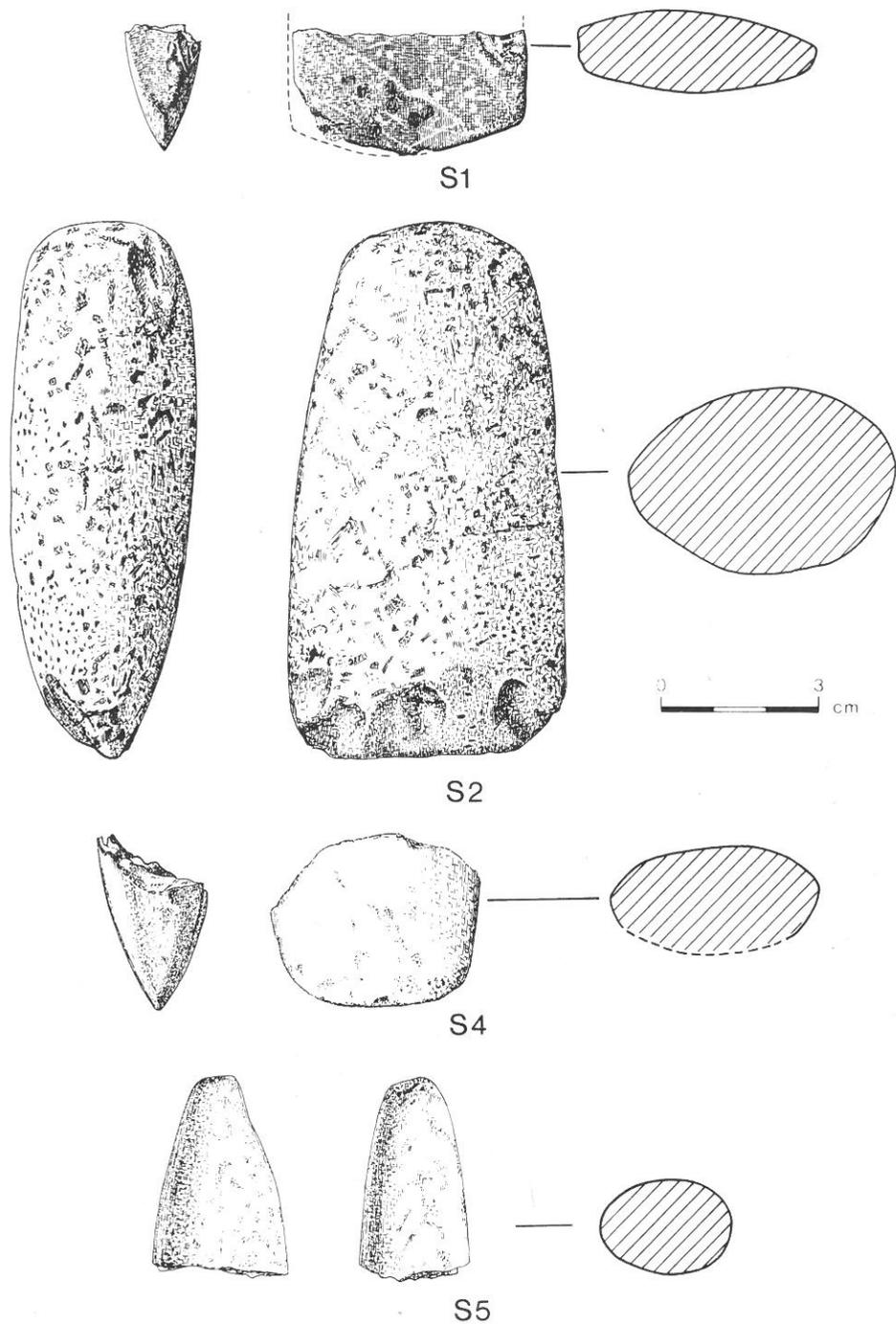


Fig. 5 - Monte Covolo. Stone axes: S1, Neolithic; S2, Bell Beaker; S4 and S5, Early Bronze Age.

contemporaneity of a later Beaker phase in France with the Reinecke A1 in Central Europe (Treinen 1970 p. 94). The Monte Covolo example however would seem to be earlier than Reinecke A1 to judge from its stratigraphical relationship with the overlying Early Bronze Age level.

The bone pin with a ring head is a type widespread in Early Bronze Age contexts of groups related to the Únětice tradition, similar pins being found on other Polada sites, e.g. Ledro (Rageth 1975 Taf. 75, 1 - 8).

At Monte Covolo we can see evidence of the radical change in bone tool types which comes about in Northern Italy between the end of the Neolithic and the start of the Early Bronze Age. This change may have taken place at the start of the Beaker phase, although clear evidence for this is not preserved at Monte Covolo. The White Ware levels contain bone chisels still in the Neolithic tradition, while at the Copper Age settlement of Le Colombare metapodial points are still in use. With the Beaker period, points made on *ulna* are the fashion as attested at Sant'Ilario (Barfield *et al* 1975 fig. 7, 4). These *Ulna* points remain very distinctive of the Early Bronze Age as for example Ledro and Cattaragna (Rageth 1974 Taf. 99; Aspes 1972 Tav. VIII).

d - STONE AXES

One complete or five fragmentary stone axes were found on Site A and one fragment on Site B.

Petrological identification by thin section was made of all pieces, nos. 1-2 and 4-6 by Mr. W. Hardie of the Geology Department, Birmingham University and no. 3 by Dr. A. Wooley of the British Museum.

Neolithic (fig. 5)

S1 Blade of an axe with a flat rectangular cross-section. Highly polished with sharp cutting edge. Made in a very attractive dark green rock with light green veining. In addition the rock is speckled with pinkish white crystals of *zoisite* and larger angular red-brown *garnets*. This rock was certainly selected for its attractive colouration in addition to its functional properties. Petrological identification: A contact altered limestone (skarn), containing relatively large garnets and smaller scattered crystals of *zoisite* dispersed throughout a matrix of randomly oriented *actinolite* crystals. Also present are many small crystals of a deep reddish brown *rutile*. S3 E1 (19).

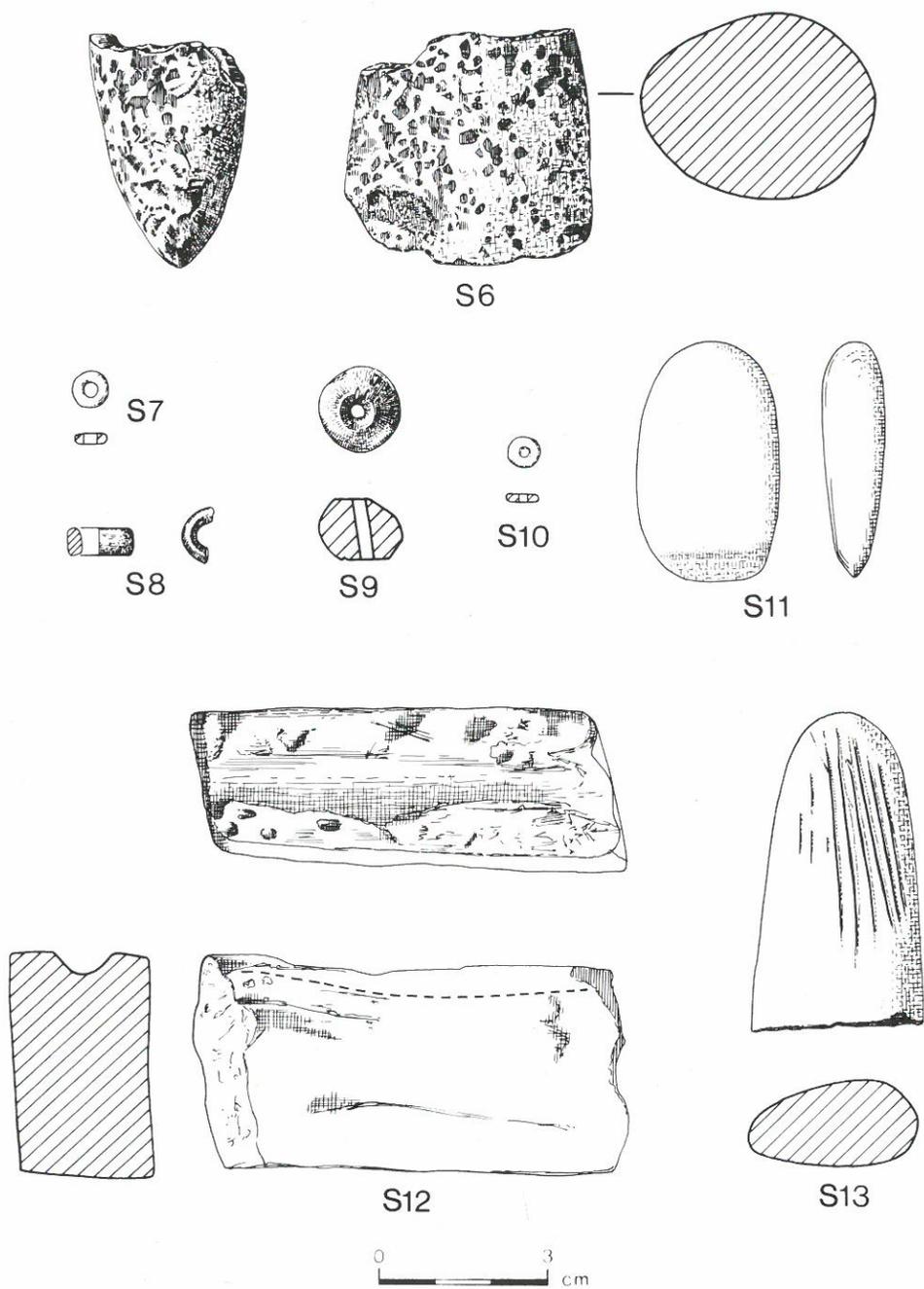


Fig. 6 - Monte Covolo. Axe, beads and miscellaneous stone equipment: S7, Neolithic; S11, White Ware; S6, S12 and S13, Bell Beaker; S8, Bronze Age; S9 and S10, unstratified.

Bell beaker (fig. 5)

- S2 Plump axe with oval cross-section, flattened butt and blunted cutting edge. Light grey green rock speckled with dark green hornblende crystals. Petrological identification: porphyritic microdiorite with scattered hornblende phenocrysts. S3 E1 (10).
- S3 Chip from the cutting edge of an axe. Petrological identification: jadeite, (not illustrated).
(N.B. This identification is based on a thin section. Chemical analysis is also being undertaken).
This piece came from the very lower level of the Bell Beaker deposit immediately above White Ware levels. S3 E3 (10).

Early bronze age (fig. 5)

- S4 Cutting edge of what must have been a fairly plump axe. Grey greenish mottled rock. Petrological identification: Acid pruoclastic lithic tuff much impregnated with calcite and containing scattered quartz and feldspar crystals. S3 E2 (2).
- S5 Pointed butt of oval sectioned axe. Grey green rock, Petrological identification: Contact altered limestone (*skarn*), consisting largely of a clino-pyroxene (probably *diopside*), also scattered grains of pink *garnet* and iron ore. NE (1).

Unstratified (fig. 6)

- S6 Blade of a plump axe with oval cross-section. Greenish white mottled rock with dark inclusions. Petrological identification: Contact altered limestone (*skarn*), consisting very largely of randomly orientated crystals of tremolite, containing larger scattered porphyroblasts of *monticellite*, also very variable concentrations of iron ore. Site B, unstratified - but probably to be associated with Bell Beaker horizon.

Of the morphology of the axes little can be said on account of the fragmentary condition of the pieces. It can be commented that the plump forms, nos. 2, 4 and 6 are more typical of the Copper Age and onwards and in contrast with flatter forms of the Neolithic. Nos. 2 and 4 are indeed so thick and no. 2, especially, so blunt that it is probable that they were more likely to have been used as wedges.

Axe fragment S1 is made of particularly attractive material being a light veined green, flecked with pink crystal and incorporating some larger garnets. The axe has

clearly been manufactured so that the garnets show prominently along the cutting edge. Parallels for this use of crystals and also deliberately incised geometric shapes along blade edge of axes are found at the Rocca di Rivoli (Barfield and Bagolini 1976 fig. 123, S19) and Alba (Lo Porto 1956 fig. 10).

The source of the rocks has not yet been determined, although the jadeite axe is certainly not of local Brescian origin but probably comes from the Piedmontese Alps. It is hoped in respect of the other axes that we will be able to resolve the question as to whether the axes obtained locally in glacial deposits or whether they were extracted from the original source of the rock in the Alps, once a fuller programme of analysis has been completed.

e - STONE BEADS (fig. 6)

The following beads were recovered from the excavation:

Neolithic

S7 Small disc shaped white calcite (marble) bead, diameter 6 mm; thickness 1,75 mm, worn and rounded; S2 W2 (12).

Bronze age

S8 Black cylindrical steatite bead, broken, perforation rounded diameter 10 mm, thickness 5 mm; S1 W4 (2).

Unstratified

S9 Irregular, slightly biconical, blank stone bead (steatite?), perforation biconical and cylindrical, diameter 14 - 15 mm, thickness 10 mm; SW sector, unstratified.

S10 Small disc shaped white calcite (marble) bead, diameter 6 mm thickness 1.50 mm, worn and rounded almost identical to no. 1; N1 W2 or 3, unstratified.

Discussion

The marble beads are of a type which is more characteristic of the Copper Age period in Northern Italy. Similar ones were found with the burials at Sasso di Manerba, a site which has affinities with the Remedello cemetery (Barfield 1978), and other beads are known from sites of the Civate group in the Lombard Alps (e.g. Bùs de la Scabla, Buco

della Strega, Buco del Corno, Buco della Sabbia and Bùs de l'Andrea) (cf Barfield 1978). This type of bead survives also into the period of the Early Bronze Age, as at Lavagnone (Brescia), (Perini 1976). Bead no. 1 is smaller than the average sizes from Sasso where average diameter is 7 - 8 mm and thickness c. 2 mm or Tana Bertrand where sizes are c. 6 mm diameter and 4 thick. Bead no. 4 is closer in size to these other beads, however stone beads are known from neolithic contexts in Italy as for example the steatite beads from Chiozza (Bagolini and Barfield 1970).

It should be noted that both the marble beads were recovered from sieving.

f - MISCELLANEOUS STONE ARTIFACTS (fig. 6)

White ware

S11 Pebble with sharpened edge. A natural rolled pebble of fine grained rock with sharpened edge. Perhaps used as a wedge. S1 W3 (11).

Bell beaker

S12 Grooved stone. Block of purple coloured sandstone with wide surface groove. For finishing tools of wood or bone. S2 W2 (8).

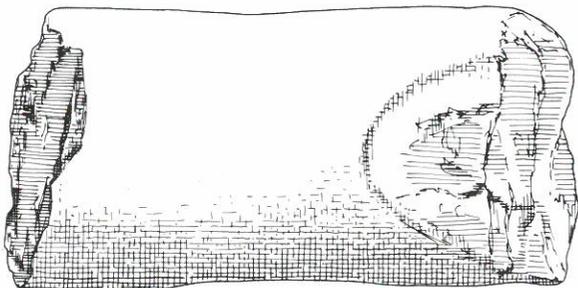
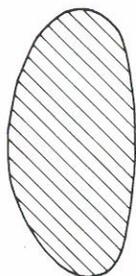
S13 Grooved pebble. Broken pebble of fine grained rock with several deep narrow grooves on one surface. The grooves would appear to be too fine for working of any material except metal. It was probably used therefore for sharpening metal awl points. Site B (4).

The sharpened pebble, S11, can be compared with a similar artifact from the Beaker site of Ochtendung in the Rheinland, (Fehr 1978 fig. 12, 14).

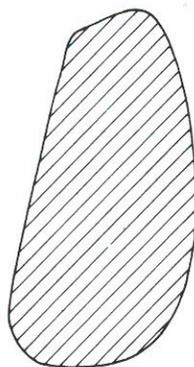
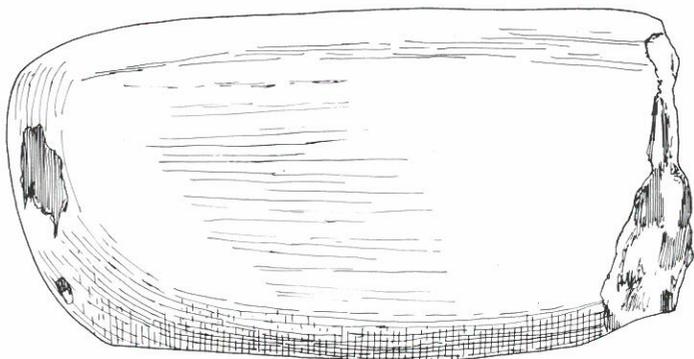
g - QUERNS (fig. 7)

34 mainly fragmentary quern stones were recovered from Site A, throughout the deposit: two are from Neolithic, eight from White Ware, nine from Bell Beaker, seven from early Bronze Age, two from the Early and Middle Bronze Age levels. Fourteen of these were the upper rubbing stone, and of these seven had also been used as hammerstones or crushers at the extremities. Nineteen were the lower grinding stone.

The dimensions of the intact stones are varied; the largest (unstratified) base stone measuring 36 x 25 cm. Fig. 8 shows a plot of the eight complete querns recovered.



S14



S15



Fig. 7 - Monte Covolo. Quern stones: S14, Bell Beaker; S15, Neolithic.

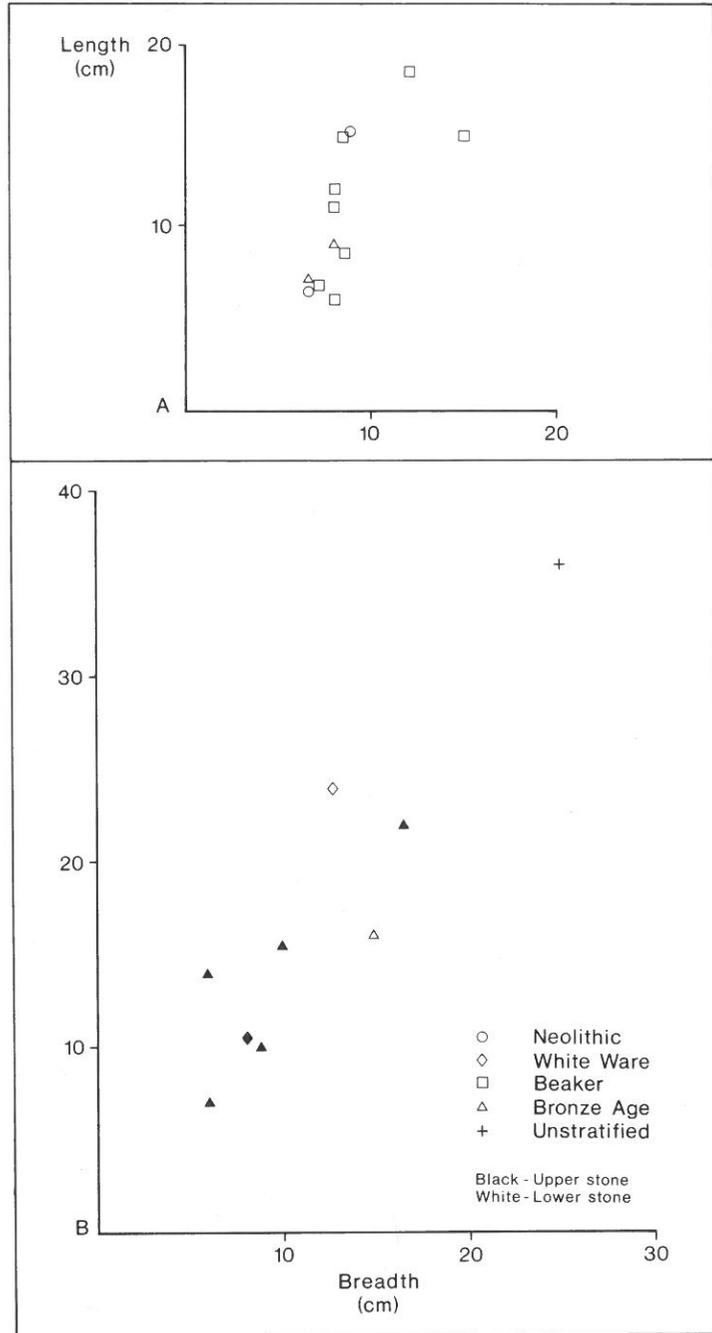


Fig. 8 - Monte Covolo. A, dimensions and hammer stones. B, dimensions of complete quern stones.

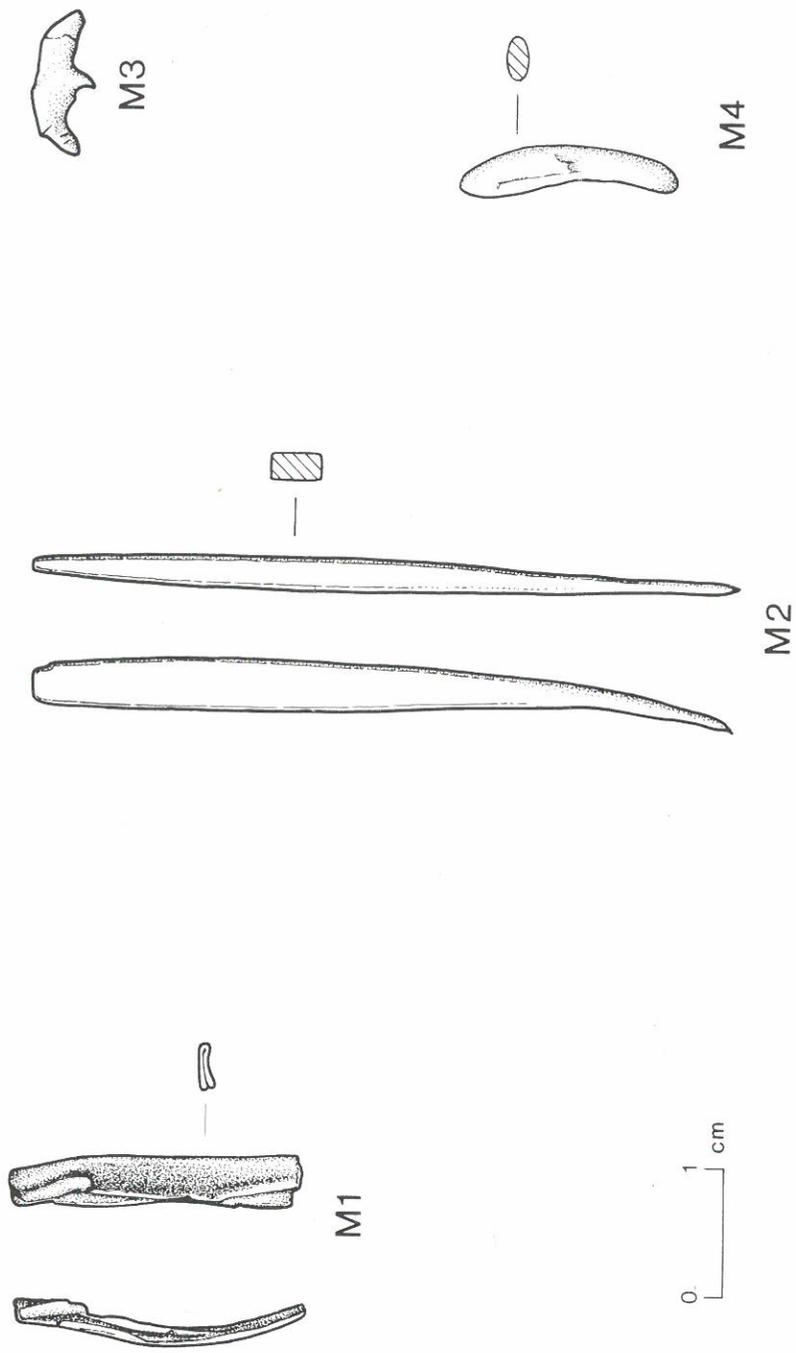


Fig. 9 - Monte Covolo. Metal objects: M1, White Ware; M2 and M3, Bell Beaker; M4, Early Bronze Age.

The querns were all made from natural glacially rounded boulders of a variety of locally available hard rocks, most usually of a quartz-porphory, but also of micaceous rocks and sandstone.

The number of quernstones, in all levels, indicates that the grinding of cereals was carried out on the site at all periods.

h - HAMMER STONES

Fourteen hammer stones made from unmodified natural round or oval pebbles were recovered. Two are from Neolithic, eight from Beaker, and two from Early Bronze Age levels on site A. Two were unstratified, one from site A, the other from site B. Hard rocks were used, mainly quartz porphory and some quartzite. A plot of the range of sizes is shown in fig. 8A. Two stone with shallow, hammered hollows came from site A, both from Beaker levels. These may have been used for preparing food.

It should be noted that seven of the quern stones had also had their extremities used for hammering or crushing.

i - METALLURGY (fig. 9 and Pl. 1)

Only a few small metal items were found on site A.

White ware

M1 Small strip of thin sheet copper folded double. The straight edge of the fold suggests that it might have been folded intentionally, perhaps as ornamental edging on cloth, or even strung on a thread; S3 W1 (10).

Bell beaker

M2 Fine copper awl with a rounded heel and rectangular cross-section; N3 W2 (7).

M3 Small copper object, irregular and curved with a central projection; either waste copper or less probably part of an artifact; S2 W2 (8).

Early bronze age

M4 Short copper rod; either waste metal or part of an artifact; Bronze Age level.

M5 and M6 Two droplets of copper alloy; S1 E1 (3) and S2 E4 (4).

Table 1 — Analysis of metal objects from Monte Covolo.
ELEMENTS DETECTED

Object	Ni	Cu	Zn	As	Pb	Au	Bi	Ag	Sn	Sb	Fe
White Ware											
M1 A S3 W1 (10) Strip	-	+++	-	-	-	-	+	-	-	-	+
Beaker											
M2 A N3 W2 (7) Awl	-	+++	-	-	-	-	-	++	+	++	-
M3 A S2 W2 (8) Waste	-	+++	-	-	-	-	+	-	-	-	-
Early Bronze Age											
M5 A S1 E1 (3) Droplet	-	+++	-	-	-	-	+	++	+	++	+
M6 A S2 E4 (4) Droplet	-	+++	-	-	-	-	+	++	+	++	+
Early and Middle Bronze Age											
M7 A S3 E2 (2) Droplet	-	+++	-	?+	-	-	+	++	+	+	+

Table 2 — Analysis of metal awl from Bell Beaker levels
at Monte Covolo

A N3 W2 (7) awl	
Ni	< 0.03%
Cu	
Zn	< 0.05%
As	0.21%
Pb	< 0.05%
Au	< 0.05%
Bi	< 0.05%
Ag	2.0%
Sn	< 0.05%
Sb	2.2%
Fe	< 0.05%

Early and middle bronze age

M7 Single droplet of copper alloy; S3 E2 (2).

The provenanced metal finds from the Bronze Age levels were all from the South East sector; a concentration which may or may not be significant.

Analyses were carried out on these objects by Ethel Eaton at the Research Laboratory of the National Museum of Scotland. All objects were subjected to XRF analysis the results of which appear in table 1.

Analysis show that traces of tin occur only in the awl (0.05%) and in the Bronze Age droplets.

The awl was the only object to be subjected to a more detailed quantitative analysis (table 2) which showed a 2% presence of silver. Silver is also present in substantial amounts in all the other metal items from the Bronze Age levels. The presence of silver in copper ores in the Veneto is recorded by Biringuccio and this probably indicates a local source for this metal. The nearest copper deposits are found in Val Sabbia not far from Monte Covolo (Braunstein 1965).

Few parallels exist for the sheet copper strip from the White Ware levels. The copper awl is of a standard type from the Beaker period.

The metal droplets demonstrate that some form of metallurgy was practised on the site both in the Beaker phase and the Early Bronze Age.

CHAPTER II

HUMAN BONES

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Frangmentary human bones were recovered on site A from the following layers: Neolithic levels, S2 W2 (13B), S1 W2 (12); White Ware, S3 E1 (14) and Early Bronze Age level, S3 E1 (4). The bones were thus effectively scattered throughout the sequence.

Neolithic

Right Fibula, S2 W2 (12B)

Two pieces, one the lower anterior part of a shaft, and the other one-third of the circumference of a shaft, probably part of the junction between the upper two-thirds and lower one-third.

Right Tibia, S2 W2 (13B)

Three parts, and several small fragments, of a tibia broken in antiquity. One fragment shows a nutrient artery medullary foramen 0.5 cm. from lower end, with the markings of the line between flexor digitorum longus and tibialis posticus very indistinct.

Right femur, S1 W2 (12)

Two pieces broken in antiquity comprising the head and part of the subcapital neck, and a piece from top of the great trochanter to the lowest part of the shaft. Part of neck is missing so it is impossible to be certain that these two parts came from the same individual, but the probability is high. The markings on the great trochanter, gluteal ridge, spiral line, and linea aspera are poor, suggesting a female, though this cannot be confirmed by the head which is too damaged for assessment. The bone for size matches

that of the right humerus found in S3 E1 (4). It is an adult bone as the upper epiphysis is completely fused. The Platymetric Index is 66.6 (Fe D₁ 22 mm Fe D₂ 33 mm). Since this is exceptionally low, X-Rays were taken to see the internal structure of the bone, especially in the region of the lesser trochanter. This revealed a typical female pattern of cancellous tissue. The cortex is thicker than normal and the trochanter is relatively large and well formed.

White ware

Right Os Coxae, S3 E1 (14)

Five pieces, including a fragment of the right ilium involving most of great sacro-sciatic notch, and of the acetabulum and up to posterior part of inferior curved line and the right ischium. The greater sacro-sciatic notch is of female type, the muscular markings poor and the pre-auricular groove is faint. The femur head from the neolithic level, S1 W2 (12), fits the acetabulum.

Early bronze age

Right Humerus, S3 E1 (4)

Two pieces from same shaft from an individual with an estimated height of 160 cm \pm 8 cm and apparently of small build. The muscle insertion of deltoid and coracobrachiales are poorly marked and suggest that the sex is female. In size it matches the tibia found in neolithic level S2 W2 (13B).

Discussion

Although these bone fragments were scattered throughout the sequence, it is possible that they all belonged to a single individual, an adult female about 160 cm in height. The fibula and tibia fragments from S2 W2 (13B) are physically close to the femur fragments from S1 W2 (12) and it may be that a Neolithic burial had been disturbed in this area. However the fact that the other bone fragments from higher levels are also from higher up the slope in the south east sector would make it improbable that these originally came from the lower levels of the south west sector. It would therefore seem more probable, if all the bones belong to the same individual, that are all derived from a deposit higher up the slope.

The presence of exceptional platymeria in the femur is unusual and it should be noted that this is a feature which might be helpful in the recognition of ethnic groupings.

CHAPTER 111

CARBONISED SEEDS, FRUITS AND CHARCOAL

J.P. PALS AND A. VOORRIPS¹

Field and laboratory procedures

During the excavation it was the policy to take a sample of one bucketful of earth, approximately 50 litres, from each level of each metre square and process it by water flotation. Although this aim was not totally adhered to on account of the time taken to process each sample, about one-hundred-and-forty buckets were processed during the course of the excavation. Double samples were also taken from some squares.

The flotation equipment employed for the flotation was constructed on the site from locally available supplies. A large plastic basin, containing the earth sample and water, was tilted at an angle so that surface water would pour from a spout into a 500 micron sieve. A hand pump was used for filling the basin as well as supplying air for frothing the water. Washing-up detergent was used as a frothing agent and an irrigation canal flowing past the site was used as a water source. The residue from the basin was subsequently wet sieved².

The use of an impure water source meant that recent organic debris was often present in the water, this however was uncarbonised and together with modern rootlets was extracted from the sample in the laboratory with the help of a stereo microscope.

1) Albert Egges Van Giffen Institute for Pre- and Protohistory, University of Amsterdam. This article should be read in conjunction with a recent publication by the two authors (Pals and Voorrips 1979).

2) We are very grateful to Mr. J. Lewthwaite for his help in designing and operating the flotation equipment during the excavation.

Table 3 — MONTE COVOLO
Seeds and fruits

Period	Early Bronze Age					Tot.	s.fr.														B			
	s2e2	s2e3	s2e4	s3e1	s3e3			s1e1	s1e1	s1e1	s1e2	s1e2	s1e3	s2e1	s2e1	s2e1	s2e1	s2e1						
Square																								
Layer	5	5	5	3	4			8	9	10	9	10	6	8	9	10	2	8						
Number of samples	1	1	1	1	1	5		3	1	1	1	1	2	3	1	1	3	1						
<i>Hordeum vulgare</i> ²⁾	1	2	2	—	—	5	60	5	—	—	1	—	1	2	—	5	2	2						
<i>Panicum miliaceum</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Triticum monococcum</i>	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—						
<i>Triticum dicoccum</i> ¹⁾	1	4	2	—	1	8	80	3	—	—	2	2	2	—	2	—	9	6						
<i>Cerealia</i> indet.	3	—	2	—	3	8	60	1	—	1	—	—	2	5	—	—	4	1						
<i>Cornus mas</i>	1	2	2	—	—	5	60	—	—	—	—	1	—	1	—	—	1	—						
<i>Malus sylvestris</i>	—	—	—	1 ^{fruit}	—	1	20	—	—	—	—	—	—	—	—	—	—	—						
<i>Physalis alkekengi</i>	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—						
<i>Prunus avium</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Prunus spinosa</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Quercus</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2					
<i>Rosa</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Rubus</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Sambucus ebulus</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Vitis sylvestris</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Rumex</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
<i>Vicia</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
Indet.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						

1) Presence of glume or rachis fragments indicated by + and number.

2) (1v) Means: one specimen identified as *H. vulgare* von. vulgare.

		Bell Beaker Culture																			Tot.	s.fr.		
s2e1	s2e1	s1	s2e2	s2e2	s2e2	s2e2	s2e3	s2e4	s3e1	s3e1	s3e1	s3e2	s3e2	s3e3	s3e3	n3e4	s3e4	s2w2	n1w3	n1w2	n1w2	n1w1		
9	10	2	8	9	10	12	9	6	8	9	10	9	10	6	11	6	9	8	11b	6	8	6		
1	1	5	1	1	1	3	2	1	2	1	1	2	1	2	1	3	1	1	1	3	3	1	50	
—	5	2	2	—	—	3	2 ^(1v)	3	1	2	1	—	—	—	1	1	—	—	—	7	1	5	47	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	1	—	—	1	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	6	10
2	—	96	—	3	5	7	7	4	1	3	2	5	2	4	17	8	3	—	1	24	3	1	128+1	66
—	—	4	1	—	5	3	—	2	1	—	—	—	2	2	—	6	—	—	—	6	—	—	41	32
—	—	1	—	—	—	2	—	2	—	1	—	1	1	—	—	—	—	—	—	—	—	—	10	18
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 ^{seed}	—	—	—	—	—	—	—	1	2
—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	1	1	—	—	—	7	—	—	14	16
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	2
—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2
—	1	2	—	—	—	1	—	1	—	—	—	—	—	—	1	—	—	1	—	1	—	—	9	16
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	1	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	6
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	2
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2	4
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2	4
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	2	—	—	—	—

Table 4 — MONTE COVOLO 1973
Seeds and fruits

Period	White ware																				Tot.	s. fr. (20)			
	s1w3	s1e1	s1e2	s1e3	s2w4	s2w3	s2e3	s2e3	s2w3	s2e3	s2e3	s2w3	s2e3	s2e3	s3e1	s3e1	s3e1	s3e2	s3e2	s3e4			n1w2	n1w2	n1w2
Square	11b	12	13	12	9	11	11	11b	11b	11	13	12b	11	13	12	13	13	13	13	13	11	13	15	13	11
Layer	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of samples	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hordeum vulgare ¹⁾	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Panicum miliaceum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Triticum monococcum ¹⁾	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Triticum dicoccum ¹⁾	2	1	4	11	3	4	2	1	2	1	2	3	2	1	4	2	4	5	13+1	15	—	—	—	—	—
Cerealia indet.	—	1	—	—	—	2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Cornus mas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malus sylvestris	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Physalis alkekengi	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prunus avium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prunus spinosa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Quercus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rosa sp.	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rubus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sambucus ebulus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vitis sylvestris	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rumex sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vicia sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Indet.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

1) Presence of glume or rachis fragments indicated by + and number.

2) (1v) Means: one specimen identified as *H. vulgare* var. *vulgare*.

Table 5 — MONTE COVOLO 1973
Seeds and fruits

Period	Neolithic																			Tot.	s. fr. (20)	
	s1w4	s1w4	s1w4	s1w4	s1w3	s1w3	s1w3	s1w3	s1w2	s1w2	s1w2	s1e3	s2w4	s2w2	s2w2	s2w2	s2w2	s3w3	s3w3			
Square	11b	14	20	22	12b	13	13b	13	13b	13	13c	13	21	12	12b	13	14	21	13			
Layer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	20	
Number of samples	—	2	—	—	1	—	—	2	—	1	1	—	—	2	—	—	2	2	—	—	13	40
Hordeum vulgare	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Panicum miliaceum	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Triticum monococcum ¹⁾	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	3	10
Triticum dicoccum ¹⁾	6	4	1	1	—	1	3	1	3	—	—	—	6	7	3	1	—	—	—	2+1	39+1	70
Cerealia indet.	—	—	4	3	2	—	—	10	1	—	—	—	2	5	3	—	4	2	—	—	36	50
Cornus mas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nalus sylvestris	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Physalis alkekengi	—	—	—	—	—	—	1	—	—	—	—	—	3	—	—	—	—	—	—	1	5	15
Prunus avium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prunus spinosa	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	5
Quercus sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	2	3	10
Rosa sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rubus. sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sambucus ebulus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vitis sylvestris	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	3	15
Rumex sp.	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5
Vicia sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	5
Indet.	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

1) Presence of glume or rachis fragments indicated by + and number.

For the identification of the carbonised seeds and fruits, which were present in small numbers in most of the samples, magnifications up to 50x were used. Preservation was usually poor.

Carbonised seeds and fruits

The distribution of samples containing seeds from Site A was as follows:

	SW	SE	NW	Sector
Bronze Age	—	6	—	
Beaker	—	42	8	
White Ware	5	15	5	
Neolithic	18	2	—	

The identification of the plant remains relating to grid squares and layer are shown in tables 3-5. The small number of samples from the Bronze Age levels makes it difficult to compare the results from these with the samples from other periods. The absence of *Triticum monococcum*, *Physalis alkekengi* and other species in the Bronze Age may simply be caused by the low number of samples from this period. Observations are further hampered by the bad preservation of the material and the low numbers of seeds per sample.

Comparison of the amounts of seeds per plant group in the different periods using the chi-square tests ($\alpha = .05$) showed no significant differences, so if there has been any change in plant husbandry in the course of time this is not shown by the seed analysis. The only other statistically reliable remark we are able to make is that *Cornus mas* is restricted to the Beaker and Bronze Age levels.

Plant husbandry

Triticum dicoccum was the most important cereal, followed by *Hordeum vulgare*. Apart from two specimens (from S1 E3 (12) and S2 E3 (9)) which could be identified as *Hordeum vulgare*, var. *vulgare* (hulled barley), no distinction could be made between naked and hulled barley. *Triticum monococcum* was a minor crop, possibly an admixture in other cereals. The find of *Panicum miliaceum* in the White Ware phase is remarkable, because this species is supposed not to have reached Italy until the Bronze Age (Helbaek, 1956 p. 291). However, before the conclusion may be drawn that *Panicum* was present in Late Neolithic northern Italy some other occurrences should be established, since this find consists of a single grain only the reliability of the vertical distribution is questionable.

Practically no threshing remains were found, which might indicate that either the areas where the threshing took place were not excavated, an activity not likely to have taken place on the steep hillside, or that threshed grains were brought to the site from elsewhere.

The seeds of a great number of wild plants indicate that the wood and its undergrowth, but especially the forest border scrub, were extensively exploited. As is shown by the results of the charcoal analysis the site was situated in the climax zone of the *Quercion pubescentis* (Lüdi 1936), a deciduous oak forest, represented in the seed samples by acorn cotyledons and seeds of *Physalis alkekengi* (winter berry). Fruit stones of *Prunus spinosa* (sloe), *Prunus avium* (wild cherry), a seed and half a fruit of *Malus sylvestris* (crab apple), seeds of *Rosa* sp. (rose), *Vitis sylvestris* (wild grape) and *Sambucus* sp. (elderberry or danewort) and pips of *Rubus* sp. (blackberry) found their origin in vegetations of the *Prunetalia* (Braun-Blanquet 1964), a border scrub characteristic for the forests of the class *Quercio-Fagetea*, to which the *Quercion pubescentis* belongs. Several *Prunetalia* species with edible fruits, and as *Sorbus* (medlar), *Crataegus* (hawthorn) and especially *Corylus* (hazel) are notably absent. The extensive exploitation for the forest border shrub, in combination with the absence of threshing remains, might be taken as an indication for seasonal occupation.

The fact that *Cornus mas* is restricted to the Bronze Age und Beaker levels is discussed at the end of this chapter.

Charcoals (table 7)

The analysis of the charcoals of Monte Covolo is qualitative rather than quantitative. The results are presented in table 7. The numbers in this table show the number of squares and layers in which each wood-type was encountered.

Identifications were performed to the genus level when possible. For a number of the genera it is certain that since the last ice age only one species has existed in the area. In

Table 6 — Synopsis of the carbonized seeds and fruits from Monte Covolo

Phase	Neolithic		White ware		Bell Beaker		Early Bronze Age	
	20		5		50		5	
	sfr.	Total	sfr.	Total	sfr.	Total	sfr.	Total
Cultivated								
Triticum dicoccum	14	39 (36,1%)	23	83 (62,9%)	33	128 (47,2%)	4	8 (30%)
Id., spikelet forks	1	(1)	1	(1)	1	(1)	—	—
Hordeum vulgare	8	13 (12,0%)	11	26 (16,6%)	25	47 (17,3%)	3	5 (19%)
Panicum miliaceum	—	—	1	1 (0,6%)	—	—	—	—
Triticum monococcum	2	3 (2,8%)	5	6 (3,8%)	5	6 (2,2%)	—	—
Id., spikelet forks	—	—	1	(1)	—	—	—	—
Cerealea indet.	10	36 (33,3%)	7	23 (14,7%)	16	41 (5,1%)	3	8 (30%)
		91 (84,2%)		139 (88,6%)		222 (81,8%)		21 (79%)
Collected								
Cornus mas	—	—	—	—	9	10 (3,7%)	3	5 (19%)
Malus sylvestris	—	—	—	—	1	1 (0,4%)	1	1 (2%)
Physalis alkekengi	3	5 (4,6%)	3	3 (1,9%)	8	14 (5,2%)	—	—
Prunus avium	—	—	1	1 (0,6%)	1	1 (0,4%)	—	—
Prunus spinosa	1	1 (0,9%)	—	—	1	1 (0,4%)	—	—
Quercus sp.	2	3 (2,8%)	3	3 (1,9%)	8	9 (3,3%)	—	—
Rosa sp.	—	—	1	1 (0,6%)	—	—	—	—
Rubus sp.	—	—	1	1 (0,6%)	3	3 (1,1%)	—	—
Sambucus sp.	—	—	2	2 (1,3%)	1	1 (0,4%)	—	—
Vitis sylvestris	3	3 (2,8%)	2	3 (1,9%)	2	2 (0,7%)	—	—
		12 (11,2%)		14 (6,3%)		42 (5,6%)		6 (21%)
Div.								
Rumex sp.	1	1 (0,9%)	1	1 (0,6%)	2	2 (0,7%)	—	—
Vicia sp.	1	2 (1,8%)	1	1 (0,6%)	—	—	—	—
Indet.	2	2 (1,8%)	2	2 (1,3%)	4	5 (1,8%)	—	—
		5 (4,6%)		4 (2,6%)		7 (2,5%)		
Total	Neol.	108	White w.	157	Bell B.	271	EBA	27

The first column of each phase or sample complex indicates sample frequency (s.fr.): the number of samples in which each species is present. Second column indicates total number of specimens of a species found in all samples from a phase (complex) and, in brackets, the percentage of the total number of seeds in that phase (complex).

Table 7 — Monte Covolo, charcoal identifications

Phase	Neolithic	White Ware	Bell Beaker	Early Bronze Age
Number of squares	8	30	29	14
<i>Quercus</i> sp.	8	27	27	14
<i>Ulmus</i> sp.	3	7	3	—
<i>Taxus baccata</i>	1	2	—	—
<i>Crataegus</i> type	2	12	9	4
<i>Corylus avellana</i>	—	1	—	—
<i>Prunus</i> type	—	13	6	—
<i>Alnus</i> sp.	—	1	1	—
<i>Salix</i> sp.	—	1	1	—
<i>Tilia</i> sp.	—	—	1	—
<i>Sambucus</i> sp.	—	—	1	—
<i>Sorbus</i> sp.	—	—	2	—
<i>Abies alba</i>	—	—	1	—
<i>Fraxinus</i> sp.	—	1	1	1
<i>Acer</i> sp.	—	5	7	1
<i>Fagus sylvatica</i>	—	4	5	3
<i>Carpinus betulus</i>	—	1	2	4

these cases species names have been added to the genus names. Some comments must be made for a number of the other identifications.

Quercus species: all pieces originate from ring porous *Quercus* species. On cross section about half of them showed discontinuous rings of large vessels in the spring wood. This has been described as a characteristic of *Quercus Pubescens* (Greguss 1959), which would accord with present and past composition of the oak woods in the area (Lüdi 1936).

Crataegus type and *Prunus* type. These two types of wood of Rosacea both represent species of the Prunetalia spinosae, in general spiny, forest border shrubs. Species like *Malus sylvestris* (crab apple), *Pyrus communis* (pear), together with species of *Crataegus* (hawthorn) are identified as *Crataegus* type. Some of the characteristics of this wood type are:

Vessels isolated and often angular on cross section.

Rays 1-4 seriate, and up to 20 cells high.

Spiraloid thickenings in the vessel walls absent or sparse.

Vessel perforations simple.

Second column indicates total number of specimens of a species found in all samples from a phase (complex) and, in brackets, the percentage of the total number of seeds in that phase (complex).

Various *Prunus* (plum) and *Rosa* (rose) species show the *Prunus* type.

Some characteristics of this wood type are:

Vessels isolated and in groups.

Rays 1-10 seriate and up to 50 cells high.

Spiraloid thickenings in the vessel walls abundantly present.

Vessel perforations simple.

The number of squares from which samples have been taken are too small to permit hard conclusions on vegetational changes in the area during the occupation(s) of the site. Apart from this, it is at least questionable if such changes will be clearly represented in a sample of the fire woods collected by the occupants. However, the fact that in all periods most of the woods are from *Quercus* sp. might show that the vegetation zone, in which the site was located during all its prehistoric occupation phases, was the *Quercion pubescentis* (deciduous oak forest). The gathering of wood was not totally restricted to this vegetation zone, as is shown by the incidental appearances of species from other vegetation types. Here it is worth noting that during the Neolithic and White Ware period these "foreigners" are mainly from lower vegetation zones (elm, yew, alder and willow), while in the Bronze Age the wood of beech and hornbeam, representing a higher vegetation zone, forms the major component apart from oak wood.

These differences, as well as the fact that the occurrence of the seeds of *Cornus mas* are restricted to the Beaker and Bronze Age levels, might lead to the following ideas: towards the end of the Subboreal period a slight deterioration of the climate has as its effect that the vegetational zones move to lower altitudes. In its early phases the site is located near the lower borders of the *Quercion pubescentis*, but later on, near the upper border of this zone. Assuming random collection of firewoods the nearest vegetation zone has the largest chance to contribute to the firewood used in the site.

Cornus mas, characteristic for the *Quercion pubescentis* in the mediterranean area, and a faithful species of the *Prunetalia* in the Eurosiberian region (cf. Doing Kraft 1957) shows a shift in its habitat by the impact of the changing climate, becoming more inclined to the *Prunetalia*.

The population density increases during the Beaker period and Bronze Age; because of more extensive cultivation of the lower zones the wood is chopped, the area of the *Prunetalia* expands, and consequently *Cornus mas* becomes more common. The wood vegetations of the lower zones are no longer a source of firewood and this function is taken over by the vegetations in the zone above the *Quercion pubescentis*. Of course extensive palaeobotanical research will be necessary to test these hypotheses.

CHAPTER IV

THE ANIMAL BONES, SITE CATCHMENT AND DISCUSSION OF THE PREHISTORIC ECONOMY

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Introduction

Over the past fifteen years, faunal studies have made an increasingly important contribution to the prehistoric archaeology of northern Italy. Much of the most significant material has been recovered from the modern excavations of major neolithic and bronze age settlements such as Fivè, Isolone, Molino Casarotto, Monte Leoni, Rivoli and Vhò (Ammerman *et al.* 1975; Barker 1976, 1977; Jarman 1971, 1975; Riedel 1975). At many of these sites, too, flotation techniques were employed to recover seeds and other plant residues, and so the faunal analyses have been integrated with botanical studies in a balanced reconstruction of subsistence behaviour. Apart from Rivoli, however, all of these neolithic and bronze age sites were basically single-period settlements. Thus, although the individual faunal and plant samples have provided detailed information about the subsistence system at each site, allowing the reconstruction of a series of regional subsistence models within each major chronological phase, the lack of deep-stratified settlements means that it is often difficult to trace the development of each regional economy through time.

Therefore one of the most important aspects of the faunal sample from Monte Covolo is the fact that it is derived from a stratified settlement with occupation levels embracing four major phases from the Late Neolithic to the Middle Bronze Age (Barfield *et al.* 1975-76). Phase 1, Late Neolithic, was characterised principally by Lagozza pottery and Phase 2, Copper Age, by White Ware. Phase 3, Bell Beaker occupation, contained Beaker pottery. Phase 4, principally Early Bronze Age, was typified by Polada pottery. The Monte Covolo occupation probably spans a period of some fifteen hundred years, from *c.* 3,000 to *c.* 1,500 b.c.

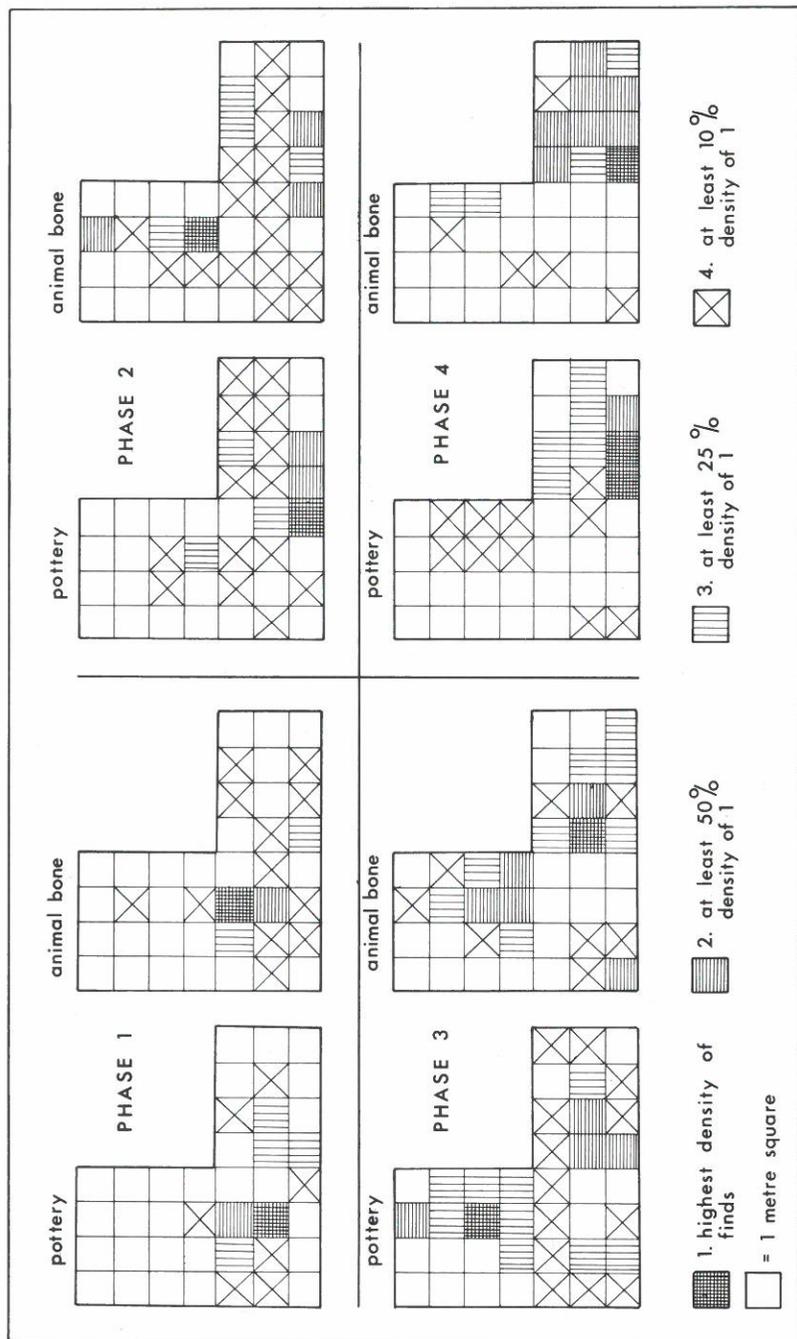


Fig. 10 - Density distributions of pot sherds and animal bones at Monte Covolo.

Furthermore, the fact that the third phase of occupation is characterised by Beaker pottery makes the Monte Covolo faunal sample all the more attractive. In the first place, this is one of the few Beaker settlements to be excavated properly in Italy. Secondly, subsistence data from Beaker settlements in Europe generally are still extremely rare, and yet explanations for the Beaker phenomenon as a whole have often pivoted on ideas about the economic life of Beaker people (Clarke, 1970; Lanting and Van der Waals, 1976). Thus the faunal material from Monte Covolo, combined with the plant remains from the excavation studied by J.P. Pals, provide us with the rare opportunity to reconstruct the subsistence system of a major Beaker settlement, and to compare this system with that of the preceding and following phases of occupation at the site, tracing the stability or fluctuations in subsistence behaviour in one locality in northern Italy through fifteen centuries.

Sample size and distribution

The prehistoric settlement was situated amidst the scree and boulders lying at the foot of the precipitous western slopes of Monte Covolo. The main concentration of archaeological material was found in the gap between two particularly massive boulders, a kind of natural shelter. A deposit of earth, pebbles and rocks up to two metres in depth had built up against the bedrock here, and at much the same angle, sloping down quite sharply from east to west. The formation processes of this hillslope deposit soil- and scree-slip, and occasional rockfalls, meant that the stratigraphy was extremely complex: soil and artifacts could be left undisturbed in crevice or under boulders in some places, and yet percolate down through the rockfall in others. The main trench was L-shaped, lying between and to one side of the two major boulders, and to facilitate the separation of the disturbed and undisturbed material each square metre of deposit was excavated separately. The trench covered forty square metres.

Intensive recovery procedures were employed throughout the excavation. All the deposits were excavated by trowelling and most units were also water-sieved. Soil was washed first to extract botanical samples by flotation, and the mud residues were then water-sieved to extract any small chips of bone, flint and pottery missed by the trowelling. In an earlier series of recovery experiments rather similar to this, Payne (1972) water-sieved the earth discarded after pick-and-shovel excavation and trowelling at a number of sites and was able to demonstrate that these traditional techniques of recovery could easily miss very large numbers of small artifacts. His findings were particularly crucial in the case of faunal remains: many small specimens such as teeth often provide some of the most valuable information, and also, as small fragments of bone tend to belong to the smaller animals, so poor recovery procedures consistently missing small fragments can easily result in a faunal sample biased misleadingly towards larger animals.

My own comparisons of the faunal samples recovered by trowelling and those recovered from the sieves at Monte Covolo did not find such drastic differences. In part this was to be expected, for Monte Covolo was a small controlled excavation whereas some of Payne's experiments were carried out at major settlements excavated on a very large scale by gangs of workmen. On the other hand, the sieved deposits at Monte Covolo produced many individual teeth, particularly of small animals, which had been missed by trowelling - deciduous sheep/goat incisors, for example. In my first report I described how my preliminary impressions were that the sieved deposits were probably not going to alter significantly the conclusions based on the trowelled deposits (Barker 1973-74). In fact, further analysis has since shown that the small bones and teeth recovered by the sieving provide important data about the fragmentation processes that have affected the faunal sample.

Almost 20,000 fragments of animal bone were recovered from the excavation, just over 17,000 pot sherds and just over 6,000 pieces of worked stone, so the bones are the most numerous category of finds and make up almost half of the total archaeological assemblage. In total, therefore, over 40,000 archaeological specimens were excavated from forty square metres of deposit, a remarkable density of finds give the comparatively shallow depth of the stratigraphy and the large number of stones and rocks within the deposit. In Figure 10 I have plotted the densities of the two major categories of finds, pottery and animal bones, within the forty square metres of the excavation in the four phases of the settlement. There seems to be a rough correlation between the densest areas of sherds and bones in each phase. In Phase 3 the square metre with the biggest concentration of pottery is also the one with the most animal bones. In the other phases the main collections of bone are usually beside or very near to the main concentrations of pottery. Thus there seems to be very little evidence for separate activity areas at the site reflected by different clusters of pottery and bone in each phase. There is a degree of change over time in the total distribution of finds, but this mainly reflects the configuration of the two major boulders and the intervening rocks at different heights in the stratigraphy. The exact figures for the distribution of worked stone were not available to me, but general agreement in the major areas of recovery can be seen from the provenance of the most important stone tools from the site listed by Biagi (Barfield *et al.* 1975-76).

Having established the fact that there is a rough correlation between the distributions of the various categories of finds at the site, we can go on to compare the relative frequencies of the material in the four phases of occupation. Table 8 shows the phase-by-phase percentages of specimens within each of the three categories of material, whereas Table 9 shows the percentages of the different categories of finds within each phase. Roughly 40% of the faunal sample occurred in Phase 3 units, whereas each of the other three groups of units contributed about 20%. Most of the worked stone was found in Phase 3, and the Phase 1 collection was particularly small. Pottery was

Table 8

	Phase 1		Phase 2		Phase 3		Phase 4		Total	
	N	%	N	%	N	%	N	%	N	%
Animal bones	3135	16.3	4057	21.1	8245	42.9	3775	19.7	19212	100.0
Pot sherds	906	5.3	2009	11.7	6189	35.9	8119	47.1	17223	100.0
Worked stone	396	6.4	1179	19.1	3143	50.8	1466	23.7	6184	100.0

Numbers and phase-by-phase percentages of finds within the three main categories of material at Monte Covolo. Numbers of pot sherds and stone tools taken from Barfield *et al.*, 1975-76.

Table 9 — Species identification at Monte Covolo

	Phase 1		Phase 2		Phase 3		Phase 4		Total	
	N	%	N	%	N	%	N	%	N	%
Animal bones	3135	70.7	4057	56.0	8245	46.9	3775	28.3	19212	45.1
Pot sherds	906	20.4	2009	27.7	6189	35.2	8119	60.7	17223	40.4
Worked stone	396	8.9	1179	16.3	3143	17.9	1466	11.0	6184	14.5
Total	4437	100.0	7245	100.0	17577	100.0	13360	100.0	42619	100.0

Numbers and percentage of the three main categories of material within each phase of occupation. Numbers of pot sherds and stone tools taken from Barfield *et al.*, 1975-76.

especially frequent in the two upper levels, but particularly rare in the earliest phase of settlement.

Chronological variation in the nature of the archaeological record is clearer still in Table 9. Animal bones made up 70% of the total number of finds from the earliest phase of settlement, but this figure dropped steadily through the later phases, to below 30% in Phase 4. At the same time the amount of pottery in each level increased as the proportion of faunal material decreased, from 20% in Phase 1 to 60% in Phase 4. Worked stone remained at about 10/15% of the total number of finds throughout the occupation.

Recovery techniques were standardised for the entire deposit, and so variation in excavation techniques cannot account for these drastic differences in the archaeological record of the site. A second hypothesis is that fragmentation processes have affected the sample in different ways. If they have not, then a third hypothesis remains that the differences seen in the archaeological record today are a direct reflection of differences in the amount of pottery and bone discarded at various times in the past at the site, with whatever implication this conclusion may hold for the cultural or economic behaviour of the prehistoric communities using the site.

Butchery and fragmentation

5,689 fragments of animal bone were indentifiable, roughly 30% of the total sample. This is a comparatively low figure for faunal analysis: in the samples I have studied from over a dozen neolithic and bronze age sites elsewhere in Italy well over 50% of the material has been indentifiable. Two factors account for the discrepancy. In the first place the intensive sieving at Monte Covolo has resulted in the recovery of large numbers of tiny fragments of bone which were unindentifiable. Secondly, the amount of fragmentation suffered by the sample during burial has been extremely severe, so again there are many small chips of bone which cannot be identified reliably to species.

The indentifiable fragments are listed in Table 10. The major species, clearly, were the basic domestic stock of prehistoric husbandry - cattle, pigs, sheep and goats. Sheep and goats are treated together because many small fragments cannot be separated reliably into sheep or goat. The other animals which were relatively important for food were red deer and roe deer. Bear and hare were hunted, but the numbers of specimens of these species are extremely small. Birds may also have been hunted, but again the sample is very small; the bones are in two categories, crow-sized and thrush-sized. A single caudal centrum of a fish was found. Fish vertebrae are tough solid bones, and the collection of many other small bones such as rodents in the sieves makes it unlikely that numerous fish bones were missed. In the case of the other neolithic and bronze age samples I have studied from Italy, the bones of scavengers such as dog, fox and wolf invariably survive more or less complete, and contrast strikingly with the butchered remains of the domestic stock and of game such as red and roe deer. At Monte Covolo the degree of fragmentation is so intense that the carnivore bones are as smashed as those of the normal food animals, but it remains unlikely that these animals were normally killed for food. The same is true of the rodents - the bones of these creatures probably derive from animals that lived and died naturally in the locality of the settlement.

The main food animals, therefore, are cattle, hare, pig, red deer, roe deer and sheep/goat. One question which will have to be resolved later is whether the cattle and pig samples include both wild and domestic specimens. For the moment, however, we can simply treat these animals as the seven species killed for their meat by the Monte

Table 10 — Species identification at Monte Covolo

	Phase 1	Phase 2	Phase 3	Phase 4	Total
Bear	1	—	3	—	4
Bird	5	2	1	3	11
Cattle	238	361	650	370	1619
Dog	6	1	14	3	24
Fish	—	—	1	—	1
Fox	—	1	—	3	4
Hare	1	1	1	—	3
Pig	264	373	712	407	1756
Red deer	40	30	34	11	115
Rodent	15	19	14	1	49
Roe deer	11	14	10	5	40
Sheep/goat	340	417	880	425	2062
Wolf	—	—	—	1	1
Total identifiable	921	1219	2320	1229	5689 (29.6%)
Total unidentifiable	2214	2838	5925	2546	13523 (70.4%)
Total sample	3135	4057	8245	3775	19212

Covolo community, whether wild or domestic. In Table 11 I have broken down the faunal sample composed of these species into the principal anatomical elements which are most reliably identifiable.

The most significant information provided by Table 11 is about the fragmentation processes that have affected the faunal sample. Bones are subjected to a variety of such "taphonomic" processes between the killing of the animal and the final burial of the faunal sample derived from it in the ground, and then from the time of burial to the time of excavation. The main meat-bearing bones are, in the fore-limb, the scapula, humerus and upper radius and ulna, and, in the hind limb, the pelvis, femur and upper tibia. These get broken up to a certain extent in primary butchery, and they can also be further broken up for the extraction of the marrow. Later on, after discard, they may be gnawed by scavenging animals and weathered if they are left exposed to the elements rather than buried straightaway. The extremity bones of the head and feet provide a certain amount of meat, but the most important use of the lower limbs, the metapodials, is usually tool manufacture, while foot bones can be boiled down for glue. The faunal samples I have studied from normal open settlements of the Italian

Table 11 — Principal anatomical elements of the six food species at Monte Covolo

	Mandible	Tooth	Skull	Scapula	Humerus	Radius	Ulna	Metacarpal	Pelvis	Femur	Tibia	Calcaneum	Astragalus	Metatarsal	Carpal/Tarsal	Phalange
Phase 1																
Cattle	18	84	10	5	14	18	7	2	5	5	16	5	6	2	7	16
Hare	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Pig	17	154	6	1	3	2	1	2	1	8	11	4	6	—	5	14
Red deer	1	11	—	—	—	—	—	1	—	—	—	—	1	2	—	1
Roe deer	—	3	—	—	—	2	—	1	—	—	1	—	—	1	—	—
Sheep/goat	26	119	12	12	17	25	1	13	7	30	41	—	1	14	4	11
Phase 2																
Cattle	34	107	6	14	20	26	4	6	13	22	31	6	4	5	13	23
Hare	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Pig	19	180	12	4	23	7	5	9	2	7	14	9	4	6	2	27
Red deer	—	21	—	1	—	—	—	2	—	—	—	—	—	1	1	3
Roe deer	—	5	—	—	—	—	—	—	—	—	2	—	—	1	—	—
Sheep/goat	26	137	7	11	21	25	2	17	8	56	55	5	4	15	4	17
Phase 3																
Cattle	51	163	12	18	49	35	4	31	13	26	44	7	11	21	21	57
Hare	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Pig	42	388	23	6	19	15	8	20	5	12	42	14	9	9	2	54
Red deer	—	13	—	—	—	—	—	1	—	1	—	—	—	—	3	—
Roe deer	—	6	2	—	—	—	—	—	—	—	1	—	—	—	—	—
Sheep/goat	36	287	24	19	48	83	8	37	18	113	123	1	11	22	5	25
Phase 4																
Cattle	15	110	7	12	26	30	1	20	12	13	26	3	5	19	11	38
Pig	20	215	11	5	28	14	2	7	6	12	34	6	5	4	2	23
Red deer	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Roe deer	—	1	—	—	—	—	—	1	—	—	—	—	—	1	—	—
Sheep/goat	15	139	5	13	24	43	3	11	9	59	66	1	4	19	5	9

Neolithic and Bronze Age are very different in appearance to that of Monte Covolo, for fragmentation has been much less intense. For example, they usually have many large jaw fragments containing teeth, for jaw bones (particularly the lower jaws, the mandibles) are narrow and fairly tough, and the teeth are some of the most indestructible parts of the body, so the two together make a strong combination. Large fragile bones like the skull, scapula, and pelvis easily break up into a number of smaller fragments, but many of these commonly remain identifiable. In the same way the main limb-bones have usually been butchered into several major identifiable pieces, particularly the tough extremities (the epiphyses) and large fragments from the central shaft. The same is true of the metapodials. On the other hand many of the very small bones such as individual teeth (particularly the deciduous teeth of small animals like pigs, sheep and goats) and carpals, tarsals, and phalanges (again, especially of the smaller animals) tend to be relatively uncommon because they are easily missed in excavation.

The Monte Covolo sample is very different. Loose teeth are by far the most common specimens, especially those of pig and sheep/goat. Jaw bones are relatively rare compared with these large numbers of individual teeth; identifiable fragments are usually of the tougher mandibles rather than the upper jaw (maxilla), and comparatively complete jaws are exceptionally rare. In the case of the limb bones destruction has usually been so effective that only the most solid pieces of bone have survived in identifiable form, and even complete epiphyses are rare. On the other hand, even quite small pieces of the shafts of the limb bones of the smaller animals are often identifiable in normal samples, and fragmentation has not been able to prevent this in the Monte Covolo sample. Finally, the small solid bones are all well represented at Monte Covolo such as astragali, calcanea, carpals, phalanges and tarsals.

The obvious conclusion is that faunal recovery has been very effective at Monte Covolo, but that fragmentation before or during burial has been very severe. The paucity of scavenger bones and the absence of gnawing marks suggest that fragmentation has primarily taken place during rather than before burial. In fact, the appearance of the faunal sample is scarcely surprising, given the depositional context. In the first place, the soil is limestone-based, a type of soil in which animal bones can often be severely damaged or destroyed completely because of its acidity. Secondly, the area of the prehistoric settlement on the scree and boulder slope was also subject to continual water percolation, soil slip and even rock-fall. The result has been that the attritional processes of burial in this context have probably resulted in a far greater degree of fragmentation than that effected by the prehistoric community, so that the large bones have broken up into very large numbers of tiny fragments and only the toughest types of bone or parts of bone have survived in identifiable form. Fragmentation has clearly had a massive biasing effect on the sample which must affect arguments about the stock economy of the settlement.

One further point that can be made from Table 11, despite the level of destruction, is

that all the parts of the body are nearly always represented for the three main species in each layer, though of course in very different proportions. The implication is that these animals were normally killed and dismembered at the site. The bear and hare samples are too small for comment in this respect, but the red and roe deer samples include many head and foot bones, a fact that suggests that these animals too were butchered on site. In some ways we might have expected the extremities of the carcass to have been discarded if game was killed away from the settlement and had to be manhandled some distance, but on the other hand the straight metapodial bones of the lower limbs and the antlers would both have been well suited for tool manufacture. Many very small pieces of limb bone probably derived from red and roe deer, but had to be classified as unidentifiable.

Finally, to return to the proportional variation between pottery and bone shown in Table 9, there does not seem to be any real difference in the degree of bone fragmentation between the earlier and later phases of the site, even though the Phase 1 layers were composed of a much finer soil than the upper deposit: the percentage of identifiable fragments is much the same in all four phases, about 30% (Table 10), nor is there any significant difference in the rates of survival of the different anatomical elements of each species between the various phases.

Species proportions

The two principal methods used by archaeozoologists for calculating the relative proportions of different species in a faunal sample are the basic count of identifiable fragments and the estimation of the minimum number of individuals. Various systems have been suggested for the latter method (Grayson 1973). One normally takes the commonest bone and divides the sample into left and right specimens, calculates which specimens must come from separate individuals (for separate distal and proximal epiphyses could belong to the same bone) and so reaches the figure which must represent the minimum number of individual animals represented by the sample. For the Monte Covolo sample, however, an accurate calculation is impossible because most of the limb-bone samples consist of innumerable very small fragments. The loose teeth also show that very many jaws have been smashed beyond recognition, so a count of the minimum number of identifiable mandibles will certainly be far too low. Hence I made my calculation by correlating the loose teeth with the mandibles containing teeth. The proportions of the species according to the fragments count and the estimation of the minimum number of individuals are shown in Table 12. The two figures are shown as accurate percentages, but in reality both should be treated as a very general guide to species proportions.

It must be remembered that fragmentation has biased bone survival and identification considerably, and therefore these calculations. Nevertheless, there is a heartening

Table 12 — Proportion of the six food species at Monte Covolo
(F = fragments; M = minimum number of individuals)

		Phase 1		Phase 2		Phase 3		Phase 4	
		N	%	N	%	N	%	N	%
Cattle	F	238	26.7	361	30.2	650	28.4	370	30.4
	M	18	25.4	28	35.0	39	29.3	15	27.3
Hare	F	1	0.1	1	>0.1	1	>0.1	—	—
	M	1	1.4	1	1.2	1	0.7	—	—
Pig	F	264	29.5	373	31.2	712	31.1	407	33.4
	M	24	33.8	24	30.0	50	37.6	20	36.4
Red deer	F	40	4.5	30	2.5	34	1.5	11	0.9
	M	3	4.2	4	5.0	4	3.0	2	3.1
Roe deer	F	11	1.2	14	1.2	10	0.4	5	0.4
	M	2	2.8	2	2.5	3	2.3	1	1.8
Sheep/goat	F	340	38.0	417	34.9	880	38.4	425	34.9
	M	23	32.4	21	26.3	36	27.1	17	30.9
Total	F	894		1196		2287		1218	
	M	71		80		133		55	

degree of correlation between the two sets of figures. Cattle make up between a quarter and a third of the total sample throughout the occupation for the site. Sheep and goats tend to make up a third of the sample rather than a quarter, and pigs too stay at about a third. The main game animals - bear (?), hare, red deer and roe deer - clearly did not make a major contribution to the meat diet in terms of numbers: the total numbers of fragments of these animals from Phase 1 to Phase 4 add up to 5.9%, 3.8%, 2.1% and 1.3% respectively, and the comparable percentages of minimum numbers are 9.7%, 8.7%, 6.7% and 5.5% respectively. The overriding impression from the figures is that cattle, sheep, goats and pigs were the most important animals throughout the history of the settlement, and that they were killed in roughly similar proportions, though with sheep and goats being perhaps slightly more numerous than the others. Stability rather than change is the most striking aspect of the proportions in the faunal sample. The gradual diminution in the amount of game killed may not be significant; at first sight a lessening in game densities might have indicated more open vegetation conditions around Monte Covolo in the later phases of occupation (rather than simply dietary preference), but numbers of pigs, the main domestic animal we might expect to have been affected by changes in forest cover, do not alter accordingly (Table 12).

On the other hand, the numerical importance of an animal need not reflect directly the importance of the animal in the economy of the site. In the first place, some species provided a much greater amount of meat per carcass than others. Secondly, some species provided useful additional products on the hoof such as wool in the case of sheep, and milk in the case of cattle, sheep and goats, in addition to meat after slaughter. These secondary products will be discussed later in the sections on the individual species, but the amount of meat provided by the different animals can be usefully contrasted here with their numerical importance. In Table 13 I have taken average live weights of the seven food species, used 50% of these weights as the amount of edible meat per animal, then multiplied the second figure by the relative frequency of each group according to the "fragments" and "minimum numbers" calculations in Table 12, and converted these into percentages of meat supplied by each species. At every stage the calculation can be disputed, certainly. In the first place, body weights of different populations of some of these species today can vary enormously in different parts of Europe: red deer are a classic example - animals in the forests of eastern Europe can be twice as heavy as those in Scotland. Secondly, the "average body weight" takes no account of the great variation in the age and sex structure of normal wild and domestic populations. Thirdly, we know that animal sizes varied considerably in the past: for example, domestic stock were usually much smaller in prehistoric Italy than their modern counterparts. Finally, the figure of 50% carcass weight can only be a very rough guide to meat weight, for the amount of edible meat varies considerably from species to species, as well as according to differing tastes and dietary requirements of different human populations.

Nevertheless, the calculation in Table 13 is still a useful guide to the relative importance of the different species in the supply of meat to the Monte Covolo settlement. Cattle obviously could provide at least two thirds of the total amount of meat. Compared to this, pigs supplied less than 20% and sheep and goats less than 10%, despite their numerical importance in the faunal sample. Together, cattle, pigs, sheep and goats provided well over 90% of the total meat consumed at the settlement. These species we shall now consider in turn.

Cattle

The domestic cow *Bos taurus* is descended from the wild European aurochs *Bos primigenius*. The Pleistocene aurochs was an enormous animal, and skeletal evidence from many mesolithic and neolithic sites in Europe shows that its size decreased drastically in the Postglacial. This diminution was once regarded as a direct result of domestication, with neolithic farmers deliberately selecting smaller animals from the wild population for ease of handling, or breeding smaller animals because of poor

Table 13 — **Meat weights**
(F = fragments; M = minimum number of individuals)

	Unit weight (Kgs.)	Meat weight (Kgs.)		Phase 1	Phase 2	Phase 3	Phase 4
Bear	240	120	F	0.1	—	0.1	—
			M	1.8	—	0.8	—
Cattle	500	250	F	69.3	73.5	72.4	74.2
			M	66.6	76.1	71.7	69.4
Hare	4	2	F	>0.1	>0.1	>0.1	—
			M	>0.1	>0.1	>0.1	—
Pig	100	50	F	15.4	15.2	15.9	16.3
			M	17.8	13.1	17.7	18.5
Red deer	220	110	F	5.2	2.7	1.7	1.0
			M	4.9	4.8	3.1	4.0
Roe deer	24	12	F	0.1	0.1	0.1	0.1
			M	0.4	0.3	0.3	0.2
Sheep/goat	50	25	F	9.9	8.5	9.8	8.5
			M	8.5	5.7	6.4	7.9
Total (F/M)				100.0	100.00	100.0	100.0

feeding regimes (Degerböl 1963). However, cattle size was probably related above all to the pressures of the changing postglacial environment than simply to human exploitation (Barker 1967a; Jarman 1969). The same point is true of pig populations in postglacial Europe. Thus size alone cannot be regarded as a simple criterion of wild or domestic status in postglacial Europe, because prehistoric animal populations could vary considerably from region to region according to the different pressures within the particular ecosystem in which they lived - pressures of differing food resources and population levels, differing levels of competition, predation and so on. However, *Bos primigenius* certainly survived in parts of Europe into the Middle Ages, and seems to have been much larger than local cattle populations, so drastic size variation in an archaeological cattle sample greater than would be expected from sexual dimorphism may at least point to wild and domestic populations.

The measurements that could be taken from the Monte Covolo faunal sample are listed at the end of this report. In Figure 11 I have plotted the length and breadth measurements taken from the distal epiphyses of ten cattle tibiae in the sample, within

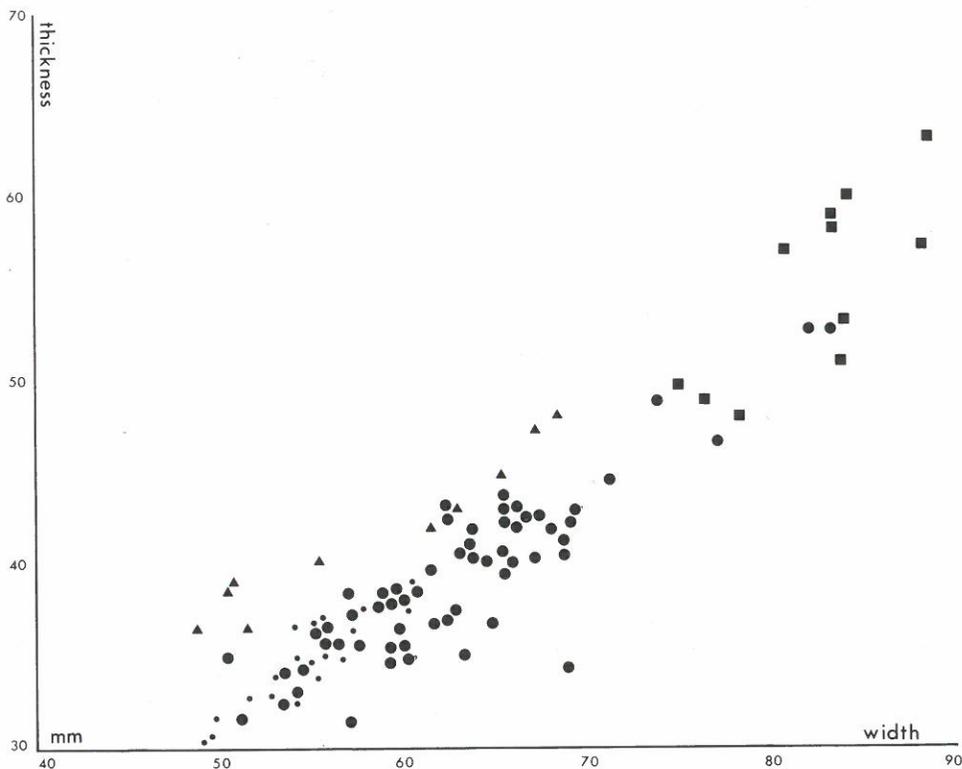


Fig. 11 - Cattle: tibia, maximum width and thickness of distal epiphysis. (Square: palaeolithic; large circle: neolithic; small circle: bronze age; triangle: Monte Covolo).

a scatter diagram of identical measurements from a sample of Italian cattle from palaeolithic, neolithic and bronze age sites. In Figure 12 the five metacarpal measurements from Monte Covolo cattle are plotted in a similar diagram. It is apparent that the Pleistocene specimens are all massive, the bronze age cattle are considerably smaller, and that the neolithic cattle range in size from the middle specimens of the bronze age sample to the smallest of the Pleistocene cattle. The Monte Covolo cattle specimens all fall within the size range of the other neolithic and bronze age cattle from Italy, and most of them are in the smallest part of this range.

Further amplification is provided by the measurement of the mean and maxima of the maximum length of the third lower molar (Fig. 13). Again, the Pleistocene specimens from middle and upper palaeolithic sites are massive, the bronze age specimens are far smaller, and the neolithic specimens are in between. The range and mean of the Monte Covolo sample are virtually identical to those of the small bronze age

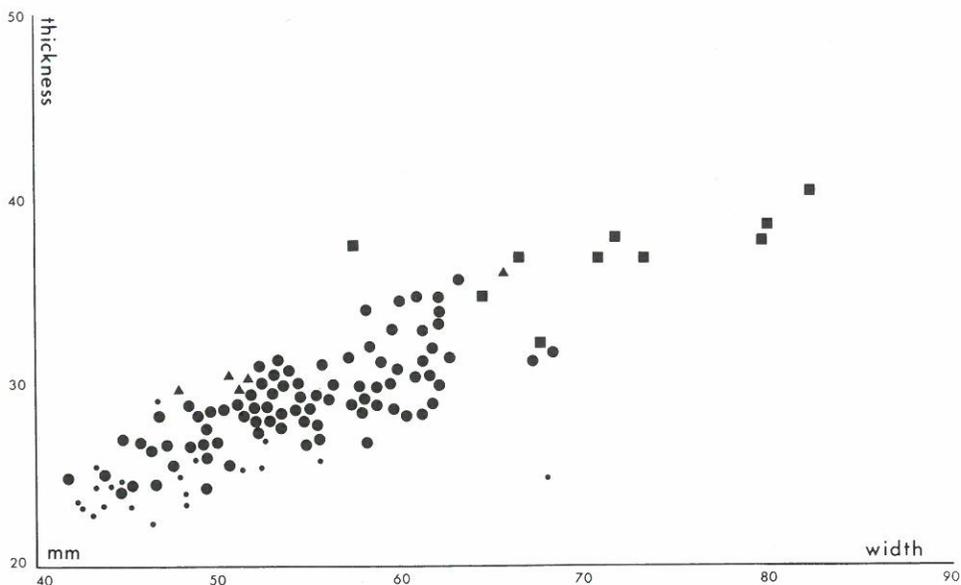


Fig. 12 - Cattle: metacarpal, maximum width and thickness of distal fusion point. (Square: palaeolithic; large circle: neolithic; small circle: bronze age; triangle: Monte Covolo).

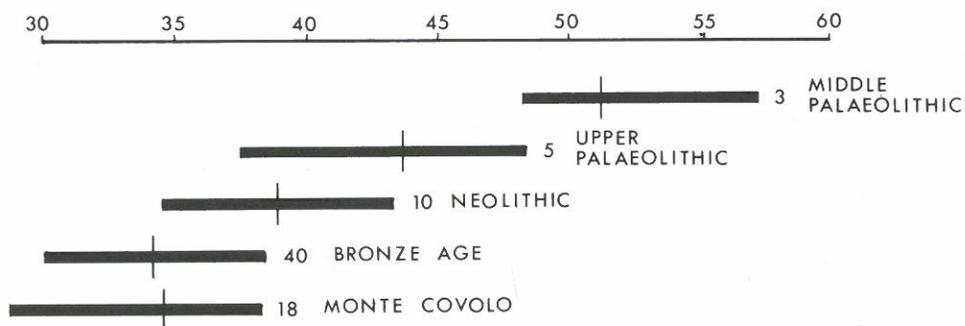


Fig. 13 - Cattle: mean and maxima of the maximum length of the lower third molar, in millimetres. Number of specimens given to the right of the measurements.

Table 14 — Cattle mortality data at Monte Covolo
(NF = not fused; F = fused)

		Age in months	Phase 1		Phase 2		Phase 3		Phase 4	
DENTITION	Stage 1	0/6	—		—		—		—	
	Stage 2	6/15	5		1		2		1	
	Stage 3	18/24	2		4		1		1	
	Stage 4	24/36	7		10		18		5	
	Stage 5	24/36+	18		19		24		13	
	Stage 6	24/36++	1		—		—		4	
			NF	F	NF	F	NF	F	NF	F
FUSION	Stage 1	12/18	—	20	—	33	4	53	1	45
	Stage 2	18/36	—	2	2	14	4	9	2	14
	Stage 3	36/48	3	12	5	8	4	9	2	6

cattle. The measurements of the teeth and limb-bones all suggest that we are dealing with a population of small domestic cattle at Monte Covolo.

The age of a farm animal at death is a good guide to the role it played in the stock economy. The animal raised purely for its meat will normally be killed as soon as it reaches an adequate weight, whereas animals kept for breeding will obviously live much longer. So too will cows and ewes bred for their milk. In a wool economy adult male sheep (wethers) may well be kept for several years to supply a number of fleeces. Cattle needed for ploughing or pulling carts will be at their strongest in their adult years. Of course, modern farming is highly specialised and usually geared to specific markets such as milk or beef, or pork or bacon, whereas traditional peasant economies in countries like Italy have usually been far less specialised. For example, according to both documentary and archaeological evidence, medieval farmers in central Italy usually raised a few cattle to a great age for traction (meat and dairy cattle were very rare because their fodder requirements were difficult to meet), killed their pigs off quite young as they were a main source of meat, and concentrated especially on sheep, which they bred primarily for their milk (for cheese) and wool rather than for their meat (Barker 1973; Jones 1966). What is also clear from documentary records here and elsewhere in Europe is that Roman and medieval animals took far longer to mature than modern improved breeds, which are fattened on specialised foodstuffs (Slicher Van Bath 1963), and we must presume that prehistoric husbandry was far more like these traditional peasant systems than modern factory farming. Hence we cannot expect killing policies in prehistoric husbandry to be as clear cut as today.

However, the mortality data that can be extracted from a faunal sample are still a very useful indicator of the stock economy of the people who discarded the animal bones at the site as their food refuse. The age of an animal at death can be calculated from the state of the dentition (according to whether there are deciduous or permanent teeth in the jaw, and how worn these are), and from the degree of fusion in the limb-bones - the proximal and distal epiphyses of the various bones fuse at different stages in the animal's life. These figures are known for modern stock and are at least a guide to mortality ages of prehistoric stock, although we presume the stages of dentition and fusion we use are all too young by several months at least (Grant 1975; Silver 1969).

The evidence for cattle mortality at Monte Covolo is shown in Table 14. I have grouped the dentition evidence in six stages according to stages of tooth eruption and wear. The first four stages are adapted from Silver's eruption data (Silver 1969). Stage 5 and 6, shown as 24/36+ months and 24/36++ months, are clustered versions of Grant's tables of tooth wear (Grant 1975). These are primarily relative stages of age, but Stage 5 ought to be six months or a year after Stage 4, and Stage 6 consists of old specimens with extremely worn teeth. Stage 1 of the fusion evidence is from the distal humerus, proximal radius, and first and second phalanges; stage 2 is from the distal metacarpal, distal tibia and distal metatarsal; and stage 3 is from the calcaneum, proximal humerus, femur and tibia, and distal radius and femur. For each phase I have listed the numbers of bones unfused and fused at the particular fusion stage. This tells us that the bone was older than (i.e. fused) or younger than (i.e. unfused) the particular fusion stage when the animal was killed, but we cannot tell whether by a few weeks or several months or, in the case of the fused bones, even years.

According to the dentition evidence, a few cattle were killed at the end of the first and second years, many were killed in the third year, but most died older still. On the other hand few cattle seem to have reached a very great age. The fusion evidence tells much the same story, emphasising the mature cattle deaths - most cattle were at least three and were often four years old or more.

We should expect more young deaths in a specialised beef economy, even given the slower rates of maturity in prehistoric times than today. At the same time, if cattle were raised simply for traction at the site, we should expect to find a much smaller proportion of this species compared with the other, stock, and a much older population. There certainly are a few very old specimens, but with one exception these are in Phase 4 contexts, and we know that the traction and pulled by cattle or oxen was used in Italy by this time, for actual specimens have been excavated in the lake settlements of the Bronze Age and there are ploughing scenes shown in the rock carvings of Val Camonica dated to the second millennium b.c. (Anati 1964; Barfield 1971). Given the preponderance of mature deaths, we can probably envisage a system of mixed cattle production at Monte Covolo, consisting primarily of a herd of mature cows kept for breeding and to supply the community with dairy produce, and then meat once their

Table 15 — **Sheep/goat mortality data at Monte Covolo**
(NF = not fused; F = fused)

		Age in months	Phase 1		Phase 2		Phase 3		Phase 4	
DENTITION	Stage 1	0/5	—		—		—		—	
	Stage 2	5/9	1		1		8		3	
	Stage 3	12/18	1		2		7		1	
	Stage 4	18/24	15		8		23		12	
	Stage 5	18/24+	14		13		21		12	
	Stage 6	18/24++	1		3		8		5	
			NF	F	NF	F	NF	F	NF	F
FUSION	Stage 1	10/16	1	13	1	16	3	30	—	12
	Stage 2	18/28	1	6	3	2	7	1	1	1
	Stage 3	30/36	1	1	3	2	6	4	2	1
	Stage 4	36/42	—	2	—	1	21	1	1	1

fertility dropped. Many artifacts associated with dairying have been recovered from the bronze age lake villages of northern Italy, such as straining vessels and butter churns. Presumably the males surplus to breeding requirements were also fattened up and slaughtered after two or three years, and these animals would be part of the "young mature" deaths. At the same time, even though meat production was clearly not the sole aim of the cattle economy, the herd was still capable of supplying the community at Monte Covolo with far more meat than the smaller stock.

Sheep/goat

The dentition and fusion evidence provided by the sheep/goat sample is shown in Table 15. The first fusion stage is established from the distal humerus, proximal radius, and first and second phalanges; stage 2 from the distal metapodials and distal tibia; stage 3 from the proximal femur and tibia, the distal radius and the calcaneum (tuber calcis); and stage 4 from the proximal humerus and distal femur. According to the dentition evidence, most animals were mature when they died, with the full set of adult teeth that first appears at stage 4, and usually with a degree of wear that shows that they were killed many months after this - and of course the fusion stages shown are presumed to be minimum ages because they are derived from modern stock. Hardly any bones at the first fusion stage are unfused, but over half those at the second stage are unfused.

The deaths represented by these unfused bones correlate approximately with those marked by the fourth dentition stage. Almost half of the specimens in the two late fusion stages are fused, indicating that the animals must have been older than these stages when they were killed. Clearly the two sets of mortality evidence show that most sheep and goats at Monte Covolo were normally raised to maturity. On the other hand there are no obvious peaks at particular stage within the mature range, but a range of deaths over some considerable period of time. According to Boessneck's criteria for distinguishing between sheep and goats from skeletal data, most of the Monte Covolo specimens that were preserved enough to be used for this exercise (particularly humeri, astragali, calcanea and phalanges) were clearly of sheep rather than goat (Boessneck 1969).

The maturity of the Monte Covolo sheep suggests strongly that the flock was dominated by ewes kept for breeding, for milk and for wool, and by adult wethers kept for their wool. Of course both also supplied mutton when they were killed, and younger males could have been killed too, but we have already seen how little meat could be provided by the sheep and goats compared with the cattle at Monte Covolo. On the other hand they seem to have been quite numerous. All in all we are probably right in envisaging them as an important part of the Monte Covolo economy because of the range of their uses. Sheep's milk in the traditional peasant household in Italy is turned into *pecorino* cheese, and cheese in one of the few forms of storable protein in the peasant economy.

Measurements taken from the Monte Covolo sheep and goats indicate that they were identical in size to contemporary sheep/goat populations elsewhere in Italy. For example, the range and mean of the lower third molar is almost exactly the same as those of the animals at Luni and Narce, two bronze age settlements in central Italy, and Tufariello, a bronze age settlement in southern Italy, and measurable limb-bones such as the humerus are also very similar in size (Barker 1975, 1976b).

Pig

Diminution in size is as marked in the postglacial pig as it is in cattle (Barker 1976a). However, although there is a general trend in diminution from the late Palaeolithic to the Iron Age, neolithic faunal samples in Italy commonly provide evidence for two pig populations, one small, the other as large as the Pleistocene pig. The size difference is so large that it is unlikely to represent sexual dimorphism. There is evidence for considerable regional variation in pig size in neolithic Italy (Barker 1976c, 1977), but although this is in part related to the physical environment, there is also the possibility that the difference marks two pig populations, wild and domestic. In Figure 14 the six measurable distal tibiae from the sample at Monte Covolo are shown in a length/breadth scatter diagram of palaeolithic, neolithic and bronze age pig tibiae. All except

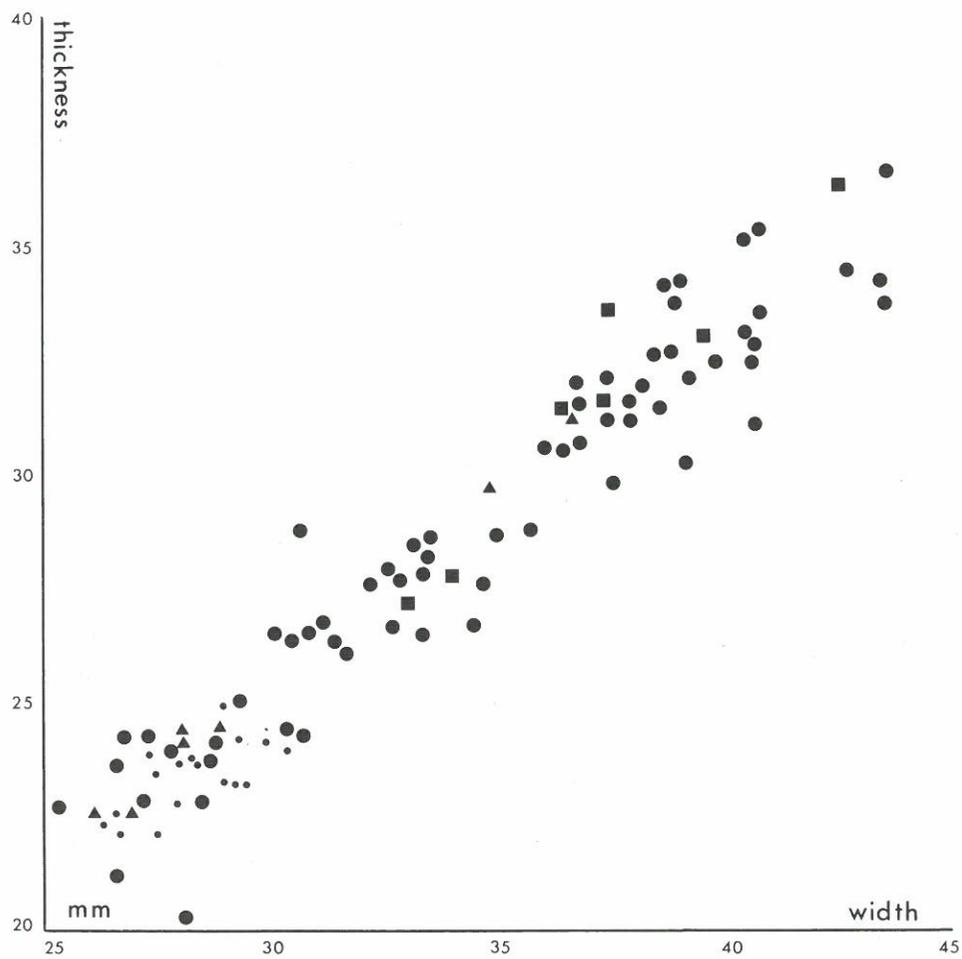


Fig. 14 - Pig: tibia, maximum width and thickness of distal epiphysis. (Square: palaeolithic; large circle: neolithic; small circle: bronze age; triangle: Monte Covolo).

Table 16 — Pig mortality data at Monte Covolo
(NF = not fused; F = fused)

		Age in months	Phase 1		Phase 2		Phase 3		Phase 4	
DENTITION	Stage 1	0/4	—		—		2		1	
	Stage 2	4/7	1		4		5		1	
	Stage 3	7/13	10		10		8		6	
	Stage 4	12/16	19		19		24		19	
	Stage 5	17/22	22		34		77		32	
	Stage 6	17/22+	6		7		19		13	
	Stage 7	17/22++	2		1		—		3	
			NF	F	NF	F	NF	F	NF	F
FUSION	Stage 1	12/18	5	11	13	14	16	32	9	15
	Stage 2	18/36	6	7	9	10	13	7	4	4
	Stage 3	36/48	—	1	3	1	2	—	6	1

one are in the smaller size range. In a similar calculation using the distal humerus, all the Monte Covolo examples were in the lower part of the smaller size range. On the other hand, the measurement of the length of the lower third molar indicated a range (27.8-43.4 mm) as large as the range of all the neolithic specimens I have measured from Italy (27.0-45.1 mm), and a mean (35.9 mm) only slightly smaller than the mean for the rest of the Italian sample (36.5 mm). Most of the larger pig teeth from Monte Covolo come from very old animals, which could be the breeding sows kept at the site or old animals killed by hunting. The likelihood is that most of the pig sample from Monte Covolo is from the domestic herd kept by the community, but that a wild population also lived in the woods around the settlement. Like the red and roe deer, however, it is unlikely that the wild population made a major contribution to the diet of the inhabitants.

The fusion data provided by the pig bones were grouped into three stage: stage 1 - the distal humerus, proximal radius, and first and second phalanges; stage 2 - the metapodials, distal tibia and calcaneum; and stage 3 - the proximal humerus, femur and tibia, the distal radius and femur, and the ulna. One major difference can be seen at once between the pig fusion data shown in Table 16 and those of cattle and sheep/goat. Many animals died in the first year, and most pigs were dead by the second fusion stage at 24/30 months. The dentition evidence likewise indicates that many pigs died after about a year and that the majority was killed in the second year or first part of the third year. Pigs are only useful for their meat and fat, and as the reproduction rate is very fast, normal practise is to fatten up a litter as fast as possible, kill them off young (nowadays

after about six months) and use to sow the breed again as soon as possible. No purpose is served by keeping the fattening pigs alive once they have reached a satisfactory body weight. In the past, of course, it would have taken far longer for young pigs to reach this stage, for in many peasant economies the pigs pannaged in the woods for part of the year and fended for themselves by scavenging around the settlement for the rest, so growth was much slower than today. At the same time fat pigs were normally preferred in any case, to provide essential lard for the peasant diet. Presumably the Monte Covolo pigs were raised in this kind of slow-fattening regime, being killed off after two or three years. The same sort of killing policy was practised at many other neolithic and bronze age settlements in Italy (Barker 1975, 1976b, 1976c, 1976d; Jarman 1970, 1971, 1975).

Coprolite

A well preserved coprolite, certainly from a dog, containing large quantities of fragmented bone was found in Early Bronze Age level S2 W4 (3); diameter 2,3 cm.; length (broken) more than 4.3 cm. It should be noted that this layer is at the base of the Early Bronze Age deposit in which some Beaker material was also present.

Discussion

I have put forward three main conclusions so far in the analysis of the Monte Covolo fauna. First of all, the sieving techniques practised throughout the excavation have ensured that recovery was of a very high standard, so that the animal bones collected ought to be a reliable and representative sample of what was in the ground before excavation. Secondly, the frequency of certain anatomical elements and the paucity or absence of others clearly indicate that fragmentation during burial has been much worse than at many similar prehistoric settlements in Italy. Finally, the preliminary analysis of the faunal sample revealed a stable system of mixed stock-keeping which varied very little through the long occupation of the site. The reconstruction of the system has been that the community kept cattle, pigs, sheep and perhaps goats, maintaining a breeding stock of each species; pigs were bred for meat, sheep were valued as much for dairy products and wool as for meat, and cattle were the major meat source but were also bred for dairying. Stock-keeping was augmented on a small scale by hunting, mainly of red deer and roe deer but perhaps also of wild boar.

This system of stock-keeping was established at Monte Covolo in the Late Neolithic, and was still practised without significant change some fifteen hundred years later in the Early/Middle Bronze Age. We do not know whether the site was occupied continuously through this period, but the fact remains that, whenever a prehistoric community used the site, they always seem to have managed their stock in the same

way. The critical question raised by the faunal sample, therefore, is why was such a system so successful at Monte Covolo?

In trying to answer this question, we can first augment the study of the animal bones with the analysis of the plant remains by J.P. Pals. The botanical material has suffered as badly as the animal bones in terms of crushing and disturbance, and the upper layer is poorly represented in the samples, but the principal conclusion from the study is that emmer wheat was the major crop, followed by barley, with einkorn and millet also being present, whilst a large selection of edible wild fruits and berries was also collected. As with the animal bones, the emphasis of the botanical data is on subsistence stability rather than change. In crude terms, therefore, the economic system at Monte Covolo throughout the use of the site consisted of mixed farming and stock-keeping, augmented by hunting on a small scale and by the collection of wild plant foods.

This brings us to the "site catchment analysis" of the Monte Covolo settlement. The technique was developed by Higgs and Vita-Finzi (1972), based on the assumption that the "principle of least effort" that normally controls the locational planning of traditional subsistence economies (Chisholm 1968; Lee and DeVore 1968) will also have guided long-term site selection by subsistence hunters and farmers in prehistory. In the case of subsistence agriculture, the predication is that the most time-consuming and demanding tasks in the farming system will normally take place no more than one or two kilometres from the settlement, whilst even the less arduous tasks like herding or firewood collection will tend to take place within about five kilometres of the site. On the other hand a ten-kilometre range is suggested for hunting. The principal value of the technique of site catchment analysis is that it forces us to examine data like animal bones and plant remains from an excavation in terms of the detailed location of the site rather than in terms of vague locational generalisations (highland, lowland, riverine, coastal and so on), for a site might be selected by a prehistoric community because it was typical of the general area or precisely because it was atypical and special.

Monte Covolo is one of the southernmost outposts of the mountain ranges that stretch from the central Dolomites to the edge of the Po plain. In broad terms, therefore, the settlement was at the major ecotone or junction, between plain and mountain that lies east/west across northern Italy (Fig. 15). The detailed location of the site is shown in Figure 16, which illustrates the major landforms within five kilometres. Monte Covolo is an isolated whale-back hill rising over 300 metres above the surrounding countryside, nearly sheer on the west side and sloping much less steeply on the eastern side. Glacial moraines lie south and east of the hill, separating it from the wide floor of the Garda lake basin. The prehistoric settlement was situated at the foot of the western side of Monte Covolo, looking out onto the flood plain of the Chiese river. Steep limestone hills lie on the other side of the river.

Three plant communities are represented in the botanical samples from the excavations: cultivated crops, deciduous oak forest, and forest border scrub. The charcoal at

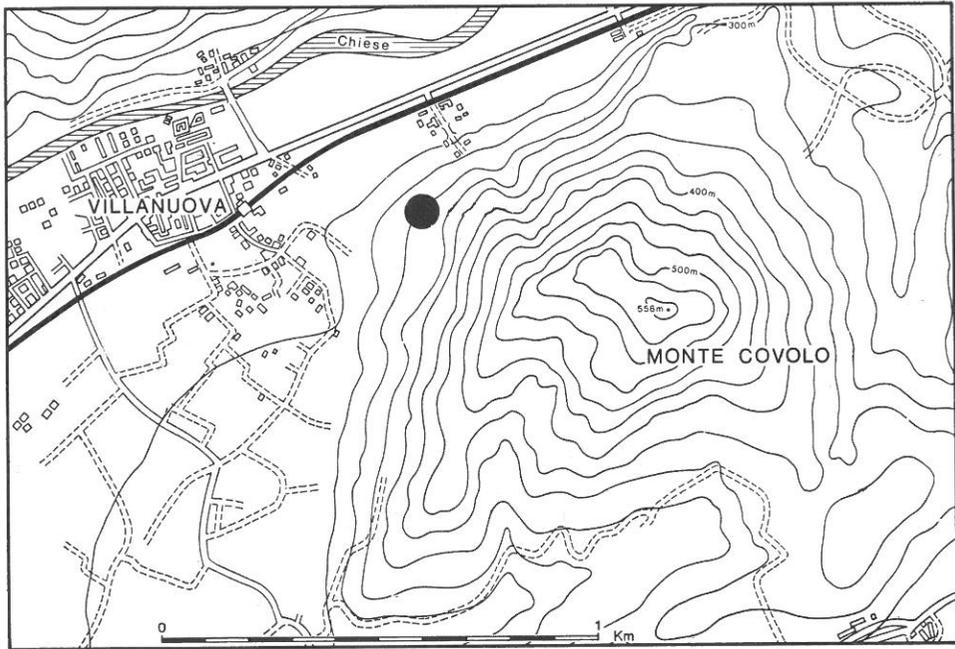
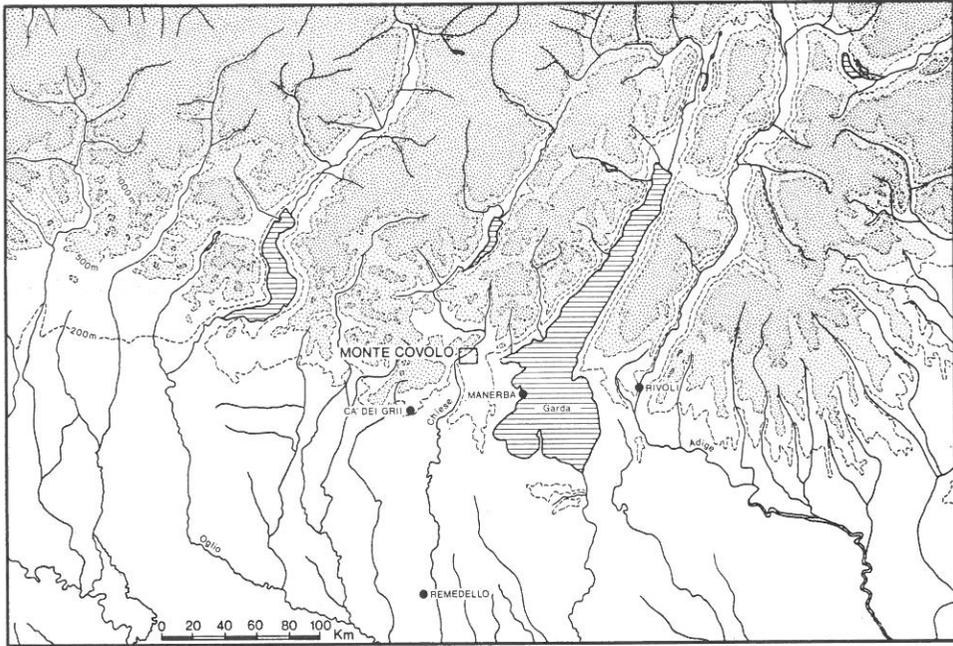


Fig. 15 - Monte Covolo: general locational map.

the site is also derived from deciduous oak forest. The limestone hills today carry scrub and deciduous woodland, and presumably did so at the time of the prehistoric settlement - their thin soils and steep slopes cannot have been attractive for the prehistoric farmers. In fact the best soils for cultivation would have been on the other side of the river, for there is a band of well-drained diluvial soil here along the foot of the limestone hills, where most of the modern villages lie. These hills face south and east, so the soils are warmer than those of the valley floor by Monte Covolo. The most accessible arable soils lay right in front of the settlement beside the Chiese, but the alluvium here is cold and damp, and would probably have carried extensive areas of woodland and meadow pasture depending on drainage. The edge alluvium at least would have been stoney and reasonably light, so could have been cultivated with simple hand tools or the scratch ard. It is significant that emmer was the main crop, for it prefers a light to loamy soil and "neither requires soils of high fertility nor does it extract nutrients from the soil to the same extent as other cereals" (Jarman and Bay-Petersen, 1976 p. 181), and that barley was the other crop, for barley is best for light soils and soils of limited fertility. Millet, a crop for heavy soils, is extremely rare.

If cereal cultivation had been the most important part of the subsistence system, we would have expected the prehistoric communities to settle on the other side of the river, on the warm diluvial soils; yet generation after generation occupied the Monte Covolo site, despite its position away from these soils and in the shadow of the cliffs, a place with long frosts in winter and cold mists in the autumn, and with little access to the sun in the early part of the day at any time of the year.

The other major elements in subsistence at the site were of course stock-keeping and hunting, and the location of the settlement on the left bank of the Chiese and at the foot of Monte Covolo makes better sense in terms of these activities. If the community had settled on the prime arable soils on the other side of the river, they would have had very restricted access to pasture and open woodland suitable for stock. Monte Covolo, on the other hand, was ideally suited to give easy access to a wide range of woodland and grazing types: in the Chiese valley, on the limestone hill, the lake basin floor, and the moraines. The valley floor to the south, as it begins to widen out before debouching onto the Po plain, and the basin floor crossed by the Garda feeder streams to the east, would both have offered large areas of woodland and damp pasture for much of the year that would have been ideal for the cattle. Foliage could have been collected from the denser woods, on Monte Covolo itself for example, as fodder for the cattle, and the same woods would also have provided excellent pannage for the pigs close to the settlement. Much of the land suitable for cattle and pigs would have been too wooded or too damp or both for sheep, but the dry gravelly soils of the moraines behind Monte Covolo would have been ideal for them, and they could also be taken to river pastures in the summer months, or even taken (with the cattle) some distance up the Val Sabbia.

The grazing resources of the territory were such that a prehistoric community could

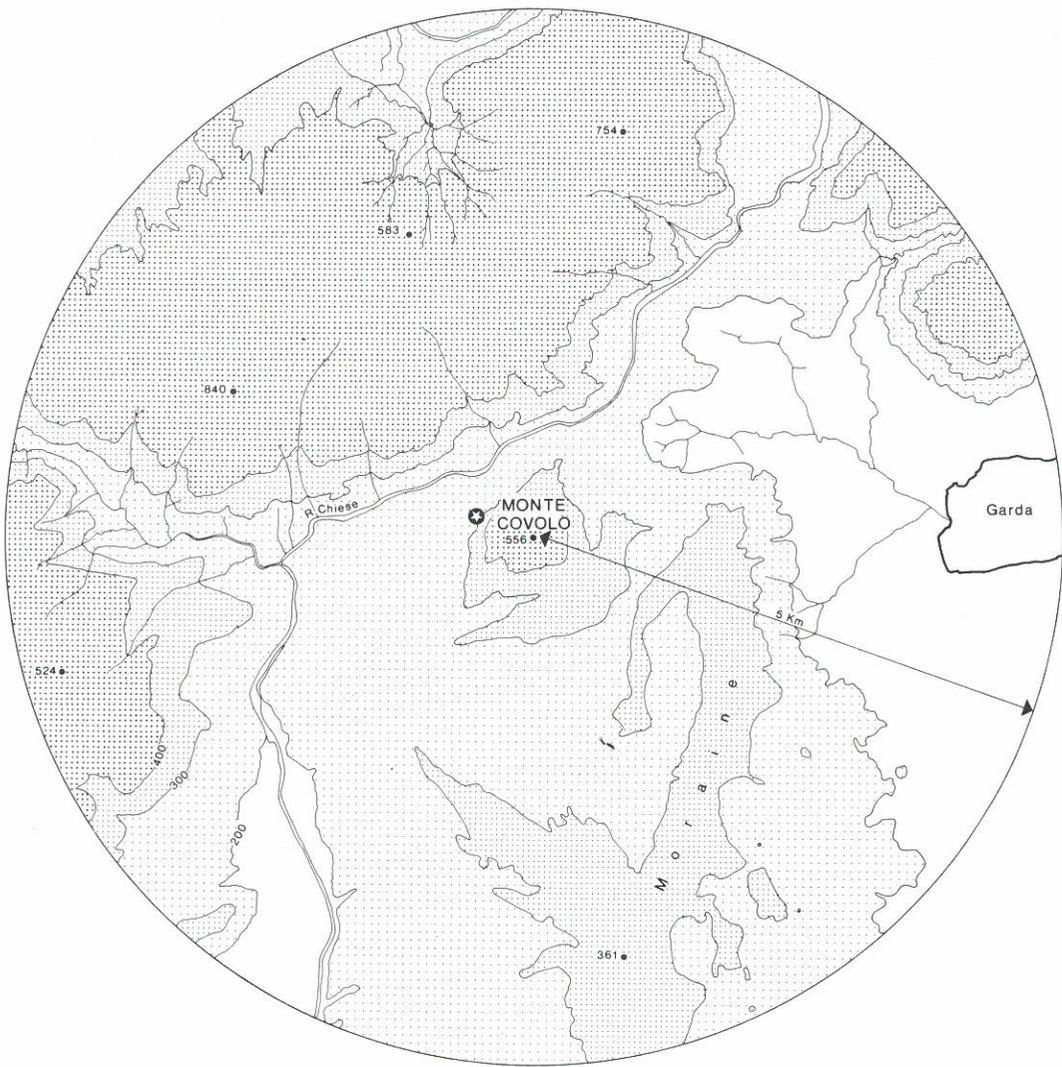


Fig. 16 - Monte Covolo: the 5-kilometre catchment.

have lived there all the year round with their stock. The settlement itself would have been extremely cold and damp in the winter months, however, and these months would also have been the most difficult for feeding the stock. It is therefore possible that herding groups tended to use the site from spring to autumn. It is difficult to find any convincing evidence in the archaeological record for seasonal or permanent occupation. Pals notes that the absence of threshing debris at the site could indicate that occupation was seasonal, with people bringing threshed grain from elsewhere, or simply that threshing took place away from the settlement; and certainly, if the settlement was inhabited at harvest time, it is still likely that threshing would have been carried out down on the valley floor rather than in the rocks and boulders of the settlement area. The faunal sample included a few pieces of red deer antler attached to the skull, from animals killed in the autumn or winter months, and one shed antler, presumably collected in spring or early summer. The evidence is clearly not sufficient to settle the question of permanent or seasonal occupation.

However that may be, the evidence of the catchment and the economic data suggest that the prehistoric communities using Monte Covolo tended to be stock-keeping groups who supplemented their diet of meat and dairy products with cereals, fruits, nuts and berries. A further reason for the attraction of the site must have been the flint that was available on the flank of Monte Covolo. Thus the place offered excellent grazing for the stock, a reasonable soil for cultivation, and a useful stone resource.

The Monte Covolo subsistence data can be compared with similar material from an increasing number of Neolithic and Bronze Age settlements in northern Italy. Some years ago, Jarman integrated faunal and botanical evidence from half a dozen of these settlements to propose a thesis that subsistence in the Early/Middle Neolithic was based primarily on hunting, fishing and the collection of wild foods, with cultivation and stock-keeping being very much a minor activity, but that by the Late Neolithic and Bronze Age this was replaced by mixed stock-keeping and cereal cultivation as woodland was cleared and rising populations forced economic intensification (Jarman 1971). However, as I argued in my analysis of the faunal material from neolithic Vhò, it has since become increasingly clear that a variety of subsistence strategies characterised northern Italy during the Neolithic (Barker 1976c). Mixed farming was in fact practised throughout the Neolithic on the northern and southern margins of the Po valley, whilst the wild foods and game that were abundant in marshy and wooded areas were also exploited throughout the same period. In the Bronze Age the agricultural economy prevailed on both sides of the Po plain (Ammerman *et al.* 1975; Barfield 1971; Jarman 1971, 1975), but dairying was developed more and more to feed the growing population of the second millennium.

Although the mixed farming economy dominated subsistence systems on the margins of the Po plain, there was clearly quite marked regional variation within this economy, primarily adapted to local environmental variation. On the southern side of

the Po plain, for example, many prehistoric settlements were situated on the lowest hills at the junction between the plain and the northern Apennines, growing a variety of cereals on the well-drained soils edging the hills and grazing their stock on the hills above and on the plain. The stock systems were often dominated by sheep and goats, which were ideally suited to the grazing behind the settlements on the Apennine slopes (Ammerman *et al.* 1975; Barfield *et al.* 1975). On the northern side of the Po plain settlements at higher elevations in the Alpine foreland, like Ledro and Fiavè, tended to have stock economies dominated by sheep and goats (Jarman 1975), whereas cattle and pigs were usually more important at the lakeside settlements situated in moister and more wooded environments at lower elevations on the edge of the Po plain. Monte Covolo, although in the same ecorone as the latter group of settlements, in fact enjoyed an intermediate situation, with a territory which shared in both the damp meadows and woods of the lowland lake basins and the forest scrub and open grazing of the limestone and morainic country. As we have seen, the stock economy practised throughout the use of site was adapted to the nature and variety of the natural resources in the locality, a remarkably successful adaptation enduring without a significant change for some fifteen centuries.

Finally, the economic data at Monte Covolo have important implications not simply for our models of prehistoric subsistence in northern Italy, but also for the problem of Beaker settlement in general. At this site Beaker sherds formed a small percentage of the total ceramic material in the Beaker levels, and the fabric of the Beakers and associated pottery was very similar, so that it is likely that the Beakers were made by the inhabitants of the settlement rather than imported from elsewhere (Barfield 1977 p. 28). Furthermore, the subsistence data show very clearly that the people using this pottery at the site lived in much the same way as the prehistoric communities who settled here before and afterwards. The traditional thesis about Beakers has been that they were the pottery of a new folk group, probably metal prospectors, who swept across western Europe in the late third millennium b.c. and took control of local neolithic populations. The alternative hypothesis put forward in recent years is that the Beaker assemblage was simply a particular set of status artifacts demanded by the new elites who were developing within many European neolithic societies by this time. In the case of Monte Covolo, perhaps supporters of the traditional thesis could still argue that Beaker folk displaced the local population but developed the same way of life, or forced the local people to work for them but adapted to their way of life, but in my view the evidence of subsistence continuity correlates more economically with the alternative hypothesis of demographic continuity. The issue is discussed more fully by Barfield later in this report.

Certainly subsistence stability at Monte Covolo would be all the more fascinating on the context of internal social transformation in the late third millennium. At the same time it must be remembered that, whilst economic intensification may well have been

possible at the site (for example by producing a surplus of wool, dairy products or stone tools for barter), the faunal sample is not sufficient to show what would be changes of degree rather than kind in the system of stock-keeping. However, there is every reason to hope that the further development of subsistence studies in northern Italy will enable us in time to reconstruct regional systems of production and consumption at such a detailed level that we shall be able to discern these kinds of transformation in economic behaviour, and so investigate the economic basis of social change.

Appendix: metric data from the Monte Covolo sample

The following measurements were taken (all in millimetres). (L) = maximum length of a complete bone.

Mandible: (1) maximum length M3; (2) maximum length M3-M1; (3) maximum length P4-P2.

Maxilla: (1) maximum length M3; (2) maximum length M3-M1; (3) maximum length P4-P2.

Humerus: (1) maximum width distal epiphysis; (2) maximum thickness distal epiphysis; (3) maximum height distal articulation; (4) maximum width distal articulation.

Radius: (1) maximum width proximal epiphysis; (2) maximum width distal epiphysis.

Metacarpal: (1) maximum width proximal epiphysis; (2) maximum thickness proximal epiphysis; (3) maximum width distal fusion point; (4) maximum thickness distal fusion point.

Tibia: (1) maximum width distal epiphysis; (2) maximum thickness distal epiphysis.

Calcaneum: (1) length from most posterior point of bone to most anterior part of articular surface; (2) length of articular surface; (3) height of bone from superior surface of articular surface to base.

Astragalus: (1) maximum length lateral side; (2) maximum thickness lateral side, measured from baseline to anterior side; (3) maximum length medial side.

Metatarsal: (1) maximum width proximal epiphysis; (2) maximum thickness proximal epiphysis; (3) maximum distal fusion point; (4) maximum thickness distal fusion point.

	Phase	Bone	(1)	(2)	(3)	(4)	(L)
CATTLE	1	Mandible	30.6	79.4	—		
	1	Mandible	34.5	—	—		
	1	Mandible	28.7	—	—		
	1	Mandible	37.3	—	—		
	1	Mandible	34.3	—	—		
	2	Mandible	34.7	84.3	—		
	2	Mandible	37.8	86.5	—		
	2	Mandible	33.9	—	—		
	2	Mandible	32.3	—	—		
	2	Mandible	34.0	—	—		
	2	Mandible	32.0	—	—		
	2	Mandible	36.2	—	—		
	3	Mandible	33.5	79.6	—		
	3	Mandible	38.2	—	—		
	3	Mandible	37.8	—	—		
	4	Mandible	37.3	—	—		
	4	Mandible	37.6	—	—		
	4	Mandible	32.0	—	—		
	3	Maxilla	31.8	—	—		
	1	Humerus	69.1	—	41.8	67.7	
	1	Humerus	—	—	51.3	81.8	
	2	Humerus	71.9	57.5	43.5	72.5	
	2	Humerus	76.5	70.6	42.0	67.9	
	2	Humerus	—	82.3	47.4	—	
	3	Humerus	69.7	59.1	37.0	63.3	
	3	Humerus	69.2	—	42.5	68.0	
	4	Humerus	73.3	—	42.0	69.0	
	1	Radius	84.5	—	—	—	
	1	Radius	67.4	—	—	—	
	1	Radius	60.2	—	—	—	
	1	Radius	80.5	—	—	—	
	1	Radius	—	73.6	—	—	
	2	Radius	69.6	—	—	—	
	2	Radius	—	73.7	—	—	
	2	Radius	82.0	—	—	—	
	2	Radius	—	54.1	—	—	
	1	Metacarpal	—	—	48.4	32.2	
	3	Metacarpal	50.5	30.1	—	—	
	3	Metacarpal	51.7	29.5	—	—	
	3	Metacarpal	—	—	53.4	28.2	
	3	Metacarpal	—	—	56.6	29.6	
	3	Metacarpal	—	—	53.5	29.4	
	4	Metacarpal	65.5	36.0	—	—	
	4	Metacarpal	47.9	29.7	—	—	
	4	Metacarpal	51.5	29.9	—	—	
	4	Metacarpal	—	—	54.1	29.1	
	2	Tibia	50.4	38.8	—	—	
	2	Tibia	51.5	36.4	—	—	
	2	Tibia	50.7	39.0	—	—	
	3	Tibia	62.4	43.2	—	—	
	3	Tibia	67.1	47.3	—	—	
	3	Tibia	68.3	48.0	—	—	
3	Tibia	48.5	36.6	—	—		
4	Tibia	61.4	42.0	—	—		
4	Tibia	55.7	40.0	—	—		

	Phase	Bone	(1)	(2)	(3)	(4)	(L)
CATTLE	4	Tibia	68.6	66.0			
	1	Calcaneum	49.3	27.0	47.5		138.0
	2	Calcaneum	44.8	30.5	52.9		
	2	Calcaneum	39.2	21.7	40.1		
	3	Calcaneum	47.3	24.6	46.6		130.0
	3	Calcaneum	41.3	24.0	43.2		
	1	Astragalus	63.4	34.7	57.3		
	2	Astragalus	55.1	30.5	52.9		
	2	Astragalus	66.0	37.0	59.5		
	3	Astragalus	56.0	30.6	52.8		
	3	Astragalus	54.6	29.6	52.8		
	3	Astragalus	67.7	37.5	61.1		
	3	Astragalus	66.9	36.4	60.3		
	3	Astragalus	60.3	32.8	56.1		
	3	Astragalus	58.2	32.3	52.7		
	3	Astragalus	63.5	34.1	—		
	4	Astragalus	56.5	31.6	52.7		
1	Metatarsal	47.0	46.1	—	—		
3	Metatarsal	—	—	47.5	26.9		
3	Metatarsal	—	—	43.7	24.0		
SHEEP/GOAT	1	Mandible	21.8	44.7	—		
	1	Mandible	22.3	—	—		
	1	Mandible	25.0	—	—		
	1	Mandible	22.2	—	—		
	1	Mandible	20.4	—	—		
	2	Mandible	20.8	47.8	35		
	2	Mandible	20.3	—	—		
	2	Mandible	20.6	—	—		
	2	Mandible	23.6	—	—		
	2	Mandible	24.7	—	—		
	3	Mandible	22.3	46.1	—		
	3	Mandible	22.6	—	—		
	3	Mandible	19.5	—	—		
	3	Mandible	20.7	—	—		
	4	Mandible	21.7	—	—		
	4	Mandible	22.5	—	—		
	4	Mandible	22.8	—	—		
	4	Mandible	18.2	—	—		
	1	Maxilla	18.2	—	—		
	1	Maxilla	15.1	—	—		
	1	Maxilla	15.8	—	—		
	1	Maxilla	15.0	—	—		
	1	Maxilla	17.3	—	—		
	1	Maxilla	17.1	—	—		
	2	Maxilla	15.7	—	—		
	3	Maxilla	16.5	—	—		
	3	Maxilla	15.1	—	—		
	3	Maxilla	20.9	—	—		
	3	Maxilla	20.0	—	—		
	3	Maxilla	14.8	—	—		
	3	Maxilla	14.6	—	—		
	3	Maxilla	17.8	—	—		
	3	Maxilla	17.8	—	—		
4	Maxilla	16.5	—	—			
4	Maxilla	18.8	—	—			

	Phase	Bone	(1)	(2)	(3)	(4)	(L)
SHEEP/GOAT	4	Maxilla	16.8	—	—		
	4	Maxilla	16.7	—	—		
	4	Maxilla	17.7	—	—		
	1	Humerus	27.8	23.5	17.0	27.3	
	2	Humerus	32.1	25.7	19.9	30.1	
	2	Humerus	28.4	23.7	20.3	25.4	
	2	Humerus	28.3	24.0	18.6	28.3	
	3	Humerus	28.3	20.5	17.4	27.0	
	3	Humerus	26.8	—	21.2	26.0	
	3	Humerus	—	—	23.2	26.6	
	4	Humerus	29.6	24.1	17.6	26.1	
	3	Radius	—	32.3			
	3	Radius	—	26.0			
	4	Radius	26.3	—			
	4	Tibia	26.0	19.1			
	2	Calcaneum	20.0	10.0	20.9		
	4	Calcaneum	22.6	13.1	23.6		54.1
	1	Astragalus	32.1	17.0	32.0		
	2	Astragalus	28.2	14.1	25.8		
	2	Astragalus	28.6	16.1	27.7		
	2	Astragalus	—	16.5	29.8		
	2	Astragalus	—	14.1	26.1		
	3	Astragalus	28.0	14.9	26.1		
	3	Astragalus	28.4	15.0	26.7		
	3	Astragalus	22.8	14.2	22.6		
	3	Astragalus	29.8	16.5	27.3		
	3	Astragalus	28.2	14.1	26.0		
	3	Astragalus	26.0	14.0	25.7		
	3	Astragalus	27.0	14.0	—		
	4	Astragalus	28.7	16.1	27.1		
	4	Metatarsal	17.5	16.0		—	
PIG	1	Mandible	31.0	—	—		
	1	Mandible	41.6	—	—		
	1	Mandible	35.6	—	—		
	1	Mandible	33.7	—	—		
	1	Mandible	35.3	—	—		
	1	Mandible	42.8	—	—		
	2	Mandible	38.3	—	—		
	2	Mandible	42.0	—	—		
	2	Mandible	36.8	—	—		
	2	Mandible	33.3	—	—		
	2	Mandible	27.8	—	—		
	3	Mandible	43.4	—	—		
	3	Mandible	36.7	—	—		
	3	Mandible	33.7	—	—		
	3	Mandible	33.8	—	—		
	3	Mandible	35.7	—	—		
	3	Mandible	33.7	—	—		
	3	Mandible	35.2	—	—		
	3	Mandible	42.0	—	—		
	3	Mandible	36.0	—	—		
	3	Mandible	—	—	37.0		
	4	Mandible	36.9	—	—		
	4	Mandible	35.0	—	—		
	1	Maxilla	35.3	—	—		

	Phase	Bone	(1)	(2)	(3)	(4)	(L)
PIG	2	Maxilla	30.5	—	—		
	2	Maxilla	31.3	—	—		
	2	Maxilla	32.0	—	—		
	2	Maxilla	25.6	—	—		
	2	Maxilla	33.7	—	—		
	2	Maxilla	28.3	—	—		
	2	Maxilla	35.0	—	—		
	2	Maxilla	—	—	34.8		
	3	Maxilla	30.4	—	—		
	3	Maxilla	30.2	—	—		
	3	Maxilla	30.1	—	—		
	3	Maxilla	31.7	—	—		
	4	Maxilla	32.5	—	—		
	4	Maxilla	33.5	—	—		
	4	Maxilla	33.2	—	—		
	4	Maxilla	33.0	—	—		
	4	Maxilla	32.7	—	—		
	4	Maxilla	35.7	—	—		
	4	Maxilla	—	—	32.1		
	1	Humerus	30.0	30.7	19.8	24.0	
	1	Humerus	34.7	—	25.5	28.8	
	2	Humerus	35.4	32.8	29.1	31.5	
	3	Humerus	31.6	—	20.1	31.0	
	4	Humerus	35.5	26.8	—	28.9	
	2	Radius	—	45.2			
	3	Radius	25.3	—			
	3	Radius	29.8	—			
	4	Radius	30.5	—			
	2	Metacarpal	—	—	21.0	18.2	92.0
	2	Tibia	26.7	22.6			
	2	Tibia	28.6	24.4			
	2	Tibia	34.7	29.8			
	3	Tibia	26.0	22.4			
	3	Tibia	36.5	31.1			
	3	Tibia	28.0	24.0			
	3	Tibia	28.0	24.1			
	2	Calcaneum	26.6	12.3	26.2		70.8
	2	Calcaneum	26.5	10.5	18.7		
	2	Calcaneum	25.7	13.7	24.9		
	3	Calcaneum	26.0	11.4	26.7		
	3	Calcaneum	21.5	11.6	22.6		
	3	Calcaneum	27.8	10.4	—		
	4	Calcaneum	23.6	12.5	24.0		64.6
	1	Astragalus	40.0	21.2	36.5		
	1	Astragalus	49.0	26.5	43.8		
	1	Astragalus	53.3	28.3	48.0		
	2	Astragalus	42.6	23.2	40.0		
	2	Astragalus	57.9	30.5	52.1		
	3	Astragalus	34.8	18.3	32.8		
	3	Astragalus	39.0	22.0	37.5		
	3	Astragalus	42.2	2.6	39.6		
	3	Astragalus	50.0	27.8	45.0		
3	Astragalus	41.4	22.5	37.0			
4	Astragalus	42.7	22.3	38.7			
4	Astragalus	38.3	20.2	35.3			

CHAPTER V
CARBON 14 DATING

L.H. BARFIELD

Five charcoal samples were dated by the Radiocarbon laboratory in the Geology Department of Birmingham University, and two by the laboratory at Groningen.

Neolithic	N1 W2 (20): Birm. 473:	4790 ± 210 BP (2840 b.c.)
	S1 W4 (13): Birm. 472:	4240 ± 190 BP (2290 b.c.)
Bell Beaker	N1 W2 (8): Birm. 471:	3950 ± 320 BP (2000 b.c.)
	N2 W2 (6): Birm. 470:	3810 ± 210 BP (1860 b.c.)
	S3 E2 (10): GrN 8013:	4010 ± 40 BP (2060 b.c.)
Early Bronze Age	S2 E4 (4): Birm. 469:	3840 ± 210 BP (1890 b.c.)
	S2 E3 (4): GrN 8012:	3610 ± 60 BP (1660 b.c.)

The two Neolithic samples were both from well-stratified levels, although in the case of Birm. 472 there was little associated archaeological material in the square from which it was recovered. The Bell Beaker sample Birm. 471 came from the lower part of the cultural deposit in which there was a certain amount of White Ware material and GrN 8013 also came from the lower part of the Beaker level. Birm. 470, on the other hand, was from the main Bell Beaker horizon. The Early Bronze Age dates Birm. 469, and GrN 8012 both come from the lower part of the Early Bronze Age deposit.

It is unfortunate that no date has been obtained from the White Ware levels due to the fact the samples were submitted before the precise boundaries between the main phases had been established.

Birm. 473 matches well with other dates for the Lagozza culture in Northern Italy, which fall into the middle of the range of dates from the Lagozza type site (R. 338 3030 \pm 50 b.c.; R. 337 2855 \pm b.c.; Pi. 34 2844 \pm 90; R. 78 2785 \pm 50; R. 78A 2630 \pm 50). Birm. 472 is later than any of the Lagozza dates so far obtained and it is difficult to judge its validity in the absence of dates for the succeeding White Ware level. However, it would appear to be too late for Lagozza in view of the evidence for the dating of the Copper Age horizon in Italy (cf. Barfield 1975; Whitehouse 1978), even though an argument has been made for a continuity of Lagozza tradition until the Early Bronze Age (Lavioza Zambotti 1938-39; Barfield and Fasani 1973).

A C14 date for the Civate tradition which would appear to be related to the White Ware at Monte Covolo has been obtained from the Buco della Sabbia; R. 1001 1730 \pm 110. Although this appears to be late to fit in with evidence from Monte Covolo, it is probable that Civate tradition does survive contemporaneously with the Bell Beaker horizon somewhere along the Alpine fringe since its influence is recognisable in Early Bronze Age contexts, as at Romagnano (Perini 1975).

Birm. 471 and 470 both fall within the range of dates known for the Beaker period in Europe but it is unfortunate that the deviation is too large to allow us to say whether the dates indicate an early or late moment within the Beaker development. GrN. 8013, with a much smaller standard deviation, might suggest an early stage of the Beaker culture.

Birm. 469, when the large deviation is taken into account, falls within the range of Early Bronze Age Polada dates, while GrN. 8012 is also acceptable for Polada. Both point to a fairly early stage in the Polada development.

CHAPTER VI

DISCUSSION AND CONCLUSIONS

L.H. BARFIELD

The cultural succession at Monte Covolo provides us with a stratified development covering the transition from Late Neolithic to Early Bronze Age which is so far unique in its detail in the area of the Po valley. This sequence, however, can be compared with similar stratigraphies in adjacent regions of Italy and Switzerland, namely the Grotta La Romita in Tuscany (Peroni 1962-63), where the succession develops through Late Neolithic, Copper Age and Early Bronze Age; the Arma di Nasino in Liguria (Leale Anfossi 1968) where Lagozza levels are followed by a "Late Neolithic" (comparable with our "White Ware" phase), a Beaker horizon and a probably Bronze Age deposit. At Sion in Valais, Switzerland, the succession is Late Neolithic (Chassey), Final Neolithic, Bell Beaker and Early Bronze Age (Gallay 1972).

A basic question at Monte Covolo and on these other sites is whether the sequence is a continuous one, i.e. showing occupation by the same group of people through time, or whether there are interruptions either by periods of abandonment or by substitution of one group of people by another.

The very fact of a continuous occupation of the same site through several successive cultural stages can be taken as evidence of a unique population while similarity in the faunal percentages in each phase also argues for continuity in the economy. On the other hand we can observe breaks in the development of the artifact types which underline fairly abrupt changes between the material culture of the four different stages. This is especially apparent between the "White Ware" and Bell Beaker phases.

Briefly summarised, the main changes in material culture are as follows. The tradition from Lagozza to "White Ware", although not clearly differentiated stratigraphically, is marked by a clear decline in the quality of ceramic technology, which is a phenomenon noticeable at this time in several other parts of Europe (cf. Barfield *et al* 1975-76, pt. I). The similarity of this pottery with that from the Buco della Sabbia, Civate would also suggest that this was the same time that the collective burial

tradition may have been introduced into Lombardy, although we have no evidence for this at Monte Covolo itself. The few bone artifacts also show some differences from Neolithic times.

With the Beaker phase we see the greatest changes. New ceramic forms appear, which have no precursors in the local Italian tradition, and at Monte Covolo itself there is a noticeable change in the type of filler used for pottery manufacture. In flint production a new range of arrowheads, short-barbed and tanged and hollow-based in the Bell Beaker style, as well as the crescents, occur.

In the Polada phase certain ceramic forms persist from Beaker times but native Italian elements such as the pierced rims, deriving from White Ware prototypes, are recontinued and elbow handels are introduced probably from the Remedello area.

In each of the four phases at Monte Covolo, as we have demonstrated especially in the discussion of the pottery at Monte Covolo, we can also recognise features of cultural fashion extending well beyond the frontiers to Northern Italy.

Whereas many features underline a rapid transition between phases, in other aspects of the material culture we can see more gradual long term trends. The progressive replacement of impressed cordons on pottery by plain cordons throughout the sequence and the progressive decrease in the blade index of the flint industry are the most notable examples of this phenomenon.

The case for both continuity and discontinuity in the settlement at Monte Covolo can be thus supported by the archaeological evidence. On the whole continuity is the most likely model for the reconstruction of the sequence, although for the White Ware to Bell Beaker transition a strong argument can be made for a break in cultural continuity, if not population.

One crucial problem which has not yet been resolved is the reason for the absence of any evidence for the Remedello culture on the site. The type site of Remedello Sotto lies forty km. to the south on the same Chiese river and abundant evidence for this culture has been found only fifteen km. away from Monte Covolo at Sasso di Manerba (Barfield 1978).

There are three alternative correlations that can be proposed. Remedello may either be contemporary with the White Ware phase or the Bell Beaker phase, or perhaps a Remedello phase is missing between the White Ware and the Beaker phase. The proximity of Remedello features at Manerba where both "White Ware" and Beaker remains are present does not really clarify the problem. What is increasingly clear, however, is that the sequence at Monte Covolo is not necessarily typical for Lombardy as a whole. It is evident, for example, that aspects of the ceramic tradition of White Ware (or Civate) persisted until the start of Polada. This can be observed at Arolo, Leggiuno, on Lake Maggiore (unpublished material in the Soprintendenza Archeologica, Milan) and can also be assumed from the persistence of perforated rims into the Polada tradition. Likewise the Remedello trait of elbow handels is likely to be contemporary

with the Beaker phase at Monte Covolo and certainly directly influenced Polada fashion. The cultural complexity of the Po Valley at this time is difficult to define and indeed it is perhaps advisable to refrain from attempts to define normative cultural patterns for this period in the Po Valley. Different distributional patterns are visible in many individual cultural traits, burial ornaments, flint work, etc. and these cannot be clearly combined into cultural groups (Barfield in press).

The Beaker episode on the site is of particular interest for the current discussions as to the nature of the Beaker phenomenon. The traditional view that the Bell Beaker culture is related to a specific population group has been challenged and the idea that beakers only represent a fashion of status related objects connected with elite within the native society (Shennan 1975). If we interpret the development at Monte Covolo in terms of a continuity of culture, as Barker does, then this elitist model of interpretation might be considered. However, as we have seen, there is in fact an almost total break in the material cultural tradition suggesting total cultural replacement and the new features suggest cultural penetration from beyond the Alps. The absence of local elements in the Beaker tradition and the fact that they actually reappear in the Polada culture is also a strong argument for an intrusive cultural tradition.

The main economic aspects of the site relating to faunal and floral evidence have been discussed in detail by Pals, Voorrips and Barker. Among their evidence we can find some support for the idea that the site was not permanently occupied. The location of the site is unsuitable for winter occupation while the absence of cereal winnowing may indicate that no cereals were grown near the site.

That the settlement was more than just a temporary encampment is however demonstrated by the extensive use of querns for grinding corn throughout the sequence, together with the evidence for ceramic production using apparently local fillers in the Beaker and Polada phases, and the evidence of metal working on the Beaker and the Early Bronze Age periods.

The nearby flint deposits on the east side of Monte Covolo could well be a reason for the establishment of the settlement. They are in fact the most southerly occurrence of flint in this area and we might well therefore link the use of the site with periodic visits to the mountain to obtain flint. It may also be of significance in this context to note that the settlement was abandoned at the very time when the use of flint declines as an essential commodity during the Middle Bronze Age.

Trade is not much in evidence on the site although two fragments of a dagger blade in a non-local, spackled red flint from the Beaker levels (Barfield *et al.* 1975-76 fig. 50,23) indicates commercial or gift exchange of a non-utilitarian perhaps prestige nature in view of the fact that local flint is readily available (Barfield in press).

RIASSUNTO

SCAVI NELLA STAZIONE DI MONTE COVOLO, VILLANUOVA SUL CLISI, BS.

Parte II

La seconda parte della pubblicazione dello scavo di Monte Covolo (1972-73) comprende lo studio dei resti della cultura materiale (manufatti di terracotta, di osso e di corno, di metallo e di pietra), le ossa umane, la fauna, i resti botanici, le datazioni radiocarboniche e la discussione finale.

Manufatti di terracotta, ossa, pietra e metallo (L.H. Barfield)

Dagli strati della White Ware, da quelli della Cultura del Vaso Campaniforme e da quelli dell'età del Bronzo, sono state recuperate in tutto sedici fusarole. L'unica fusarola proveniente dallo strato a White Ware (F2) è di dimensioni maggiori di tutte quelle note per il neolitico italiano. Le quattro fusarole trovate nello strato campaniforme sono di forma biconica; anche queste sono nettamente diverse da quelle neolitiche, solitamente lenticolari, mentre trovano raffronti con quelle rinvenute in altre stazioni campaniformi. Tra le fusarole del Bronzo antico ve n'è una ricavata da un cocci (F13); una rondella ottenuta da un frammento fittile non forato è stata anch'essa raccolta negli strati della Cultura di Polada (F17).

Un pendaglio di osso di ottima fattura, con un'estremità globulare ed anellini centrali, proviene dagli strati neolitici (B1). Si tratta di un oggetto che ha i suoi paragoni più stretti nei reparti eneolitici della Francia meridionale; molto simili al nostro, oltre che cronologicamente contemporanei, sono i pendagli più rozzi della Cultura di Cortaillod in Svizzera.

Denti forati di cane o di lupo provengono dagli strati campaniformi (B2-4) ed inoltre anche un elemento di collana tratto da un osso di uccello (B5). Strumenti d'osso sono stati recuperati dagli strati della White Ware, della Cultura del Vaso Campaniforme e da quelli dell'antica età del Bronzo. Altri due scalpelli di osso (B13-B14) erano presenti nei livelli a White Ware. Questo genere di strumento si trova nei depositi neolitici, a Rivoli, ad esempio, pur essendo tipico delle stazioni dell'età del Bronzo.

Le punte d'osso sono comuni negli strati che vanno dalla White Ware al Bronzo antico. Quelle rinvenute nei livelli campaniformi sono confrontabili con altri materiali provenienti da varie stazioni europee della Cultura del Vaso Campaniforme.

Sono assenti le punte tratte da metapodi spezzati, tipiche del neolitico. Una punta forata (B10) dagli strati a White Ware è paragonabile ad un esemplare simile proveniente dalla stazione neolitica delle Colombarie.

Un anello di corno cervino, oggetto caratteristico dell'antica età del Bronzo (B25), proviene dallo strato campaniforme. Nello strato del Bronzo antico è stato rinvenuto un ago con testa ad anello, elemento tipico di questo periodo (B26).

A Monte Covolo si può osservare che i tipi di strumenti su osso che differenziano l'antica età del Bronzo dal Neolitico, fanno la loro comparsa nel momento campaniforme se non già nei livelli a White Ware.

Si sono raccolte sei asce in pietra levigata intere o frammentarie confezionate in diversi tipi di roccia, come è stato confermato dall'analisi petrografica. Il frammento d'ascia (S1) raccolto negli strati neolitici è stato levigato in una varietà di pietra verde contenente cristalli di *zoisite* di color rosa e di granati rosa-bruno; negli strati campaniformi si è trovato anche un frammento di ascia in giadeite. Un elemento di collana in calcite proviene dagli strati neolitici; un altro in steatite da quelli del Bronzo antico.

Fra gli altri manufatti di pietra si trovano un ciottolo con solchi molto sottili (S13), forse impiegato per appuntire degli aghi di metallo, ed un oggetto di arenaria con un solco mediano (S12), interpretabile come strumento atto alla levigatura delle aste delle frecce; entrambi questi strumenti provengono dai livelli campaniformi.

Da tutto il deposito sono state portate alla luce trentaquattro macine confezionate con roccia locale. Si dividono in due gruppi, corrispondenti sia alla parte inferiore che a quella superiore della macina.

Tra gli altri strumenti in pietra si notano quattordici martelli tratti da ciottoli locali; due sassi con incavi centrali martellati provengono dai livelli campaniformi.

La presenza di oggetti metallici è documentata dal momento a White Ware in poi. Nello strato a White Ware è stata trovata una lamina in rame puro (M1), piegata; da quelli campaniformi provengono un ago in rame (M2) ed un pezzo di rame informe (M3). Negli strati dell'età del Bronzo si trovano gocce di bronzo derivate dalla fusione del metallo. Le analisi metallografiche sono state eseguite dalla Dr. Ethel Eaton del Research Laboratory del National Museum of Scotland.

Ossa umane (J.T. Chesterman)

I pochi frammenti di ossa umane raccolte provengono dai livelli neolitici, da quelli a White Ware e da quelli del Bronzo antico. È possibile che tutti questi appartengano ad un'unica deposizione femminile; forse ad una sepoltura neolitica sconvolta.

Semi, frutta e carboni (J.P. Pals e A. Voorrips).

Resti organici di semi, frutta e carboni sono stati estratti dal deposito con un sistema di flottazione del terreno. I semi osservati nella successione stratigrafica non hanno rivelato un cambiamento notevole nel tempo, con l'eccezione di quelli di corniolo (*Cornus mas*) presenti in grande quantità soltanto nei livelli campaniformi ed in quelli dell'età del Bronzo. Il frumento (*Triticum monococcum*), è il cereale più importante; presente è anche l'orzo (*Hordeum vulgare*). Un seme di miglio (*Panicum milliacum*) dei livelli a White Ware è di particolare interesse in quanto questa pianta non è finora nota altrove in Italia settentrionale prima dell'antica età del Bronzo. Resta comunque qualche dubbio circa la provenienza di questo unico seme, dato che la stratigrafia non si presentava con scanditure del tutto nette.

Le piante selvatiche rispecchiano un ambiente di margine boschivo, con la presenza di diversi alberi da frutta.

Fra i carboni è abbondante il rovere (*Quercus*) ed altre piante tipiche del margine di bosco.

La fauna (G.W.W. Barker)

Uno dei fatti interessanti di questo insediamento rispetto ad altre stazioni neolitiche e dell'età del Bronzo dell'Italia settentrionale è che qui è stato possibile per la prima volta studiare la fauna di una sola stazione attraverso diverse fasi culturali nel corso del III millennio.

Nelle capre/pecore, si trova una dominazione di individui adulti; grazie ai criteri proposti da Boessneck, si è potuto stabilire che la maggior parte di questi erano pecore, probabilmente allevate sia per il latte che per la lana. La statura di questi animali è identica a quella di altre popolazioni loro contemporanee note in Italia.

La maggior parte dei resti faunistici sono stati recuperati dal deposito archeologico con dei mezzi tradizionali, vale a dire con l'aiuto della cazzuola. Un controllo per vedere se questo metodo non avrebbe alterato le statistiche dei reperti faunistici è stato condotto su una parte del materiale raccolto con un'accurata vagliatura. Da questo controllo si è potuto dimostrare che poco materiale è sfuggito al recupero totale.

Dei 20000 frammenti di ossa, il 40% provengono dagli strati campaniformi. Un confronto eseguito con gli altri materiali archeologici ha mostrato una diminuzione del numero delle ossa rispetto alla quantità totale dei frammenti ceramici nel corso della sequenza stratigrafica. Le ossa sono molto frammentate; fatto questo dovuto soprattutto al carattere roccioso del terreno; soltanto il 30% di queste sono state determinate.

Gli animali predominanti sono il bue, il maiale e la capra/pecora, fra i domestici; il cervo, il capriolo e la lepre fra i selvatici.

In tutti gli strati esaminati, i bovini comprendono tra un quarto ed un terzo del totale della fauna. Capre/pecore e suini comprendono ciascuno un terzo. La selvaggina

non è mai molto importante e costituisce rispettivamente solo il 5,9%, il 3,8%, il 2,1% e l'1,3% del totale della fauna in ciascuna delle fasi. Dal computo statistico si è potuta notare una notevole stabilità nell'economia durante tutti i periodi di occupazione; tanto è vero che le proporzioni relative delle diverse specie variano di poco. Nello studio vengono presentate le cifre ed il numero assoluto dei frammenti, il numero minimo di animali presenti e la stima del peso in carne per ciascun animale. Da quest'ultima statistica si può vedere che bovini, suini e capre/pecore fornivano insieme più del 90% della carne consumata nell'insediamento.

Confrontando questa con altre raccolte faunistiche si può vedere che la taglia dei bovini è simile a quella registrata in altre stazioni italiane neolitiche e dell'età del Bronzo. Dallo studio dei denti si è giunti alla conclusione che la maggior parte dei bovini venivano uccisi a tre o quattro anni di età, probabilmente per il fatto che venivano allevati per produrre sia carne che latte.

I suini, di piccola taglia, sono, con ogni probabilità, da considerare domestici; la loro età è normalmente compresa tra i 24 ed i 30 mesi.

Lo studio della zona circostante la stazione, eseguito seguendo il metodo proposto da Higgs e Vita Finzi (1972) per un raggio di km. 5, ha portato ad interessanti considerazioni circa la potenzialità economica dell'ambiente. L'insediamento si trova al confine tra prealpi e pianura. La sua ubicazione, subito ad ovest del Monte Covolo, proprio nell'area ombreggiata della rupe, non parrebbe idonea ad un insediamento permanente; è quindi probabile che la stazione sia stata abitata soltanto stagionalmente, in estate.

Il sito è inoltre maggiormente adatto per un'economia basata sia sull'allevamento del bestiame che sulla coltivazione dei cereali, pur essendo attestate entrambe le attività.

Non è detto che la località sia stata scelta esclusivamente per motivi agricoli in quanto Monte Covolo è anche una zona ricca di selce.

Datazioni assolute (L. H. Barfield)

Sette campioni di carbone sono stati analizzati nei laboratori delle università di Birmingham e di Groningen, fornendo i seguenti risultati:

Neolitico	Birm 473	4790 ± 210 BP	(2840 b.c.)
	Birm 472	4240 ± 190 BP	(2290 b.c.)
Campaniforme	Birm 471	3950 ± 320 BP	(2000 b.c.)
	Birm 470	3810 ± 210 BP	(1860 b.c.)
	GrN 8013	4010 ± 40 BP	(2060 b.c.)
Bronzo antico	Birm 469	3840 ± 210 BP	(1890 b.c.)
	GrN 8012	3610 ± 60 BP	(1660 b.c.)

È un peccato che manchino datazioni assolute per l'orizzonte a White Ware, specialmente per il fatto che la seconda datazione neolitica sembra troppo recente se messa a confronto con altre note da stazioni della Cultura di Lagozza. Tutte le altre sono confrontabili con quelle già conosciute in altri depositi delle medesime culture.

Problemi dello sviluppo culturale e discussione (L.H. Barfield)

La stratigrafia di Monte Covolo è l'unica dell'area padana che documenti in dettaglio lo sviluppo culturale dal tardo Neolitico al Bronzo antico. La sequenza è confrontabile con altre stratigrafie riconosciute, in Liguria, all'Arma di Nasino, in Toscana, alla Romita di Asciano e, nel Vallese (Svizzera), a Sion.

La domanda che ci si pone quando ci si imbatte in stazioni di questo tipo è se tali successioni siano state prodotte dalla presenza dilazionata di un'unica popolazione o se si tratti di sovrapposizioni di gruppi umani diversi. L'economia, per quanto osservabile dai resti faunistici, indicherebbe una certa continuità; mentre i resti della cultura materiale denunciano uno stacco netto per ogni fase, specialmente per quanto riguarda il passaggio tra la White Ware e la Cultura del Vaso Campaniforme, nella quale si notano cambiamenti notevoli sia nella ceramica che nell'industria litica.

L'episodio campaniforme pare infatti interrompere uno sviluppo culturale locale in quanto elementi della White Ware, quali gli orli forati, riappaiono poi con la prima età del Bronzo.

D'altra parte, si possono riconoscere elementi comuni ad altri siti in tutte e quattro le fasi d'abitazione; fatti questi indicanti che lo sviluppo locale non può essere avvenuto in isolamento.

In più, si possono notare elementi che evolvono in modo graduale attraverso tutta la successione, come ad esempio i tipi di cordoni variabili ed il decremento progressivo dell'indice laminare nell'industria litica scheggiata. Continuità e cambiamenti possono tutti e due venire interpretati in base all'evidenza dei rinvenimenti di Monte Covolo e, in termini di mutamenti di popolazioni, è difficile dire se si tratti o meno di una comunità etnica.

Un problema che rimane ancora insoluto è il rapporto tra la successione di Monte Covolo e la necropoli di Remedello. È pur sempre possibile che, a Monte Covolo, manchi una fase corrispondente a Remedello, tra la White Ware e quella Campaniforme; ma è anche possibile che l'una o l'altra di queste ultime due sia stata contemporanea di Remedello. Ciò che è chiaro, però, è che nella Val padana non si è assistito ad un unico sviluppo culturale e che l'evoluzione e la distribuzione culturale sono abbastanza complesse. Per quanto riguarda il III millennio, non è quindi facile nè tanto meno consigliabile tentare di definire dei gruppi culturali definendoli sulla base dei resti della cultura materiale.

Lo scavo di Monte Covolo è di notevole importanza per una migliore interpretazione

del fenomeno della Cultura del Vaso Campaniforme. Le ipotesi di interpretazione sono per il momento divise tra chi interpreta la cultura come legata ad un gruppo etnico e chi spiega il problema nei termini di un fenomeno culturale diffuso attraverso diverse popolazioni indigene. In questo caso abbiamo preferito vedere l'introduzione della Cultura del Vaso Campaniforme come intrusiva della zona nordalpina.

Nella Cultura di Polada si può riconoscere una mescolanza di elementi della Cultura del Vaso Campaniforme con altri locali italiani. Per quanto riguarda la stazione in esame, sulla base dei dati paleoambientali e paleoeconomici, si può provvisoriamente considerare che gli insediamenti erano forse stagionali, probabilmente estivi.

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0 1 cm



M1



M2

0 5 cm

Plate 1 - Monte Covolo. Metal objects: M1, White Ware; M2, Bell Beaker.