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PREISTORIA E PROTOSTORIA
DELLE CIVILTA' ANTICHE

Direttore:
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SOMMARIO

A PRELIMINARY NOTE ON THE TYPOLOGY, FUNCTIONAL VARIABILITY, AND TRADE OF ITALIAN NEOLITHIC GROUND STONE AXES

Daniel EVETT - Detroit

The purpose of classification

It is commonly understood that following excavation two major tasks remain for the archeologist — classification and interpretation. Yet the great writers of culture histories rarely carried out the direct examination and classification of the materials from which they derived their interpretative narratives of man's past. Today, with the increasing popularity of multi-disciplinary teams, it is not uncommon to find typological analysis performed by one individual and interpretation carried out by another. Such practices seem to me risky if one believes that meaningful classification must be guided by explicitly stated theory. Indeed, several philosophers of science as well as numerous scientists have argued that what scientists « see », (i.e., the categories of data perceived and utilized) is determined by the goals of their research [1].

All classifiers of archeological data use a set of characteristics or attributes with which they hope to define categories or « types » in an otherwise amorphous group of materials. The choice of attributes is extremely important in all typological endeavors because the selection of attributes predetermines to a great extent the kinds of categories that will be 'discovered'. Obviously, one cannot generate a typology of vessel forms if only surface decorations are recorded and analyzed.

[1] See Marvin Harris' (1965, p. 3-18) useful discussion of this issue from the perspection of a cultural anthropologist.

Since there is an almost unlimited number of attributes for even the simplest of objects, the archeologist inevitably selects only a portion of the attributes. What strategy best serves to determine the selection of this portion? One apparent solution is to state in advance the attribute fields and attribute states which will be considered: in other words the field of observation is specified before classification is carried out. Thus, if one were classifying a collection of ceramics such attribute fields as rim profiles, handle shapes, and decorative techniques might be singled out by the classifier. Such a tactic however, begs the question of why rim profiles, handle shapes and decorative techniques are more important for study than attributes of paste, temper, surface color or other observable ceramic characteristics.

What is needed is a framework which provides both a rationale and empirically sound criteria for the selection of attributes. If one feels that the major goal of the archeologist is to describe and explain prehistoric culture systems then the rationale for selecting a certain field of attributes is the archeologists belief that those attributes will be informative about a particular aspect or range of prehistoric socio-cultural patterns. Thus I suggest that archeological categories exist for the purpose of discovering the nature of past culture systems not just for classifying the material remains of those systems. [cf. Binford '65] In my view, the archeologist should not initiate his typological analysis because he is interested in the formal patterns of artifacts per se but because he is interested in some facet of prehistoric culture patterns. Thus the archeologist confronted with a collection of ceramics in need of classification might better begin his work by considering what aspects of socio-cultural systems could be revealed through typological analysis of pottery. For instance, the archeologist might state his intentions as follows: « I think a typology of ceramics based on rim profiles, handle shapes and decorative techniques will best distinguish the residence and task groups that produced and utilized the pottery. »

« All well and good », one might say, « but by what special process does the archeologist know that socio-cultural differences are distinguished by differences in rim profiles and handles? » At this stage the archeologist doesn't « know » this at all; it is only a proposition based perhaps on analogy from ethnographic data, or an idea rescued from an archeological dream. The archeologist must now prove that his idea relating certain formal differences in pottery to socio-cultural variables is valid and he must use classification as one step in the acquisition of such knowledge of the past. Since this knowledge is best

gained through the creation and testing of hypothetical models that use typological constructs, it follows that the validation of the models also serves to validate the typological categories themselves. Just how might this work? Let us continue with the above hypothesis.

Our archeologist has postulated a relationship between pottery types based on variations in rim profiles and the like and social structure. What kinds of archeological evidence would support such a hy-

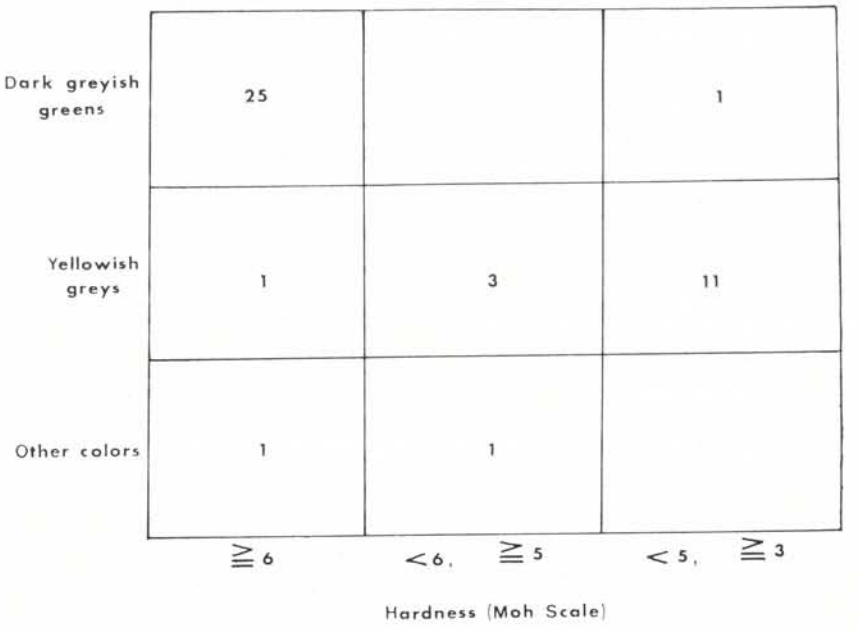
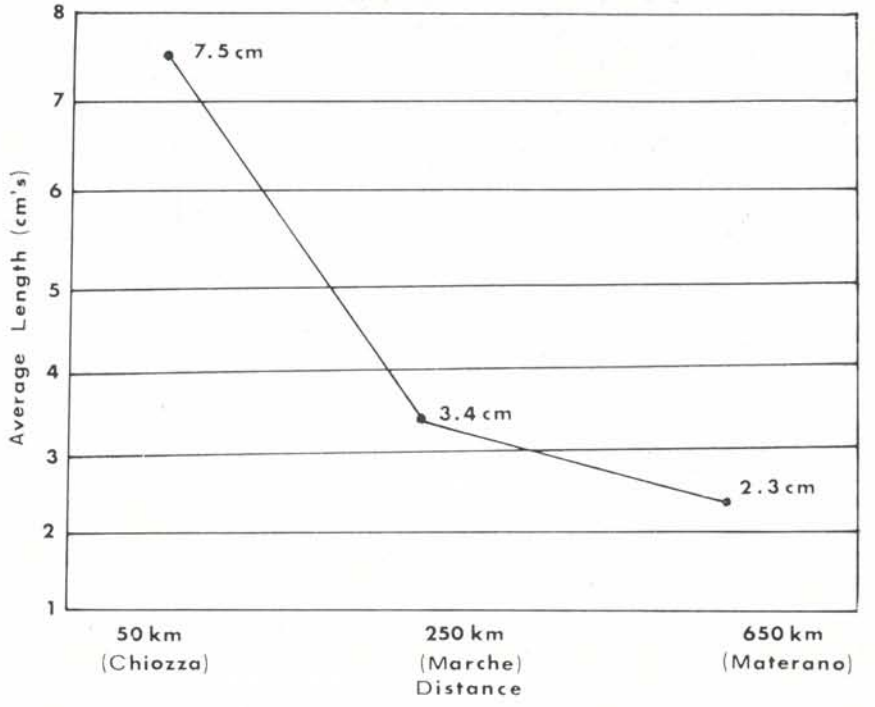


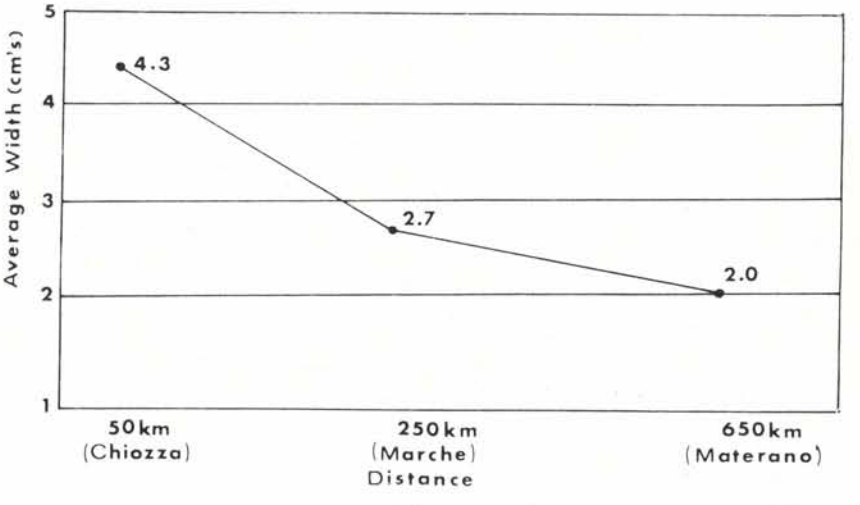
Table 1 - Hardness and Color (All Pieces).

pothesis? We know that different social (or task) groups, at some point in their existence, occupy mutually exclusive segments of space and time. Therefore, if pottery types reflect the social contexts of their production we would expect the types to be differentially distributed in time and/or space.

One then proceeds to do the classifying and to check the categories for the expected time and space distribution patterns. If the predicted patterns are identified, then not only is the hypothesis validated, but the typology also because it has proven useful in identifying prehistoric

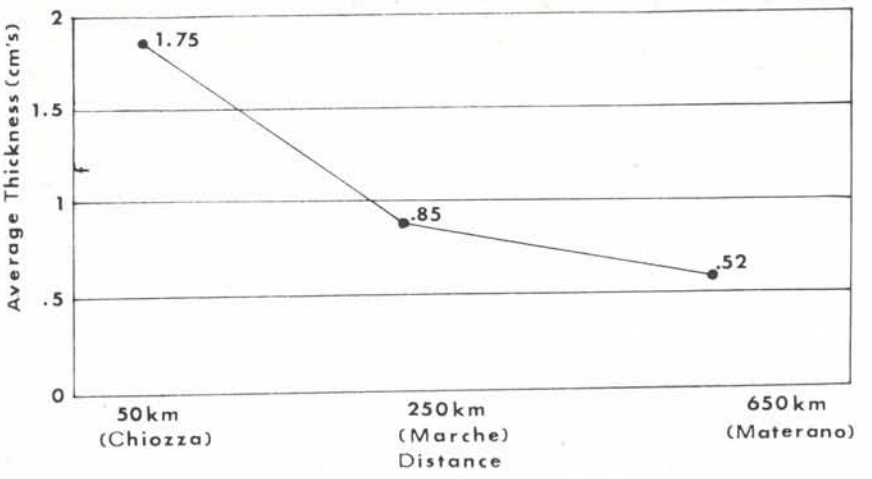


a



b

Tables 2*a,b* - Size vs. Distance from Source - Greenstone Pieces Only.



c

Table 2c - Size vs. Distance from Source - Greenstone Pieces Only.

culture patterns. The types are empirically sound because the typological categories reflect the organizational structure of past cultures. I suggest that all taxonomies must be evaluated against culturally determined spatial and chronological distributions [2].

Unfortunately most archeologists do not explicitly acknowledge their reasons for choosing some attributes and ignoring others. Since all such selection implies some intuitive evaluation of the cultural role of the given attributes, any typology which merely creates (or « discovers ») types without stating *why* the particular set of attributes used to define the types was selected is the result of a nonscientific, subjective operation. It is both more economical and more scientific to use an explicit, deductive method in creating and testing typologies. This

[2] The process of hypothesis formulation, testing, evaluation of results, and possible modification of the original hypothesis has been referred to as the hypothetico-deductive approach. [c.f. Watson, Redman and LeBlanc]. The basic framework for the use of this approach is as follows: Let (H) = the hypothesis that in (C), if (A) then (B). (C) stands for the conditions which are given; (A) stands for the postulated event or condition necessary for the occurence of (B). The hypothesis is shown not to be false (and therefore correct insofar as presently known) if certain other phenomena called « test implications » (I) (which are the logical consequences of the proposed relationship in the hypothesis) are observed.

is not to say that all typologies using intuitively, « non-purposefully » derived attributes are always « incorrect » in an archeological sense, but only that they serve no purpose until they have been tested for their ability to distinguish and explain past spatial and temporal culture patterns. Since much archeological interpretation revolves about the functional reasons for archeological similarities and differences, archeologists should devote greater attention to creating and testing typologies that attempt to measure functional variability in prehistoric cultures [3].

A FUNCTIONAL ANALYSIS OF ITALIAN NEOLITHIC GROUND STONE AXES

The ground stone « axes » found in virtually every Italian Neolithic site offer fit subject matter to demonstrate the productivity of the deductive method in testing a functional typology. It is widely held that ground stone axes were subject to long-distance trade in Italy during Neolithic times. The early attempts to trace the precise locations of the greenstones from which Ligurian and Po Valley Neolithic axes were made were only partially successful [c.f. Franchi 1900, Piolti 1902, Taramelli 1903]. The widespread occurrences of the greenstone minerals in northern Italy seems to preclude identification of precise locations of raw materials from geologic data alone. Although the greenstone axes were probably traded short distances in northern Italy, the general proximity of the raw material to all Neolithic groups was not conducive to the establishment of extensive trade networks in axes. However, greenstone axes found outside in central and southern Italy can safely be regarded as of northern origins, and hence, as trade items.

The almost ubiquitious presence of ground stone axes at Neolithic sites and the availability of at least some knowledge about the geographic locations of certain kinds of raw materials would seem condusive to accurate documentation of ground stone ax data. Unfortunately

[3] When « function » is mentioned with regard to archeological materials, the tendency is to assume that some sort of mechanical activity is implied. However, if one regards the totality of a culture as operating in the maintenance of that cultural system, then a wide spectrum of socio-cultural phenomena are « functional ». Thus, technological, socio-structural, and ideological variables are all « functional ». (For a fuller exposition of these views the reader is directed to L. R. Binford '62.)

most of the site report literature is vague on three points (raw materials, measurements, and wear patterns) regarding ground stone axes found in central and southern Italy [4]. In addition, in the general literature one has the impression that *all* axes from central and southern sites are greenstone and, by inference, imported. [c.f. Radmilli '65, Piccola Guida Tav. XIV, XVII]. Moreover, it is assumed that all of the items shaped like axes are in fact axes, that is, chopping tools.

I believe both of these assumptions about trade and function to be incorrect. Thus one of our research goals is to disprove these as-

Raw Material	50 km Chiozza		250 km Marche		650 km Materano	
Greenstones	19	86.3%	2	25%	4	28.6%
Limestones	1	4.6%	6	75%	7	50.0%
Other	2	9.1%	—	—	3	21.4%

Table 3 - Percentage of Raw Material Type vs. Distance from Greenstone Source.

sumptions. On the positive side, we want to know if there are typological differences in a sample of Italian Neolithic stone axes that are explicable in terms of different functions. We think that there will be first-order, typological, and associated functional dissimilarities that reflect differences in the availability of raw materials, while other second-order typological differences reflect variations in the structural qualities of divers materials. Since we are primarily concerned with possible functional differences within the class of axes, the first task is to select attributes that we hope reflect the functional specializations for which the axes were produced. Differences in three attribute para-

[4] For instance, in his report on Ripoli, which is otherwise quite rich in descriptive detail, Cremonesi discusses the ground stone axes in the following terms. « *Small ground stone axes.* They are rather scarce and often extremely small with triangular shape and accurately ground. Only three examples... are of larger dimensions. » [Cremonesi. '65, p. 140].

meters (shape, size and raw material) would seem to be related to functional variability since variations in these characteristics would influence the initial mechanical efficiency as well as the long term serviceability of axes. Shapes will be measured by length, width, and thickness ratios and size by the maximum values of these three dimensions. Petrological analysis would normally require a trained geologist and/or sophisticated laboratory analysis. In our case we had neither at our disposal, but it was felt that measurements of hardness (Moh scale) and color (Munsell Color Charts) would effectively discriminate different types of rocks. Finally, assuming that our petrological analysis is reasonably accurate, we measured (with the aid of the Carta Geologica d'Italia) the availability of raw materials in proportion to their distances from the source areas.

The following series of hypotheses, if not disproven, should indicate that there are explainable differences among Italian Neolithic ground stone axes. First, we propose that outside of those areas of ready access to « greenstone » materials, at least two kinds of raw materials — locally available indurated limestones and the greenstones from distant sources — were used to produce ground stone axes. Second, at those sites where the two raw materials from different localities were used, the limestone axes will be larger than the greenstone axes. Third, sites close to greenstone raw materials will contain greenstone axes almost to the exclusion of other kinds of raw materials and they will be larger than greenstone axes from sites distant from the sources of greenstones. Fourth, the limestone axes will generally be larger than even the greenstone axes from sites close to greenstone raw materials because the limestone, being softer, required extra thickness for strength. Finally, although there are morphological and metric differences between the limestone axes and the greenstone axes made at sites near the greenstone raw materials, these two kinds of axes were functionally equivalent, while the smaller greenstone axes found at sites far from the greenstone raw materials served a different function. Specifically, the larger axes, regardless of raw materials, were used for chopping activities, while the smaller greenstone axes served some kind of sociological or ideological function [5]. The necessary evidence for the func-

[5] The lack of precise data on the primary archeological contexts of those items precludes any attempt to further define the possible functions of the small greenstone axes.

tional differences of the two types of axes will be found in the presence of unmistakable signs of use in the larger axes and in the lack of utilization marks on the small greenstone axes. In addition, members of the category « small greenstone axes » will show suspension holes which indicate probable use as objects of personal adornment. In summary, our fundamental hypothesis is that there are formal, typological differences in Italian Neolithic axes which do not reflect style or chronological differences but rather are the result of functional differences. A more formalized statement of the basis hypothesis will take the following form: (H) = the hypothesis that in a sample of Italian ground stone axes (C), if there are two or more functional differences

Size Dimensions	Limestones	Local Greenstores
Average Length (cm's)	7.7	7.1
Average Width (cm's)	4.9	4.1
Average Thickness (cm's)	2.6	1.8

Raw Materials

Table 4 - Raw Material vs. Size (With Distance from Greenstone Source Controlled.)

(A), then there will be two or more associated types of axes (B). Substantiation of the functional differences will be found in the evidence of different utilization attribute modes (I) associated with the various morphological types.

The sample

Although a complete survey of Italian Neolithic ground axes would be desirable, it was felt that an appropriately selected sample would serve to evaluate our hypothesis. The sample consists of 45 whole of fragmentary axes from Chiozza di Scandiano [c.f. Degani '41, Manfre-

dini '70, Bagolini and Barfield '71], the Marche sites of Ripabianca and Maddalena La Muccia [c.f. Lollini '63], and the Materano sites of Murgia Timone, Murgecchia, and Tirlecchia [c.f. Lo Porto, '68]. (See Appendix 1 for detailed listing of attribute data). Several factors influenced the selection of sites, but the availability of materials for direct observation was obviously of prime importance and I would like to thank Dr. G. Ambrosetti, Dottoressa D. Lollini, and Prof. D. Adamesteaneu for their cooperation in making the materials available to me. Obtaining a suitable quantity is always a major concern when samples rather than complete populations must be used. All of the sites have been rather extensively excavated and have produced sizable lots of materials including, of course, ground stone axes. These sites are also aligned along a scale of increasing distance from the assumed source of greenstone raw materials. Finally, it was also regarded as important that all of the sites be of a comparable level of cultural complexity and a similar chronological range. All of these sites are « Middle Neolithic » in date and all are open village sites associated with evidence of food production.

Analysis

Before proceeding to consideration of the various hypotheses, (both typological and explanatory), it is essential that we demonstrate that there are different kinds of raw materials and that these raw materials were either of local or distant origins at the various sites. Table 1 provides strong support for the supposition that there are two major categories of raw materials in the sample. The hard, dark grey-green rocks probably include such minerals as jadite, serpentine, olivine and chloromelanite, all of which belong to the greenstone category. The primary outcrops of the greenstones are indicated on the map. The second, more variable group of softer, reddish and yellow tinged grey materials can probably be regarded as consisting of a variety of limestones. In addition, there are a few axes made from igneous minerals other than greenstone. [See samples number 15, 39, and 44]. The map also indicates the primary outcrops of indurated and softer limestones.

As the map reveals, Chiozza is closest to the greenstone source; the Marche sites are not a much greater distance from greenstone outcrops but these sites are very close to limestones. The Materano sites are at least 650 kilometers from the nearest source of greenstone and, as

with the Marche sites, limestones are locally abundant. In light of the above petrographic and geologic evidence, it seems reasonable therefore, to conclude that the greenstone axes at the Marche and Materano sites were imported items, while those at Chiozza may reflect at best the workings of a local goods exchange network. Likewise, the limestone axes at the Marche and Materano sites were not long distance trade items.

Since the petrographic analysis is somewhat weak in its mineralogical data, the possibility that we have erred in assigning « trade » and « non-trade » status to these categories must be reckoned with. However, the correctness of the distinction between « trade » and

Availability	Very Heavy (Battered and/or numerous large chips)	Heavy	Medium Wear Patterns	Light	None Visible
Local	3	10	12	8	2
Imported (All greenstones from the Marche and Materano)	—	—	—	1	5

Table 5 - Wear Patterns vs. Availability of Raw Material (the reader will recall that the locally available greenstone and limestones were also significantly larger in all respects than the imported greenstones).

« non-trade » items could be further confirmed if it can be shown that these categories are associated with differences in « value ». One would expect that the farther a product moves from its source, the more valuable it becomes. The value of prehistoric trade objects can rarely be measured directly, but if samples of an object become increasingly rare or smaller the farther removed they are from their source, then one can assume that the value has increased in proportion to the distance. A glance at Tables 2 and 3 lends support (given the above assumptions to the proposition) that greenstone axes increased in value as they were moved farther from their source. Greenstone axes are not as frequent at sites more distant from the source of greenstone, and they are clearly smaller than the axes produced of local limestones. At the Marche and Materano sites there are definite patterns of association between raw materials and sizes, and between size and distance from the sources of the materials. We think these patterns reflect differences in « value » which in turn

reflect the differential status given to « trade » and locally obtained materials and/or finished products.

Because there is a difference in the average sizes of limestone and greenstone axes, the question arises as to the cause for this difference. One likely possibility is that the greenstone axes were smaller because of their greater hardness, density, and tenacity. To test for this possibility one must first control for size differences due to « value ». Therefore only local greenstones and local limestone axes should be compared. [See Table 4]. The limestone axes tend to be bigger in all dimensions than the locally derived greenstone axes, but the differences between these two kinds of axes are minor when either is compared with the imported greenstone items. Thus, another variable, raw material, does account for some of the differences in size, but distance from the source of raw material appears to be the underlying major factor in explaining the size differences in Italian Neolithic axes.

Our major hypothesis states that the formal differences between the large and the small axes are correlated with functional differences and that evidence of this will be found in the patterns of utilization damage. Since axes were presumably employed in chopping activities most of the wear will occur on the bit edge. Table 5 demonstrates that, while there is some overlap in the wear patterns of the large limestone and greenstone axes and the small greenstone pieces, the great preponderance of large axes show signs of intensive use, while only one of the small greenstone trade items shows macroscopic evidence of edge wear. Another strong indicator of a « non-ax » function of the small greenstone pieces is the presence of suspension holes in two of these items. The suggestion is of course, that these pieces were worn as part of an array of personal adornment status markers whose more exact significance is presently unknowable.

All of the hypotheses having been confirmed, the pattern that emerges is one in which there are differences in raw material and size of Italian Neolithic ground stone axes that seem explicable in terms of the differences in values and in functions between traded and locally produced pieces. Certainly these results and conclusions are not viewed by the author as immutable truths. Larger samples and more refined mineralogical and typological analyses will no doubt produce new information. What we hope is that further work on these relatively neglected items will be carried out with explicitly stated goals and methodology. Some areas of further inquiry come to mind. Not

least among them is the need for greater knowledge of the precise archeological contexts of axes, for without this information discovery of the socio-structural or ideological functions of archeological materials is nigh impossible. Macroscopic analysis of wear patterns is not an entirely satisfactory method for distinguishing modes of use, and surely microscopic analysis linked with experimentation would further our knowledge of the possible mechanical tasks performed by ground stone axes. One unexplored area is the degree to which shape variability is amenable to categorization and whether shape types would reflect mechanical or socio-structural dimensions. It is also clear that much more needs to be done on the raw material aquisition, manufacture, and distribution of axes. In conclusion, it is hoped that this brief exercise has served to demonstrate both the potential of applying the hypothetico-deductive method to archeological data and the degree to which new information can be gained from materials from older excavations.

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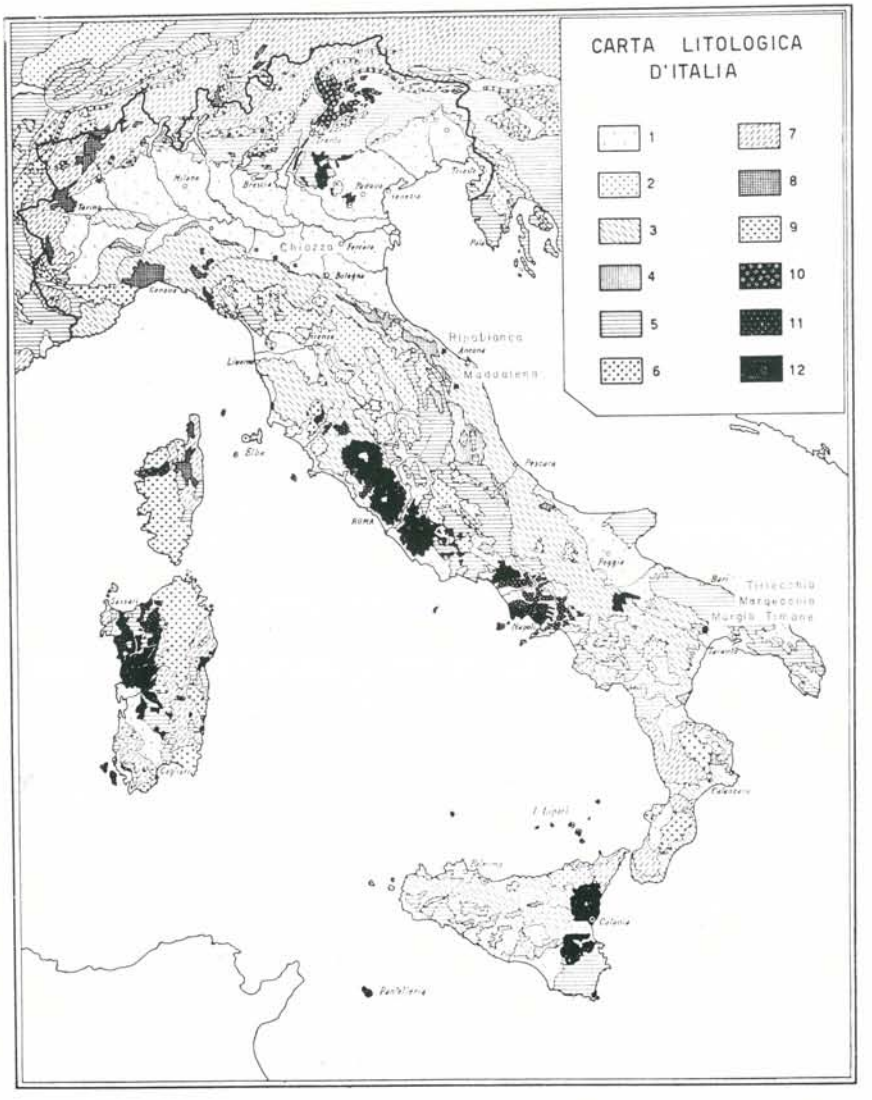
APPENDIX I - GEOLOGIC AND PETROGRAPHIC MAP OF ITALY



(Da A. BIANCHI, *Corso di Mineralogia*, Padova, 1954).

Per la compilazione di questa Carta, necessariamente schematica, hanno servito di base la Carta Geologica (Gb. Dal Piaz e P. Leonardi) e la Carta litologica (A. Moretti) alla scala 1 : 2.500.000 dell'Atlante fisico-economico d'Italia (G. Dainelli T.C.I. - 1940) e la Carta geologica alla scala 1 : 1.000.000 dell'Ufficio Geologico d'Italia (1931).

SPIEGAZIONI

1 — *Sabbie e limi* (prevalenti), *ghiaie, argille*: terreni sciolti di depositi alluvionali fluvio-lacustri; spiagge e panchine litoranee; anfiteatri morenici, etc. del Quaternario, con limitati affioramenti di conglomerati ed arenarie a scarsa cementazione, ghiaie e sabbie, del Quaternario infer. e del Pliocene.

2 — *Arenarie* (prevalenti) e *conglomerati* dell'Era terziaria (macigno oligocenico; molasse mioceniche, etc.).

3 — *Argille scistose e galestri, argille scagliose*, con limitate intercalazioni calcaree del Mesozoico superiore (Cretaceo) e del Terziario inferiore (Eocene); *argille* e *marne* del Terziario superiore (Miocene, Pliocene).

4 — *Formazione gessoso solfifera*, con alternanze di calcari, del Miocene superiore (Emilia, Romagna, Marche, Calabria, Sicilia).

5 — *Calcari e calcari dolomitici* del Mesozoico (in prevalenza) e del Cenozoico.

6 — *Conglomerati antichi*, (Verrucano) ed *arenarie* (Val Gardena); *scisti sericitici* con intercalazioni di porfidi quarziferi più o meno laminati (*porfiroidi*, Alpi Marittime) e limitati affioramenti di calcari paleozoici (Carnia): complesso Permo-carbonifero delle Alpi e della Toscana.

7 — *Scisti cristallini*: paragneiss, micascisti e filladi, con limitate intercalazioni di marmi od anfiboliti (Archeozoico in prevalenza e Paleozoico); masse di ortogneiss granitici e granodioritici (Gran Paradiso, Monte Rosa, Antigorio, Ticino, Alpi Aurine, Gran Veneziano); quarziti, marmi ed anidriti del Trias; calcescisti mesozoici.

8 — *Ofioliti* (*Pietre verdi* dell'Era mesozoica): rocce magmatiche femiche ed ultrafemiche e loro prodotti metamorfici: gabbri, eufotidi, diabasi e peridotiti; anfiboliti e prasiniti; serpentini, scisti cloritico-antigoritici, talcoscisti.

9 — *Graniti* (prevalenti), *granodioriti, tonaliti, dioriti* e *sieniti*, essenzialmente paleozoici (intrusioni del Ciclo ercinico: Sardegna, Corsica, Sila, Aspromonte, Argentera, Monte Bianco, Aar-Gottardo; o cenozoici (intrusioni del Ciclo Alpidico: Biella, Traversella, Val Masino, Adamello, Bressanone, Vedrette di Ries, Predazzo, Baveno (?), Isola d'Elba).

10 — *Rocce effusive paleovulcaniche: porfidi quarziferi* del Permiano, con subordinate porfiriti (Trentino-Alto Adige); *porfiriti* mesozoiche con subordinati melafiri (Trias medio delle Alpi dolomitiche).

11 — *Lave neovulcaniche in prevalenza acide e loro tufi* (Terziario e Quaternario): trachiti (C. Euganei, M. Amiata, Sardegna, Campania), trachiliparíti e liparíti (Euganei, Isole Lipari) comenditi e pantelleriti (Sardegna, Isola S. Pietro e S. Antioco, Pantelleria).

12 — *Lave neovulcaniche in prevalenza basiche e loro tufi* (Terziario e Quaternario): basalti ed andesiti (Monti Lessini ed Euganei, Etna, Stromboli, Sardegna occidentale); tefriti e basaniti leucitiche, con subordinati basalti leucitici (Vesuvio, Rocca Monfina, Vulcani Laziali; Vulture).

APPENDIX II - ATTRIBUTE LISTE OF AXES

NUMBER	SITE	MAX. LENGTH	MAX. WIDTH	MAX. THICKNESS	THICKNESS [MOH SCALE]	COLOR [MUNSELL]	EDGE WEAR PATTERNS
1.	Chiozza	[Frag.] 5.f.	4.7	1.5	6.5	5G 4/2	Very light (rare tiny nicks & slightly smoothed bit)
2.	Chiozza	7.1	4.2	1.4	6.5	5G 3/1	Very light (rare small nicks)
3.	Chiozza	[Frag.] 6.4	4.7	2.8	6.5	5G 3/1	Heavy (numerous, deep scars & partially snapped hit)
4.	Chiozza	4.4	3.1	1.0	6.5	5G 3/2	Very light (tiny nicks & slightly smoothed bit)
5.	Chiozza	5.2	4.0	1.3	4.5	5Y 4/1	Medium (1 large nick, numerous small nicks & smoothed bit)
6.	Chiozza	[Frag.] 2.8	[Frag.] 2.4	.7	.7	5GY 3/1	Bit portion missing
7.	Chiozza	[Frag.] 5.6	4.3	1.2	6.5	5G 3/2	Heavy (numerous small & medium chips)
8.	Chiozza	5.6	2.9	1.4	6.5	5G 3/1	Medium (numerous small chips)
9.	Chiozza	8.2	3.4	.9	3	5GB 3/1	Bit snapped - entire piece corroded & friable
10.	Chiozza	7.8	3.5	2.4	6.5	5BG 3/1	Light (1 medium chip & scattered tiny nicks)
11.	Chiozza	7.0	6.0	1.7	6.5	5G 3/1	Medium (1 medium chip, numerous tiny chips & edge smoothing)
12.	Chiozza	7.5	4.5	1.9	7.0	5G 4/2	Medium (1 medium chip, numerous small nicks)
13.	Chiozza	11.4	5.0	2.4	7	5G 3/1	Light (numerous tiny scars & slight edge smoothing)
14.	Chiozza	[Frag.] 15.1	[Frag.] 5.4	—	6.5	5G 4/1	Questionable whether this item was a finished ax.

NUMBER	SITE	MAX. LENGTH	MAX. WIDTH	MAX. THICKNESS	HARDNESS, [MOH SCALE]	COLOR [MUNSELL]	EDGE WEAR PATTERNS
15.	Chiozza	[Frag.] 7.5	4.9	3.3	5.5	10 1/R 2/1	Light (rare small chips)
16.	Chiozza	10.4	4.8	2.5	6.5	5BG 3/1	Light (rare tiny nicks & 2 medium chips)
17.	Chiozza	8.7	3.5	1.2	6.5	5GY 3/2	Very light (1 small chip)
18.	Chiozza	[Frag.] 7.8	4.9	2.2	6.5	5G 3/2	Very light (tiny nicks)
19.	Chiozza	7.4	5.2	2.2	6.5	No Data	Light (tiny nicks & edge smoothing)
20.	Chiozza	[Frag.] 6.8	4.7	2.2	7	5B 2/2	Very light (tiny nicks)
21.	Chiozza	6.4	3.9	1.6	6.5	5BG 3/1	Medium (tiny nicks & edge blunted)
22.	Chiozza	[Frag.] 5.1	3.9	2.4	6.5	5B 4/1	Medium (small & medium chips)
23.	Chiozza	[Frag.] 4.0	2.8	.8	6.5	5GB 4/1	Light (3 small scars)
24.	Ripabianca	[Frag.] 8.9	4.9	4.0	4	N 5/1	Very heavy (numerous large chips)
25.	Ripabianca	13.5	5.6	3.6	4	5Y 6/1	Very heavy (partially snapped bit; large scars)
26.	Ripabianca	3.6	2.8	.9	7	5G 4/2	None visible
27.	Maddalena di Muccia	8.3	6.2	2.4	3.5	5Y 7/2	Medium (blunting & one large chip)
28.	Maddalena di Muccia	8.6	4.6	1.7	3.5	2.5Y 7/4	Medium (4 medium chips)
29.	Maddalena di Muccia	[Frag.] 9.2	6.1	4.8	5.5	10Y 7/1	Light (small nicks)
30.	Maddalena di Muccia	3.1	2.6	.8	6	5BG 4/1	Very light (tiny nicks)

NUMBER	SITE	MAX. LENGTH	MAX. WIDTH	MAX. HARDNESS.	HARDNESS. [MOH SCALE]	COLOR [MUNSELL]	EDGE WEAR PATTERNS
31.	Maddalena di Muccia	4.9	3.9	1.3	5.5	10YR 7/4	Medium (1 large flake & small nicks)
32.	Murgecchia	6.2	3.9	2.0	5.5	2.5YR 2/2	None visible
33.	Murgecchia	3.2	2.8	.4	6.5	5G 4/2	None visible
34.	Murgecchia	1.5	1.4	.3	7	5G 5/2	None visible/SUSPENSION HOLE
35.	Murgecchia	9.2	4.9	2.1	3.5	2.5YR 4/2	Heavy (numerous medium chips)
36.	Murgecchia	6.0	4.3	1.8	3	2.5YR 3/2	Heavy (medium chips on corners, small chips, & light blunting)
37.	Murgecchia	8.0	5.9	4.2	3.5	7.5YR	Very heavy (large chips on edge)
38.	Tirlecchia	[Frag.] 5.5	3.7	1.0	3	5Y 6/2	Heavy (edge partially snapped & large chips)
39.	Tirlecchia	4.1	3.1	.8	7.5	« White with black crystals »	Light (small nicks)
40.	Tirlecchia	2.4 [Frag.]	2.1	.6	7	« Dark green »	None visible
41.	Tirlecchia	1.9	1.7	.7	No Data	« Dark green »	None visible
42.	Tirlecchia	9.6	5.9	4.0	6	5Y 4/1	Very heavy (large chips & blunted edge)
43.	Murgia Timone	13.6	7.4	1.9	3.5	2.5Y 6-7/2	Medium (a few large & medium chips)
44.	Murgia Timone	10.6	5.7	2.5	6.5	5GY 4/1	Heavy (medium & small chips)
45.	Murgia Timone	6.9	4.4	1.9	4	10YR 2/1	Light (small chips)

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RIASSUNTO

In questa breve nota l'A. tenta di fissare e spiegare alcune delle affinità e differenze litologiche e morfologiche all'interno di una esemplificazione delle « asce » litiche del Neolitico italiano. Nel fare ciò egli adotta il metodo ipotetico-deduttivo, metodo che non è stato precedentemente usato, nelle analisi di materiali preistorici italiani.

Si dimostra come, dato un complesso di ipotesi ed un sistema di classificazione unilineare sia possibile definire diverse categorie di « asce », e riconoscere che queste categorie siano distinte da un punto di vista funzionale. Tali differenze nelle qualità formali e nell'impiego sono un derivato diretto della distanza dalla sorgente delle materie prime e del tipo della materia prima utilizzata per lo strumento. Perciò si può ipotizzare che le « asce » diffuse attraverso la rete di scambi commerciali nel Neolitico italiano non siano da identificare con oggetti simili derivanti dalla disponibilità locale di materia prima.

SUMMARY

In this brief note the A. attempts to define and explain some of the physical and morphological similarities and differences within a sample of Italian Neolithic ground stone « axes ». In doing so he utilizes the hypothetico-deductive approach, an approach which has not been formally used in previous analysis of Italian prehistoric materials.

It is shown that, given a set of hypotheses and a straight-forward classification technique, it is possible to define different categories of « axes », and to demonstrate that these categories are functionally distinct. These differences in formal qualities and use are a direct function of the distance from the source of the raw materials and the kinds of raw materials used for the « axes ». Hence it is suggested that « axes » circulated in Italian Neolithic goods exchange networks are not the same things as similar items produced from locally available raw materials.