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EVOLUTION OF THE SQUARE MOUTHED POTTERY CULTURE IN TRENTINO-ALTO ADIGE, VENETO AND FRIULI: CULTURAL, CHRONOLOGICAL, PALAEOECONOMIC AND ENVIRONMENTAL ASPECTS

In memoriam
Lawrence Harry Barfield
1935-2009

EVOLUZIONE DELLA CULTURA DEI VASI A BOCCA QUADRATA TRA TRENTINO-ALTO ADIGE, VENETO E FRIULI: ASPETTI CULTURALI, CRONOLOGICI, PALAEOECONOMICI E AMBIENTALI

Riassunto breve - Gli autori tracciano un quadro della Cultura dei vasi a bocca quadrata dell'Italia nord-orientale alla luce dei risultati emersi dalle nuove ricerche sul campo, che hanno consentito anche una revisione dei dati storici noti per il territorio. Gli esordi di questo nuovo scenario culturale sono stati individuati al momento solo dal punto di vista tipologico nei siti di Lugo di Grezzana (Verona), Quinzano Veronese (Verona) e Fimon - Pianezze (Vicenza). Evidenze più significative provengono dalla fase piena e finale della Cultura quella che storicamente viene identificata con lo "stile meandro-spiralico" e/o lo "stile ad incisioni ed impressioni". Le recenti ricerche hanno infatti consentito una migliore definizione cronologica dei due aspetti, che pur esprimendo una profonda differenza culturale, sembrano aver interagito e coesistito. La Cultura dei vasi a bocca quadrata si esaurisce in quest'area del Paese in modi non ancora del tutto chiari.

Per quanto riguarda i dati paleoeconomici, la ridotta presenza di siti analizzati nell'Italia nord-orientale e la difficoltà nell'individuare delle differenze regionali, hanno reso necessario un ampliamento dell'area presa in esame. Le specie vegetali attestate a fini agricoli comprendono un discreto numero di cereali e di leguminose, il lino e il papavero, ovvero sia specie derivate dal "pacchetto neolitico iniziale" proveniente dalla Mezzaluna Fertile, che specie secondariamente acquisite.

Per quanto riguarda invece la fauna, gli aspetti precoci della Cultura sembrano proporre una certa continuità nello sfruttamento delle prede selvatiche, cui si affianca l'allevamento di domestici più o meno rilevante a seconda del sito, a dimostrazione che l'attività di gestione del bestiame domestico non è ancora del tutto affermata. Con il II stile della Cultura sembra realizzarsi un incremento delle attività di allevamento e un apparente declino delle risorse selvatiche. In particolare nella fase successiva sembra evidenziarsi un incremento progressivo della rilevanza dell'allevamento ovicaprino che si affianca a quello dei bovini e dei suini ed indica forse un cambiamento non solo nelle scelte economiche legate allo sfruttamento di altri prodotti precedentemente considerati meno importanti, ma anche nelle caratteristiche dell'ambiente e delle modalità insediative.

Parole chiave: Neolitico, Cultura dei vasi a bocca quadrata, Cronologia, Paleoeconomia, Italia nord-orientale.

Abstract - *The authors trace a picture of the Square Mouthed Pottery (SMP) Culture in north-eastern Italy in the light of the results emerging from new excavations, which have also made it possible to review old data regarding the area.*

At the moment, typological aspects related to the beginning of this new cultural setting have only been identified at the sites of Lugo di Grezzana (Verona), Quinzano Veronese (Verona) and Fimon - Pianezze (Vicenza). There is more significant evidence relating to the main and final phase of the culture, historically identified as the "meandro-spiralico" style or the "ad incisioni ed impressioni" style. Recent research has indeed allowed better chronological definition of the two aspects, which albeit representing profound cultural differences, would seem to have interacted and coexisted. The SMP culture exhausted itself in this area of the country in a manner which has yet to be fully clarified.

As far as palaeo-economic data is concerned, the limited presence of sites analysed in north-eastern Italy and the difficulties in identifying regional differences have made it necessary to extend the area taken into consideration. The plant species known to have been used for agricultural purposes include a significant number of cereals and pulses, flax and poppy, hence both species deriving from the "initial Neolithic package" coming from the Fertile Crescent, and species acquired subsequently.

As regards fauna on the other hand, the early phases of the culture would seem to suggest a certain continuity in the exploitation of wild animals, combining with the rearing of domestic animals, which was more or less important depending on the site, demonstrating that animal husbandry was not yet fully established. In the style II phase of the culture there would seem to have been an increase in the rearing of animals and an apparent decline in the use of wild resources. In particular, in the later phase there was apparently a progressive increase in the importance of rearing sheep and goats, alongside the rearing of cattle and pigs, perhaps indicating a change not only in economic choices linked to the exploitation of other products previously considered to be less important, but also in the characteristics of the environment and settlement patterns.

Keywords: Neolithic, Square Mouthed Pottery Culture, Chronology, Palaeoeconomy, North-Eastern Italy.

1. Introduction ⁽¹⁾

In recent times the evolution of the Neolithic in the area investigated, starting from its later stages up to the progression to the early Metal Ages, has been the subject of extensive debate, with individual papers at conferences (PESSINA & VISENTINI 2006) and meetings specifically dedicated to the matter. Here we may recall in particular the conferences held in Pordenone in 2001 (FERRARI & VISENTINI 2002) and in Riva del Garda and Finale Ligure in 2009. All this has been made possible by the large quantity of data emerging from excavations in the last few years in Northern Italy, both research and rescue excavations making it possible to re-examine many of the ideas proposed over the years.

For this reason it is considered opportune to summarise the cultural framework emerging for North-Eastern Italy, including the contribution that palaeoeconomic and palaeoenvironmental studies can make towards understanding this⁽²⁾. The starting point for all this is the framework of knowledge existing up until a few years ago, a rapid summary of which is provided.

2. Historical backgrounds

In the book “Le più antiche culture agricole europee. L'Italia, i Balcani e l'Europa centrale durante il Neoeolitico”, the Trentino archaeologist Pia Laviosa Zambotti, taking as her starting point excavations carried out in 1941 at Chiozza di Scandiano in the Reggio Emilia area, defined the “Civiltà delle grotte liguri o di Chiozza” characterised by the presence of square-mouthed pottery, pintaderas, perforated ladles and small clay figurines as guiding elements. According to Laviosa Zambotti, in Northern Italy this culture took on local characteristics, albeit referable to the “Tisza Culture” in relation to the “square-mouthed” pottery and to the “fusion of existing styles in the area” in relation to pottery decoration (LAVIOSA ZAMBOTTI 1943, 486-487).

Subsequently in 1946, Luigi BERNABÒ BREA, on the basis of stratigraphic excavations carried out at the Arene Candide cave, revised the definition and the subdivision of the Italian Neolithic into phases, defining an archaic aspect for the middle phase, with quadrilobate bowls,

1) The cultural aspects and the conclusions have been dealt with by Elisabetta Mottes and Paola Visentini, palaeoeconomic aspects by Mauro Rottoli (palaeobotanist) and Gabriella Petrucci (archaeozoologist). Translation by Vivienne Frankell.

2) The cultural framework is based almost exclusively on analysis of pottery production. As regards lithic industry, see the papers presented at the conference “NeoLitica. Identità culturali delle industrie litiche scheggiate del Neolitico in Italia”, Florence, 5-7 May 2009 in particular by Gardin and Bertola for the Fimon Molino Casarotto site (GARDIN & BERTOLA in press) and by Bianchin and other authors in relation to styles II and III of the SMP culture in the area investigated (BIANCHIN et al. in press).

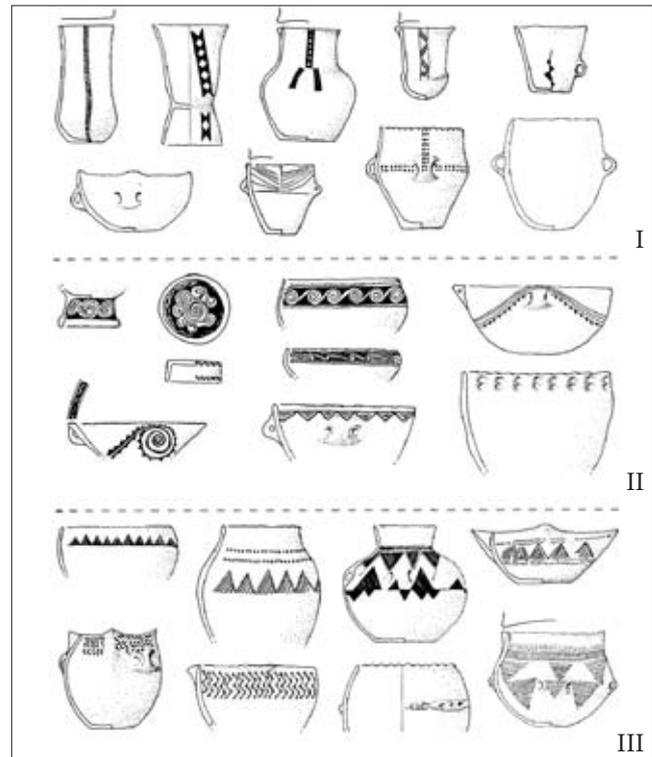


Fig. 1 - Synthetic table of pottery repertoire of the three styles of the Square Mouthed Pottery Culture (from PESSINA & TINÈ 2008).

- *Tavola sintetica del repertorio ceramico dei tre stili della Cultura dei vasi a bocca quadrata (da PESSINA & TINÈ 2008).*

and a more evolved aspect with square-mouthed pottery. For Bernabò Brea the latter represented the most flourishing period for the culture, with extensive diffusion of elements originating in the Danube area and at the same time openness to influences coming from the south of Italy, recognisable in particular in the shape of vessels (BERNABÒ BREA 1946, 188-225).

A few years later, in the early 1950s, the pharmacist and archaeologist from Modena, Fernando Malavolti drew up a chronological scheme for the “Neo-Eneolithic” in Emilia in 4 phases, referring to the Ligurian sequence of Bernabò Brea. Phase 2 is represented by the Chiozza Culture, linkable to the Veneto facies of Quinzano and the intermediate layers of the Arene Candide. Phase 3 is the expression of the Pescale Culture, considered to be an aspect of the Late Neolithic in Emilia (MALAVOLTI 1951-1952, 6-31; 1953-1955, 3-28).

The research of Bernabò Brea and Malavolti, carried out independently using data coming from very different stratigraphic contexts, made it possible to outline an essentially homogenous cultural framework for the Middle Neolithic in Northern Italy, within which the SMP culture was shown to spread from Liguria to the Trieste Karst region (BARFIELD 2002a). While Malavolti and Bernabò Brea established the basic related sequences, other scholars tried to establish an internal cultural division valid for each regional area concerned by the phenomenon.

In particular Lawrence H. Barfield, making use of research carried out by him above all in Veneto, outlined a more up-to-date sequence for Neolithic cultures in Northern Italy starting from 1963. He identified three chronological and regional phases, redefining the intermediate levels of the Arene Candide and Malavolti's Chiozza Culture in the following way:

- The Finale - Quinzano phase: spreading from Liguria to Veneto, it represents the oldest form of the culture and is characterised by the presence of beakers with tall quadrangular neck and with scratched geometric decoration.

- The Rivoli - Chiozza phase: recognised in Veneto (Rivoli-Spiazzo), Lombardia and Emilia; this shows close contact with the Balkan cultural area (in particular with the Danilo Culture) and is distinguished by large square-mouthed bowls with elaborate dynamic motifs, in particular spirals, realised by scratching, incision and excision. According to Barfield, Malavolti's Chiozza culture includes this phase and the preceding Finale Quinzano phase.

- The Rivoli Castelnuovo phase: this represents the most recent phase in the development of the SMP culture, its area of distribution being reduced to Veneto, Eastern Lombardia and Trentino. It is characterised by deep square-mouthed bowls decorated with incised herringbone motifs. According to the author, Malavolti's Pescale Culture includes both elements from this phase and above all those from the Rivoli - Chiozza phase (BARFIELD 1973, 393-8).

At the end of the 1970s, Bernardino Bagolini and Paolo Biagi, starting from the need to overcome the difficulties linked to rigid boxing of SMP sites within the context of the three phases proposed by L.H. Barfield, proposed a more dynamic vision of the cultural and chronological evolution of the culture, essentially recognising three decorative styles of pottery that are divided over and combined in the different regional areas concerned by the SMP culture (fig. 1).

The first, characterised by simple scratched geometric motifs, is characteristic of the initial phases of the phenomenon and has been defined as the "geometrico lineare" style. This went alongside and was gradually substituted by decoration characterised by complex dynamic motifs, meanders and spirals, mostly obtained using scratching and excision, which was defined as "meandro-spiralico" style. Finally in the late Neolithic, when the SMP culture drastically reduced its area of influence, the previous styles were substituted by incised and impressed decoration described as the "incisioni ed impressioni" style (BAGOLINI et al. 1979; BAGOLINI 1980a, 132-41). The earliest typological aspects of this style which were originally recognised at Le Basse di Valcalaona (Padua) in the Colli Euganei and at Motton di Asigliano (Vicenza) to the south of the Colli Berici, were initially defined as the "Basse di Valcalaona facies" (BAGOLINI et al. 1979, 25) and subsequently the "Berico-Euganea facies" (BAGOLINI 1984, 402). This phase is characterised by the presence of impressed decorative

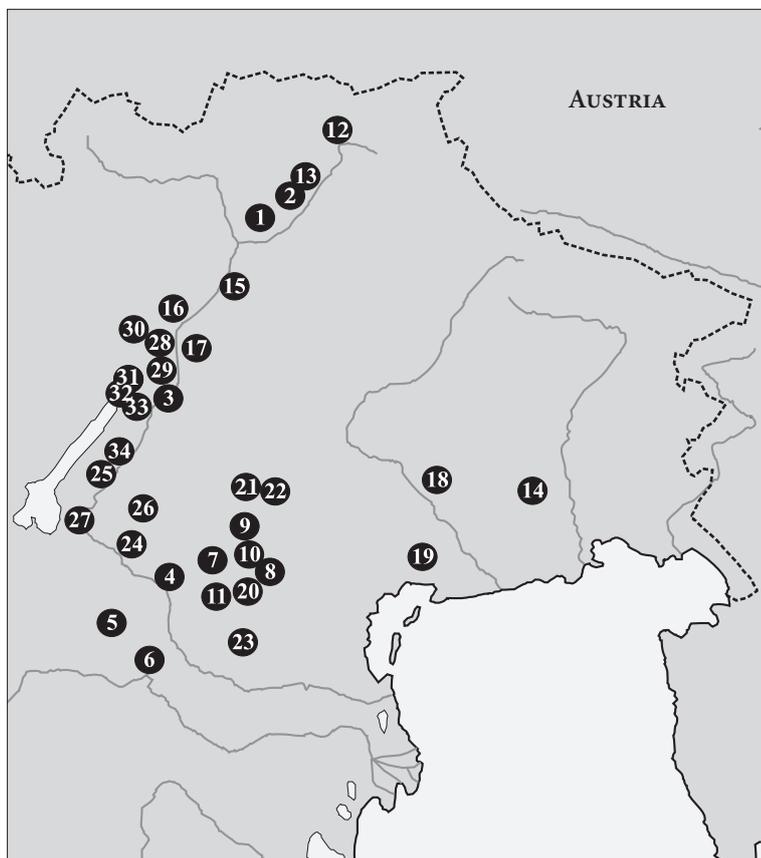


Fig. 2 - Map showing the distribution of the main SMP culture sites in north-eastern Italy. 1. Renon/Ritten, Johanneskofel (BZ), 2. Villandro/ Villanders, Plunacker (BZ), 3. Isera La Torretta and "Ai Corsi" (TN), 4. Bernardine di Coriano (VR), 5. Pila Culà di Isola della Scala (VR), 6. Gazzo Veronese-Scolo Gelmina and Ponte Nuovo (VR), 7. Brendola-Soastene (VI), 8. Fimon (VI), 9. Sovizzo (VI), 10. Villa del Ferro (VI), 11. Motton di Asigliano, Le Basse di Valcalaona and Castelnuovo di Teolo (PD), 12. Bressanone/Brixen, Stufles (BZ), 13. Velturmo/Feldthurns, Tanzgasse (BZ), 14. Bannia-Palazzine di Sopra (PN), 15. Ora/Auer (BZ) 16. Mezzocorona, Borgonuovo (TN), 17. Trento, Riparo Gaban (TN), 18. Parè, Ferrera (TV), 19. Meolo, Fossa Vecchia (VE), 20. Maserà (PD), 21. Grotta delle Mura and Bocca Lorenza (VI), 22. Grotta della Lora (VI), 23. Poiana Maggiore, Ca' Bissara (VI), 24. Quinzano Veronese and Ponte Crencano (VR), 25. Rocca di Rivoli (VR), 26. Colombare di Negrar (VR), 27. Domegliara, Fondo Del Ben (VR), 28. Trento, La Vela (I-IX) (TN), 29. Romagnano Loch (I-III) and Garniga Nuova (TN), 30. Covelò di Terlago (TN), 31. Arco, Moletta Patone (TN), 32. Riva del Garda, via Brione (TN), 33. Mori, Castel Corno (TN), 34. Ala, Le Corone (TN).

- Carta di distribuzione dei principali siti della Cultura vbq dell'Italia nord-orientale.

motifs, finely incised lines and points recalling some of the known motifs on painted pottery from the Ripoli culture, executed on fine-grained pottery and figuline.

The general picture of the SMP culture as outlined by L.H. Barfield, B. Bagolini and P. Biagi, today appears to be essentially unchanged in terms of the cultural aspects. However, particularly in the last decade, it has been possible to specify the processes of cultural change taking place in the 5th millennium BC more clearly.

3. North-Eastern Italy in the 5th millennium BC⁽³⁾

3.1 *The beginning of the Square Mouthed Pottery culture*

According to the current state of knowledge, there are no formative aspects of the SMP culture in the area investigated by this work, at least not as they are known in Liguria (MAGGI 1997) and Western Emilia (BERNABÒ BREA et al. 2000; FERRARI et al. 2006 and the bibliography cited there). Processes of assimilation/interaction or transformation of Early Neolithic communities, moving towards features of the SMP, would instead appear to be recognisable - on the basis of typological analysis of the materials (FERRARI in press)⁽⁴⁾.

At the moment this phenomenon can only be noted at typological level, in particular in the Veneto area, where absolute dating is not yet available. This is the case of the site at Lugo di Grezzana (Verona), in structure 235, realised after a phase of abandon following Early Neolithic frequentation of the site (PEDROTTI et al. 2000) and at Fimon - Pianezze (Vicenza), where materials attributable to both periods of the Neolithic, above all pottery, in addition to pottery with Early Neolithic matrix decorated with scratched motifs which would seem to have been widespread within the context of the SMP culture, were collected from a single anthropic layer in 1981 (PEDROTTI 1986; BIANCHIN CITTON & PEDROTTI 1987).

The idea of an Early Neolithic influence on the manifestation of SMP style I had already been proposed by Biagi in 1974 on the basis of the finding of a carinated vessel with bossed strap handle decorated with an incised band filled with dashes at the Quinzano Veronese site (BIAGI 1974: fig. 17/1) and of a Ripabianca burin with tang obtained using flat covering bifacial retouch at Fi-

mon Molino Casarotto (BAGOLINI et al. 1973: fig. 23/6; GUERRESCHI 1986: fig. 27/3).

In addition to the aforementioned findings of style I material with strong Early Neolithic influences, generic evidence of style I has been recognised in the area in the materials from the Grotta del Mondo in the Verona area (BAGOLINI 1980b, 47: fig. 6), at Fontega, Persegaro and Capitello identified in the late 19th century and the middle of the 20th century in the Fimon valleys (Vicenza) (PEDROTTI 1986, 35-38) and at Villa del Ferro (Colli Berici, Vicenza) (BARFIELD & BROGLIO 1966, 61-9: figs. 6/2, 9, fig. 7), only the presence of which can be documented.

On the basis of the theory suggested by BARFIELD & BROGLIO (1971, 28)⁽⁵⁾, according to which internal subdivision into styles or phases must be understood as moments in the evolution of the same culture, it would not appear unusual that in certain sites attributed to the oldest style in the culture there are also pottery elements with stylistic features typical of style II, often obtained using a scratched or incised decorative technique, which is likely to document an advanced phase of style I. This is the case at Fimon Molino Casarotto, in relation to the excavations conducted by L.H. Barfield and A. Broglio between 1969 and 1972, in the area identified by G. Trevisiol during the Second World War: the range of pottery, mostly belonging to style I, is enriched with elements which clearly belong to the "meandro-spiralico" style, as in the case of the square-mouthed beaker with spiral decoration (BAGOLINI et al. 1973: fig. 17/6).

Rare style II elements in style I contexts are also present at Quinzano Veronese, with the finding of a plate with narrow brim decorated with excised triangles (BIAGI 1974: fig. 10/1), a lid with incised spiral motif (BIAGI 1974: fig. 10/2) and two fragments of pots with incised spiral and curvilinear decoration (BIAGI 1974: fig. 18/17, 18), but as these were stray finds it is not possible to take any account of their presence in a style I complex.

The Gaban Group developed in the Trentino-Alto Adige area in the first centuries of the 5th millennium BC, at the same time as the appearance of formative elements of the SMP culture in Liguria and the Po valley, in a later chronological phase as compared to some Early Neolithic phase in Northern Italy, as confirmed by the radiometric measurements currently available (IMPROTA & PESSINA 1998: tab. 1; NICOLIS et al. 2007: tab. 1; NISBET 2008, 95-6).

In Alto Adige elements of SMP style I have been noted at the Villandro/Villanders - Plunacker settlement in the Val d'Isarco, trench C (DAL RI & RIZZI 1987-1988, 59-61; 1989: taf. III, 4-8; 1989-1990, 87-9; 2002, 270: fig. 2; NISBET 2008, 79-80), at Stufles (Bressanone/Brixen) (DAL RI et al. 2003 and unpublished at the Archaeo-

3) The dates used in this paper have been taken from FERRARI et al. (2006), VISENTINI (2005; 2006), supplemented by new measurements available for Trentino presented in Table I. The radiocarbon measurements expressed in BP have been calibrated to give calendar dating (BC) using the software OxCal 3.10, selecting the intervals with 1 sigma, on the basis of atmospheric data provided by REIMER et al. (2004).

4) We accept the proposal of FERRARI (in press) to use the term Early Neolithic without giving this a chrono-cultural value.

5) This theory has recently been reconsidered and discussed by FERRARI (in press).



Fig. 3 - View of the Adige valley to the north of Trento with localisation of La Vela site (archives of the Soprintendenza per i beni archeologici della Provincia autonoma di Trento, photo G. Zotta).
 - *Panoramica della Valle dell'Adige a nord di Trento con la localizzazione del sito de La Vela (archivio della Soprintendenza per i beni archeologici della Provincia autonoma di Trento, foto G. Zotta).*

logical Museum of Alto Adige in Bolzano)⁶⁾ and at Castel Juvale/Schloss Juval (Castelbello/Kastelbell) in Val Venosta (DAL RÌ & TECCHIATI 1995, 10: abb. 11/1). Unfortunately, the stratigraphic context of origin for these materials is not certain and in the case of Villandro/Villanders it is not known whether the SMP findings were found in association with pottery attributed to the early Neolithic or whether they came from overlying layers.

On the basis of data coming from recent investigations and a review of old contexts in Trentino in the Adige valley, the SMP phenomenon would seem to have appeared in an evolved phase of style I and have developed into an initial phase of the “meandro-spiralico” style (MOTTES in press). Advanced elements of SMP I have currently been recorded at the settlement at Garniga Nuova (Trento), but the documentation available is too limited to enable detailed considerations (BAGOLINI & BIAGI 1975).

At the pluri-stratified site at La Vela in Trento (sectors II, III and VII) the levels of frequentation of the SMP culture succeeded a previous phase of settlement which can be assigned to the local Early Neolithic, on the basis of radiometric measurements available, attributable to between 5020 and 4780 BC (MOTTES in press). The beginning of the SMP took place in the final phase of style I or the initial phase of style II, as it has been possible to document in sectors VII (1987-1988 excavations) and VIII (2003 excavations) (fig. 3). In particular, in sector VIII of La Vela it has been possible to stratigraphically

isolate an initial phase of style II, documented by the remains of a dwelling, from an advanced phase in the “meandro-spiralico” style containing elements heralding the subsequent phase of incisions and impressions.

The most ancient “meandro-spiralico” phase is characterised by the presence of archaic elements such as long-necked beakers, hollow-base shapes and fragments mainly decorated with scratched motifs, in particular filled-triangle patterns, but also with spiral motifs (DEGASPERI et al. 2006). Technological study of the lithic industry has highlighted more extensive laminarity of the supports as compared to the later “meandro-spiralico” phase (CONCI & ZIGGIOTTI in press).

Radiocarbon dating to the fireplace US 41: 5835±35 BP corresponding to 4770-4610 BC is available for this phase of occupation. The different funeral structures brought to light at La Vela could also refer to this initial episode of SMP frequentation of the site, which would appear to be relatively ancient, on the basis of the only radiometric measurement available⁷⁾.

At Romagnano Loc III the scarcity of pottery and lithic materials brought to light at levels T1 and T2 does not make attribution possible with any security, although

6) Traces of settlement relating to SMP I have also been noted in excavations carried out in 2007 in Bressanone/Brixen, Via Elvas, Oberegger property (TECCHIATI 2009a, 194-7).

7) Tomb 1, in stone cist, excavated in 1960, belonging to an adult male with a wealthy grave goods, provided a measurement of UTC-5064: 5710±50 BP corresponding to 4620-4460 BC. On the basis of the composition of the grave goods, the tombs excavated in sector VII (1987-1988 excavations) were attributed to an incipient phase of the “meandro-spiralico” style (DEGASPERI & PEDROTTI 2002a, 235). However, the dating available for tomb 2 and tomb 4 shows that they can be attributed to a late phase of the 5th millennium BC (tab. I).

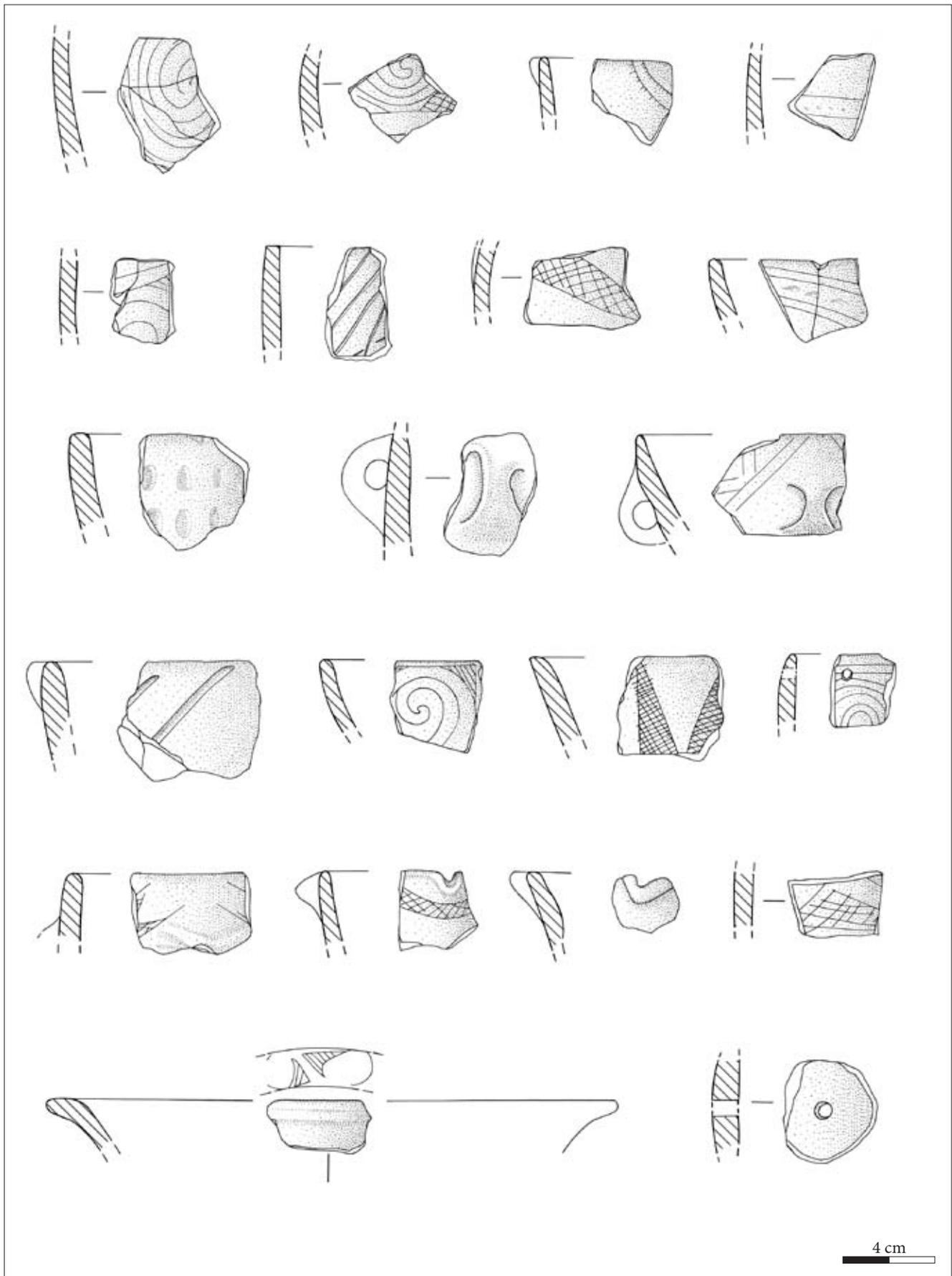


Fig. 4 - Pottery from the "stile meandro-spiralico" site of Riva del Garda, Via Brione (Trento; drawings C. Conci).
 - Materiali ceramici dal sito di stile meandro-spiralico di Riva del Garda, Via Brione (Trento; disegni C. Conci).

Site	Phase	Layer	Laboratory code	Material	Uncal BP	Cal BC 1 σ	References
La Vela di Trento I 1960	vbq II iniziale	burial 1	Utc-5064	human bone	5710 \pm 50	4620-4460	MOTTES et al. 2002
La Vela di Trento VIII 2003	vbq II iniziale	US 41	KIA30560	charcoal	5835 \pm 35	4770-4610	MOTTES in press
La Vela di Trento VII 87-88	vbq II	burial 2	Utc-10555	human bone	5579 \pm 45	4450-4365	PEDROTTI 2001
La Vela di Trento VII 87-88	vbq II	burial 4	Utc-10556	human bone	5555 \pm 48	4450-4350	PEDROTTI 2001
Romagnano Loc III	vbq II iniziale	T1	R-776	charcoal	5560 \pm 50	4450-4350	BAGOLINI & BIAGI 1990
Romagnano Loc III	vbq II iniziale	T1	R-777a	charcoal	5530 \pm 50	4450-4330	BAGOLINI & BIAGI 1990
Romagnano Loc III	vbq II iniziale	T2	R-779a	charcoal	5470 \pm 50	4360-4230	BAGOLINI & BIAGI 1990
Ala Le Corone	vbq II	US 99c	KIA30573	charcoal	5688 \pm 33	4550-4460	NICOLIS et al. 2007
Ala Le Corone	vbq II	US 98	KIA30577	charcoal	5580 \pm 30	4450-4365	NICOLIS et al. 2007
Ala Le Corone	vbq II	US 94	KIA30576	charcoal	5497 \pm 28	4365-4330	NICOLIS et al. 2007
La Vela di Trento VIII 2003	vbq II evoluto	US 8	KIA30556	charcoal	5552 \pm 32	4450-4350	MOTTES, in press
La Vela di Trento VIII 2003	vbq II evoluto	US 8	KIA30557	charcoal	5458 \pm 28	4345-4265	MOTTES, in press
Covelo di Terlago	vbq II iniziale	US 14a	KIA30582	charcoal	5714 \pm 34	4600-4490	MOTTES, in press
Ala Le Corone	vbq III	US 90	KIA30578	charcoal	5688 \pm 35	4550-4460	NICOLIS et al. 2007
Isera la Torretta fase 1	vbq III	US 61	ETH-12494	animal bone	5440 \pm 55	4345-4245	PEDROTTI 1996
Isera la Torretta fase 1	vbq III	US 75	ETH-12495	animal bone	5580 \pm 65	4460-4350	PEDROTTI 1996
Isera la Torretta fase 1	vbq III	US 76	ETH-12496	animal bone	5570 \pm 55	4450-4355	PEDROTTI 1996

Tab. I - Radiocarbon dating of SMP culture sites of Trentino. The dating has been calibrated to one sigma with OxCal 3.10 software on the basis of the atmospheric data of REIMER et al. 2004.

- *Datazioni al ¹⁴C dei siti della Cultura dei vasi a bocca quadrata del Trentino. Le datazioni sono state calibrate ad 1 sigma con il software OxCal 3.10 sulla base dei dati atmosferici di REIMER et al. 2004.*

the radiocarbon measurements available (tab. I) and the data coming from Romagnano Loc I, layer M” (PERINI 1971) suggest that there was initial SMP occupation of the site in the early “meandro-spiralico” phase.

Evidence of settlement referring to the initial phase of style II has also been brought to light at the open-air site of Covelo di Terlago, in the Valle dei Laghi, where the presence of a phase of frequentation attributable to an advanced phase of the “meandro-spiralico” style has also been documented. For the earliest phase of occupation a radiometric measurement is available, providing a dating of between 4600 and 4490 BC (tab. I) (MOTTES 2010). Unfortunately, the data available for the Acquaviva di Besenello site (Trento) does not make it possible to establish the extent of frequentation in the Early Neolithic and during SMP I (ANGELINI et al. 1980).

Evidence of Neolithic frequentation in the upper Lake Garda area, recently supplemented by the discovery of the Riva del Garda settlement in Via Brione, attributable to the middle of the “meandro-spiralico” phase in 2007 (MOTTES 2010) (fig. 4), is limited and above all unreliable as far as old excavations are concerned. This is the case of the Neolithic deposit brought to light at the levels called C and C1 in the rock shelter of Moletta Patone di Arco, from which both pottery findings attributable to the local Early Neolithic Gaban tradition and elements of SMP I come (BAGOLINI et al. 1984). Unfortunately, the processes involved in the formation of the deposit are unclear⁽⁸⁾

8) According to the authors the Neolithic deposit “is the result of accumulated sediment sliding and flowing down on repeated occasions from the neighbouring talus cone on the slope to the north of the shelter. Only during the Mesolithic era is it possible to recognise that inside of the shelter was used for settlement, albeit periodically; the Neolithic material could instead come from periodic settlement outside the shelter” (BAGOLINI et al. 1984, 124). This indication would appear to be in contrast with the fact that a fireplace structure was found on site at level C1 (BAGOLINI et al. 1984, 115: fig. 23).

and the stratigraphic context has been partly disturbed by excavation works at the neighbouring quarry.

The picture of the beginning of the SMP culture in the area investigated is currently inconsistent and the chronological situation awaits better definition; even the later phase, represented by the Fimon-Molino Casarotto site, is not helpful in this respect, because the numerous radiocarbon datings available have been considered partly methodologically erroneous by the authors themselves (BAGOLINI et al. 1973; BAGOLINI & BIAGI 1990) and at all events have a high standard deviation standard which invalidates their value in the calibration process.

3.2 The middle and final phase of the culture

The evolution of the SMP culture towards a clearly meandro-spiralico phase has currently been noted particularly in the area around Verona and Trentino. Five sites are known in the Verona area, the Rocca di Rivoli site standing out, characterised by a Neolithic level and numerous pits, post holes and ditches containing style II and III materials, often in association following the pits intersecting one another (BARFIELD & BAGOLINI 1976)⁽⁹⁾.

The overall cultural picture that can be deduced from a general overview of pottery coming from five locations around Verona is characterised by the homogeneous presence of fine-ware clay materials and well-treated surfaces decorated with geometric motifs or spiral-meander patterns, using bands below the edge or festoons around the mouth, usually scratched

9) In the Verona area elements of the meandro-spiralico style are known in the rock shelter at Vaio di Scalucce (BAGOLINI 1980b), Sant'Ambrogio di Valpolicella (SALZANI 1987-1988), Pieve di Colognola ai Colli (SALZANI 1992) and Ponte Nuovo di Gazzo Veronese (SALZANI 2002b; 2003; 2005).



Fig. 5 - Bannia-Palazzine di Sopra (Pordenone). Copper tip found in US 2 of the B2 structure dated to 4490-4390 BC.
- Punta di rame rinvenuta nell'US 2 della struttura B2 di Bannia-Palazzine di Sopra (Pordenone), datata 4490-4390 BC.

or incised or more rarely excised. The predominance of scratched or incised decoration and the limited examples of excised ornamentation would seem to suggest that they date back to a relatively early phase of the “meandro-spiralico” style which did not develop as took place in Emilia¹⁰⁾, perhaps due to the early emergence of the “incisioni ed impressioni” style and the peripheral position as compared to developments in the Po valley (VISENTINI 2002a).

In Trentino the central “meandro-spiralico” phase of the SMP culture is currently documented at the sites of La Vela di Trento in eight of the ten sectors investigated to date, at Romagnano Loc III, layer S (PERINI 1971, 97: fig. 52/6) and Romagnano Loc, survey 2, 1969, layer D (PERINI 1971, 81-7), at the rock shelter at Ala Le Corone (NICOLIS et al. 2007, 89), at the settlements in Riva del Garda, Via Brione and Covelo di Terlago at Torlo in the Valle dei Laghi, in Mori at Corno (MOTTES 2010).

In Alto Adige there is little documentation of the “meandro-spiralico” phase of the SMP culture, probably due to the early diffusion of late and final Neolithic elements. Traces of settlements relating to the early aspects of SMP II are known in Velturto/Feldthurns, Tanzgasse in the middle of the Valle Isarco (BAGOLINI & DAL RÌ 1987). Pottery materials which can be referred to the middle of the SMP II phase have also come from the monastery of Sabiona/Säben (Chiusa/Klausen) (LUNZ 1986, 100; BAGOLINI & DAL RÌ 1986, 180), from the site of the Johanneskofel (Renon/Ritten) in Val Sarentino (NIEDERWANGER 1984: taff. 36-37), from Castel Firmiano/Schloss Sigmundskron in the Bolzano valley

10) South of the Po, it is possible to interpret evolution of style II at the sites of Le Mose - Prologhis site, attributable to a relatively early moment of style II (BERNABÒ BREA et al. 2002), at Razza di Campegine (CAZZELLA et al. 1976) and Pescale (FERRARI et al. 2002b), outlining an evolving picture of this style - albeit under review following the recent excavations by Maria Bernabò Brea - which has been dated radiometrically as between 4785 and 4040 BC.

(BONFANTI 1985) and from Castelfeder (Ora/Auer) (Dal Rì, pers. com.). Again at Ora/Auer recent excavation works for the construction of the new ringroad brought to light a pluristratified deposit on a talus slope with Neolithic archaeological levels dating back to SMP II (MARZOLI 2009a; 2009b).

Aspects of the later and final Neolithic, permeated by influences from North of the Alps have also been noted at Johanneskofel (Renon/Ritten) in the Val Sarentino (NIEDERWANGER 1984: taf. 30-32; MOTTESS & NICOLIS 2002, 239-240: fig. 3/1-3), Aica di Fiè/Völser Aicha (BAGOLINI et al. 1982), Barbiano/Barbian, Fondo Rabanser and Caserma dei Pompieri (PARNIGOTTO & TECCHIATI 2006; VASARIN & MIOLA 2006) in the Val d'Isarco, Castel Juval/Schloss Juval (Castelbello/Kastelbell) in the Val Venosta (DAL RÌ & TECCHIATI 1995, 7: abb. 12-13) and Tesimo S. Ippolito/Tisens St. Hippolyt in the Adige valley (LUNZ 1986: taff. 53-54, 55/1,4; MOTTESS & NICOLIS 2002, 245: fig. 3/7-8).

In the Trentino area of the Adige valley diffusion of aspects of the “incisioni ed impressioni” style would seem to have taken place early.

In sectors V (1977 excavations) and VIII (2003 excavations) of La Vela in Trento in a context dominated by advanced aspects of “meandro-spiralico” style there are pottery elements which would seem to prelude SMP III (BAGOLINI et al. 1979, 22: fig. 22, 57; PEDROTTI 1990, 222-3: fig. 5/9; MOTTESS & NICOLIS 2002, 238; DEGASPERI et al. 2006, 148: fig. 7). For this phase of frequentation there are two radiocarbon datings available coming from sectors VIII, US 8: KIA 30556: 5552±32 BP corresponding to 4450-4350 BC and KIA 30557: 5458±28 BP corresponding to 4345-4265 BC.

In the same chronological band, at the hill site of Isera La Torretta - Isera 1 phase (PEDROTTI 1996; 2001, 153-9; DEGASPERI & PEDROTTI 2002b) and at Corsi (BARFIELD 1970) and in the rock shelter of Ala Le Corone (NICOLIS et al. 2007, 83: fig. 5/6-12, 89) the appearance of incisions and impressions has been noted in a SMP context without elements of contact with the “meandro-spiralico” phase and not yet under the Chassey sphere of influence. However, the pottery production shows the existence of cultural relations with the area north of the Alps¹¹⁾.

11) Links with cultures in areas north of the Alps are documented above all by the diffusion of certain types of pottery and decorative techniques (*Furchenstich*, *Pfeilstich*) which are extraneous to the SMP culture and can be related to the post-Rössen groups, more precisely to the Münchshöfen and Aichbühl cultures existing in Southern Germany (MOTTES et al. 2002). At the site of Isera La Torretta the presence of pottery decorated using the *Furchenstich* technique is documented in the Isera 1 (CONCI 2004-2005, 90-1: fig. 11) and Isera 2 phases (PEDROTTI 1996, 77: fig. 5; 2001, 159: fig. 44). A thin copper strip was also found in the Isera 2 phase, its presence being attributed to influences from north of the Alps (PEDROTTI 1996, 77; 2001, 160; ARTIOLI et al. 2003, 20-1).

The archaic nature of the incisions and impressions documented in Trentino and the overlapping chronology with the later aspects of meandro-spiralico style is confirmed by a series of ^{14}C datings available for the sites of La Vela di Trento, Isera La Torretta - Isera 1 phase and Ala Le Corone (tab. I)⁽¹²⁾.

It has also been observed that some pottery findings coming from the late SMP II context at La Vela in Trento (sectors V and VIII) and from the SMP III context at Isera la Torretta - phase 1, have in common stylistic aspects which can be referred to SMP-Isolino (DEGASPERI et al. 2006, 159), in particular some decorative features present at the Ticino site at Castel Grande di Bellinzona (CARAZZETTI 1986, 111-3: figs. 4 and 6; DONATI & CARAZZETTI 1987: fig. 4/2, 7-10), for which we have four radiocarbon datings dating back to between 4460 and 3780 BC⁽¹³⁾.

In the Adige valley, starting from the middle of the 5th millennium BC, the data available would therefore seem to indicate an extremely varied situation in which there was a rapid evolution of the SMP culture. This took place with cultural input from the sector north of the Alps, in the context of which later aspects of the "meandro-spiralico" style are documented, associated with a stylistic component drawing on decorative motifs typical of Isolino SMP. These overlap with the beginning of the "incisioni ed impressioni" style cultural phase, possibly with the coexistence of settlements belonging to groups adopting different styles within the context of the same culture.

This situation has been observed in a further two style II sites: Casatico di Marcaria in the Mantua area (BIAGI et al. 1983) and Ponte Nuovo di Gazzo Veronese (SALZANI 2002b, 82; 2005); whereas the opposite has also been documented: early style III sites with individual elements which can be referred to a previous period of the SMP culture at the Verona site of Scolo Gelmina (SALZANI 2002a; 2003).

A particularly interesting example of what has been stated is the site in the Padua area at Monselice, Via Valli, which can be related to the "incisioni ed impressioni" style⁽¹⁴⁾, where a square-mouthed vessel with third

style decoration enriched by a spiral motif was found, a clear and undeniable sign of the coexistence of the two styles⁽¹⁵⁾.

Early signs of the third style - even when previous elements do not appear - can be noted in a relatively widespread manner in the central-eastern area south of the Alps⁽¹⁶⁾. These aspects are not at all homogeneous in terms of pottery findings. Indeed they appear in a irregular and scattered manner, often in association with elements probably coming from areas north of the Alps, represented above all by the *Furchenstich* decorative technique, the horizontal incised bands typical of Isolino SMP, stylistic features such as those historically known at the site of Le Basse di Valcalaona in the Padua area or those most widespread in the Mantua area, which have bands of impressed dots probably obtained using a comb⁽¹⁷⁾. The common denominator for this variety of pottery styles is the square-mouthed vessel with or without curved handles, but always decorated with zig zag incised motifs. As stated, the area includes southern Trentino and Veneto, with the exclusion of the most easterly part of the region, the Mantua and Pordenone areas⁽¹⁸⁾, where recent surveys allowing radiometric dating to between 4550 BC - 4333 BC.

On the basis of the aforementioned chronological dating, if the "incisioni ed impressioni" style did not extend beyond the aforementioned area, the reason for this must be the existence of Isolino SMP groups to the north-west, "meandro-spiralico" style groups in the Po valley and south-westerly area and Diana and late Ripoli groups in the Adriatic area (VISENTINI 2005).

15) Styles II and III of the SMP culture can in some ways be considered relatively different, in terms of appreciation of vase shapes and decorative motifs, lithic technology, the use of prestigious raw materials such as obsidian and green stone and the appearance of elements related to the spiritual dimension, such as clay figurines for example. The same cannot be said of their respective chronological positions (VISENTINI 2005).

16) In 1984 Bagolini defined this period of the third style as "facies berico euganea", due to its diffusion above all in eastern Veneto. 17) Decorative elements relating to this phase of the culture have been found at the site of Levata (Mantua), recently excavated by the "Soprintendenza Archeologica della Lombardia" under the direction of dr Elena Maria Menotti (AMADASI et al. in press). The Mantua area has also provided documentation of the third style at the sites of Rivarolo and Belforte di Gazuolo. In all these locations the emergence of a decorative element characterised by bands of impressed dots, probably made using combs, would seem to be distinctive. The same decorative style is also present at the site of Isera La Torretta - Isera 1 phase (CONCI 2004-2005) and at Corsi (BARFIELD 1970: fig. 4/1-5).

18) There was an unusual finding of an artefact in pure copper at the Bannia-Palazzine di Sopra site in the Pordenone area, currently representing the oldest known example in Northern Italy, with the reassurance of stratigraphic data and radiocarbon dating (VISENTINI 2005: figg. 5-6). This finding confirms the theory of relations with the area north of the Alps during the third style and suggests the circulation of metal materials starting from the middle of the 5th millennium BC.

12) The radiometric measurements available for the Isera La Torretta settlement - Isera 1 phase fall within a chronological period included between 4450 and 4245 BC, which may overlap both with the later phase of style II in Vela sector VIII and with SMP II and SMP III at Ala Le Corone. It should also be highlighted that the SMP II and SMP III phases are distinguished stratigraphically in the stratigraphic sequence of the rock shelter at Ala Le Corone, whereas the radiocarbon measurements available may overlap and lie between 4550 and 4330 BC for SMP II and between 4550 and 4460 BC for SMP III.

13) B-4825: 5480±60 BP; B-4824: 5440±60 BP; B-4563: 5410±100 BP; B-4561: 5150±60 BP (DONATI 1986, 108-9; CARAZZETTI & DONATI 1990, 366).

14) The location has recently been investigated by the "Soprintendenza Archeologica per il Veneto" under the direction of dott. ssa Bianchin Citton (BIANCHIN CITTON & FERRARI in press).

Hence the SMP culture and what has to date been defined as the Chassey-Lagozza culture may have come into contact in the North-Eastern area of the country when the SMP culture was petering out. An advanced phase in this interaction, concluding the SMP experience in the area, can be identified in the pottery and lithic aspects at the sites of Mosio-Acquanegra sul Chiese (Mantua) and Ronchetrin di Gazzo Veronese (Verona), for which we have ¹⁴C dating, establishing this period as between 3980 and 3540 BC (VISENTINI 2006).

It is also true that as far as the cultural entity to date known as the Chassey-Lagozza culture is concerned,

all the archaeological evidence relating to the western alpine area, the northern Tyrrhenian coast and its inland areas and the Po valley is situated chronologically before the genuine Lagozza culture, which can be placed between 3790 and 3340 BC, on the basis of the data from the site from which it takes its name.

The theory according to which Chassey style pottery evolved naturally into aspects that to date we have called Lagozza and which we believe may represent a final phase of the Neolithic, in individual ways and differing from one area to another, is therefore acceptable.

The picture illustrated briefly above shows how the substratum from which Late Neolithic findings emerge

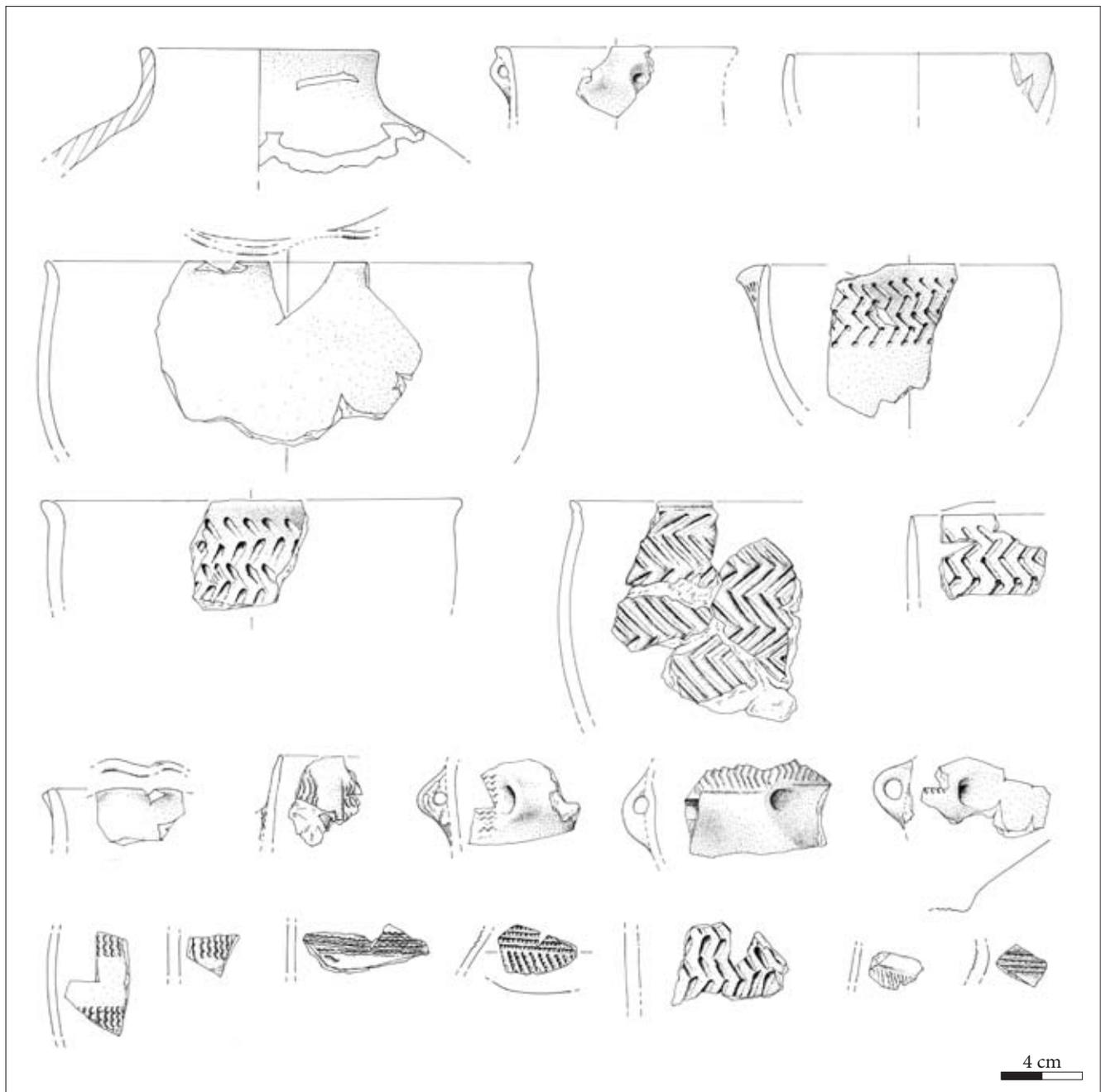


Fig. 6 - Pottery from the “stile ad incisioni ed impressioni” site of Bannia-Palazzine di Sopra (Pordenone; drawings G. Almerigogna).
 - Materiali ceramici dal sito di “stile ad incisioni ed impressioni” di Bannia-Palazzine di Sopra (Pordenone; disegni G. Almerigogna).

was relatively diversified and complex, both chronologically and geographically.

It is possible that the difficulties in identifying genuine cultural areas in Late Neolithic phases are the result of this lack of definition.

In general, one can perhaps observe an initial distinction between pottery findings in the North-East of the country, namely where the “*incisioni ed impressioni*” style spread in an earlier era, and an area between the western and eastern Po valley, in which the harbingers can be sought in the Chassey culture.

In general, in North-Eastern Italy the Late Neolithic would seem to have been influenced by styles north of the Alps, giving rise to the cordoned pots and perhaps also to the hollow bosses. These could have arrived south of the Alps via the Sarca-Adige river network, more naturally involving the areas of Trentino-Alto Adige and the province of Verona. On the other hand, the presence in Veneto and Friuli of bowls mostly in medium-ware and rare square-mouthed vessels⁽¹⁹⁾ may be the result of the survival of the previous cultural experience, perhaps more deep-rooted and solid in certain areas.

In Trentino the site of Isera la Torretta is particularly important. Here two phases of the Late Neolithic (called Isera 3 and Isera 4) were recognised stratigraphically and it can be observed that traditional Neolithic elements become increasingly rare (PEDROTTI 1996, 78-9; 2001, 160-4). The characteristics of Later Neolithic pottery and lithic products in the central-eastern area can also be recognised in the wetland site at Fiaavè-Carera, on the level described as Fiaavè 1 (PERINI 1984; 1987; 1994)⁽²⁰⁾. The objects include pottery, lithic and bone industry. For the moment there is no documentation regarding the production of wooden artefacts. The pottery is mostly made up of coarse-ware truncated cone items with decorative elements essentially represented by plastic motifs such as cordons, plain or with finger prints, nail marks or notches, mostly running horizontally and serving to consolidate the rim, bosses and hollow bosses. There are no SMP elements (PERINI 1994, 44-7: tabs. 1-4). The lithic objects include the blade of a flint bifacially flaked dagger which currently represents the most ancient finding of this type of ar-

tefact in Northern Italy (PERINI 1987, 90: tav. IX/23; MOTTES 2006, 26-7).

¹⁴C dating is available for this phase of frequentation carried out on a sample of bone: (ETH-12498) 4950±55 BP corresponding to 3780-3660 BC.

Close analogies with Fiaavè 1 have been found in the settlement recently brought to light at Castelrotto/Kastelruth Grondlboden (Bolzano), where a hoard of polished stone axes was also found (TECCHIATI 2009b).

In addition to similarities between the pottery, relations with cultural groups north of the Alps in this chronological phase are demonstrated by the presence of kidney-shaped loom weights and pintaderas along with flint objects coming from the Veneto and Trentino foothills, showing relations with both the Lagozza culture and later aspects of the SMP culture in certain settlements attributed to the Pfyner-Alttheim groups in Oberschwaben, dendrochronologically dated to between 3740 and 3650 BC (KÖNIGER & SCHLICHTERLE 1993; MOTTES 2002; MOTTES et al. 2002; BORRELLO et al. 2002; 2009)⁽²¹⁾.

As far as the most easterly area of the country is concerned, without the contribution of stratigraphic excavations and radiocarbon dating, on the basis of typological and comparative criteria, some authors (GILLI & MONTAGNARI 1993; 1994; 1996; BERTOLDI 1996; MONTAGNARI 1997; BARFIELD 1999) have recognised a Late Neolithic-Eneolithic aspect of the Trieste Karst in deep vessels, with convex sides and tight mouth or with distinct rim, often decorated with cordons or a series of impressed motifs around the rim, in almost all cases with the external surface treated in the *Besenstrich* manner.

From the chronological point of view, the dates for Fiaavè - Carera phase 1 (Trento) and Aica di Fié/Völser Aicha (Bolzano) make it possible to determine a chronological period going from 3780 BC to 3370 BC. This chronological position would seem to be confirmed by the data available for the site of Castel Grande di Bellinzona in Ticino, for the phase described as the final Neolithic by CARAZZETTI & DONATI (1990) and characterised, on the basis of the material published, by carinated bowls, deep vessels decorated with impressed cordons around the rim, a series of pseudo parallel cordons or impressed decoration of the rim. The two radiometric measurements available place these features between 3790 BC and 3660 BC.

The numerous datings coming from the site of Palù di Livenza (Pordenone) cannot contribute towards

19) The presence of square-mouthed recipients at Isera La Torretta in the Late Neolithic phase (Isera 3 phase) was interpreted by PEDROTTI (2001) as probably resulting from disturbance of the lower layer.

20) In Trentino the characteristics of pottery from Fiaavè 1 can also be recognised at Romagnano Loch III, layer R (PERINI 1971, 96-7, fig. 52/4-5), Covelo di Terlago, Loc. Torlo (DALMERI 1985, 209: fig. 5 and unpublished excavations), Castelaz di Cagnò (PERINI 1973: fig. 2), S. Lorenzo di Storo - site 1 (DALMERI 1982: fig. 4), Drena - sports field (MOTTES & NICOLIS, 2002, 243-44: fig. 5), Colodri di Arco (BAGOLINI & MATTEOTTI 1973), Bersaglio di Mori (AVANZINI et al. 1985, 28-9: fig. 3), Corsi di Isera (BARFIELD 1970: fig. 5) and perhaps at Mezzocorona-Borgonuovo (MOTTES & NICOLIS 2002, 248-9: fig. 7).

21) Of these, the wetland site of Reute-Schorrenried (Germany), dendrochronologically dated between 3738 and 3732 BC (MAINBERGER 1998), is of particular importance, its pottery having strong similarities with the contexts south of the Alps at Isera 3, Fiaavè 1, Lagozza and Breno.

better defining the chronological framework of the Late Neolithic because they cover a relatively extensive period of time⁽²²⁾.

4. Agriculture and the data provided by macroremains

Environmental data relating to the 5th millennium BC agrees as regards climatic stability and the lack of significant changes in terms of increasing cold and humidity (HAAS et al. 1998). Environmental crises, resulting both from climate changes and the increase in man's activities are only evident towards the end of the Neolithic, in the middle of the 4th millennium BC (BARFIELD 2002b).

The settlement model in the Early Neolithic saw villages as relatively small entities existing on the same land, cyclically cultivated and abandoned, without however making notable changes and transformations. It is thought that there were small cultivated areas around the villages, with hedges of live trees or fences, to prevent animals from entering. From the agricultural point of view, the overall picture is closer to what we would describe as "vegetable gardens" rather than cultivated fields. This model would not seem to evolve in the subsequent phase: the harvesting systems, on the basis of the few weeds present, would not seem to change, nor for the moment have other archaeological elements or materials shown any significant change. However, during the course of the 5th millennium BC there would seem to have been a general increase in the population and colonisation of more internal areas of valleys in the Alps and Apennines, related to the increase in pastoral activities. These activities have been well-documented at sites used as animal shelters, rock shelters and caves, but would also seem to be clear in some open-air sites (see for example Bannia: VISENTINI 2005).

One can presume that at least in terms of knowledge, the whole of Northern Italy had the same group of cultivated species available by the 5th - beginning of the 4th millennium BC. This included a reasonably large number of cereals and pulses, flax and the poppy, both species deriving from the "initial Neolithic package", coming from the Fertile Crescent, and species acquired subsequently (ROTTOLI & CASTIGLIONI 2009; ZOHARI & HOPF 2000). The number of species recorded at sites would appear to depend mainly on conservation

methods and on the greater or lesser completeness of tests carried out. It is commonly thought that each production site cultivated all the different species for self-subsistence. It is likely that within this common cultural background, the quantities differed in each settlement. There would have been peculiarities linked to the characteristics of the land and the environment, the presence of varieties selected locally, with a greater or lesser yield and some strictly local customs, both as regards the sowing-harvesting cycle and the preparation of food. It is also likely that there were differences in the picking of spontaneous or semi-cultivated species, fruit, vegetables and other, as they are more closely linked to the characteristics of the environment in the immediate area around the settlement.

Archaeobotanical research at SMP sites in North-Eastern Italy is still too limited to allow in-depth analysis of this area during the course of the 5th millennium BC and the first centuries of the following millennium. It is currently more useful to group together all the sites in northern Italy which have provided botanical material attributable to the different phases of the SMP culture or which have a chronology, in terms of calibrated ¹⁴C dating, between 4800 and 3800 BC, then attempting to distinguish any geographical or chronological differences. This involves a total of 29 settlements (3 of which wetland sites) where systematic sampling has rarely been carried out. We have numerical data or percentages and know the quantity sampled and the methods used to carry out the tests for a few of them (ROTTOLI & CASTIGLIONI 2009, see tab. I).

Of these sites, only 8 are situated in the regions which most interest us, 3 in Trentino Alto Adige (Villandro/Villanders Plunacker: NISBET 2008; La Vela di Trento - sector VIII: DEGASPERI et al. 2006; MOTTES & ROTTOLI 2006; COTTINI & ROTTOLI 2010; Riva del Garda, Via Brione: MOTTES 2010; COTTINI & ROTTOLI 2010), 3 in Veneto (Maserà: BIANCHIN CITTON & CASTIGLIONI in press; Fimon-Molino Casarotto: BAGOLINI et al. 1973; Rocca di Rivoli: BARFIELD & BAGOLINI 1976) and 2 in Friuli (Bannia: COTTINI & ROTTOLI 2005; Palù di Livenza: CORTI et al. 1997; 1998). The quality and quantity of data for these sites is again very variable. It is therefore necessary to make reference to other sites scattered over Liguria (6 sites, Arene Candide: EVETT & RENFREW 1971; AROBBA et al. 1997; BIAGI & NISBET 1986; AROBBA & VICINO 2003; Grotta del Sanguinetto o della Matta, AROBBA & VICINO 2002; Grotta Marina di Bergeggi, AROBBA & CARAMIELLO 2006b; Arma dell'Aquila: AROBBA & CARAMIELLO 2006a; Riparo dell'Alpicella, AROBBA & CARAMIELLO 2006b; Riparo di Pian del Ciliegio, AROBBA & CARAMIELLO in press), Piemonte (5 sites, Casalnoceto: CASTELLETTI & MOTELLA DE CARLO 1998; Alba-C.so Europa: MOTELLA DE CARLO & VENTURINO GAMBARI 2004; Alba C.so Langhe: MOTELLA DE CARLO & VENTURINO GAMBARI 2004; Castello

22) Nor can the date obtained for a sample of charcoal taken from structure 3 at the Este site at Meggiaro in the Padua area, materials from which were attributed to the Late Neolithic by the authors (BIANCHIN CITTON et al. 2002), be of assistance in the chronological definition of the Late Neolithic, as this returned a result which does not fit with the chronological framework just outlined, being situated between 2470 BC and 2350 BC (HD-22562 3919±30 BP), namely in an advanced phase of the Eneolithic, on the basis of current chronology.

d'Annone: CASTELLETTI & MOTELLA DE CARLO 1998; MOTELLA DE CARLO & VENTURINO GAMBARI 2004; Valgrana: MOTELLA DE CARLO & VENTURINO GAMBARI 2004), Lombardia (5 sites, Isolino di Varese: BANCHIERI & ROTTOLI 2009; Pizzo di Bodio: CASTIGLIONI & COTTINI 2000; Casatico di Marcaria: NISBET 1985; Rottoli & Dellagiacomina unpublished; Rivarolo Mantovano: CASTELLETTI 1984; CASTELLETTI & MASPERO 1992; Acquanegra sul Mosio: CASTELLETTI et al. 1987; NISBET 1985) and in Emilia (5 sites, Rivalentella-Ca' Romensini: MARZIANI & TACCHINI 1996; Bazzarola: CARRA & RICCIARDI 2007; Parma-Via Guidorossi: ROTTOLI & REGOLA in press; Ponte Ghiara: CARRA in press; Chiozza di Scandiano: EVETT & RENFREW 1971) (tab. II).

The cereals cultivated in the later phases of the Neolithic were barley (probably in the naked and hulled forms, with two or more rows, *Hordeum vulgare/distichum*), emmer wheat (*Triticum dicoccum*), einkorn (*Triticum monococcum*), naked wheat (common and/or durum/rivet, *Triticum aestivum/durum/turgidum*) and the so-called "new glume wheat" (JONES et al. 2000). The cultivation of spelt wheat (*Triticum spelta*) is uncertain, as is the cultivation of millet (*Panicum miliaceum*). The former species has been documented in a more significant manner, albeit doubtful, only at Valgrana in Piemonte, 3 findings were made in Parma-Via Guidorossi; a single well-defined finding of millet comes from Castello d'Annone. The introduction (or diffusion) of these species would therefore only appear to have taken place later, around or after 3000 BC, probably from North to South, coming from across the Alps (KÖHLER-SCHNEIDER & CANEPELE 2009; AKERET 2005).

Establishing the importance of the different cereals, above all barley, is problematical: counting of the caryopses would seem to suggest it had considerable importance at sites in the Adige valley (Villandro/Villanders, Plunacker; La Vela; Riva del Garda, Via Brione), in the Ligurian shelters (Pian del Ciliegio shelter) and in some areas in the hills or mid valley (for example Alba-Corso Langhe and Palù di Livenza). When the remains on the spikelet are considered, the barley is often scarce or more frequently absent. This contradiction is probably due to a combination of factors: greater fragility of the spike elements as compared to wheat, use of barley waste for animal feed and as a degreaser in the mixture for raw earth walls (barley is for example used more extensively, although not exclusively, in raw earth mixtures at Palù di Livenza: Rottoli unpublished).

Emmer wheat is the best documented species, both in terms of presence and of quantity per site. Einkorn is often well-represented (in Trentino at La Vela and in Riva del Garda, Via Brione, at Bazzarola in the Reggiano area and in Via Guidorossi in the Parma area), although overall its presence has been noted in a less continuous manner (it is absent at sites in Liguria and

at Villandro/Villanders, Plunacker in Alto Adige); at Maserà (Padua) and Bannia-Palazzine di Sopra (Pordenone) it is the predominant species. The "new glume wheat" already present at sites in Friuli in the Early Neolithic (ROTTOLI 2005), radiated out towards the West and the Alps in the 5th millennium BC (present in Lombardia, Trentino and Emilia). Its real distribution has still to be established, given the lack of checks on materials determined before 2000. At sites with more detailed studies (La Vela, Riva del Garda, Via Brione in Trentino and the site in Parma, Via Guidorossi) the cultivation of this form of wheat appears to have been modest, with levels lower than 10%, much lower than emmer wheat and einkorn. In contrast to indications provided previously (ROTTOLI & CASTIGLIONI 2009), the cultivation of naked wheat does not appear to have increased at all in the Middle Neolithic as compared to the Early Neolithic, indeed it would seem to decrease clearly even in areas (such as the central band of the Po valley) where it appeared to be most frequent (Rottoli, in preparation). There would appear to be greater interest in this species in Liguria (Riparo di Pian del Ciliegio, more recent layers: AROBBA & CARAMIELLO in press), but for the moment this is an isolated case.

There is limited evidence of pulses, with peas (*Pisum sativum*, a slightly more frequent species), lentils (*Lens culinaris*), chickling vetch (*Lathyrus cicera/sativus*) and common vetch (*Vicia sativa* agg.), a species already recorded in the Early Neolithic in Northern Italy (ROTTOLI & CASTIGLIONI 2009). There is a single preliminary report of bitter vetch (*Vicia ervilia*) a "first generation" species which is thought to be present at Ponte Ghiara in Emilia, also reported in the Early Neolithic at a single settlement (Sammardenchia: ROTTOLI 1999). The broad bean (*Vicia faba minor*, a "recent" species) is present at only one site in Piemonte (Valgrana), occupied only seasonally for the working of greenstone; this was probably a "consumer" site, so the cultivation of the broad bean probably did not take place locally.

There is little evidence of the cultivation of flax (*Linum usitatissimum*) and the opium poppy (*Papaver somniferum*); the former coming from the east and introduced to Italy in the Early Neolithic, based on the only information available at the moment (a seed found at Sammardenchia: ROTTOLI & CASTIGLIONI 2009), while the latter was instead cultivated along the western Mediterranean coast, perhaps at La Marmotta near Rome (FUGAZZOLA DELPINO et al. 1993; ROTTOLI 2002). Flax has only been recorded at a few sites: Ponte Ghiara in Emilia, La Vela and Riva del Garda, Via Brione in Trentino, Maserà in the Padua area and Palù di Livenza in Friuli, in this last case abundantly. It is not clear whether its absence in more westerly sites is in some way significant. However, it is also present at Isolino di Varese, but in contexts which have not yet been clearly dated. The lack of evidence would

only seem to be linked to the difficulty in conserving burnt seeds. Likewise, the poppy has also only been documented in two wetland sites (Isolino di Varese and Palù di Livenza). The documentation regarding Isolino is remarkable, because of the age (layers from the beginning of the 5th millennium BC), although it does not solve the problems regarding its introduction to Northern Italy, i.e. whether the species arrived from the South, the West or from the North, across the Alps. Some findings in Germany, Switzerland and France mean that the last theory cannot be excluded (BANCHIERI & ROTTOLI 2009).

The list of fruit species used is relatively extensive: the most frequent are hazelnuts (*Corylus avellana*) and wild grapes (*Vitis vinifera sylvestris*), but there are also the berries of the cornelian cherry (*Cornus mas*) and the common dogwood (*Cornus sanguinea*), apples (*Malus sylvestris*) and pears (*Pyrus* sp.), bladder cherries (*Physalis alkekengi*), acorns (*Quercus* sp.), blackberries (*Rubus fruticosus*), raspberries (*Rubus idaeus*), hawthorn berries (*Crataegus* sp.), elderberries and danewort (*Sambucus nigra/racemosa*; *Sambucus ebulus*), wild plums (*Prunus spinosa* agg.), figs (*Ficus carica*), strawberries (*Fragaria vesca*) and the water chestnut (*Trapa natans*). The common walnut (*Juglans regia*) appears at two sites. It has already been suggested that its presence is linked not to food but rather to trade or gifts, so the presence of the tree in Italy in this period is controversial (COTTINI & ROTTOLI 2005). There is a remarkable abundance of the fruit of the cornelian cherry at Bannia-Palazzine di Sopra, the only site from this period with abundant remains of this species, anticipating the success it was to have in the Eneolithic, but above all in the Bronze Age. The change in its use may have come about as a result of contact with the Balkans, where this species was apparently already popular in the Neolithic.

The natural distribution of fruit trees was different within the geographical area considered, however these differences do not seem to have had any particular effects on the harvest, which seems similar throughout the whole of Northern Italy. However there is little data and there are too few wetland sites, where findings of this species are most abundant.

To conclude, despite limitations regarding the quantity and quality of data currently available, it is possible to observe that agriculture was fully developed in Northern Italy in the 5th - beginning of the 4th millennium BC, also thanks to excellent climatic conditions. Limited differences can be observed as compared to the previous period, such as the introduction of the opium poppy, possible spreading of flax cultivation and the spreading of cultivation of the "new hulled wheat" towards the west; aspects which are still poorly documented for which only trends can be noted. It is difficult to evaluate the presence of regional differences.

The expansion of a single culture into the Po valley and alpine area, albeit divided into three distinct stylistic phases, may actually have led to the establishment of a homogeneity in terms of products. However, overlapping between cultural aspects and the types of crops is not automatic: archaeobotanical studies of the Neolithic in Switzerland show that areas with the same type of pottery have developed different types of economy (JACOMET 2007).

The analysis of new sites and checking of previous data suggests that, above all in the North-East, the diffusion of naked wheat was limited if not absent. This would appear to go against the trend, as it is normally believed that this type of wheat, more demanding but more adaptable and productive, became progressively more important. The widespread use also in areas north of the Alps, such as central Switzerland, was considered to be a direct consequence of contact with the Mediterranean. However this would not seem to be confirmed by the information currently available, unless these contacts took place through France. It is nevertheless possible, as has been suggested in other areas, that the development of agricultural techniques led to the selection of more resistant varieties, capable of ensuring constant production in different areas, with less dependence on climatic conditions and soil. This kind of specialisation would also have led to good harvests of other species, such as emmer wheat and einkorn, which according to today's parameters are considered less interesting and productive. However it cannot be excluded that these choices were also determined by food preferences that today it is not possible to evaluate.

The occasional nature of evidence regarding pulses, but also to a certain extent fruit, demands a certain caution in interpreting this data. There would appear to have been a partial decrease in the consumption of hazelnuts as compared to the Early Neolithic, and perhaps a progressive increase in interest in the vine, which nevertheless would not seem to have given rise to genuine production. Interest in the cornelian cherry, which is clear in the Bronze Age, has only been documented at Bannia-Palazzine di Sopra, perhaps in relation to contacts with the Balkans. The species used, as has already been observed, are essentially the same everywhere. The presence of different, Mediterranean, environmental conditions, undoubtedly already present in Liguria but also in other areas with milder climates (the Adriatic coast, around the large pre-alpine lakes, COTTINI & ROTTOLI 2010), did not lead to a different use of fruit trees. However, analysis of the vegetation (wood and charcoal) tends to underline a reduced presence of Mediterranean vegetation for this phase of the Neolithic, which subsequently imposed itself, more due to man's intervention than for climatic reasons (see AROBBA & CARAMIELLO in press).

5. Animal resources

Previous papers (FERRARI et al. 2002a) have already examined aspects relating to the palaeoeconomy of sites relating to the final period of the SMP culture in Northern Italy in an attempt to summarise the data available. In particular, examination of archaeozoological findings, when coming from chronological and cultural contexts considered to be reliable, was carried out with the intention of evaluating ways of acquiring and managing animal resources within the context of activities linked to subsistence. The picture emerging from this examination has clearly highlighted above all the wide variety of responses to the conditioning represented by the different habitats in which the sites were situated.

A glance at the development of the SMP culture in a more limited area including Trentino, Veneto and Friuli makes it possible to make more specific observations, also thanks to the contribution of more recent studies⁽²³⁾. Comparisons with the Mantua area have only been noted in order to highlight any common trends in economic activities suggested by the archaeofauna.

The sites with the earliest findings relating to the SMP culture have yielded practically no information on fauna, with the exception of Fimon Molino Casarotto, a settlement on the Colli Berici near the lake, for which archaeozoological data suggests an economy based essentially on hunting, particularly of deer (49.8% of remains) and boar (37.5% of remains), while domestic species were of decidedly secondary importance (JARMAN 1976a). These aspects recall the situation found in sites dating back to the Early Neolithic, such as the Gaban shelter, Romagnano Loc, La Vela sector VII and Mezzocorona - Borgonuovo in Trentino, Isorella, Vhò and Ostiano in the Po valley area (BAZZANELLA et al. 2000; STARNINI et al. 2000), where the data suggests the existence of economies still based on the exploitation of wild prey, with the rearing of domestic animals being more or less relevant depending on the site, a situation in which the management of domestic livestock would not seem to be fully established (PETRUCCI et al. 2000).

Some sites characteristic of style II have provided dietary documentation regarding the exploitation of animals: in particular the settlements at Rocca di Rivoli, in the hills to the north of Verona (JARMAN 1976b), and Pieve di Colognola ai Colli, 20 km east of Verona in the foothills (RIEDEL 1992), are characterised almost exclusively by domestic animals. At Rivoli the percentage of deer remains as compared to other animals goes down to 16.9%, whereas the economy tends decidedly to be based on the use of cattle, pigs (domestic and wild),

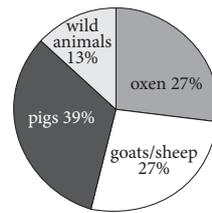


Fig. 7 - Gazzo Veronese, Scolo Gelmina. 7 structures: % MNI for domestic species and overall data for wild animals.

- Gazzo Veronese, Scolo Gelmina. 7 strutture: % MNI per taxa domestici e dato complessivo dei selvatici.

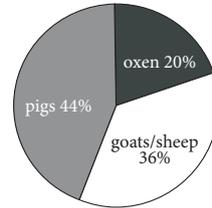


Fig. 8 - Bannia, Palazzine di Sopra (Pordenone). Structures 6-20: % MNI species present in the sample.

- Bannia, Palazzine di Sopra (Pordenone). Str. 6-20: % MNI taxa presenti nel campione.

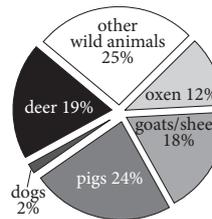


Fig. 9 - Palù di Livenza (Pordenone). All sectors 1993-1994: % MNI species present in the sample

- Palù di Livenza (Pordenone). Tutti i settori 1993-1994: % MNI taxa presenti nel campione.

goats and sheep. The cattle were large-framed (estimated to be around 130 cm wither height), almost at the limit of variability in terms of the size of domestic species, as shown by almost complete horns found at Pieve. The increase in animal rearing and the apparent decline in wild resources in this phase could suggest an intensification in deforestation practices to make space for crops and pasture for cattle.

As for the aforementioned sites, the fauna at sites in the central Po plain, for example Casatico di Marcaria (Mantua), show a marked tendency to exploit large cattle, butchered almost exclusively when adult, alongside the rearing of pigs, goats and sheep (mostly sheep), the latter largely being slaughtered between the ages of two and three (BARKER 1983). The age of death for domestic species would seem to indicate that they were used above all to obtain meat, to supplement the increasingly smaller amount coming from the hunting of deer, roe deer, boar and occasionally other species such as the marten.

As far as the Trentino sites are concerned, new aspects emerging from the archaeozoological tests conducted at Riva del Garda, Via Brione made it possible to add another piece in the reconstruction of this picture, which undoubtedly still has much missing information⁽²⁴⁾. The data regarding the La Vela settlement would seem to suggest an intensification in the rearing of livestock, especially sheep, goats and cattle, as compared to hunting in the progression from phases of the Early Neolithic to the establishment of the SMP culture (BAZZANELLA 2002).

23) New elements for discussion and new ideas for the interpretation of archaeozoological data emerged during the conference "Vasi a bocca quadrata. Evoluzione delle conoscenze, nuovi approcci interpretativi" held in Riva del Garda (13-15 May 2009).

24) The study of the fauna at these two sites, presented at the conference in Riva del Garda (see note 23), to be published shortly, was carried out by Alex Fontana, Daniela Marrazzo and Alessandra Spinetti.



Fig. 10 - Gazzo Veronese, Scolo Gelmina (Verona). Deer horns from pit 141.
- Gazzo Veronese, Scolo Gelmina (Verona). Palco di capriolo dalla struttura 141.

The study of fauna coming from the Scolo Gelmina di Gazzo Veronese site on the Verona plain has recently provided new data helping to determine the economic activities carried out in style III sites⁽²⁵⁾. During excavations carried out in 1997 by the Archaeology Office of Veneto - Verona operational unit, numerous small shafts were brought to light, different in terms of size and depth; it has been suggested that the main role of some of these was for the extraction of clay or, as in the case of structure 151, that they were used as silos to conserve food provisions (SALZANI 2003). The archaeological material present in these structures, transformed into waste tips when they were no longer adopted, made it possible to attribute 24 out of the 26 shafts investigated to SMP style III. In addition to numerous pottery and stone findings, 22 out of the total of 26 shafts provided a relevant quantity of animal remains, which were subjected to preliminary analysis. The overall animal remains were made up of 4000 very well-conserved findings; currently the study has been limited to archaeozoological analysis of 1485 animal remains coming from seven structures. 418 remains (28.5%) have been specifically identified, whereas the undefined objects are represented by bone fragments smaller than 3 cm and by numerous diaphysis fragments of long bones. There are rare examples of burnt fragments, whereas bones with traces of having been gnawed by carnivores are particularly evident only in shaft 151.

The animal findings show the presence of the most common domestic taxa (oxen, goats/sheep, pigs, dogs) alongside wild animals such as deer, roe deer, boars and hares, the latter in relatively small quantities. The species with the largest number of identified remains in almost all the structures examined was the ox, followed by sheep and pigs, with similar percentages. Calculation of the minimum number of individuals per taxon

25) The analysis of animal remains carried out by the author has been carried out at preliminary level; the data was presented during the last conference in Riva del Garda, the proceedings of which will publish the overall archaeozoological study (PETRUCCI in press).

and structure instead highlighted a certain equilibrium; substantial differences in the composition of the animal remains in the different filling materials were not noted, at least in this phase of the study. Considering the overall findings, one can observe only a slight predominance of the domestic pig (33%), in terms of MNI, over sheep and oxen (both at 27%). The methods of exploiting the species which can be surmised on the basis of analysis of the age of death highlight different behaviour, both when evaluating individual structures and examining the overall fauna samples (fig. 7). It can thus be noted that most of the findings relating to oxen belong to adults (>30 months) whereas sheep and goats were mostly slaughtered young, under the age of one year (6-12 months). The remains of domestic pigs are distributed across all age groups, but in this case a consistent number belong to young and very young animals (<6 months). Biometric data shows the presence of large-framed cattle, comparable with those at other Late Neolithic sites already reported in the literature (RIEDEL 1996; PETRUCCI et al. 2006). The remains of domestic pigs, easily distinguishable from the boar both in terms of morphology and size, also belong to relatively large animals.

The individuals belonging to wild species are all adults; the presence of roe deer is demonstrated by a skull fragment with incomplete set of antlers, in addition to a tibia diaphysis. Hunting thus took place occasionally and was directed at the most common and easily available species in the area surrounding the settlement, including small animals such as the hare.

The finding of smaller or larger sections of ox skulls with one or both of the horns in shafts 115, 143, 145 and 151 should be noted; in particular, in shaft 143 the horns, incomplete, have an oval section at the base, thick walls, unfurrowed surfaces and curve forwards, twisting slightly upwards. In shaft 115 a large horn was found, probably belonging to a male, belonging to a large fragment of the frontal bone of a bovine skull. Skull remains from other species identified at Scolo Gelmina are very limited, so the placing of ox skulls with large more or less complete horns in some shafts would seem to be intentional and is similar to the characteristics of animal materials also found, as will be seen, in structure 12 at the Bannia - Palazzine di Sopra site (Pordenone) (PETRUCCI 2005), as well as at Pieve di Colognola and Olmo di Nogara (fig. 10).

Both in shaft 157 and the others, most of the findings relating to oxen are made up of incomplete long bones of the front and rear limbs; there are also carpal, tarsal and phalanx bones, indicating that the waste parts of the carcass ended up in these structures, once the animal was butchered.

Traces of butchering have been identified on some findings in the form of skinning stria, dislocation and more occasionally slashes, as in the case of a pig's epistropheus for example. Examination of the SEM of these

traces, provided for on completion of the work⁽²⁶⁾, will make it possible to clarify the characteristics of man's intervention recorded on the findings.

Alongside findings indicating the exploitation of animal species in the subsistence economy, the study of fauna at Scolo Gelmina has also made it possible to highlight the use of bone to realise worked objects: this is the case of the two tips found in shafts 104 and 151, incomplete and broken at the top, probably obtained from two diaphysis fragments from a small herbivorous animal.

The analysis of fauna material collected at two settlements on the Po plain with cultural elements relating to SMP style III makes it possible to carry out comparison with the data available for Veneto. At Rivarolo Mantovano, the recovery of bone findings from 11 shafts initially studied by Barker (BIAGI et al. 1983) and subsequently by CATALANI (1984), has made it possible to outline an economy based on the rearing of the main domestic species, in which it also appears possible to note, at least on the basis of MNI evaluation, an increase in the importance of smaller livestock (in particular sheep) as compared to sites in the previous phase. Again in this case, the age groups for slaughtered cattle, butchered after the age of three, suggests that this species was not used only to exploit its meat, but perhaps also for other products. The oxen, large-framed as in the other sites mentioned above, provided around 60% of the total meat potentially provided at this site, along with the meat obtainable from domestic pigs, these too usually butchered when adult. Hunting of common wild species (deer and roe deer) would appear to have taken place sporadically. The vicinity to watercourses perhaps allowed secondary resources to be obtained occasionally, as is demonstrated by limited findings related to fish and turtles among the fauna samples⁽²⁷⁾.

The style III site at Belforte di Gazzuolo (Mantua), not far from the ancient river bed of the Oglio, is characterised by a series of shafts used as waste dumps. The finding of numerous animal remains belonging to domestic and wild species in one of these has made it possible to evaluate in a more reliable manner the true extent of activities managing animal resources at this site (CATALANI 1985). On the basis of the MNI the economy was based mainly on the rearing of pigs, followed by sheep and goats: individuals of these species were butchered both when young (less than one year old) and when adult, indicating diversified exploitation depending on the product to be obtained. Cattle were usually butchered when adult or even senile, which suggests that they were used to obtain other products

(principally milk) but perhaps also exploited for their force. Of the wild species characterising the natural environment surrounding the site, the following have been recognised: beaver, wild cat, badger, hare and fox, some probably hunted not only for their meat but also for their fur. The remains of fish and molluscs show that these resources were also used to supplement the diet of the community living in the settlement.

Analysis of the animal resources exploited in sites relating to the SMP culture, in particular in Veneto and on the Po plain, would thus seem to highlight a progressive increase in the rearing of sheep and goats alongside cattle and pigs and perhaps indicates a change not only in economic choices linked to the exploitation of other products previously considered less important, but also in environmental characteristics and methods of settlement. These aspects were brought to light at the site in Bannia - Palazzine di Sopra (Pordenone) (PETRUCCI 2005) and would in effect seem to point in this direction. Study of the animal remains collected at Bannia-Palazzine di Sopra allows us to make some observations about the economic activities carried out at the site around the middle of the 5th millennium BC, the ways in which animal species were exploited, the morphology and size of the animals to which the remains belong and the environment surrounding the settlement.

Analysis of samples coming from the shafts has highlighted some common characteristics of the overall findings and some elements differentiating structures 8, 8A and 8B from the others. The common characteristics include above all the exclusive presence of three domestic species (oxen, sheep/goats, pigs) with the exception of a single wild boar (fig. 8).

Considering the samples from Bannia-Palazzine di Sopra as a homogeneous whole, the predominance of sheep, goats and pigs over oxen appears clear; an economy based on the rearing of smaller animals and on sheep-farming products was relatively common and widespread in Late Neolithic sites in Northern Italy (FERRARI et al. 2002a) and Central Italy (COCCHI GENICK 2002). The wider diffusion of sheep-farming was linked to the greater mobility of human groups during this phase and created the basis for an economy particularly concerned with the exploitation of secondary products. The type of exploitation of animals by man, in this case sheep in particular, can be deduced from analysis of the mortality curves obtained from the examination of tooth eruption/wear and the degree of fusion of the epiphyses of long bones. The Bannia-Palazzine di Sopra samples relating to structures 6 to 20 (excluding 8, 8A and 8B) highlight a tendency to slaughter sheep and goats when adult, while a smaller percentage was butchered when young. This tendency can be related to the need to exploit sheep and goats for as long as possible to obtain milk or wool and to ensure constant levels of reproduction. Although corresponding with the predominantly

26) The analysis, still underway, is being carried out in collaboration with Ursula Thun Hohenstein from the "Dipartimento di Biologia ed Evoluzione" of the University of Ferrara.

27) The paper refers generally to *Testudo* without indicating the species (BARKER 1983: tab. 13, 63).

sheep-farming framework emerging from analysis of the structures previously described, the material filling structures 8, 8A and 8B would seem to have formed in a different way. In these the quantity of sheep and goat remains is clearly predominant as compared to the other two due species, both in terms of the number of identified remains and the minimum number of individuals. Tests on teeth and bone findings have made it possible to establish that the majority of animals were killed by the age of three months (more than 40%), with much lower percentages of sub-adult and adult individuals. The predominance of very young or newborn sheep and goats, demonstrated by the finding of milk teeth and postcranial bones, is an aspect which can be compared to the findings of the fauna study at the Arene Candide cave, occupied seasonally by travelling shepherds up to the Eneolithic (ROWLEY-CONWY 1991; MAGGI & NISBET 1990). In particular, the bones of very young or foetal animals and the presence of milk teeth would seem to show, especially in contexts such as caves or rock shelters, that these were used as shelters for the stabling of animals, as in the case of the Mitreo Cave, in the Trieste Karst (layer 5)⁽²⁸⁾ (PETRUCCI 1996).

The remains of structures 8, 8A and 8B at Bannia-Palazzine di Sopra suggest that the dynamics leading to the forming of these deposits, clearly involving the almost exclusive accumulation of the remains of sheep butchered very young, were the result of different behaviour by man, as compared to the action giving rise to the material filling the other ditch structures at the site.

The slaughtering of young and very young animals can be explained by the desire to use the mother's milk for the human diet. However, the homogeneous characteristics of the animal samples from the structure suggest that the actions leading to the filling of the shafts with the remains of carcasses took place over a relatively short period or at times close together. The killing of so many lambs in a relatively short time (at least 52 animals) would have led to a serious impoverishment of the population of goats and sheep reared at Bannia-Palazzine di Sopra. We could therefore surmise that the butchering of very young individuals, albeit over a period of time which we cannot quantify, was motivated by an increased demand for food (although it appears obvious that the killing of older animals would have provided more meat) or by the need to reduce the flock, slaughtering the weaker and less economically viable animals as the winter approached, in order to avoid wasting resources on feeding animals that would not have survived the cold season anyway.

This theory is partly supported by data, not altogether reliable, obtained from tests on the growth lines carried out on some molar and premolar milk teeth; these

tests suggest that the death of animals from which the teeth examined came took place at the end of the summer⁽²⁹⁾.

The animals butchered when sub-adult or adult, although not numerous, were therefore kept alive longer in order to exploit their milk or wool. It is possible to surmise, although these considerations are not at the moment confirmed by archaeological data, that the young animals were killed in order to obtain the curd obtained from their stomachs, used to realise simple cheese products ("ricotta") which did not require elaborate working processes.

On the basis of the biometric data, the sheep population of Bannia-Palazzine di Sopra was made up of small animals, with slender bones, with a wither height of between 54 and 56 cm.

Pigs, the second species in terms of MNI, were probably left to range freely in order to feed near the site, the environmental characteristics of which must have been suitable for this form of husbandry. Palaeobotanical tests suggest that close to the settlement there were forests characterised by deciduous oak, ash and alder trees (VISENTINI 2002b), and indirectly suggest the presence of wetland areas. Alongside clearly domestic animals and some examples of boars, other evidence would seem to suggest the presence of hybrid forms, characterised by the morphology of domestic animals but much larger. These very large pigs could be the result of cross-breeding with boars, which could easily have taken place given the type of free-ranging animal husbandry.

There was little use of oxen, perhaps because the characteristics of the environment in which the settlement was situated were not suitable for the rearing of this species. Despite its indubitable value as a source of meat, the percentage figures for its presence at Bannia go from 9% (the MNI for structure 8) to 20% (other structures). Evaluation of the measurements for ox findings demonstrates that there was a large-framed cattle population, with long robust bones.

Interesting data has been provided by the finding of an incomplete skull but with two almost intact horns in structure 12, demonstrating the presence of a large adult male. Very few other animal remains were thrown into the shaft, so the placing of the skull would seem to be intentional and perhaps have a special value. This context can be compared with the site at Pieve di Colognola (Verona) (RIEDEL 1992), attributed to SMP style II, and the chronologically more recent site of Olmo di Nogara (Verona) (RIEDEL 1995). In addition to clear similarities (presence of horns with or without skull fragments

28) The chronological data relating to this site is difficult to interpret and relates to earliest frequentation in a phase between the Neolithic and the Eneolithic.

29) The tests were carried out by Alessandra Facciolo, who works for the "Laboratorio di Paleontologia e Archeozoologia" of the "Museo Nazionale Preistorico ed Etnografico L. Pigorini", Rome. The unreliability of the results is due to the damaged state of the findings caused by phenomena occurring subsequently, which have altered the internal structure of the teeth.

in Middle-Late Neolithic shafts, together with limited quantities of fauna remains, mostly from domestic animals) comparison with the findings relating to cattle at the aforementioned site is important because it makes it possible to evaluate the size and above all the morphology of ox horns and bones in a chronological and cultural period for which similar data is not abundant.

The ritual placing of the skull cannot be excluded, also given the almost total lack of traces of action by man (for example traces of cutting or intentional fracture) on the horns to remove the horn sheath.

To conclude, evidence of the material culture, the structures and traces of other economic activities carried out at Bannia-Palazzine di Sopra would seem to suggest frequentation which could not be defined as permanent residence: in particular the limited quantity of evidence relating to cereals and the almost total absence of findings linked to agricultural practices such as sickle parts or tools for milling suggest that the site was not occupied on a stable basis and that the subsistence economy was based mainly on the rearing of smaller animals, easier to manage and more mobile (VISENTINI 2002b).

Evidence relating to the Late Neolithic is unfortunately limited to the information on fauna offered by the site at Palù di Livenza (Pordenone) (CORTI et al. 1998). The overall findings include around a thousand identifiable remains, only a small part of which come from stratigraphic units 9 and 6 investigated in sector 1 in 1992 and US 20 and US 21 excavated in 1994 in sectors 2/V and VI, whereas a larger number were recovered during cleaning and the 1993 and 1994 excavations of sectors 2/I - VIII. The data obtained from the analysis of the two bone samples, which are different in terms of the collection method and quantity of remains, are essentially similar and are differentiated only by the number of species represented in the two groups. The fauna identified in US 20 is characterised by a greater frequency of deer and wild and domestic pigs as compared to other mammals: sheep and goats predominate in terms of domestic animals, with fewer cattle. In US 20 the fauna spectrum is limited to the main domestic species and roe deer, in addition to deer and boar.

As far as excavation sectors 2/I - VIII 1993 and 1994 are concerned, one can note the prevalence of deer and pigs, particularly pigs, over other domestic and wild animals. The age groups of the individuals show that as far as domestic animals are concerned, a larger number of young animals were killed, i.e. under the age of 12 months (particularly goats and sheep, sheep predominating) whereas the wild animals, namely deer, boar and roe deer, were older, with a greater frequency of individuals over the age of two.

An extension of the spectrum of fauna as compared to the data for US 20 and US 21 is also evident: the presence, albeit limited, of the otter, the turtle *Emys orbicularis*, and the wild duck *Anas platyrhynchos* in

terms of birdlife, are in accordance with a wetland environment, with stagnant waters, close to wooded areas where deer, roe deer and boars could find food and shelter. Some findings demonstrate the presence and perhaps the hunting of wild cats, foxes and badgers, within a context of animal exploitation which in this case would seem to see the resources offered by the natural environment dominate (fig. 9).

6. Conclusions

In the area in question the formative aspects of the SMP culture are not as well-known as in the Liguria and Emilia regions but have been noted exclusively in contexts for which we do not have certain stratigraphic data.

It was only with the beginning of the classical aspects of the “geometrico-lineare” style, noted particularly at the site of Fimon Molino Casarotto (Vicenza) and above all with the diffusion of aspects of the “meandro-spiralico” style, that the SMP culture would seem to have consolidated itself in the area, particularly in the Adige valley and the Verona area.

In the Friuli and Trieste Karst region on the other hand, the cultural aspects of the early Neolithic with strong eastern influence (Danilo and Hvar cultures) would also seem to have extended into the first centuries of the 5th millennium BC (PESSINA 2006), effectively acting as an obstacle to the advance of the SMP phenomenon towards the east.

Starting from this chronological phase, the SMP culture indeed developed long distance cultural contacts and exchange networks both with areas in southern Italy, perhaps through the mediation of the Po plain area (presence of obsidian from Lipari and Serra d'Alto elements at Trentino sites: MOTTES 2002) and with areas to the north of the Alps. Contacts with the area north of the Alps were to become more extensive starting from the middle of the 5th millennium BC, with the diffusion of aspects of the “incisioni ed impressioni” style (DEGASPERI et al. 2006, 160-161, note 26; MOTTES et al. 2002; BORRELLO et al. 2009; TÖCHTERLE et al. 2010, 340: figs. 2-4). The trading of flint from the Veneto and Trentino foothills must have served as a vehicle for the circulation and exchange of ideas. It is very likely that one of the main routes for this raw material was represented by communications routes following the course of the Rivers Adige and Isarco, which go from the Po plain directly to the central alpine passes. In particular, the site at Rocca di Rivoli (Verona), which has been interpreted as a centre for the working and distribution of southern alpine flint during the Middle and Late Neolithic (BARFIELD & BUTEUX 1999, 16-17; BARFIELD 2000, 62), must have had an important role in the context of prehistoric trading.

The adaptability of the SMP culture to different natural habitats has been underlined for some time (BAGOLINI 1980a, pp. 126 and 131). The impression obtained from the data available for the area in question is that the SMP culture imposed itself in different geographical contexts and on the local cultural substratum in different ways and at different times, with economic exploitation being based on the potential offered by the environment. In the Trentino area for example, palaeoeconomic data and the results of the technological and functional analyses carried out on lithic industry have made it possible to highlight significant differences between the sites of La Vela in Trento (sector VIII) and Riva del Garda in Via Brione.

The site of La Vela, situated in the Adige valley in an area little suited for agriculture, would seem to have been characterised by limited investment in production activities and greater orientation towards the rearing of livestock and sheep and goat farming. The presence of sheep and goats, particularly sheep, saw a considerable increase between the initial and later phases of the “meandro-spiralico” style (FONTANA et al. in press); furthermore, functional studies of lithic industry have shown a marked tendency towards the exploitation of animals (CONCI & ZIGGIOTTI in press). As regards this, it should be noted that sheep farming at high altitude developed in the alpine area starting from the middle of the 5th millennium BC, which would seem to suggest greater mobility of human groups, with a significant anthropic impact on mountain areas, as documented by archaeobotanical and palynological analyses carried out at some peat bogs (BORTENSCHLAGER 1999; 2000, 15-22). On the other hand, agricultural cultivation activities dominated at Riva del Garda in Via Brione, probably due to particularly favourable environmental characteristics at the site, with the presence of typically Mediterranean tree species (COTTINI & ROTTOLI 2010), while the cultural context shows elements of contact with “meandro-spiralico” sites in the Po plain area.

After the first appearance and stabilisation of style II SMP groups in the first half of the 5th millennium BC cal, the data available in particular for the Adige valley would seem to highlight an extremely complex situation starting from the middle of the 5th millennium BC. In this phase there was a rapid evolution in the SMP culture, which took place due to the influence of cultural contributions coming from the area north of the Alps, in the context of which later aspects of the “meandro-spiralico” style are documented, associated with stylistic components reworking aspects typical of the Isolino SMP facies. This was superimposed on the cultural beginnings of the “incisioni ed impressioni” style, with the possible joint presence of settlements belonging to groups adopting different styles within the context of the same culture.

In the central-eastern sector south of the Alps, the cultural evolution of the SMP culture from the “meandro-

spiralico” style phase to the “incisioni ed impressioni” style, albeit very rapid and accompanied by considerable changes regarding in particular the range and decorative style of the pottery, lithic technology and some aspects of the ideology (VISENTINI, 2005, 192), took place without significant repercussions. There was however an intensification in cultural contributions from areas north of the Alps and a moderate influence exerted by areas further south in the peninsular area, which can be traced particularly in the decorative techniques and motifs of the pottery. In this chronological phase the first metal objects (Isera la Torretta, Rocca di Rivoli, Bannia Palazzine di Sopra) began to spread south of the Alps, probably coming from territories north of the Alps. These may have followed the same trading routes as flint from the Veneto and Trentino foothills.

The current known picture would appear to exclude the idea of distinct or traumatic transitions between aspects of SMP styles II and III. Indeed it has been shown that style III groups were strongly rooted in the area, both culturally and economically, this being manifested, at least initially, in the inviolability of the areas of diffusion of the “incisioni ed impressioni” style by Chassean groups.

The entrenchment of the SMP culture in the eastern area can also be seen as a way of maintaining control of the supply sources and distribution for flint from the Monti Lessini (MOTTES 2002).

As far as the palaeoeconomic data is concerned, the limited presence of sites analysed in north-eastern Italy and the difficulties in identifying regional differences made it necessary to extend the area examined to the whole of northern Italy.

In general, the environmental data is in accordance in indicating a certain climatic stability, this situation apparently only changing in the middle of the 4th millennium BC. The settlement models already applied in the early Neolithic, with small villages surrounded by limited areas for the cultivation of crops, would appear to have continued into the 5th millennium BC, although in this phase one can observe a general increase in the population and the colonisation of more internal areas of the Alpine and Apennine valleys, perhaps also in relation to what can be deduced from the archaeozoological data.

The plant species recorded for agricultural purposes included both a significant number of cereals and pulses, flax and the poppy, namely species deriving from the “initial Neolithic package” coming from the Fertile Crescent, and species acquired subsequently. It is believed that mixed cropping was adopted at the sites, namely cultivation for self-support in relation to all the different species. The data currently available indicates considerable homogeneity in the choice of cereal crops, which would seem to be independent of climatic conditions and soil characteristics at the sites.

As far as archaeozoological data is concerned, it is only possible to suggest some ideas for thought arising from the analysis of the sites examined. In sites characterised by the establishment of styles I and II of the SMP one can observe a progressive decrease in hunting and an apparent reduction in the spectrum of wild fauna exploited, in favour of an increase in the rearing of cattle, characterised by their considerable size, and pigs. Alongside these there were variable numbers of sheep and goats. The choice of preferred species was specific to each site, depending on the physical characteristics of the environment. A different trend would seem to characterise the passage to the later phase of the SMP culture, when the greater importance given to sheep and goats in the economy of some sites would suggest the adoption of new production or settlement methods.

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