TEN YEARS AFTER: THE NEOLITHIC OF THE BALKANS, AS UNCOVERED BY THE LAST DECADE OF RESEARCH,
TIMIŞOARA, 2009. Edited by Florin Draşovean, Dan Leopold Ciobotaru and Margaret Maddison

NEW EVIDENCE OF NEOLITHIC AND COPPER AGE AGRICULTURE AND WOOD USE IN TRANSYLVANIA AND THE BANAT (ROMANIA)

Renato Nisbet[*]

Keywords: *archaeobotany, Romania, early crops, charcoal analysis.*

I. INTRODUCTION

The aim of this paper is to propose a reconstruction of some aspects of on-site vegetation as shown by charcoal, charred fruits and seeds, from some digs carried out in the last few years in Transylvania and Romanian Banat[1]. These materials were collected by different teams from a few Neolithic and Copper Age sites: Parța, Dudeştii Vechi, Foeni-*Cimitirul Ortodox* and Sânandrei, in the Banat, Miercurea Sibiului-*Petriș* and Peştera Ungurească in Cheile Turzii Gorge, in Transylvania.

Unfortunately, the materials are abundant only for the last site and come from a large wet-sieving sampling (at 1 mm). The other samples are small or even very small – between 50 and 100 mL – and mostly were handpicked (except for Miercurea Sibiului-*Petriș*, which was also floated and sieved at 1mm). Given this difference in sampling in the diverse sites, we have therefore only a very preliminary indication on agriculture and wood use.

II. NEOLITHIC SITES

1. Miercurea Sibiului-*Petriș*

In our record, the only Early Neolithic evidence of agriculture comes from Miercurea Sibiului-*Petriș* (Secaşelor Plateau, Sibiu district) where extensive flotation of sediment from several pits belonging to the Starčevo-Criș culture led to the recovery of barley and bread/club wheat, as shown from Table 1.

Taxa	**Early Criș**		**Vinča A2**	
Triticum cf *monococcum*, einkorn			1	G20s2
Triticum dicoccum, emmer			4	G20s2
Triticum cf. *dicoccum*, emmer			3	G20s2
Triticum sp., wheat	1	Pit 35	6	Pit 18, G20s2
Triticum sp., wheat			1	G20s2
Hordeum vulgare, barley	1	Pit 35		
Panicum miliaceum, broomcorn millet			4	Pit 18, G20s2
Cerealia, cereals undiff.	2	Pit 35	2	Pit 18, G20s2

Table 1. Miercurea Sibiului-*Petriș*. Neolithic cereals.

These few data are presented here, in spite of their obvious limits, because no agricultural remains were previously known in spite of the large extent of the site, which until 2006 was investigated over a surface of not less than 840 square metres[2]. The absence of cereal chaff,

[*] Viale Rimembranza, 7 – 10066 Torre Pellice, Italy, *renisbet@tin.it*

[1] I would like to thank Drs D. Ciobotaru and F. Draşovean (Banat Museum, Timişoara) and Prof. S. A. Luca (Lucian Blaga University, Sibiu) who provided part of archaeobotanical materials. Thanks are due also to Prof. P. Biagi (Ca' Foscari, Venice University), for support and funding and the organizers for the invitation to the Timişoara Symposium.

[2] Luca *et alii* 2007.

weeds and other agricultural indicators documents the high dispersion of these remains, and makes impossible to compare the local farming activity to other sites of the Balkans. A single emmer grain from Pit 18 (105 cm) was dated to an early Vinča phase, i.e. GrA-33127: 6475±40 uncal BP (*Biagi et al*., 2007).

However, other sites had already been studied for their archaeobotanical contents, like Parța, where barley and both glume and free-threshing wheats in the Vinča B layers were found[3] , Foeni-Sălaș, with einkorn, emmer, barley, oat, millet and lentil from early Criș layers[4] and Dudeștii Vechi, with Early Neolithic glume wheat[5] . The few data from Miercurea Sibiului therefore fit well in this general framework of with the presence of barley and wheat since the seventh millennium uncal BP (Early Criș).

In all these sites agriculture first developed in a woody landscape with an homogeneous tree cover, as shown in the following Table, where only a small number of plants is represented in the Criș hearths of different sites.

	Criș	**Banat Culture IIC**	**Vinča**	**Radiocarbon Date**
Miercurea Sibiului-*Petriș*	*Quercus, Acer, Fraxinus*		*Quercus, Acer, Fraxinus, Prunus* sp. *Carpinus,* Maloideae	GrN-28520:7050±70 BP[6]; GrN-29954: 7010±40 BP; GrN-28521: 6920 ±70 BP; GrN-33127:6475±40 BP; GrN-29503:6350 ±139 BP; GrN-30500:6200±60BP; GrA-26606:6180±40 BP
Parța			*Quercus, Ulmus, Corylus, Fraxinus*	
Sânandrei		*Quercus, Ulmus, Fraxinus, Acer, Carpinus,* Maloideae		
Foeni-Cimitiriul[7]			*Quercus, Acer, Fraxinus, Pr unus* sp*, Carpinus*	GrN-29015:5750±30 uncal BP; HD-22653: 5699±37 uncal BP; HD-22658: 5783±27 uncal BP[8]
Dudeștii Vechi	*Quercus, Ulmus*			GrA-28111:6990±50 BP[9]; GrA-28113:6930 ±50 BP; GrA-24115: 6920±80BP; GrA-26951:6845±40 BP; GrN-28876±70 BP

Table 2. Wood use in some Neolithic sites from the Romanian Banat.

Altogether these data show the presence in all sites of a broad-leaved Oak. Ash wood is always present, with the exception of the scanty materials from Dudeștii Vechi, and Elm wood was found in 50% of samples. The existence of open woodland, or wood fringe, where edible wild plants could be collected, are shown by Hazel, some *Prunus* and Maloideae species, such as Crab Apples, wild Pears, Hawthorns and Whitebeams.

At Miercurea Sibiului-*Petriș*, in a hilly landscape, the Early Neolithic woodland was formed by mixed-oak forest with Ash and Maple. Later on, trees from more open environments were added to these species, such as elements of the Maloideae subfamily and *Prunus*, but it is impossible to relate this apparent change to men in the form of some kind of agricultural or pastoral activity. That the latter was fundamental to the local Criș economy is well documented

[3] Monah 1994.
[4] Drașovean 2007; Greenfield and Jongsma 2008.
[5] Fischer unpubl., in Fischer and Rösch 2004.
[6] All uncalibrated radiocarbon dates from Biagi *et alii* 2005 and Biagi *et alii* 2007.
[7] Medeleț and Bugilan 1987.
[8] Dates HD from Drașovean 2005.
[9] All uncalibrated radiocarbon dates from Biagi *et alii* 2005 and Biagi *et alii* 2007.

by the presence of cattle and caprovines[10], so that some impact on the vegetation cannot be discounted. Moreover, the occurrence of flint and obsidian sickles in several Vinča pits[11] also points to an increase of farming activities and therefore of human pressure on the woodland.

On other sites different vegetation types occur, such as *Querco-Ulmetum* and *Querco-Carpinetum*. Summing up, we observe from these few data that farming communities, at least since the Vinča culture, had settled in a heterogeneous woody environment, from which they could draw different kinds of wood to be used as timber or firewood, with a strong bias towards Oak.

References to pollen analysis in the Banat and Transylvania, which may broaden our knowledge of middle Holocene forest vegetation as obtained by charcoal, point to a similar and more detailed development of the forest cover. In the Banat (Semenic, 1400 m asl)[12] the Holocene vegetation history is dominated by *Pinus* in the Preboreal, by *Corylus* and Mixed Oak Forest from the Boreal to the Middle Atlantic, by *Picea* and Mixed Oak Forest in the Late Atlantic, by mainly *Carpinus* in the Early Subboreal. Other work[13] carried out in the middle altitude Romanian Carpathians, over 1,000 m asl, shows that the first indications of human activities are observed during the second half of the seventh millennium uncal BP, following the spread of *Carpinus* and develop in the so-called *Quercetum mixtum*, with Elm, Ash and Lime. At a lower altitude in Transylvania[14] middle/late Holocene vegetation is again dominated by *Quercus* and *Ulmus*, followed, before 5000 cal BP, by the spread of Corylus.

2. Peştera Ungurească, Copper Age

Greater evidence of agriculture and wood use comes from Peştera Ungurească. This cave opens at an altitude of about 800 m, some 100 m above the local base flow, and is located in a narrow gorge some 3 km long. It can be reached only from the valley bottom, today crossed by the Hăşdatelor River. The gorge is carved through a variety of habitats, up to the proximity of the cave; further in the plain are wet environments with mires and probably peat favourable for off-site palaeobotanical investigations.

The material presented in this paper comes from the dig carried out in 2003-2004, directed by P. Biagi and Gh. Lazarovici[15], near the mouth of the cave covering a surface of some 5 square metres. All sediment was transported down to the river, where it was water-sieved with a 1 mm grid. Altogether, 94 samples were processed obtaining a volume of charred material of 6.3 litres.

A. Charcoal analyses

This table shows the number of charcoal fragments for taxon and for culture.

In about 2,500 fragments, 19 tree taxa were recognised. They represent some aspects of the forest cover in the surrounding areas for no more than four or five centuries of the second half of the sixth millennium uncal BP.

The radiocarbon dates for layers 2a-2b, Early/Middle Toarte Pastilate culture (TP)[16] span between 5350 e 5100 uncal BP. The layer 3a2 has been dated as GrA-35701: 5275±35 uncal BP (Petreşti culture).

Most of the charcoal fragments are scattered in cave sediment, and could not be clearly related to any particular context. Only a small part of the charred material (both wood and seeds) comes from close contexts, namely one pit, four fireplaces and one oven.

The wood could have been brought inside the cave for heating, for cooking, for lighting, for baking clay or for melting metals[17]. At least in part, it was also used as timber for building specific structures, such as enclosures and hut walls, as possibly shown by one small "*man-made structure delimited by an alignment of very small post-holes*" in the Early TP layers[18]. From these

[10] El Susi 2007.
[11] Biagi, oral comm. 2007.
[12] Rösch and Fischer 2000.
[13] Farcas *et alii* 1999; Tantau *et alii* 2003.
[14] Feurdean *et alii* 2007.
[15] The excavations were carried out with the financial support of the Italian Ministry for Foreign Affairs (MAE), with thanks.
[16] Biagi and Voytek 2006.
[17] Biagi and Voytek, ibid., 179 and 183.
[18] Biagi and Voytek, ibid., 178.

	Coțofeni/TP	Late TP	Middle TP	Early TP	Petreşti
Alnus sp.	+		-		-
Betula sp.			-		
Corylus sp.	+	+	++	+	-
Carpinus sp.			-		
Quercus sp.	+++	++	+++	+	+++
Acer sp.	++	+	+++	++	++
Ulmus sp.	+	+	++	-	+
Fraxinus sp.	+++	++	+++	++	++
Maloideae	+	-	++	-	+
Prunoideae	-	-	-		-
Prunus cf. *spinosa*			-		-
Prunus sp.	-		-		+
Crataegus sp.			-		
Cornus mas	++	+	+++	+	+
Viburnum sp.	-				
Viburnum opulus	-				
cf. *Cotinus/Prunus*		-			
Euonymus europaeus			-		
Populus sp.			-		

Table 3. Charcoal fragments from Peştera Ungurească, Bronze and Copper Age. -: < 10; +: 10÷50; ++: 50÷100; +++: > 100.

data some conclusions can be drawn (Fig. 1). Apart from the older Petreşti period, where oak is prevalent, in all layers the most frequent wood is Ash, followed by Oak, Maple and Cornelian tree. However, the diagrams give an idea of the broad spectrum of habitats exploited for wood collection.

Looking at the distribution of taxa by cultural period, we appreciate remarkable differences (Fig. 2). In the Petreşti layers we found 11 taxa; the number reduces to 7 in the Early TP layers, increases to a maximum of 16 in the following Middle TP period. During the Late TP the taxa are 9 eventually reaching the number of 12 in the upper layers, the Coțofeni/TP periods.

It is possible that these variations in number of taxa, compressed in a short period of few centuries, do not necessarily reflect changes in the local wood composition, but rather a change in the use of the trees, at least partially related to grazing or animal feeding.

Apart from the absolute values, there is an interesting trend with regard to Oak and Ash, two of the main trees whose foliage was (and still is) used as fodder.

Oak prevails only in the lower, Petreşti layers, afterwards Ash becomes dominant. This may suggest the selection of Ash branches and leaves as fodder, as has been demonstrated in other Copper Age cave-sites in Europe. Oak and Ash – particularly the latter – are considered excellent plants for feeding herbivores in autumn or winter, and it is possible that a store of leaves was made in the cave in late summer for later consumption. This case is strongly supported by the frequent presence, in all layers, of very narrow tree rings over a span of several years, particularly on *Fraxinus,* Maloideae*, Ulmus, Acer* and *Quercus*, but mostly on Ash and Oak.

The charcoal assemblage gives us the opportunity to appreciate the past vegetation landscape in the surroundings of the cave (Fig. 3).

The Petreşti layers show several kind of vegetal associations. First is the mixed oak wood with Ash, Maple and Whitebeam. Scatters of thermophilous shrublands are indicated by the presence of Hazelnut, Wig-tree or Blackthorn and Cornelian tree, all extensively exploited in the diet of the local communities. Fringe wood elements are shown by the light-demanding Hazelnut, Maloideae and Prunoideae, and along the riverbanks and on sandy and gravely terraces Alder and Ash could be easily collected.

In the following periods the wood composition stays unchanged and we find at the bottom (Petreşti) and the top (Coțofeni/TP) of the sequence substantially the same taxa.

Open areas and degraded woodland with heliophilous vegetation may be represented in these later periods of occupation by a little charcoal of Birch and perhaps, more consistently, of the White Oak, *Quercus pubescens*, the latter on the south-facing side of the valley and even on the cliffs, where the soil conditions were more favourable. Mixed Oak forest is further indicated by Elm, and the wood fringe shows the presence of *Viburnum* cf. *opulus,* the Guelder Rose.

The existence of dry, open patches is suggested, apart from the previously mentioned species, by *Cotinus/Prunus* bushes, while the Poplar was collected on the riverbanks.

B. Seeds and fruits

Of 94 samples, 49 yielded evidence of seeds, cereal chaff and fruits. These materials are present in all periods, but mostly in the Middle TP period. Table 5 lists all the identified taxa.

Only a few remains can be associated with fireplaces and ovens, usually they are randomly dispersed at a low density. They are frequently fragmented or somewhat worn, probably due to trampling or solifluction. The same feature affects the shells found in the sediment[19].

B1. Cereals

The most frequent class of remains consists of cereals, 40% of which are hulled wheats; 7% are both six-rowed and two-rowed barley (*Hordeum vulgare* and *H. distichon*) and only 4% are bread/club wheat. About 50% are undetermined wheats and barley.

The main crop consisted of emmer (*Triticum dicoccum*) (28% of the total grains). Einkorn (*Triticum monococcum*) is far less abundant (7%) and very rare is the new glume wheat, represented only by a few spikelet forks. In addition grains and chaff of oat (*Avena* sp.) are present, probably as weeds. The chaff consists mostly of glume bases and spikelet forks from the hulled wheat.

In the Petreşti layers, the cereals are not abundant, but all species are present. Excluding the more problematic identifications, but adding chaff remains to the grains, emmer is still the commonest crop found in these layers, with 24% of the total, followed by einkorn (12%), barley (5%) and free-threshing wheat (4%) Only traces are present of the new glume wheat (1%). In the interpretation of these data, it must be considered that about 50% between grains and chaff are not determined at a species level.

During the whole TP layers, the crop composition does not change in respect to the Petreşti period. Emmer is still most frequent (21%), einkorn is 9%, the new glume wheat 5% and the free-threshing wheat is least common, with 3% of the total. Undetermined glume wheat reaches 11% and barley (both hulled and naked grains) 4%. Undetermined barley and wheat grains attain 46%.

In the upper layers, belonging to the Coţofeni/TP cultures, with 13 samples, emmer stands again as the commonest crop (23%), and the other wheat species follow in the same order as found previously. Only barley (two- and size-rowed files) grows to 12%.

If we take into consideration only the cereal grains, the distribution for cultural period is shown in Fig. 4.

Here we should mention the presence of few grains and some awns of Oat (*Avena* sp.). The rarity of this species confirms that it was not grown as a crop, but occurred in the cereal fields as a weed.

The relative presence of chaff remains in all layers suggests that at least part of the harvest, namely hulled wheats, was stored in the cave as spikelets, and it was only dehusked later, then, for whatever reason, coming in contact with heat. A distinctive feature is the low number of chaff remains, about 100, in comparison with a total of more than 500 cereal grains. This gives the impression that the excavated area was used for the final treatment of the crop, and the storage surface was somewhere else in the cave.

Because of the local territory morphology, it seems that only the part of these remains belonging to wild plants came from the immediate surroundings, while the cereals were probably grown on the valley floor, therefore far from the cave.

In all cultural layers a small quantity of bread/club wheat grains was found. Apart from the typical ones, there are some very short and plump caryopses, which may be referred to *Triticum compactum*.

[19] Girod, pers. comm. 2007.

Archaeological Cultural Attribution	**C/TP**	**LTP**	**MTP**	**ETP**	**Pe**	**Σ**
Samples	**13**	**1**	**24**	**3**	**8**	**49**
Cereal chaff						
Triticum dicoccum, spikelet forks	1	1	6	1	1	**10**
Triticum dicoccum/NGW, spikelet forks	2		4			**6**
Triticum monococcum/NGW, spikelet forks			5		1	**6**
Triticum monococcum, spikelet forks	2	3	12			**17**
Triticum NGW, spikelet forks	3	2	12			**17**
Triticum sp., spikelet forks	6		7			**13**
Triticum dicoccum, glumes	2	1	6		1	**10**
Triticum dicoccum/NGW, glumes			2		1	**3**
Triticum monococcum, glumes	2		1		2	**5**
Triticum monococcum/dicoccum, glumes			1			**1**
Triticum monococcum/NGW, glumes			4		1	**5**
Triticum NGW, glumes			9		1	**10**
Cerealia, stem			5			**5**
Cereal grains						
Hordeum vulgare hexastichum	1	1				**2**
Hordeum vulgare distichum	4					**4**
Hordeum vulgare	12	1	8	2	4	**27**
Hordeum vulgare, hulled			1			**1**
Hordeum vulgare nudum			2			**2**
Triticum aestivum/durum/compactum	6	1	12		3	**22**
Triticum dicoccum	29	10	66	2	16	**123**
Triticum cf. *dicoccum*	8	4	18	2		**32**
Triticum monococcum	7	2	21	1	7	**38**
Triticum sp.	35		65	3	38	**141**
Triticum/Hordeum (fragms)	18	22	89	1		**130**
Cerealia undiff.	2		9	4		**15**

Table 4. Cereal remains from Peştera Ungurească.

A few grains of a species of oat were recognised only in the Middle TP layers; some twisted awns of oat were found in a sample labelled as "*from the mouth of the oven*". As no chaff of this plant has been found, it is not known whether the few caryopses derive form the cultivated *Avena sativa* or from *Avena fatua*, which occurs as a field weed.

Only one linseed (*Linum usitatissimum*) was found in a sample from Middle TP culture. Whether it was grown for the oil-bearing seeds, for the flax fibres or for both, is not known, and this unique presence is not even sufficient to establish its effective cultivation in the fields.

Archaeological Cultural Attribution	C/TP	LTP	MTP	ETP	Pe	Σ
Samples	**13**	**1**	**24**	**3**	**8**	**49**
Crop weeds - winter annuals						
Avena sp., awn frgms			15			**15**
Avena sp., grain			2			**2**
Bromus secalinus			2			**2**
Crop weeds - summer annuals						
Galium aparine					1	**1**
Oil and fibre plants						
Linum usitatissimum			1			**1**
Fruits/Nuts						
Cornus mas	24	4	109	24	34	**195**
Corylus avellana	22	3	49	36	10	**120**
Coriandrum sativum			1			**1**
Pyrus malus					5	**5**
Prunus spinosa	1		2	1		**4**
Prunus padus			1			**1**
Rubus fruticosus	3	4	10			**17**
Rubus idaeus			1			**1**
Sambucus ebulus	2	3	20		8	**33**
Sambucus nigra		1	6			**7**
Sambucus ebulus/nigra			1			**1**
Physalis alkekengi	1	1	8	2	2	**14**
Ruderal plants						
Medicago lupulina			1			**1**
Polygonum persicaria	3					**3**
Other wild taxa						
*Medicag*o sp.			1			**1**
Ranunculus sp.					1	**1**
Polygonum sp.			1			**1**
Rumex sp.			1			**1**
Vicia sp.					2	**2**
Rumex sp.	1					**1**
Undetermined	4	2	12		3	**21**
Other						
Coproliths (prob. field-mice)	6		8	1		**15**

Table 5. Weed and fruits from Peştera Ungurească.

B2. Wild fruits

A consistent quantity of charred fruits and seeds comes from a woodland environment and its fringe. Small seeds were probably eaten when collected, and their final deposition in the cave

sediment could be due to men as well as birds. In fact, many seeds found in the samples come from berries, which are commonly eaten by birds, such as blackberries, raspberries, Dane-wort and elder berries.

Men were certainly responsible for the presence of the larger stones of blackthorn, cornelian cherry and hazelnuts, as well as small wild apples. These were found as charred fragments only in a sample from the Petreşti layers.

As a rule, there is a little probability that this category of finds undergoes carbonisation, and in most cases this happens when they are scattered on the soil and casually enter into contact with a fire. For this reason they are normally under-represented in the presence lists.

The cornelian cherry is a small tree with a high productivity of fruits, which are eaten fresh or sun-dried, or fermented to produce a sort of cider. The stones are present in all layers, and are the commonest fruits collected in the surrounding woods. Also the hazelnuts were recently gathered and then eaten in the cave. Both fruits furnish evidence of human presence in the cave during the late summer or early autumn.

B3. Cultivated fields and ruderal plants.

We have little evidence of wild plants belonging to synanthropic vegetations, in particular plants, which grow on disturbed habitats such as fields, roadsides and hedges.

Some weeds belong to the Polygonaceae family, like *Rumex* and *Polygonum*. These are currently found in waste areas, in meadows and on moist soils. Some provide sour leaves which might have been eaten in salad. Other species like *Medicago lupulina*, Black Medick, and the Ranunculaceae family, and some species of the genus *Vicia* occur in meadows, pasture and arable lands.

III. CONCLUSIONS

The territory stretching from the Dalmatian coast and the Black Sea was the obligatory corridor between Southeastern and Central Europe to be crossed by Neolithic farmers. What was the role of the Banat, in terms of chronology and human adaptation, is still to be fully established. The archaeobotanical record from this area is now quite substantial, particularly after the recent work at Ujvar tell, in the Romanian Banat, where a large documentation of early farming, chiefly for the Middle Neolithic (Vinča C), was found[20].

The few data referring to Early Neolithic agriculture confirm that free-threshing wheat and barley were already present in the crop. The list of cereals grown during the Early Neolithic of Southeastern and Central Europe is mainly formed by the glume wheats, einkorn and emmer, which are absent at Miercurea Sibiului-*Petriş*, certainly due to the small sample size.

Much evidence referring to Vinča C agriculture has recently come from the Uivar tell, where the glume wheats are by far the commonest part of the crop. Here, besides einkorn and emmer, a new wheat glume species is present, identified possibly as *Triticum timopheevii*. The same species is present also in Early Neolithic layers of Dudeştii Vechi and in Vinča C layers of Parţa. Free-threshing wheats and barley are not frequent, and oat, rye and broomcorn millet are very rare.

A somewhat similar trend is found in the later, Copper Age site at Cheile Turzii-*Peştera Ungurească cave*. The present indications from this site have a double interest. They positively confirm that during the fifth millennium uncal BP the glume wheats, both hulled and naked barley as well as free-threshing wheat were common part of the crop. They also prove the possible presence, to be better established by further work, of the new glume wheat. And finally they confirm the broad use of the forest resources, as an integration of the agricultural produce.

At the same time, it is of interest to remark the absence of some cereals currently grown since the Neolithic in the whole Southeastern Europe, like spelt, millet and rye. Also noteworthy is the absence of pods, as legumes like horsebeans, peas and lentils were well-known elsewhere since the Early Neolithic.

However, the archaeobotany of this remarkable cave-site gives a first insight into the Copper Age land-use and nutrition of this area. Basic questions however are still to be resolved, and the solution will be found only in future interdisciplinary work, linking the cave to the surrounding territory with its whole geological and biological complexity.

[20] Fischer and Rösch 2004, who provide much other research, partially unpublished.

BIBLIOGRAPHY

Biagi et alii 2005,
P. Biagi, S. Shennan, M. Spataro, Rapid Rivers and Slow Seas: New Data for the Radiocarbon Chronology of the Balkan Peninsula. Reports of Prehistoric Research Projects*, 6-7, (2005): 41-49. Salt Lake City-Karlovo.*

Biagi et alii 2007,
P. Biagi, B. Gratuze, S. Boucetta, New Data on the Archaeological Obsidian from the Banat and Transylvania. In M. Spataro and P. Biagi (eds) A Short Walk Through the Balkans: The First Farmers of the Carpathian Basin and Adjacent Regions*. Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia, Quaderno 12, (2007), 129 – 148. Trieste.*

Biagi, Voytek 2006,
P. Biagi, B. A. Voytek, Excavations at Peştera Ungurească (Caprelor) (Cheile Turzii, Petreşti de Jos, Transylvania) 2003-2004: A preliminary report on the chipped stone assemblages from the Toarte Pastilate (Bodrogkeresztúr) Chalcolithic layers. Analele Banatului*, XIV (1), (2006), 177-202. Timişoara.*

Draşovean 2005,
F. Draşovean, Zona thessalo-macedoneană şi Dunărea mijlocie la sfârşitul mileniului al VI-lea*, Apulum*, XLII, 11-26. Alba Iulia.

Draşovean 2007,
F. Draşovean, Regional aspects in the process of Neolithisation of the Banat (south-western Romania): the settlement of Foeni-Sălaş. In M. Spataro and P. Biagi (eds.), *A Short Walk through the Balkans: the First Farmers in the Carpathian Basin and Adjacent Regions*. Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia, Quaderno 12 (2008), 67-76. Trieste.

El Susi 2007,
G. El Susi, Archaeozoological records about domestic species farmed by early neolithical communities from Banat and Transylvania. *Acta Terrae Septemcastrensis*, VI, (2007), 25-36. Sibiu.

Farcas *et alii* 1999,
S. Farcas, J.L. de Beaulieu, M. Reille, G. Coldea, B. Diaconeasa, C. Goeury, T. Goslar, T. Jull, First ^{14}C datings from Romanian Carpathes. *Comptes Rendus de l'Académie des Sciences de Paris, Science de la vie*, 322 (1999), 799-807, Elsevier SAS, Amsterdam.

Feurdean *et alii* 2007,
A. Feurdean, V. Mosbrugger, B. P. Onac, V. Polyak, D. Veres, Younger Dryas to mid-Holocene environmental history of the lowlands of NW Transylvania, Romania. *Quaternary Research*, 68 (2007), 364-378, Elsevier SAS, Amsterdam.

Fischer, Rösch 2004,
E. Fischer, M. Rösch, Archäobotanische Untersuchungen. In W. Schier, F. Draşovean (eds), Vorbericht über die rumänisch-deutschen Prospektionen und Ausgrabungen in der befestigten Tellsiedlung von Ujvar; jud Timiş, Rumänien (1998-2002), *Prähistorische Zeitschrift*, 79 (2), (2004), 209-220. Berlin-New York.

Greenfield and Jongsma 2008,
H. J. Greenfield, T. Jongsma, Sedentary pastoral gatherers in the early Neolithic: architectural, botanical, and zoological evidence for mobile economies from Foeni-Salaş, south-west Romania. In D. W. Bailey, A. Whittle and D. Hofmann (eds), *Living Well Together? Settlement and Materiality in the Neolithic of South-East and Central Europe*, 108-130, Oxbow Books, Oxford.

Luca *et alii* 2007,
S. A Luca, D. Diaconescu, A. Georgescu, C. Suciu, Archaeological researches at Miercurea Sibiului-Petriş (Sibiu County, Romania). The campaigns from 1997 to 2005. *Acta Terrae Septemcastrensis*, VI, (2007), 7-23. Sibiu.

Medeleţ, Bugilan 1987,
F. Medeleţ, I. Bugilan, Contribuţii la problema şi la repertoriul movilelor de pâmînt din Banat. *Banatica*, 9, (1987), 87-198.

Monah 1994,
F. Monah, Determinări arhebotanice pentru staţiunca neolitică de la Parţa (comuna Şag, jud. Timiş). *Acta Musei Napocensis* 31, (1994), 81-85. Cluj.

Rösch and Fischer 2000,
M. Rösch, E. Fischer, A radiocarbon dated Holocene pollen profile from the Banat Mountains (southöschwestern Carpathians, Romania). *Flora* 195 (3), (2000), 277-286. Jena.

Tanţău *et alii* 2003,
I. Tantau, M. Reille, J.-L. de Beaulieu, S. Farcas, T. Goslar, M. Paterne, Vegetation history in the Eastern Romanian Carpathians: pollen analysis of two sequences from the Mohoş crater. *Vegetation History and Archaeobotany*, 12 (2003), 113-125. Springer-International, Berlin.

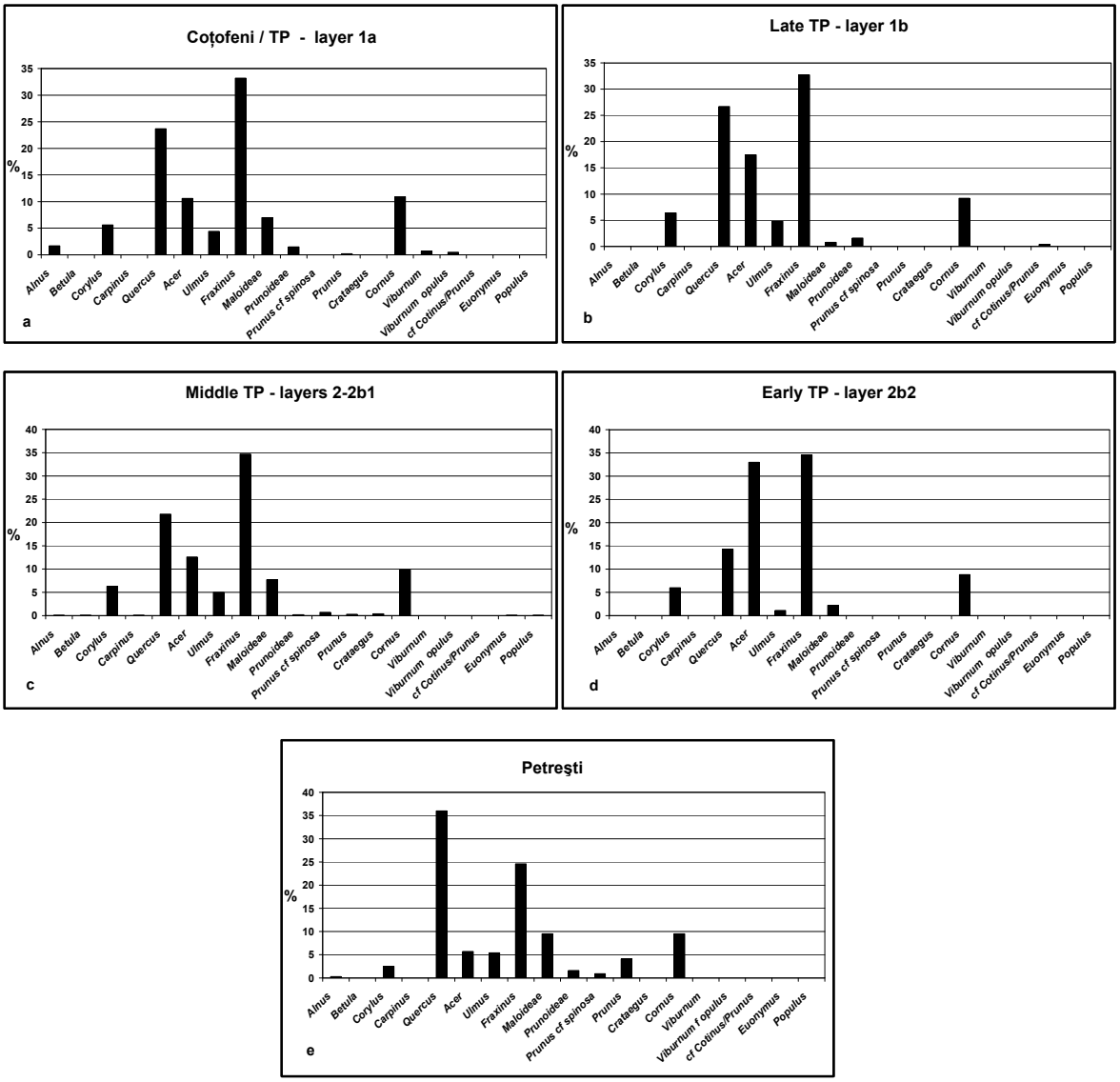

Fig. 1(a-e). Frequency of carbonised taxa from PeşteraUngurească, Copper Age.

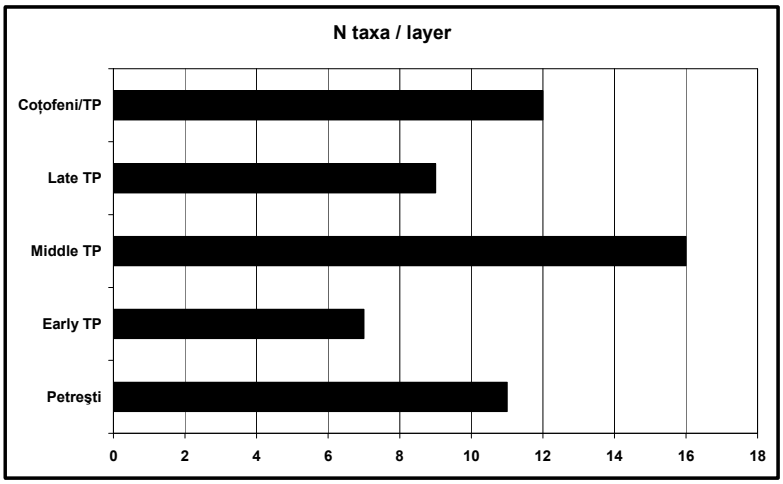

Fig. 2. Variation in number of taxa for cultural layer.

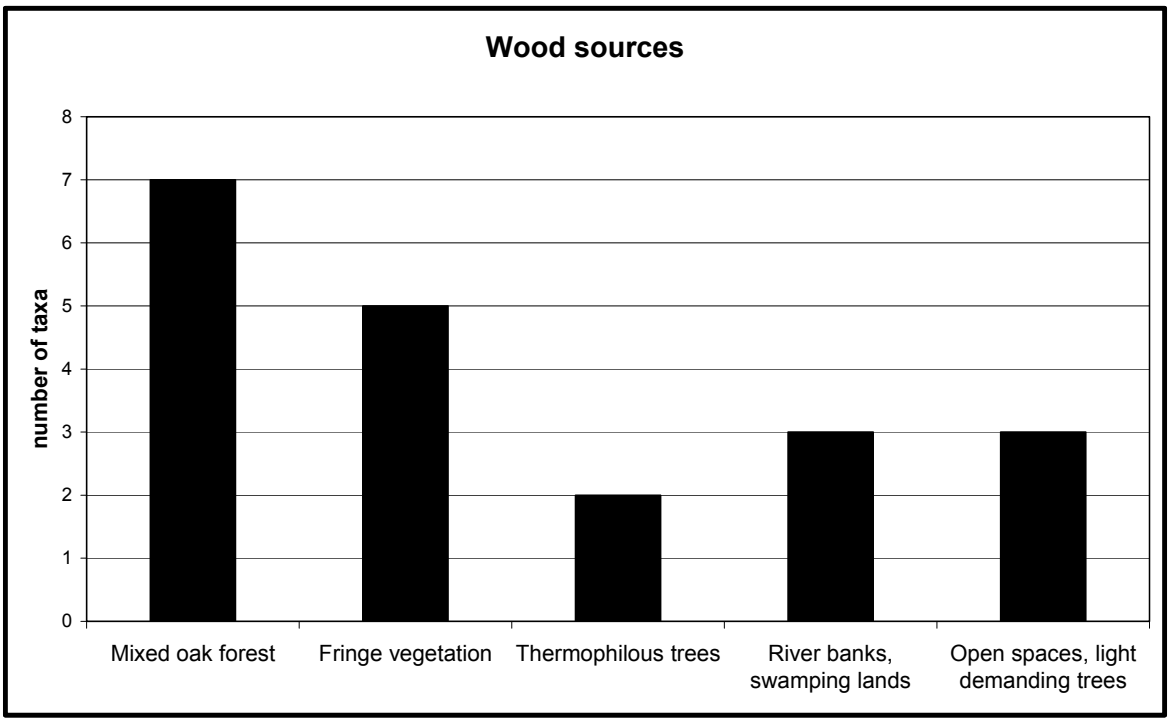

Fig. 3. Main sources of wood as inferred from charcoal.

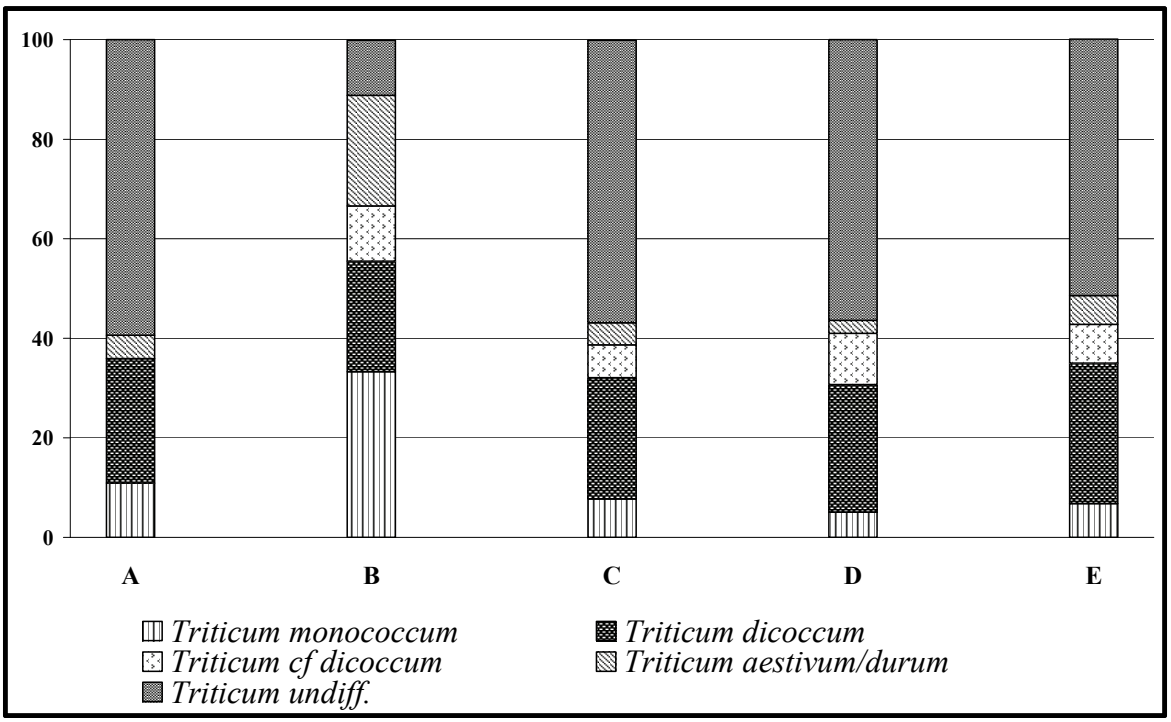

Fig. 4. Percentage of the different wheat species as grains. A: Petreşti; B: Early TP; C; Middle TP; D: Late TP; E: Coţofeni/TP.