

# AN OUTLINE OF THE LATE EPIPALAEOLITHIC ECONOMY AT THE "IRON GATES": THE EVIDENCE ON BONES

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The archaeological discoveries at the Iron Gates resulted from a six-year project (1965–1971) initiated for the purpose of studying from all points of view the area which was to be flooded by the rising water of the Danube, dammed up for the building of the hydropower station at the exit of the Gates.

Some of these discoveries are interesting, others are unique, at least for the territory of Romania. The series of Epipalaeolithic sites do not make an exception.

Now that the rising waters engulfed them, that on an over 100 km. stretch the river turned into a lake, that the villages in the flood-plain were moved to the surrounding hills, the present tense used in the following lines is already a historical present.

## 1. CHRONOLOGICAL BACKGROUND

At the "Iron Gates" there are few sites prior to 6,000 B.C.

The Climente I Cave, located at an altitude of 270 m. above sea level in the massif of Ciucarul Mare, yielded a small number of artefacts assigned to the Middle and to the Upper Palaeolithic<sup>1</sup>. The rather poor bone material from the Upper Palaeolithic layer has not yet been studied, but at first glance carnivore bones, mainly *Ursus spelaeus*, are the most common; there are only some isolated teeth and phalanges of herbivores (namely *Capra ibex* and/or *Rupicapra*, *Alces*, *Bos/Bison*). The following conclusions seem to be reasonable: a) as there is no evidence for the persistence of *Ursus spelaeus* into the Late Glacial in Romania, the deposit must be of Wurmian age; b) the frequency of carnivore bones in general and of bear bones in particular suggests that these animals were the long-term occupants of the cave, while men used it only for shorter periods; c) the location of the cave only a few metres below the platform with good grazing of the massif had a double advantage: game was close by, but men did not disturb it; d) V. Boroneanț assumes that the cave is deeper than it looks<sup>2</sup>. However, the scarcity of material precisely at the entrance into the cave where living conditions (light, insolation, etc.) must have been more favourable does not recommend the cave of Climente I as a home base, but rather as a temporary camp or a transit site<sup>3</sup>.

<sup>1</sup> V. Boroneanț, *RevMuz.* 5, 1968, 6, p. 542–546.

<sup>2</sup> *Idem.*

<sup>3</sup> The terms "home base", "transit site", etc. are used in this paper after C. Vita-Finzi and E. S. Higgs, *PPS*,

36, 1970, p. 6–7. For ampler definitions see D. A. Sturdy, *Reindeer Economies in Late Age Europe*, unpublished, Ph. D. Thesis, University of Cambridge, 1972, p. 1/20–1/28.

Almost at the foot of the same massif of Ciucașul Mare lies the rock-shelter of Cuina Turcului. The two Epipalaeolithic layers with an industry of the Romanello-Azilian type<sup>4</sup> yielded radiocarbon dates of  $10,100 \pm 120$  (Bln-804);  $10,650 \pm 120$  (Bln-803) years B.C. and  $8175 \pm 200$  (Bln-802) years B.C., respectively. Although the analysis of mammal bones pointed out some differences between the two layers (Table 1), it is their common feature — i.e. the comparatively high frequency of individuals of *Capra ibex* and *Rupicapra* — which is more interesting.

Table 1

## MAMMAL SPECIES AT CUINA TURCULUI

No. of specimens/Minimum No. of individuals. Relative frequency of Minimum number of individuals

LAYER	R I		R II	
	No. sp./MNI	% MNI	No. sp./MNI	% MNI
Suids	118/7	17.7	6/1	2.3
Castor fiber	72/7	17.7	52/4	9.5
Capra ibex	74/5	12.2	111/8	19.4
Rupicapra rupicapra	62/3	7.3	49/5	12.0
Bos/Bison	5/1	2.2	68/6	14.2
Alces alces	14/3	7.3	5/1	2.3
Capreolus capreolus	16/3	7.3	1/1	2.3
Cervus elaphus	?	—	21/1	2.3
Equus caballus	2/1	2.2	3/1	2.3
Canis lupus	35/3	7.3	49/5	12.0
Vulpes vulpes	14/1	2.2	15/2	4.7
Ursus arctos	23/2	5.0	2/1	2.3
Martes sp.	29/3	7.3	10/2	4.7
Felis silvestris	1/1	2.2	1/1	2.3
Putorius putorius	—	—	1/1	2.3
Lepus europaeus	1/1	2.2	27/2	4.7
TOTAL	466/41		420/42	

Definite survivors of the Wur-mian Age, both species might have found favourable ecological conditions at such a low altitude, since one of the characteristics of the recent flora at the Iron Gates is the presence of Alpine elements (such as *Poa badensis*, *Festuca panciciana*, *F. xanthia*, *Satureja kitaibeli*, etc.) scattered in isolated islets on a limestone substratum down to a height of a little over 300 m.<sup>5</sup> These plants are included in the usual diet of the animals<sup>6</sup>.

It was suggested elsewhere<sup>7</sup> that the Epipalaeolithic settlement at Cuina Turcului represented a winter site. If this assumption is supported by the still unidentified bird bones, the related summer site will have to be searched for north-

ward, towards the foot-hills of the higher mountains (Semenic?, Țarcu-Godeanu) with good grazing grounds = summer territories of the herbivores.

The second Epipalaeolithic layer at Cuina Turcului furnished evidence of the latest occurrence of *Capra ibex* in Romania. The fact that after 8,000 B.C. it did not survive in the Southern Carpathians as high as 2,000 metres (as *Rupicapra* did) seems to indicate that its present location was an ecological requirement rather than a refuge area of the species.

## 2. THE SITES AND THE LANDSCAPE

From the point of view of the zoologist there are two categories of sites at the "Iron Gates" containing the same stone and antler artefacts: 1) Sites from which animal remains could not be recovered either because the cultural layer was much too thin and contamination from younger periods was possible (Climente II Cave), or because of the intermixture of the deposits as a consequence of 18th century burials (Veterani Cave). 2) Sites from

<sup>4</sup> Al. Păunescu, SCIV, 21, 1970, 1, p. 3—29.

<sup>5</sup> \* \* \* Geografia Văii Dunării Românești, Bucharest, 1969, p. 320.

<sup>6</sup> M. A. J. Couturier, *Le Chamois*, Grenoble, 1938,

p. 501—505.

<sup>7</sup> Bolomey Alexandra, *The Present Stage of Knowledge of Mammal Exploitation during the Epipalaeolithic and the Earliest Neolithic on the Territory of Romania* (in press).

which the bone material is reliable either because there was only one cultural layer (Răzvrata, some sections at Icoana), or because the cultural layer was thick enough (other sections at Icoana, Veterani "Platform").

The Gorge Sector (or Iron Gates) of the Pontic Danube measures 132 km. But it is only on a stretch of 7.4 km.<sup>8</sup> known under the name of Cazanele Mari and Cazanele Mici that the gorge takes the aspect of a canyon with the slopes of the surrounding mountains falling almost vertically and the two banks being in some places less than 100 metres apart. On the Romanian bank the walls of the canyon are formed by the limestone massifs of Ciucarul Mare (318 m.) and Ciucarul Mic (313 m.) separated by the "basin"<sup>9</sup> (or depression) of Dubova<sup>10</sup>.

All the sites mentioned were located precisely in this canyon-like stretch — i.e. Cuina Turcului, the caves of Climente I and II, Veterani's Cave and Platform in Cazanele Mari (see point 1 on the map), Icoana and Răzvrata in Cazanele Mici (see point 2 on the map).

The region is cut transversely by a series of rivers. A copious underground stream branches off the river Punicova and runs out of the cave bearing the same name in Cazanele Mari. It is perhaps not by accident that all sites in Cazanele Mari are at the utmost one kilometre distant from this stream.

As far as 10 km. from the Danube the inland has the aspect of rolling country with slopes rising more or less steeply to altitudes varying between about 100 and 500 m. Above this height the relief often becomes more even, resembling a plateau<sup>11</sup>.

Access to the inland is easy enough at both ends of Cazane (through the Mraconia valley and from Plavișevița depression, as well as through the Dubova basin). But there also is a path, starting near the cave of Climente I and passing in front of the cave of Climente II, by which the tableland of Ciucarul Mare is to be reached after a 20 minutes' walk. Again, the concentration of all sites at Cazanele Mari in the immediate proximity of this quick way of access might not be due to chance<sup>12</sup>.

The vegetation cover (mostly bush associations) on the southern slope of the Ciucaru massif, which faces the Danube, is rather sparse, especially if it is compared with the inland where 65 to 90 per cent of the total surface of the Gorge sector is occupied by woods, while tillable land, to be found almost exclusively in the basins, is restricted to only 2 to 5 per cent of the total surface, half of it being grazing fields<sup>13</sup>. Whether the density of woods was the same or not during the prehistoric period considered is less important, since at any rate wood was available to man, food was available to herbivores and, hence, food was available to man. Thus, all three basic elements of a non-agricultural economy — water, food resources and fuel — were at hand.

Though everything which was left of the sites was excavated, from the beginning it was obvious that it represented only a small part of their original extent: in the case of Veterani

<sup>8</sup> \* \* \* *Geografia Văii Dunării... op. cit.*, p. 271 and 288.

<sup>9</sup> There are similar basins at both ends of Cazane: Plavișevița upstream, Ogradina downstream (see map). Such tectonic basins, formed during the Neogene, broaden here and there the narrow gorge. Within the gorge sector they represent the flood-plain of the Danube.

<sup>10</sup> \* \* \* *Geografia Văii Dunării... op. cit.*, p. 286—291. For a better understanding of the region see also *The Iron Gate Complex Atlas*, Bucharest, 1972, Plates: I, IV, VII, IX, XIII, XV, XVI and LIX.

<sup>11</sup> This very brief description does not follow the characteristics of the relief of the Danube's Gorge as estab-

lished by geographers (cf., *Geografia... op. cit.*, pp. 59—60 and 271—277), first because the amount of accurate specific data is discussed by them in general, for the whole gorge, while this article deals only with the region of Cazane, secondly because the terminology employed is not very familiar and might blur the actual purpose of this description.

<sup>12</sup> I am grateful to my colleague, V. Boroneanț, whose knowledge of the region was particularly helpful during field work.

<sup>13</sup> *Geografia Văii Dunării... op. cit.*, p. 344 and Fig. 140, p. 339.

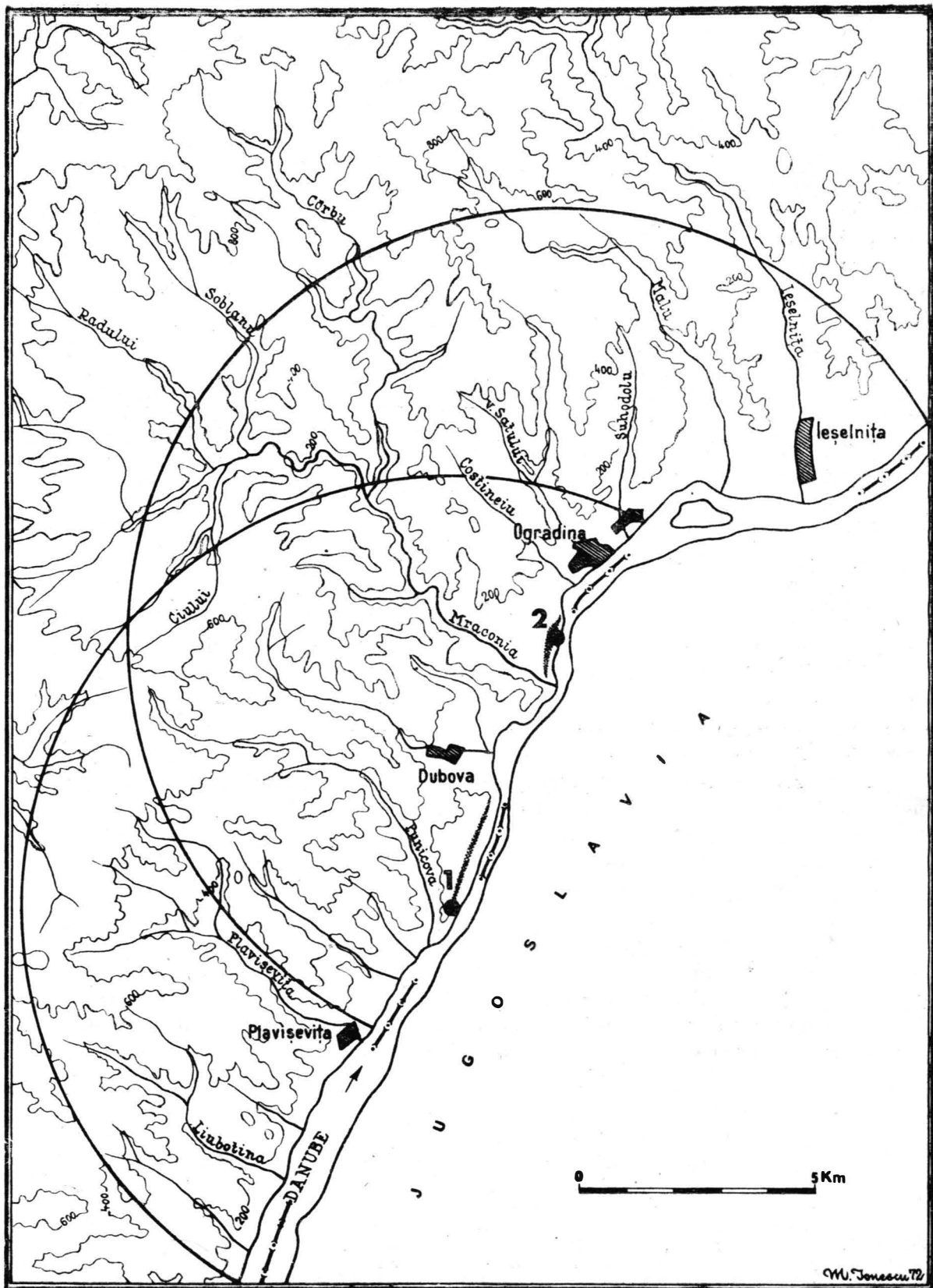


Fig. 1. — Map of the Cazane region. 1, group of sites in Cazanele Mari; 2, group of sites in Cazanele Mici,

Platform and of Icoana the building of the highroad in the last century must have destroyed one end and the waters of the Danube the other; Răzvrata was almost completely eroded by the river.

The cultural layers at Icoana and Răzvrata lay below the recent level of the Danube. As will be stated later, the materials recovered at Icoana definitely reject a seasonal occupation of the site, i.e. during the dry season only. On the other hand, it seems improbable that a human community would have settled in a place permanently exposed to the hazard of flood. These facts strongly suggest that during the period under consideration the river was much smaller, maybe the river-bed itself was deeper and therefore the river bank was wider. Nevertheless, it is impossible to estimate the width of the riverside. Logically, it is to be expected that it was the shortest way up and downstream. But in the absence of further evidence and because it is impossible to prove it, this is nothing but an assumption.

Vita Finzi and Higgs' assumption concerning the existence round prehistoric sites of a limited exploitation territory extending within a radius of 10 kilometres or two hours' walk, whichever is the least<sup>14</sup>, was derived from Lee's observations on the Bushmen's foraging strategy<sup>15</sup> and found new support in the recent data collected by Sturdy in West Greenland<sup>16</sup>.

It should be pointed out that the exploitation territories traced on the map are only indicative, first because a two hours' walk was not taken in the field and therefore the radius might have been less than 10 kilometres, and secondly, precisely because the surface of the assumed riverside cannot be estimated.

### 3. THE BONES

For the sake of brevity data obtained in mammal bones at Icoana have been summarized in table 2. The sample is large enough to be reliable. Moreover, the species involved have easily distinguishable morphological features, so that, despite the fact that the bones are heavily broken and splitted, even small fragments could be identified; non-identifiable fragments amount to less than 10 per cent of the total bone material recovered.

Although the method of the minimum number of individuals has been criticized with good reason<sup>17</sup>, although it is far from having the desired accuracy, it appears to be indispensable to an economic analysis, because animals are the most important work tool, whereas specimens simply indicate the presence of a species, but certainly not its role in a given prehistoric economy. Fig. 2 therefore shows the frequency of the different species at Icoana on the ground of the minimum number

Table 2

MAMMAL SPECIES AT ICOANA

SPECIES	No. of specimens	Minimum No. of individuals
Suids	2,038	40
Cervus elaphus	1,474	26
Capreolus capreolus	237	14
Canis sp.	236	12
Castor fiber	34	9
Martes sp.	44	8
Rupicapra rupicapra	22	4
Felis silvestris	7	3
Meles meles	13	3
Canis lupus	9	2
Ursus arctos	16	2
Lepus europaeus	11	2
Bos/Bison	21	2
Lutra lutra	2	1
Lynx lynx	2	1
TOTAL	4,056	129

<sup>14</sup> C. Vita Finzi and E. S. Higgs, *op. cit.*, p. 7.

<sup>15</sup> R. Lee in Human Biology: An Anthropological Reader (edited by A. P. Vayda), New York, 1967.

<sup>16</sup> D. A. Sturdy, in Papers in Economic Prehistory (edited by E. S. Higgs), Cambridge University Press, 1972.

<sup>17</sup> For ex. D. Perkins Jr., Science, 144, 1964, p. 3626.

of individuals<sup>18</sup>. Its striking characteristic is the high-rate exploitation of suids.

It clearly results from the brief description of the landscape that pigs found favourable living conditions in the region: mixed oak forests<sup>19</sup> with the variety of food they offer, probably marshy areas (possibly along the Danube and/or at the mouth of the river Mraconia,

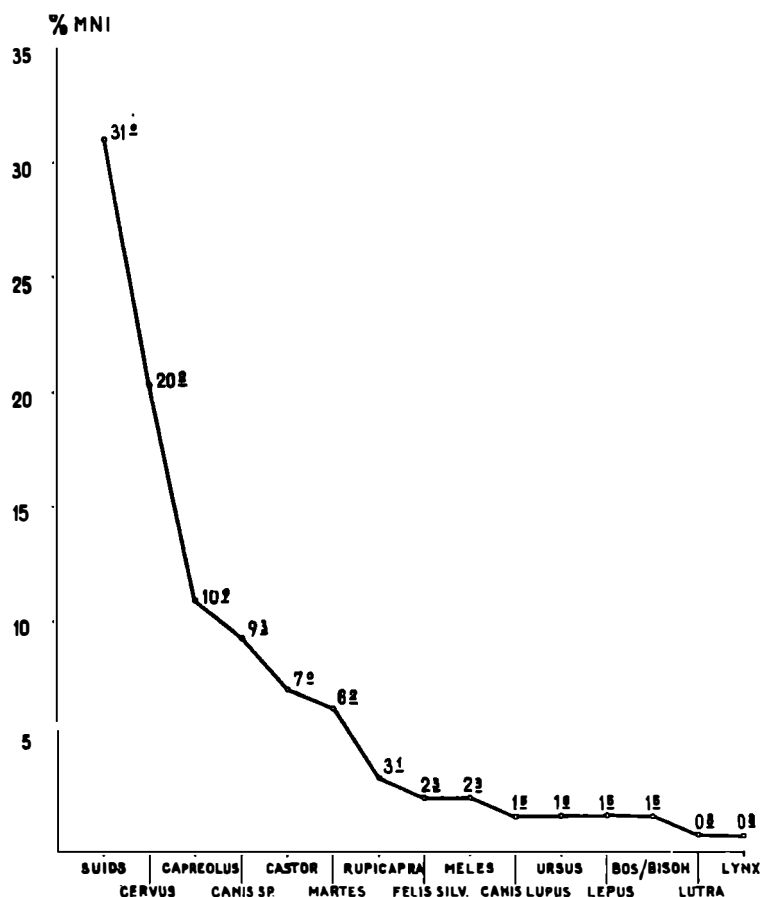


Fig. 2. — Relative frequency of the minimum number of individuals of the mammal species at Icoana.

more probably in the Dubova basin where underground water is to be found at a particularly little depth, etc.).

To exemplify the size of the animals two parameters — one for the dentition (length of lower third molar), the other for a limb bone (lateral length of the astragalus) — were chosen<sup>20</sup> and compared with the same data provided by a population considered as “wild” in the Căscioarele settlement, dating from the 4th millenium B.C. and located in the Romanian Plain<sup>21</sup>. There is good agreement for the measurements of the molars (Fig. 3)<sup>22</sup>, while the

<sup>18</sup> Methodologically, for the calculation of the minimum number of individuals, use was made of as many indicators as possible. On the other hand, though there are 61 fragments of left calcanei of pigs and 32 of red deer, 28 fragments of right astragali of red deer, etc., and though the fragments *do not match*, they were not taken into account for fear of overestimating the number of individuals.

<sup>19</sup> M. Cărciumaru, in *Dacia*, N.S., 17, 1973, p. 53–60.

<sup>20</sup> Detailed measurements of the bones will be offered elsewhere.

<sup>21</sup> Al. Bolomey, *Annuaire Roum. d'Anthrop.*, 5, 1968,

p. 19–29. Since the publication of the paper the author has strongly suspected (for reasons which cannot be discussed here because of the limited space) that the pig population in the Gumelnița B. layer at Căscioarele was feral, not wild.

<sup>22</sup> When discussing the size of the dentition of artiodactyle species, authors generally choose the third molar, although the talon/talonid of this tooth is subject to much variation. Particularly for pigs the second molar seems to be more constant, hence the most characteristic, but little reference, if any, is to be found in literature.

lateral length of the astragalus from the younger sample definitely outside the material at Icoana (Fig. 4). The equation used for the significance test (T) was

$$T = \frac{M_1 - M_2}{\sqrt{m_1^2 + m_2^2}}$$

where  $M_1$ ,  $M_2$ : mean values of the samples at Căscioarele and Icoana, respectively;

$m_1$ ,  $m_2$ : standard errors of the mean of the sample at Căscioarele and Icoana, respectively.

For  $T > 2$  the difference between  $M_1$  and  $M_2$  is significant.

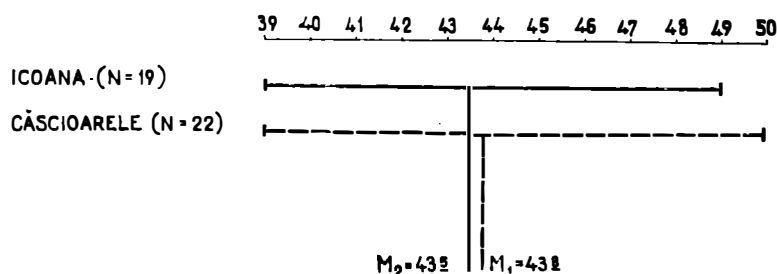


Fig. 3. — Comparison between the observed range and the mean values of the length of the lower third molar in Suid population at Icoana (Late Epipalaeolithic) and Căscioarele (Neolithic with pottery of Gumelnitza type).

It has often been stated by specialists that during the process of domestication the decrease in size of the post-cranial skeleton occurs before the decrease of the dentition, which is more conservative. However, it must be stressed that smaller dimensions were also noticed in red deer at Icoana when compared with the population from the Romanian Plain (Fig. 5)

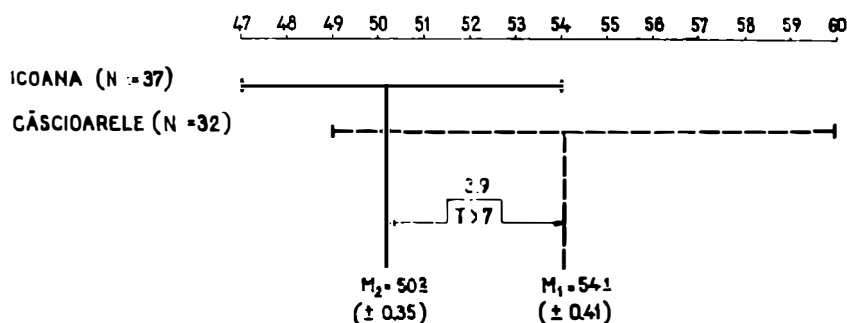


Fig. 4. — Comparison between the observed range and the mean values of the lateral length of the astragalus in Suid population at Icoana and Căscioarele.

On the other hand, measurements of red deer bones from different prehistoric sites in the Banat (Pottery Neolithic till Bronze Age), where random hunting of red deer was obvious, agree with measurements at Icoana. The smaller size of both pigs and red deer might have had a common cause and it might have been characteristic to other mammal populations of the south-western parts of Romania. It might as well have had different causes and in that case, since the smaller size of the red deer in Banat was ascertained, the comparatively small size of suids at Icoana might have been a result of man's influence.

As regards ageing on the evidence of dentition, many specialists doubt its reliability, either because of their own experience or because the data reported by various authors are not in full agreement<sup>23</sup>. Of course, the method of ageing is relative, because the degree of tooth wear depends on many physiological and ecological variables and because the estima-

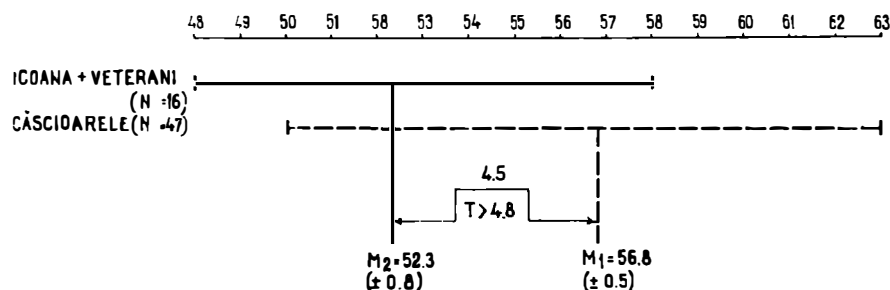


Fig. 5. — Comparison between the observed range and the mean values of the maximum width of the tibia in red deer population at Icoana and Căscioarele.

tion of the age of eruption is based on averages, but so are almost all the methods used in the study of (human and animal) bones. If this relativity is kept in mind and the figures resulting from the use of the method are employed as general reference material, then it is as helpful as any other method.

The conclusion drawn from the age groups of pigs at Icoana (Table 3) is the practice of selective killing. It should be stressed that in group III, 8 of at least 11 individuals displayed advanced to heavy wear of the dentition. There was an intense killing of animals less than one year old maybe for their tender meat, but also because this is the age of sex selection, of the selection of weak individuals, etc. Next come mature to senile animals maybe because of their high meat supply, maybe also because of their diminished reproductive capacity. The young adult group seems to have been protected because it secured the future stock.

Table 3

AGE GROUPS OF SUIDS AT ICOANA

Age groups	Minimum number of individuals	Relative frequency	Material used
I 6—10 months	22	55.0	Upper left dental series with unerupted M <sup>2</sup>
II 11—23 months	7	17.5	Upper left dental series with unerupted M <sup>3</sup>
III 2 1/2 years to senile	11	27.5	Lower right series with complete dentition

Red and roe deer are common and almost always associated in the Holocene prehistoric sites of Romania. Together they formed about one third of the total individuals at Icoana, as many as pigs dig. Moreover, many artefacts prove that antler was in demand as raw material<sup>24</sup>.

When right/left proximal and right/left distal fragments of the various bones of pigs and red deer are tabled (Table 4), fairly good agreement is found, which means that almost all, if not all these staple food animals were butchered at the camp.

<sup>23</sup> Compare Ellenberger-Baum, *Handbuch der vergleichenden Anatomie der Haustiere*, Berlin, 1943, pp. 356—357; K. H. Habermehl, *Altersbestimmung bei Haustieren, Pelztieren und beim jagdbaren Wild*, Berlin—Hamburg, 1961; I. A. Silver, in *Science in Archaeology* (edited by

Don Brothwell and Eric Higgs), Thames and Hudson, 1963, pp. 282—302.

<sup>24</sup> V. Boroneanț, PZ, 45, 1971, p. 1—25; idem, Dacia, N.S., 17, 1973, p. 5—39.



Table 4

DISTRIBUTION OF RIGHT/LEFT PROXIMAL AND DISTAL FRAGMENTS OF SOME BONES OF RED DEER AND PIG AT ICOANA

		Humerus		Radius		Metacarpal		Tibia		Astragalus		Calcaneus	
		left	right	left	right	left	right	left	right	left	right	left	right
Red deer	prox.	—	—	11	11	20	20	5	4	21	28	32	21
	dist.	11	11	15	11	10	18	13	13				
Pigs	prox.	1	6	13	16	17	18	4	4	28	38	61	38
	dist.	30	22	10	18	12	14	17	18				

The exploitation of bone as raw material has already been demonstrated by the frequent occurrence of bone tools. A further indication was furnished by 100 fragments of red deer metatarsals, all of them debris. Had they been cracked open only to extract the marrow, some extremities at least would have had to be intact. Only one of 103 first phalanges of red deer is a complete specimen, the rest being broken sagittally or longitudinally. Pig bones are also broken, but not to such an extent.

The other two herbivores — chamois and cattle — occurred accidentally. Most probably, as cervid and pig populations increased in the area, the chamois population of the previous, Late Glacial period retired above 600 m. of altitude, although it is also possible that by that time the chamois had already reached its present territories (the nearest to the Iron Gates being the massifs of Țarcu and Godeanu). As it is known, chamois may descend to very low altitudes in search of food, especially in the spring when they are tempted by the earlier sprouting vegetation in the valleys<sup>26</sup>. Possibly, a few animals were killed on such an occasion.

As to cattle, their very low frequency is a surprising finding. Had they been abundant in the region, they would have certainly been exploited by the human population. Presumably they were rare in spite of the not unfavourable environmental conditions.

Furred animals considered together (i.e. carnivores + beaver + hare, with the exception of *Canis* sp.) account for about 24 per cent of all animals. Their random killing is demonstrated by the fact that 9 species supplied less than 280 specimens. Each species is represented by a few disparate bones, mostly mandibles and phalanges brought to the camp with the skin. Obviously, furred animals were hunted for their coat and, in the case of large carnivores maybe also to restrain their competitive action on herbivores, but there is no particular evidence either for or against their use as food.

The material labelled under the name of *Canis* sp. was not included in the preceding category. The small canid might have had the significance of a fur-bearer in the economy at Icoana, as the other 7 carnivore species did. Nonetheless, the higher relative frequency of individuals (and specimens) as well as the more even distribution of the bones over the skeleton segments may point to man-animal relationships of a different nature (than usual hunting).

<sup>26</sup> M. A. J. Couturier, *op. cit.*, pp. 507—510; *Vînal și vindtoare*, Bucharest, 1964, p.115.

To exemplify the size of canids some measurements are given in table 5 and compared with bones from the Neolithic levels (with Starcevo-Criş pottery) at Cuina Turcului. In Icoana

Table 5

SOME MEASUREMENTS OF *Canis* sp. AT ICOANA (Ic.) AND  
CUINA TURCULUI (C. Tr.) (LEVELS WITH STARCEVO-CRIŞ  
POTTERY)

Length  $M_1$ /No. specimens :

Ic. 21 22 23 23.5 (24) 24.2 24.4  $\bar{X} = 23.0$   
1 2 5 1 1 1 1  $N = 12$

C.Tr. 18 18.5 19 20 20.5 21 21.5 22  $\bar{X} = 20.0$   
1 2 3 4 1 2 1 2  $N = 16$

Humerus, distal width/No. specimens :

Ic. 26 28 29 30 31 33 34 35  $\bar{X} = 30.7$   
1 3 1 1 2 2 2 1  $N = 13$

Tibia, distal width/No. specimens :

Ic. (21) 22 23 24  $\bar{X} = 22.6$   
1 3 2 2  $N = 8$

canids the mean length of the lower carnassial is definitely greater than in the younger sample from Cuina. It also exceeds that of Jericho<sup>26</sup> and Çayönü<sup>27</sup> specimens.

## REMARKS

The deposits at Icoana have been radiocarbon-dated  $8070 \pm 130$  to  $8010 \pm 120$  B.P.<sup>28</sup>.

1. The samples at the other two sites that yielded mammal bones — Veterani Platform and Răzvrata — are small: 354 and 194 specimens, respectively. Had they been the only discoveries at the Iron Gates, they would have been hardly relevant. Luckily, there is Icoana, which stands as a reference site. It may therefore be stated that about 6,000 B.C. human communities living in the Cazane area had adopted the same economic pattern. It is to be presumed that the economy was the same at Veterani Cave and Climente II Cave, from which bone material could not be recovered.

2. This economy included : a) fishing, proved by the large quantity of fish bones occurring at all sites<sup>29</sup>; b) gathering of land snails, mussels, land tortoises and red deer casts; c) occasional hunting of nine different species of furred animals plus chamois, cattle and birds; d) large-scale, permanent (?) exploitation of red and roe deer for meat and artefactual raw material; e) selective killing of suids.

<sup>26</sup> Juliet Clutton-Brock, in *The Domestication and Exploitation of Plants and Animals*, London, 1968, p. 340.

<sup>27</sup> Barbara Lawrence, Z. f. Säugetierkunde, 32, 1967, 1, p. 44—59.

<sup>28</sup> Data yielded by two of the earth samples analysed at the Institut für Bodenkunde der Rheinischen Friedrich-Wilhelm-Universität, Bonn.

<sup>29</sup> The fish bones at these sites have not yet been

identified. But identifications at Cuina Turcului proved that the species were the same as today, though on an average larger individuals were more frequent. Cf., T. Nalbant, SCIV, 21, 1970, 1, p. 41—43. Only an analysis as that made by W. Shawcross, PPS, 33, 1968, pp. 107—131 could determine the real balance between fish and mammal meat supply in the diet.

During the last years some specialists<sup>30</sup> have stressed the difficulties of separating the bones of wild and domestic animals, mostly because "The range of man-animal relationships forms a graded series in which it is difficult, and probably unprofitable, to arbitrarily select a point where the extent of human control is such that the animal is domestic rather than wild"<sup>31</sup>. Examples of this graded series of man-animal relationships in which entirely different animals are neither "wild" nor "domestic" are to be taken from regions as far apart as Australia (various forms of contact between man and dingo populations)<sup>32</sup>, Greenland (driven reindeer)<sup>33</sup> or the Balkan area (where pigs were driven into woods, left there to fatten till they reached the required weight and then slaughtered). Indeed, to decide, at least for the earlier periods of prehistory, whether a category of bones comes from a "domestic" species or from its "wild" ancestor has no objective basis at all, but is simply a matter of general outlook. Therefore, the author of the present paper rejects the term of "domestic" for the pig population at the Iron Gates, but agrees that to some extent it suffered human control. In fact, the corollary of the reindeer drivers of Greenland that the more the animals are left alone, the fatter they will be<sup>34</sup> also applies to the analysed situation, for how could a restricted prehistoric community offer the animals more than the surrounding mixed oak-forests did?

3. As mentioned in the second part of this article, the conditions of preservation at Icoana were not favourable. Still, the site delivered an amount of artefactual and bone material which enables us to consider it a home base. Even its location near the exit point of the canyon-like stretch of the gorge was a favourable one, for it afforded not only close control of the canyon, but also access to the downstream basins of Ogradina and Ieşelnița, where the riverside is much wider and flatter. Thus, if plant cultivation was practised, as pointed out by pollen analysis from coprolites<sup>35</sup>, this was the most advantageous location of the site, with tillable land within a 3 km. radius<sup>36</sup>.

On the other hand, if the Danube made the same bend at Ogradina, and the more so if it flowed closer to the present Yugoslav bank, as suspected, the exploitation territory of the Icoana group amounted to a surface of c. 192 sq. km., while the Veterani group's territory was only c. 157 sq. km.

Since saws lay down in March-April, the age groups of pigs indicate killing during approximately the following months of the year: September–February (gr. I); July–March (gr. II); July–August (for 26-month-old individuals in gr. III). Thus, only a short interval of the year (April–June) remains uncovered. Given the relativity of the ageing method it may be assumed that pig-killing occurred all year round.

Of the 22 red deer individuals assessed on the evidence of lower dentition, 4 were subadult, i.e. one 6–(11) months old (unrupted or just erupting  $M_1$ ), three 11–14 months old ( $M_2$  in eruption). The corresponding killing time was November–April and April–July. This could be an indication of seasonal (winter-spring) killing, when deer came down to the lower grazing land of the region. Nonetheless, the low frequency of young animals might be the result of an intentional protection of fawns and yearlings, and since bones of adults do not give any clue to the killing season, it is difficult to decide whether red deer were exploited all year round or not.

<sup>30</sup> E. S. Higgs and M. R. Jarman, *Antiquity*, 43, 1969, p. 31–41; S. Payne, *PPS*, 34, 1968, p. 368–384; D. A. Sturdy, *op. cit.*; M. R. Jarman and P. F. Wilkinson, *Papers in Economic Prehistory*, Cambridge University Press, 1972, pp. 83–96, and others.

<sup>31</sup> S. Payne, *op. cit.*, p. 375–376.

<sup>32</sup> M. J. Meggitt, in *Man, Culture and Animals* (edited

by A. Leeds and A. P. Vayda), Washington, 1965, p. 7–26.

<sup>33</sup> D. A. Sturdy, *Papers in Economic Prehistory* (edited by E. S. Higgs), 1972.

<sup>34</sup> *Idem.*

<sup>35</sup> M. Cărciumaru, *Dacia*, N.S., 17, *op. cit.*

<sup>36</sup> M. Chisholm, *Rural Settlement and Land Use*, London, 1970, p. 49–53.

4. There is not much to be said about the relationship between Icoana and Răzvrata : being so close together they either formed one large site, or one was occupied immediately after the other one had been left.

Because the exploitation territories of the Cazanele Mari group of sites and of the Cazanele Mici group of sites so largely intersected each other, they could certainly not be contemporaneous and independent. Two hypotheses may be advanced : a) they were contemporaneous, but inhabited by the same human community. In other words, while the bulk of the community lived at one site (more likely Icoana-Răzvrata), a few people were sent (permanently or temporarily) for strategic reasons towards the periphery of the territory (i.e. Veterani group). b) They were not contemporaneous, but then the Veterani group has no site equivalent to Icoana in wealth of artefacts and bones.

5. It may be stated that during about 4,000 years two economic patterns followed each other at the Iron Gates : a) Between about 10,000 and 8,000 B.C. a diversified mammal economy, with a comparatively unstable exploitation of different mammals, but with a growing importance of ibex and chamois (cf. R I and R II Cuina Turcului). b) Around 6,000 B.C. an economy decidedly based on pig and cervid exploitation<sup>37</sup>. Needless to say that the shift in the exploited species was influenced by climatic changes<sup>38</sup>. Since it is admitted that such changes occurred about 8,000 B.C. or shortly afterwards, it may be assumed that during the Late Epipalaeolithic at the Iron Gates human populations practised an economy which had already been successful for a long time.

<sup>37</sup> see also M. R. Jarman, *Papers in Economic Prehistory* (edited by E. S. Higgs), Cambridge University Press, 1972, pp. 125–147.

<sup>38</sup> Compare pollen analysis E. Pop, V. Boșcaiu and Viorica Lupșa, *SCIV*, 21, 1970, 1, pp. 31–34 and M. Cărciumaru, *Dacia*, N.S., 17, *op. cit.*