

THE EARTH WORKS FROM CORNEȘTI – “IARCURI” (ORȚIȘOARA VILLAGE, TIMIȘ COUNTY) IN THE LIGHT OF RECENT FIELD RESEARCH

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Keywords: *Remote Sensing, Bronze Age, Cornești, Banat, Romania, fortifications, GPS*

The Cornești “*Iarcuri*”¹ (the old name of the village is Jadani) have fascinated and continue to fascinate both the experienced researchers and the less experienced history lovers through their impressive size and good conservation state. The fact that these enormous fortifications have not been investigated yet by archaeologists (except for the superficial excavation made by M. Moga in 1939) causes their utility and dating to remain uncertain. The new Google Earth software has given an unsuspected advantage to the archeological survey research in Banat region, through the accuracy of the satellite images it provides in the 15 m clarity band, on the corridor between Arad and Timisoara. With the help of these images and as a result of numerous field researches our team (made up of Dorel Micle, Liviu Măruia, Mircea Ardelean, Adrian Cîntar, from the West University of Timișoara, and Leonard Dorogostaisky, Alcatel România) had the chance to discover a significant number of settlements dating from prehistoric ages up to the dawn of the Modern Age. Many of the discoveries are new and the results of these investigations from Banat will be published punctually by our team.

It is in this context and under the enthusiastic impulse of engineer Leonard Dorogostaisky, passionate field researcher and specialist in both computer software and on the spot realities that we started a series of surveys in the *Iarcuri* area, which resulted in a great number of findings. 9 surveys have been done between February and July 2006, by a team made up of Adrian Bejan, Dorel Micle, Liviu Măruia, Leonard Dorogostaisky and numerous students of the History Department of the West University of Timișoara. The research methodology has aimed at two aspects:

1. to examine on the field the line of the earth walls, to notice their constructive characteristics, to gather data on the logic of concentric structures, on the strategic relations among them, on their positioning in relation with the field morphology. The GPS coordinates of the line of the walls have also been gathered together with a significant number of photographs in three different seasons.

2. to research exhaustively on the field the enclosures I and II and partially the enclosures III and IV, with the purpose of gathering and indexing the traces of inhabitation, placing them on a map and elaborating a statistics of the density of the inhabitation in order to establish to which chronological and cultural background the construction of these fortifications belongs to.

The purpose of our investigations in this absolutely general context is to bring once again to the attention of the specialists an extremely interesting archaeological monument. The systematic research of such a monument requires an enormous effort from a team of specialists, who would be confronted with perhaps the largest earth fortification in Europe.

The surveys have investigated a large area and have had the function to draw a clear picture of what can be noticed today on the surface of the *Iarcuri*. Due to pragmatic reasons (the size of the area that had to be covered) the archaeological research on the spot was focused particularly on the enclosures I and II. In planning the course of the surveys, we have taken into consideration the satellite images of the site provided by Google Earth website. In the case of the *Iarc*, the images have shown details that suggest new proofs of the existence of the IVth wall. One of the surveys had as an object photographing the wall.

From the satellite images, considering the darker color, close to black of a great part of the enclosure II, but also taking into account the fact that it is located mostly on a plateau South of the Lake Valley, we have drawn the conclusion, even prior to the survey, that this was the most inhabited area of the *Iarc*. The darker color is due to higher concentration of organic matter produced by long-term inhabitation. There is also the possibility that this color is generated by a humidity excess. The researches have confirmed that on this surface there are important proofs of material culture (significant quantities of ceramics, flint fragments, grit stone or volcanic tuff grinding mills, etc.). Based on the analysis of the color spots visible on the satellite images, we could discover a great number of settlements in many areas in Banat, which have been visited on other occasions.

If the South of enclosure II has totally confirmed the calculations, this was not valid for enclosure I. In the centre of the enclosure I there were traces of modern inhabitation, from the time in which this was the spot on which the small village of “Alte Tanya” was placed, and two more classifications of archaeological prehistoric material.

Another objective of the surveys was establishing the number of initial gate enclosure I and II had. The team also hoped that in their immediate vicinity they could identify a great number of artifacts. This is the reason why there were two surveys in the enclosure I. Traces of inhabitation have been identified on both slopes – N and S – of wall I, where this is closer to the Carani Valley.

Taking into consideration the enormous surface of the *Iarc*, most of it is fortunately unoccupied by modern settlements, the great number of archaeological sites, big or small, new or rediscovered, is justified. They cover ages starting with the Neolithic Age, quoted by F. Medeleț (*Medeleț Fl.*, 1993, 119-150), and go up to the IIIrd and IVth centuries or even pre-feudal or early feudal times.

On the other hand, we have tried to understand the shape of enclosure II, and water management within the community, and we have tried to identify the water courses. On the field and on the satellite images one can notice that the minor course of the valley narrows considerably downstream, after crossing the Carani Valley in the West. The difference between the course of the water upstream and downstream has been measured: $20 - 8 = 12$ m.

It is nearly certain that there was a dam in the North, where the II-nd wall crosses the Carani Valley. In front of the crossing point the valley has a marshy feature, while downstream it is narrow and with no humidity excess. There was no other explication for the fact that the II-nd wall is parallel to the Carani Valley, at an approximate altitude of only 5 – 6 m and at a medium distance of only 80 m from it. To the North, the III-rd wall is close to the watershed, at a relative altitude that is 10 m higher, and at distance of approximately 350 m from the river. The only plausible function that can be supposed in this context, which is topographical atypical, is that it is meant to protect a water supply.

From a geographical point of view, the *Iarc* is situated in the Vinga Plain (Munteanu I., Munteanu R., 1998, 12-13; Posea Gr., 1997, 291-296, 360-372; Bizerea M., 1973, 232-243), at an absolute altitude with values between 111 m, in its lowest point at the crossing of the Lake Valley, in the North of the Cornești village, towards the IV-th wall (45°54'52.72"N, 21°13'14.19"E) and 163 m in its furthest point to the East, with the coordinates 45°56'47.45"N; 21°16'20.18"E. The Vinga Plain is a tall one, with a decrease in altitude from East to West and from North to South, characteristic that can be found in the *Iarcuri* area. The Northern limit of the *Iarc* is situated at 45°57'12.55"N, 21°13'37.22"E, altitude of 139 m and the Western limit is at 45°56'29.73"N, 21°11'58.15"E, altitude 136 m. The typical soil is the leached black earth. It is worth noticing the conclusions of the pedological study undertaken in 1977 by Ghe. Ianoș². Mr Ianoș mentions the antropycal intervention on the chemical composition of the soil in this area, considering the chemical changes that take place over a long period of time (thousands of years in this case), in contact with the atmosphere of certain chemical compounds from the clay layer.

From a hydrological point of view, two valleys with a permanent water course cross the *Iarc* on a direction oriented from ENE to WSW, at a distance of 1 km from one another. In the case of the first three enclosures the two water courses cross the areas on a distance of about 2 km. This is the Lake Valley that intersects

enclosure II at half distance N – S, and the Carani Valley that borders the enclosure I to the North.

Unlike the valleys from the North and the South of enclosure IV (the Post Valley and the Vineyard Valley), these have the following distinctive features: they are narrow (120 m Carani Valley, 250 m Lake Valley) and relatively abrupt on the contact with the surfaces that surround it (12 m difference in ground level in Carani Valley and 15 m in Lake Valley). It is worth noticing that the Vineyard Valley, although it has a hydrographic reservoir that is double the size of the one from the Lake Valley, it does not have a permanent water course. Another hydrographic feature is that on the surface of the enclosure II the Lake Valley has three affluent springs and the inter streams that are positioned to the North and to the South of the enclosure I have a width of 2.5 km and a much gentler slope to the North and respectively to the South.

The fortifications have been topographically measured only through satellite applications and GPS, a topographic elevation, with the entire station is not relevant at this time (due to the large size of the surfaces occupied by them). Except for the enclosures IV and partially the III, the fortifications have also been studied on the field through numerous surveys. The measurements were done on the satellite images with the help of the Google Earth Professional application, and on the field with the help of the GPS. The sizes resulted after the measurements are the following:

Enclosure I:

- 3140 m perimeter
- **72 ha** surface
- 72 000 m³ estimated volume of wall I

Enclosure II:

- 5980 m perimeter
- **213 ha** surface
- 144000 m³ estimated volume of wall II (24 m² medium section of the wall)

Enclosure III:

- 8120 m perimeter
- **504 ha** surface
- The volume of the wall cannot be calculated due to the fact that it has not been preserved intact on its entire line, thus any supposition can be considered to be premature

Enclosure IV:

- 15735 m perimeter
- aprox. **1722 ha** surface
- the volume cannot be estimated in this case either, wall IV is the worst preserved of all walls.

The following inhabitation complexes have been discovered as a result of the nine campaigns of on the field researches

Enclosure I.

It is situated on a plateau between the Carani and the Lake Valleys, at a medium absolute altitude of 145 m. The level difference from the thalweg of the valleys is 15 m in the North and 8 m in the South. The Northern part of the enclosure is almost flat on a surface of approximately 54 ha (900 x 600 m).

Although there are several openings in wall I, we have strong reasons to assume that the access in this enclosure was originally possible only through one gate in the SW area (GPS point 45°56'3.87"N, 21°13'58.70"E), which communicated with the main gate of enclosure II. There is a possibility that there was a small entrance in the South, in the proximity of the torrent, meant to facilitate the access to the water supplies in the area (GPS coordinate 45°56'1.57"N, 21°14'14.23"E). The other openings are made subsequently, in the Modern Age, when in this area we have the small village of "Alte Tanya". Even though the map does not indicate a road, there was one probably through the bushy precipice in the North, which was continued on the opposite slope of the valley with an opening in wall II towards the Orțișoara locality. Another hypothesis is that through this precipice there was an access to water in the case of a siege. Up to this day here is no spring inside this enclosure. There is a torrential valley only in its Southern side, but without permanent water.

Besides the modern inhabitation, situated approximately in the centre of the enclosure, only two more inhabited areas have been discovered so far. They are next to the wall, behind it. The first and most important one is in the Southern area and it is bordered by the torrent valley to the West and by the country road that goes up near the spring to the East. The ceramic material and the great quantities of ash stretch on a distance of 250 m, closely behind and along the wall, which has a height of about 1 m in this area. The traces of ash and ceramics line up along the wall at a distance of 10 – 15 m from one another, but on a width with high concentration of only 2 – 3 m. Based on this groupings of ceramic material and ash traces we assume the existence in the area of about 20 houses closely connected with the wall of enclosure I. the ceramic material is placed in the final stage of the Bronze Age.

The second inhabited area is situated in the same position towards the wall as the previous one, but this time in the Northern area of the enclosure I. Unfortunately, the time at which we surveyed the area (the end of July) did not allow us, because of the rich vegetation and the agricultural activities, to form a more precise idea of the size and proportions of the inhabitation. The ceramic fragments found in the stubble, even on the wall, are similar with the ones found in

the first inhabited area. As in the case of the fortification from Sântana (Arad County) (*Rusu M., Dörner E., Ordentlich I., 1996, 18*), we assume that a part of the wooden structure of the palisade could also serve as a structure of resistance for the construction of houses, probably designed for those in charge of defending the enclosure. This is how we can explain the building of inhabited complexes on the very line of the walls. This assumption is of course irrelevant in the absence of archaeological investigations that would clarify the connection between the wall and the inhabitation complexes. It becomes relevant only if the two elements are considered to be contemporary. This is why we believe that in the case of archaeological investigations, these two areas of the wall of enclosure I are most likely to clarify the chronology of the building of the fortification.

Enclosure II.

Enclosure II, besides its oblong shape (oriented approximately on the N – S alignment – maybe not by chance), has several extremely interesting features. It can be divided in two sectors: the one North of the Lake Valley that has, according to surveys and satellite images few traces of inhabitation, and the one South of the Lake Valley, where we found the highest proportion of inhabitation from the entire *Iarcuri* area.

The plateau South of the Lake Valley (Pistrui), includes two valleys with springs with permanent water. It can be geomorphologically divided into three unequal area. The surfaces of these three areas have the following size: 600 x 300 m - 18 ha (Western area), 600 x 250 m - 15 ha (Central area) and 200 x 100 - 2 ha (Eastern area). The medium altitude of the Southern plateau is about 2 m higher than the central enclosure.

As in the case of enclosure I, we believe that the greater part of the openings are modern. Besides the Western gate, with a double entrance in chicane mentioned previously, and having the shape of a isosceles triangle with the base of approximately 175 m oriented towards the West, and with the sides of approximately 100 m (GPS coordinate 45°56'3.31"N, 21°13'50.51"E), there is another gate with a double entrance in chicane, in the SE (GPS coordinate 45°55'38.29"N, 21°14'42.66"E). This second gate is smaller, but has the same shape as the first one (the base of 56 m and the sides of 46 m), but this time it is oriented on the line W – NW, and with the same characteristic funnel shape.

Three details are obvious on the satellite images:

1. a light spot, of regulate, rightangular shape, with dimendions of 35 x 25 m (875 m²), situated in the centre of the Western area, on a N – S alignment. Its Eastern side is perpendicular on the direction of the SE entrance.
2. the ruins of a construction placed right in the centre, near the valley spring, of 9 x 7 m.

3. a great number (aprox. 50) dark spots, of irregular shapes and with diameters between 20 and 30 m (300 – 600 m²).

(1) During the archaeological investigations in the field the team tried to focus on these points of interest. In the case of the light spot, even though it is not clearly noticeable on the field, we found a great number of ceramic fragments, fragments of grinding mill stones, the blade of a bronze knife, big flint nuclei, all dating from the Bronze Age. It is the area with the richest and most diverse material discovered from the three areas in the Southern side of the enclosure.

(2) The ruins near the spring are probably of a modern dwelling. In the SV area of the enclosure there are traces of two more modern constructions, situated in the immediate proximity of a large opening in the wall, near the country road that crosses the enclosure from West to East.

(3) In the area of the dark spots we found ceramic fragments similar to those from the light spot. However we cannot assume based only on a surface analysis that these spots stand for traces of houses, even though the case is highly possible. The somewhat rich ceramic material also belongs to the Bronze Age.

Also within the enclosure, in its Southern side there are two more areas that present smaller traces of habitation. The first is situated on the left slope of the Lake Valley in line with the Western area. The ceramic material, dating from the IIIrd and IVth centuries, suggest the presence of a small community. The second settlement is on the left slope of the small valley situated in the centre of the Southern area. The settlement has been highlighted by the different color, black, of the earth, from the mole hills on this slope, but it cannot be dated.

Enclosure III.

It can be divided into 4 areas:

1. North of Carani Valley – unexplored yet within our surveys
2. the surface between enclosure II to the East, the Carani and Lake Valleys. Two settlements have been identified here as a result of the surveys: a Neolithic one (GPS coordinates 45°56'10"N, 21°14'40"E) and a post-Roman one, from the IIIrd or IVth centuries (GPS coordinates 45°56'9"N, 21°15'1"E).
3. the surface between the Lake Valley to the South and enclosure II, where we found settlements from the IIIrd and IVth centuries (GPS coordinates 45°55'59.23"N, 21°14'41.90"E), from the IXth to the XIIth centuries (GPS coordinates 45°56'1.51"N, 21°14'59.72"E), and a possible gate (GPS coordinates 45°55'34.08"N, 21°14'59.81"E). The ruins of a few modern dwellings can be noticed in the area. It is worth noticing that no traces of habitation have been discovered in the Southern and Western area.

4. the surface between enclosure II to the West and the Carani and Lake Valleys, has not yet been archaeologically explored.

The relatively rich archaeological material resulted from the investigations will be, together with the rest of the material discovered during the surveys in the *Iarcuri* area, the object of a special study, now in work.

Enclosure IV.

Due to objective reasons, connected to the short time span at our disposal, insufficient for systematic investigations in a field of this size (over 1000 ha), the investigation of the enclosure IV was not possible, thus we lack any significant observations.

The system of fortification: the only certain clues concerning the system of fortifications of the *Iarcuri* from Cornești are based on topographic observations made in the field. Thus the lack of archaeological investigations deprives of substance the conclusions. After analyzing the constitutive elements of the walls and their enormous size, the team attempted to state certain considerations regarding the work efforts necessary for the building of such a construction.

Wall I. It was not archaeologically investigated by M. Moga in 1939. According to the plan published by F. Medeleț (*Medeleț Fl.*, 1993, 119-150), but also to the measurements done on the field, its actual height does not go beyond 2 m, being less than 1 m in the Northern area, at the limit of the Carani Valley and in the SE area near the Lake Valley. In the Northern and Southern areas, where wall I is parallel with wall II, it is 0.5 m lower than the latter. In these sectors the ditch in front of the wall has an aperture width of 8 m, and the wall has a base width of 20 m. In the SE area no traces of a ditch are visible, actually it was not even necessary there, considering the ground configuration.

Wall II. The ditch in front of the wall has an aperture width of 20 m and the wall a base width of 30 m in the plateau area. Its height is 2 – 2.5 m, except for the slopes and valleys where it is lower. In the Northern sector, the wall has a smaller base width, of approximately 12 m, and a height of 0.8 – 1 m. The size of the ditch cannot be estimated.

Wall III. It generally traces the watershed between the Carani and Post Valleys in the North and the Lake and Vineyard Valleys in the South. It is situated at a distance of 155 – 600 m from the wall II to the East and to the West. The current width of the ditch is 16 m, the base width of the wall is 16 m, and the height of the wall is 0.5 – 1 m. It is possible that the SE entrance is placed in connection with the entrance of the Wall II. It is also noticeable that wall III permanently follows the relatively maximum altitude and that it is smaller and worse preserved than the walls I and II.

Wall IV. Concerning the dimensions of wall IV, they are identical with the ones of wall III, except for the medium height of 0.5 m. Wall IV is at a distance of 275 to 1900 m from wall III. A significant detail is the fact that it also protects the spring of the Lake Valley

All in all, it is noticeable that the sizes of the wall I and II are double compared with those of walls III and IV. Considering the small dimensions that were preserved in the case of the last two, it is difficult to say how many entrances to the enclosures III and IV existed.

As a result of these topographic considerations certain question marks are raised, but in the actual stage of investigations these can only be substance of futile speculations.

The first surprising aspect of enclosure one is its very size: 72 ha!

The second thing that can be deduced from in the field observations is that at the time of its building, this fortification was not meant for permanent living. We can only imagine that it was a final refuge for an important community. For example, the historical centre of Timișoara, the old fortress had a diameter of 800 m. What population could it have sheltered, how would it have been protected by a wall with a palisade (the smallest that existed) with a perimeter of 3 km? Would the artificial lake from the North have constituted the water supply? (if the lake exists?). How did they build it and why?

The third observation is that the plateau on which enclosure I is placed, is as a relative altitude, approximately 8 m lower than the Southern and Northern plateaus. We are used with the image that the central point be situated at the highest altitude to allow a better supervision of the neighboring areas, thus to create an advantage over the attackers. In the case of the *Iarc*, we have an apparently reversed situation, being inside it is similar to being inside an enormous amphitheatre.

On the other side, except for the visibility, the central enclosure has a privileged position. As mentioned before, the Carani and Lake Valleys are in the vicinity of the *Iarc* and are narrow and relatively deep. We believe that along these valleys there was no need for a ditch, and the wall had a smaller size and a palisade (there are traces of intense burning of the wall).

Enclosure I is protected in its immediate proximity, by wall II on three directions, at a relatively small distance, a medium of 180 m. In its North side, if we take into consideration the presence of the lake, it seemed impugnable – with the succession of ditch, wall, water, abrupt slope and palisade – for the military technology of the time (we must mention that at this point we do not have sufficient arguments to clearly identify its period!). Actually the length North of the Lake Valley and South of the Carani Valley of wall II is bigger than the perimeter of wall I by 1 km. if in the case of the Lake Valley there would have

been a dam and a lake too, than access from the South would also have been difficult,. Of course from the East and West the attackers would have been confronted in their attempt to conquer the place, with a succession of two ditches and two walls with palisades. Considering these arguments, we can state that enclosure I could have been a last stronghold for a numerous population, and it would have also had access to a water supply.

From behind wall III, built at a maximum height of the area, the defenders could have noticed from a distance the moves of possible attackers, and would have had a superior advantage. It is hard to assume that the 8 km in perimeter of the wall III could have been defended only by pedestrian forces. We assume that the population had riders that could intervene in the most vulnerable places.

If the first three walls described above are probably contemporary, two hypotheses could be expressed for wall IV:

- contemporary with the first three walls, and serving as an intervention area for the cavalry, as a protection area, prestige area, delimitation for the animals' food supplies, temporary shelter
- built subsequently by another population

After the systematic survey of enclosures I and II, the habitation density is not at all intense. We believe that a general estimate of those who left the traces of the settlements from the two enclosures could centre around 1500 – 2000 people. Considering the size of the fortification its construction is not justified for this number.

If we assume the existence, on a range of 20 – 25 km, of a population that belonged to the same military and political system, and which could have taken refuge inside the fortification, in need, we could explain its very large size. From the specialized bibliography on the area, and even on a range of 20 km in the Vinga Plain, we could not find evidence of a high population density nor of the existence of large settlements from the Neolithic – Bronze – HA 1 (only 14 traces of settlements and fortifications have been published). For this reason we have carefully analyzed the satellite images, and in several locations we noticed the possible presence of prehistoric settlements that resemble the settlement from enclosure II of the *Iarc* – large light spots, of rectangular shape, and large dark spots with approximately round shape. Besides several already known sites, we began to investigate in the field the areas of interest from the satellite images. As a result we found several sites with material dating from the Bronze Age:

1. **Seceani 1** (Timiș County): The first objective, where we did the survey was the one placed at approximately 4 km East of the Orțișoara village (GPS coordinates 45°58'27"N, 21°14'48"E), and 300 m North of DJ 693-3. The site is situated on a high terrace that borders the left slope of the Izvorul Vinelor Valley,

named Vineyard Valley in its inferior course. The surface of the complex is about 14 ha and it is placed at 4.5 km from the centre of the *Iarc*.

2. **Seceani 2** (Timiș County): is at 380 m SE from DJ 693-3 and at 5 km WSW from the church in Seceani, at an altitude of 151 m, (GPS coordinates 45°57'50"N; 21°15'26"E). Topographically the site is situated on the Southern incline of the right slope of the Post Valley. Traces of settlements can be notice on the Google Earth images and in the field (*Gudea N., Moțu I., 1983, 192-193*).

3. **Vinga** (Arad County): is at 875 m SSE from the Catholic church in Vinga, at an altitude of 122 m, on the promontory of the confluence between the Vinilor and the Ardelenilor Valleys, at 800 m E of E70 and 8 km NNW from the centre of the *Iarcuri*. The surface is of 7 ha. On the field we have noticed traces of nine points that could stand for dwellings (*RMI, 1999, 133-134*) (GPS coordinates 46°0'9"N; 21°12'25"E).

4. **Cornești 1** (Timiș County): is at 1.6 km S-SE of the church in Cornești, at 119 m altitude, on a high terrace of the left slope of the Lake Valley, in the Cornet point (*Medeleț Fl., 1993, 119-150*), at 4.25 km of the centre of the *Iarcului*. Its surface is of 1.6 ha (GPS coordinates 45°53'52"N; 21°13'2"E).

5. **Cornești 2** (Timiș County): is at 1.6 km ESE from the church in Cornești, the altitude is of 132 m, on the left terrace of the Vineyard Valley, at 2.6 km S the centre of the *Iarcului*, surface 1 ha (GPS coordinates 45°54'40"N; 21°14'42"E).

6. **Mailat** (Arad County): is at 1.1 km NW of the church in Mailat, at an altitude of 113 m, on the left terrace of the valley of the Apa Mare river. The settlement is 17 km NW from the centre of the *Iarc*, its surface is of ha. The concentration of seven large size dwellings is visible (GPS coordinates 46° 2'48"N; 21° 5'37"E).

7. **Cruceni** (Arad County): is at 2.1 km SW of the church in Cruceni, at an altitude of 131 m, on the right terrace of the Cruceni Valley (*RMI, 1999, 62*), at 14.8 km NE from the centre of the *Iarc*, its surface is of 4 ha (GPS coordinates 46° 3'28"N; 21°18'40"E).

8. **Pișchia** (Timiș County): is at 5.6 km NNE from the church in Pișchia, at an altitude of 152 m, on the left terrace of the Măgheruș Valley, at 9.8 km from the centre of the *Iarc*, with a surface of 6 ha (GPS coordinates 45°57'3"N; 21°21'44"E).

8. **Sânandrei 1** (Timiș County): is at 3.2 km W of the church in Sânandrei, on the right slope of the Surduc river, at 12. 4 km from the centre of the *Iarc*, at an altitude of 87 m and with a surface of 3 ha (GPS coordinates 45°51'17"N; 21°7'33"E).

9. **Sânandrei 2** (Timiș County): is at 4.7 km NE from the church in Sânandrei, on the left slope o a small affluent of the Lake Valley, 500 m NE of the end of the Sânandrei Lake and at 6.5 km of the centre of the *Iarc*, at an altitude of 115 m, and the surface of 1 ha (GPS coordinates 45°52'36"N; 21°13'11"E).

10. **Murani** (Timiș County): is at 2.1 km S of the church in Murani, at an altitude of 107 m, on the right terrace of the Măgheruș Valley, at 5.3 km from the centre of the *Iarc* and a surface of 4 ha (GPS coordinates 45°54'20"N; 21°17'41"E).

11. **Tisa Nouă 1** (Arad County): the settlement is 1 km SE of the church in Tisa Nouă, in the upper area of the course of the Cruci Valley, on its left slope, at an altitude of 152 m, 19 km NE from the centre of the *Iarc* with a surface of 6 ha (GPS coordinates 46° 4'26"N; 21°22'50"E).

12. **Tisa Nouă 2** (Arad County): the fortification is at 2.2 km SSE from the church in Tisa Nouă, at an altitude of 158 m, located at the spring of a small affluent right of the Vrăbleac Valley, 18 km NE from the centre of the *Iarc*, with a surface of 1.5 ha (GPS coordinates 46° 3'43"N; 21°22'47"E).

13. **Hunedoara Timișană** (Arad County): is 500 m E of the church in Hunedoara Timișană, on the inter river between the springs of the Ardelenilor Valley in the South and the springs of the Apa Mare river, at an altitude of 155 m, 12.5 km NE from the centre of the *Iarc*, with a surface of 8 ha (GPS coordinates 46°1'49"N; 21°19'30"E).

As a result of the discoveries from the surveys, and based on the analyses of the already known settlements we can estimate a density of one settlement/ 30 km².

Considering the possibility that the distance between the dwellings in these settlements may have been smaller (*Kovacs T., 1977, 23-26*) (2 m), this might explain the great dimensions of the spots (eg. Seceani 750 m²). We can estimate for a dwelling a medium surface of 30 m², and for a settlement a medium number of 20 dwellings. We also believe that we can estimate the population of such a settlement to 100 people.

Considering the previous estimations, in the investigated area, we can appreciate the existence in these 900 km² of a minimum 30 settlements, with a population, except the *Iarcuri*, of 3000 people (3.3 people/km²). If we extend the area to that included in a 25 km range (a day's walk), we will have a total of 8000 people.

The earth volume moved for the construction of the *Iarcuri*, is of about 300000 m³. We know that the average digging norm for a medium present day worker is 4 m³/day, the technology is not much different, but the food is probably richer in calories. By reducing this value to one half, we can estimate a norm of 2 m³/day for that epoch. The result is for digging 150000 days/individual. We can estimate the same amount of work for the raising of the wall. The result is 300000days/individual for the embankment. During a year we can estimate 150 days with suitable working conditions. The result is 2000 years/ individual. Considering the time span of the construction 5 years, we can deduce that the embankment required 400 workers, who represent 5% of the population.

For the cutting of the trees, the weaving of twigs, the transportation of the wood, probably on small distances (possibly done at the same time with a deforestation of the area), we estimate a need for 300 workers. For tools – making, fixing – food preparation, medicine, we estimate a need of 100 workers. Thus we have 800 workers (10% of the population) that would work for 5 years.

From the investigations that have been already made in the field and from what is known in the special literature on the plain area of the Romanian Banat, there are several large fortifications, but none of these match the size of the *Iarc* from Cornești.

Among the large fortifications with earth walls known in the proximity of the inferior course of the Mureș river, the most important one is the one North of it, from **Sântana-Arad** (*Rusu M., Dörner E., Ordentlich I., 1996, 15-44*). By its dimensions 1130 x 970 m, the perimeter is over 3 km, the surface of the enclosure is about 78 ha. The shape of the wall, its dimensions and its construction technique has a series of similarities with the fortification from Cornești. The base width of the wall is 30 – 40 m, the height is 2 – 5 m, and the large ditch has an aperture of 12 m and a depth of 3 m. Unfortunately, only probing diggings have been done in this case too. These diggings included two sections of the wall and two excavated surfaces, done in 1963 and published in 1996. As a consequence of the artifacts discovered during the diggings, and especially the metal ones: golden belt of Celtic origin, spear tips, fragments of bracelets, buttons and ceramic fragments, the fortification was dated to HA1. There are however notable differences between the two fortifications, referring, among others, to the ground they were built on, the presence – in the case of the *Iarcuri* – of valleys with permanent water courses and springs. Differences can be noticed also in the cases of the shape of the possible entrances of enclosure II, the shape, size and use of the enclosures.

As a result of the analysis of several aerophotograms, traces or large circular fortifications have been identified.

Semlac “Pusta lui Cucu” (Arad County) (*Rada M., Cochină N., Manea D., 1988, 111-119*), situated 6.5 km NW-N of the village and consists of three concentric fortification belts (possibly 4). The surface of the enclosures are 1.75 ha; 8.25 ha; 24 ha, respectively 100 ha. The walls have the base width of about 15 m and ditches with the aperture of 7-8 m.

Pecica “Duleul lui Bran” (Arad County) (*Rada M., Cochină N., Manea D., 1988, 111-119*), situated 9 km N of the city, consists of two closed rings of circular fortifications, perfectly concentric and a polygonal belt, circumscribed to the rings. The surfaces of the enclosures are 3 ha, 12.5 ha, respectively 50 ha. The walls have the base width of about 10 – 12 m and ditches with the aperture of 7-8 m.

Turnu “La Prioran” (Arad County) (*Rada M., Cochină N., Manea D., 1988, 111-119*), situated 3.75 km NW-N of the city, consists of three concentric

fortification belts (with inner ditch!). The walls have the base width of about 15 – 20 m and ditches with the aperture of 8 – 10 m. the surface of the enclosures are 1.75 ha, 12 ha, 55 ha.

Dumbrăvița (Timiș County) (*Rada M., Cochină N., Manea D., 1988, 111-119*), situated 900 m W from the SV corner of the locality. It has the shape of a circle with the diameter of 300 m, an inner surface of 7 ha. The walls have the base width of about 15 m and ditches with the aperture of 10 – 12 m.

From what we know so far, these sites have not been investigated through archaeological diggings that could provide more clues, especially concerning their dating. Furthermore, two additional fortifications that could be included in this typology could be the ones from **Munar** (Secusigiu village, Arad County) (*Luca S.A., 2005, 177*), situated 2 km S of the Mureș river. The fortification has a trapezoidal shape, with an enclosure of 14.7 ha, and with a wall and a defense ditch or the one from **Bodrogu Nou** (Felnac village, Arad County) (*Luca S.A., 2005, 44*), situated at 100 m S of the Mureș river. It has a surface of 0.6 ha, the wall is 3 m wide and 0.8 m tall.

As a result of the analysis of satellite images from Google earth, our team has discovered three more fortifications of this type, and in March 2006 we have made surveys on these sites which resulted in rich archaeological material:

Variașul Mare (Arad County), 3 km SE from the village, in the hydrographic reservoir of the Ier river, a right side affluent of the Mureș river with the GPS coordinates 46°15'14."N, 21°12'20"E, there is a complex fortification:

a) the smallest one, of circular shape, with a 280 m diameter and a 6 ha surface. The trace wall – ditch is of about 15 m. it is not visible in the field. Only the enclosure is about 1 m higher than the surrounding area. The ceramic material discovered is not very rich and it dates back to the Bronze Age.

b) a approximately rectangular fortification, with two earth walls and the dimensions 1000 x 650 m, having a surface of about 60 ha. The complex ditch – wall is 20 – 25m wide. Its walls cut in half the circular fortification. Both fortifications from Variașu Mare are placed on a higher ground than the floodable surroundings, even today that the area is drained. The paleotopographic studies will reveal the exact site of the marshes in the Western Plain, from before the systematic hydrographic improvements from the Habsburg period. In this context the fortifications will definitely appear as surrounded by marshy soil.

Vinga (Arad County), situated 1.5 km SE of the Catholic church from the city, on a central terrace of the right slope of the Vinilor Valley, with the GPS coordinates 45°59'50"N, 21°12'38"E. It has a round shape, with a diameter of 560 m, and a surface of the enclosure of 18 ha. From the satellite image we could notice a succession of ditch – wall – ditch – wall 45 m wide. The traces in the field are not very visible, the soil is intensely cultivated and the walls could not be identified

during surveys. It is however clear, both from satellite images, and from the investigations in the field that the prehistoric fortification is overlapped and partially disturbed by the early – feudal settlement. A rich ceramic material, dating from the Bronze Age and early – feudal age (XIth-XIIIth centuries) was discovered.

Firiteaz (Arad County), 2.30 km SW of the church from the village there is an earth fortification of quadrilateral shape with two entrance gates, in with a double entrance in chicane, in the point called *Țârvenca* (GPS coordinates 45°59'58.74"N, 21°21'42.46"E). The point of the hill on which the fortification is situated is surrounded from three parts by abrupt slopes, at 0.5 km NW by the Măgheruș Valley. The fortification of 450 x 380 m is made up of a wall and a defense ditch, very flat, with a width of 50 m and a height of 1m. the two gates in with a double entrance in chicane, are 30 m and are oriented towards the S, respectively E towards the Măgheruș Valley. In its immediate proximity, on the hill from the N side, in the point *Dealul Golumbului*, at 200 m, over the valley carved by a right side micro affluent of the Măgheruș Valley, there is an open settlement with a rich archaeological material dating from the Bronze Age.

Thus there are 10 more earth fortifications in the area that have similar features with the *Iarcuri* from Cornești – the large size, the type of fortification, the shape of fortification (round in most cases). Unfortunately thorough archaeological investigations are missing in 10 of these sites. The similarities lead us to the assumption that there is a possible connection among some of these fortifications, in the context of a coexistence or a “affiliation”

In conclusion we can appreciate that our findings, though incomplete, bring forth some realities in the field, whose thorough investigations will certainly provide a totally different perspective on the current state of knowledge. The mystery of the *Iarcuri*, the largest earth fortification in Romania, and may be even in Europe, cannot be solved in the absence of a research based on the interdisciplinary collaboration of a great number of specialists. The purpose of this study is to bring to the attention of those interested, what can actually be “seen” in this area. We do not claim that we have cleared the issues of the dating and function of the fortification from Cornești. We merely elaborated a statistic study of what can be noticed at the surface of the field, and as a result of in the field researches on a range of 25 km from this objective, we have noticed a significant grouping of sites dating back to the Bronze Age. We do not state that the *Iarcuri* belong to this time period, we only say it is statistic evidence. It is obvious to this point that only archaeological diggings will be able to clear this aspect.

ANNEX

Pedologic study from the Vth area of Wall I

In 1977, the Office for Pedologic and Agrochemical Studies from Timișoara made several researches in the field in the *Iarcu* area, to identify the soils and to try to improve them for agricultural purposes. From the two evaluation charts of the pedologic evidence only one of them was preserved, the one with the tests from the Western area of Wall I.

1. *The area features.*

The fortification from Cornești *Iarcu* is located in the high piedmont plain of Vinga, formed on the carbonated fluvial deposits (transported by the Mureș River)

The soils are medium evolved, of the preluvosoil type, subtype soft, lymic. The content of calcium carbonate, in the undisturbed areas is between 1-10% and it is found at depths between 0.5-1.5 m. The content of calcium carbonate appears at the surface of the erosion areas, on the slopes on the erosion valleys that intersect the walls of the fortified enclosures. The presence of the calcium carbonate indicates the evolution stage of certain soils, and thus their age can be deduced: when the layer is newer $K_1=0-20$ cm depth, appearing to the surface. When the layer is older it has more contribution of rain water (meteoric water) and

$$CaCO_3 + \frac{H_2O + CO_2}{H_2CO_3} \Leftrightarrow Ca(HCO_3)_2 = CaCO_3$$
 reaction takes place, which

leads to the formation of the lime precipitates in the shape of balls.

2. *The types of soil*

The dominant type is the weakly decarbonated preluvosoil $K=50-100$ cm, with a granulometrical consistence. The texture³ is medium smooth, that is clayish – argillaceous with a percentage of argil between 33-45%. The phosphor quantity from the extracted sample does not indicate human presence, because the surface soil was excavated from deep down and brought to its current position through massive human activities.

The earth from the wall was excavated from inside the first enclosure, fact proven by the same earth texture. The Humus from the wall was washed and the soil with a high content of iron oxide was left. The PH is uniform, typical of the uncarbonated clays that can normally be found deeper in the ground.

A chemical and textural rupture can be noticed 0.80 m deep:

- From a physical point of view, there is a sudden increase in argil quantity from 35% to 47%, and the sand decreases from 47% to 33%, which points to another material on top of which the anthropical one was placed.

- From a chemical point of view, the capacity of cationic exchange increases suddenly by 8% being greater at the depth 0.80 – 1.50 m.

3. Conclusions

The pedologic study certifies the fact the readings are anthropical, that they are made from the material from inside the enclosures, and that on the wall no habitation complexes were built – the proof is the uniform PH and the lack of phosphor from the soil. It is possible that the desertion of the fortification took place over a longer period of time (at least in the area from where the samples were taken) and that there was no arson.

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Fig. 1: Cornești Fortifications Area

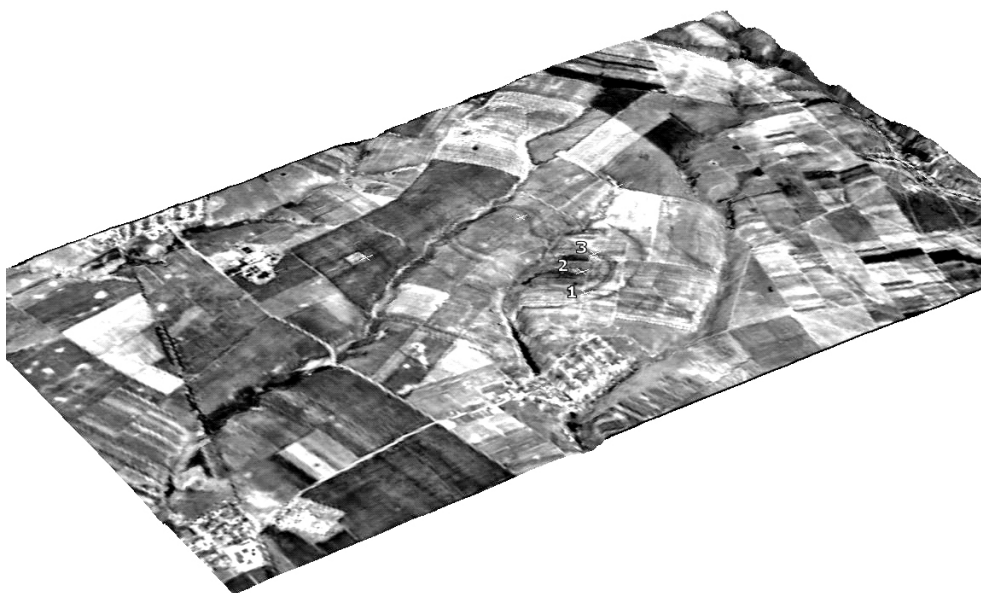


Fig. 2: GPS Data Points

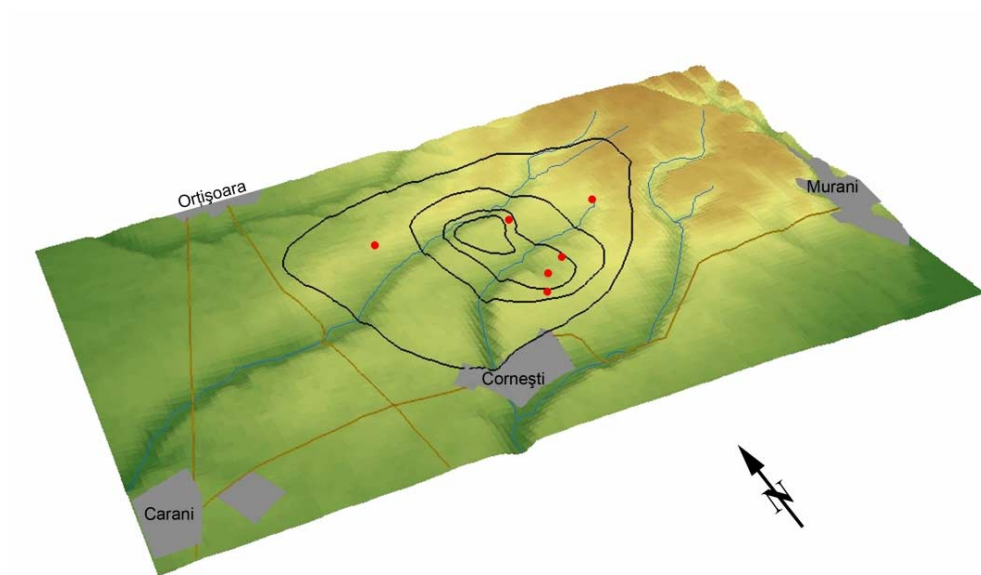


Fig. 3: GIS Reconstruction



Fig. 4: Bronze Age Settlement Repertory

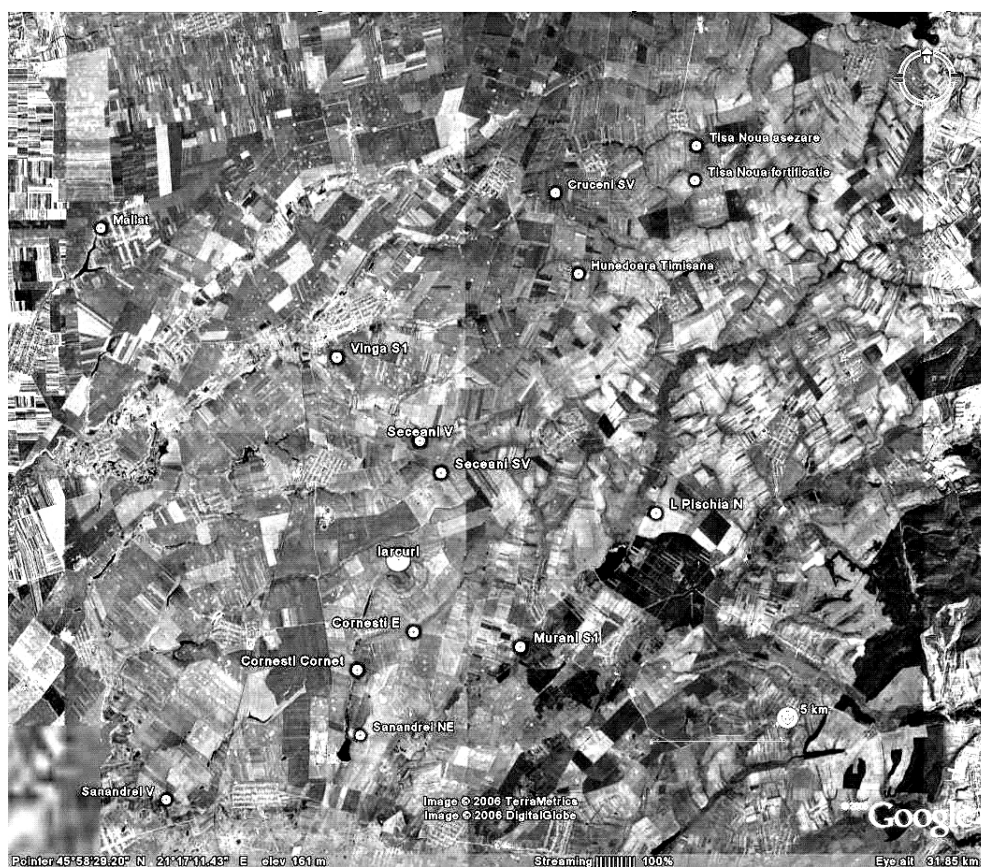


Fig. 5: New Bronze Age Settlement discovery

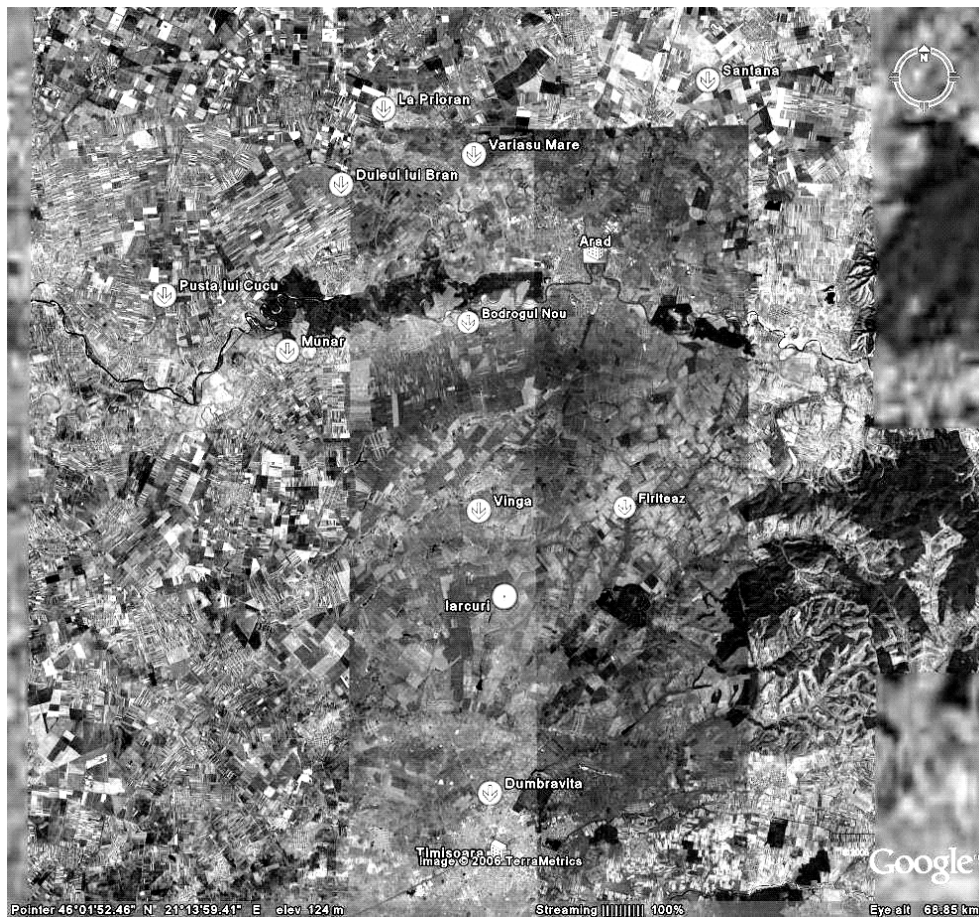


Fig. 6: Bronze Age Fortifications

