## CHAPTER TWO

# ORGANIZATION AND TECHNOLOGY OF PRODUCTION

There are many studies on the problems treating the organization and technology of ceramic production during the Roman era, but the majority of them consider only the West Roman ceramic centres. The results from the long archaeological explorations in Italia, Gallia, Germania and other provinces have found their place in a number of fundamental research works. [1]

Still insufficient work has been done on the East Roman provinces. This state of matters could be explained mainly with lack of systematic complex archaeological explorations of the ceramic centres in this part of the Roman Empire. The only explored ceramic centre in Asia Minor for the time being was localized in 1911 by S. Loeschke near Çandarli — about 30 km away from Pergam near the ancient settlement of Pitane. [2]

More data about the different stages of the organization and technology of ceramic production in the East Roman provinces are known from the archaeological explorations of the ancient sites in the Northern Black Sea area. The monograph published forty-five years ago by V. F. Gajdukevič about the ancient pottery kilns discovered in Pantikapaion and Phanagoreia has not lost its significance. The origin and development of ceramic production is considered in the monograph from Marxist methodological standpoint.

The archaeological sources published in 1966 with B. A. Rybakov [3] as editor, contributed greatly to clarifying the ceramic production and the ancient ceramic building materials. The studies of the Romanian archaeologists, who explored Micia, Oltenia, etc., [4] also throw light upon the facilities used for firing the ceramic production.

Many kilns dating from the Roman era have been discovered in Greece. [5]

There are no special studies on the problems of ceramic production in Bulgaria, but there are a number of publications on some concrete problems by A. Dimitrova, [6] D. Džonova, [7] B. Sultov [8] and V. Načeva. [9]

The comprehensive exploration of the ceramic centres near Hotnica, Pavlikeni and Butovo provided a possibility and enough grounds for considering the most important and typical stages of the organization and technology of ceramic production. The discarded products and the obsolete potter's tools found in the garbage pits are of particular significance in this respect. All this allows to follow the development of production from the potter's wheel to the firing in the kiln, as well as the different techniques used for additional processing and decoration of the earthenware.

The pottery kilns discovered and explored by the author, which had been destroyed during the firing, together with the production left in them and the remains of combustibles, were of assistance in determining the stages of their construction, improvement and use, as well as the causes which led to their destruction. The various ceramic material in the potter's workshops helped to determine the character of ceramic production. It also confirmed the relative specialization and differentiation of earthenware. The presence of human fingerprints indicates implicity that women and children were also occasionally employed in the production of ceramics.

The archaeological data from the excavations and the epigraphic records found on the territory of Nicopolis ad Istrum helped in specifying the ethnic origin and the social status of the owners of the potter's workshops.

## I. POTTER'S WORKSHOPS

The most significant stages of the sophisticated technological process of ceramic production took place in the potter's workshop processing of the clay, moulding and drying. For this purpose it was necessary to achieve constant temperature in the workshop, excluding sudden draughts, which had an unfavourable effect on the drying process.

### 1. Independent Potter's Workshops

Most of the potter's worshops discovered during the excavations had been either independent buildings constructed for this particular purpose, or occupying part of the potter's house.

The independent potter's workshops consisted of two or three rooms, their foundations were built of local stone (limestone in Hotnica and black whin-stone near Pavlikeni and Butovo) and the upper part was a rickety wooden construction or wattle, plastered with clay. The roof was made of arched tegulae and in places special ventilation facilities had been provided, i. e. tegulae with an opening and arched upper part.[10]

The detached workshop discovered near Hotnica offers the best idea of the inner layout of a potter's workshop. This is a comparatively big building, 17.9 m×8.30 m, consisting of three rooms arranged in a chain (Tables 2 and 3). The largest room measured 7.40×6.90 m, and the two side rooms were almost identical: 3.65×6.90 m and 4.25×6.90 m, respectively (Table II 2, 3). The earthenware was moulded in the East room and then arranged on wooden shelves fixed on its northern wall. The final processing of the clay was done in the Middle room, most probably on a wooden table. Iron nails were found in the northwestern corner of this room, as well as a large portion of the already processed clay. The firing of the ceramic products was done outside the workshop, but sometimes the kiln built in the room was used (Table II, 5). A kiln built inside the workshop was nothing exceptional: examples in this respect could be given from both the Hellenistic and the Roman era in particular.[11] Unusual here is that the kiln was in the vicinity of the place where the clay had been processed and then left to age, which is contrary to the main requirement for constant temperature. It is obvious that this kiln was seldom used: under hard meteorological conditions, when it was necessary to maintain a higher temperature, required, above all, for speeding up the drying process. The earthenware was arranged on wooden shelves fixed on the eastern wall of the same room. The workshop was obviously used not only in summer, but also during the colder months of autumn and spring.[12]

The third room was also used for drying, as well as for storing part of the finished products. The presence of a fireplace in the room gives grounds to assert that this process continued during the cold spring and autumn days as well.

Another independent potter's workshop was also found in the western part of the architectural complex in Pavlikeni. It consisted of two small rooms (Table V, 4).

**2. Workshops in the Potters' Lodgings**

The explorations carried out on a large scale near Pavlikeni and Butovo discovered large buildings of a sophisticated layout, which had been designed to be used by one family as lodgings, as well as for their domestic activities, which also included a workshop. The two buildings in the western part of the ceramic centre near Pavlikeni and the big architectural complex on the square in Butovo, which have been explored, are of the type described (Tables V, 3 and VIII, 3).

The buildings in Pavlikeni repeat the layout of a type of buildings very widespread in this ceramic centre, consisting of one central room, used as a lodging, around which the other rooms were grouped. There was a large anteroom, supported by columns, which led to the other rooms. The working platform of a two-chamber kiln erected outside the building was disovered in the southeastern corner of the first building (Table V, 3). The two eastern rooms, located in front of the anteroom with the kiln, were used as potter's workshops.

The two rooms in the southwestern part of the second building were used as potter's workshops. The kilns of this workshop were also outside the building.

Potter's workshops incorporated in the potters' lodgings were also discovered during the archaeological excavations in Butovo. However, the particular conditions for work in a built-up area prevented a more detailed exploration.

## II. THE KILNS

The construction of the first pottery kilns is connected with the development and improvement of ceramic production and the firm establishment of this craft. Originally earthenware firing was done on an open hearth. The inevitable temperature fluctuations with this primitive mode resulted in the irregular and misfired sides of the earthenware. This compelled the potters to develop new methods of ceramic production firing. They started to dig the fireplace deeper into the ground. Later, the earthenware arranged in a chamber dug into the ground was covered with branches, leaves and earth, thus achieving slow baking and slow cooling. The minimum temperature required for the firing (between 450 and 600° C) was thus reached in the covered fireplace, which resulted in irretrievable loss of water contained in the clay. The earthenware remained porous, slightly clinking and the uneven temperature caused a lot of products to be discarded.[13] Gradually, the closed one-chamber kiln came into being. It preserved heat better than the open fireplace and it allowed regulation of the burning. As a result, higher temperatures were reached, causing a final shrinkage in the clay and reduced porosity.

The first one-chamber pottery kilns were dug into the solid ground and did not differ from the ovens for baking bread. Ceramic production in these kilns was arranged along the wall and the fire was lit in the middle. For baking bread it is enough to fire the oven only once when there is sufficient combustible, but the firing of earthenware in the one-chamber pottery kilns required the thermal conditions to be maintained for a much longer time and

very often the earthenware was damaged when coming into contact with the combustibles. This was the reason why new means were sought to avoid direct contact between fire and the earthenware to be fired, and at the same time to keep the action of hot gases for as long as possible. For this purpose, the one-chamber kiln was partitioned by a low wall, thus forming the two-chamber horizontal kiln.[14]

Horizontal kilns turned out to be insufficiently effective, because of the incomplete utilization of the thermal effect of hot gases, rising quickly above the hearth floor, without affecting evenly and completely the products to be fired. This was not a decisive factor for the ordinary earthenware used in everyday life, for which a temperature of 800° C proved to be sufficiently high. The refinement of ceramic production, which required firing at a higher temperature, necessitated some improvement of the pottery kilns. This was achieved by the two-chamber kiln, arranged in tiers, the lower chamber of which was turned into a fireplace and the upper one into a place for arranging and firing of the raw production.[15]

In the pottery kiln, arranged in tiers, a favourable vertical draught was secured for the gases passing directly through the perforated grate into the upper chamber. However, certain difficulties appeared. The direct heating of the upper chamber did not allow control of the gradual and even warming of the earthenware, which affected its quality. Gradually, practice showed that the effect of the hot gas was greater if active fire was moved away from the lower chamber into an additional device — the so-called channel or *praefurnium* of the kiln.[16] This was the place where hot gases mixed and were enriched with oxygen in the lower chamber, before passing into the second chamber.

The earlist two-chamber kilns inherited their round shape from their predecessors, the one-chamber kilns. In fact, the round two-chamber kiln turned out to be most reliable against thermal fluctuations and showed least construction defects.The upper chamber had the same oval shape as the lower chamber; usually it had a vaulted ceiling and a vent for the smoke to come out. The vent in the small kilns was used both to put in and to take out the fired vessels, while a special hole was used for this purpose in the bigger kilns, plastered with clay during the process of firing.[17]

The partition or the grate played an important role in the two-chamber kiln. It had to be as thin and as perforated as possible, so that hot gases could pass quickly and freely from the lower into the upper chamber. At the same time it had to be strong enough in order to bear the weight of the ceramic products. The strain upon the grate of the smaller kilns was not so crucial, but in kilns with bigger grates it was catastrophic.[18] To avoid this situation, various methods of consolidating the partition or the grate were tried in the course of the centuries-long existence of two-chamber kilns.

Depending on the methods used for consolidation of the grate, two-chamber pottery kilns are classified as follows:

1. Round, two-chamber kiln with no support;
2. Round or rectangular kiln with one partitioning wall;
3. Round or rectangular kiln with one pillar supporting the grate;
4. Rectangular kiln with two walls supporting the grate;
5. Rectangular kiln with two pillars supporting the grate;
6. Rectangular tunnel-shaped kiln with a sophisticated vaulted system.

Two-chamber kilns with no supporting pillar are of the smallest variety.

They were usually dug into solid ground. However, there are kilns built in unsolid ground, as is the case with a two-chamber kiln built in the ruins of the Middle palace in Tiryns (1400—1100 B. C.).[19] This type of kiln also existed during the late Roman era and the Middle Ages.[20]

In the round or rectangular kilns, with one wall supporting the grate, the wall divides the lower chamber into two parts and ends immediately before the channel (*praefurnium*). Both round and rectangular kilns were used as early as the 1st millennium B. C.[21] One comparatively well-preserved, round pottery kiln is known from Pylos (1300—1200 B. C.).[22] Consolidation of the grate by means of one supporting wall was widespread during the Roman era and especially in the West Roman production centres.[23]

It seems that the vertical partitioning wall obstructed the complete warm air circulation in the lower chamber. That is why, an equivalent construction element had to be sought, which could function as a partitioning wall, as well as act as the smallest possible barrier for the gases. The first improvement was to separate the partitioning wall from floor of the lower chamber, thus preserving its length. Kilns of this kind are known from the Κεραμείκον of Athens, dating from the 6th-5th century B. C.[24] Later on, the wall became shorter, finally reaching the dimensions of a round supporting pillar. Thus one came to the round or rectangular pottery kilns with one pillar supporting the grate — a type widespread already in Classical Greece,[25] in Hellenistic[26] and especially in Roman times.[27] Round pottery kilns with one supporting pillar were also depicted on the Corinthian tablets dating from the 6th century B. C.[28]

The supporting wall, transformed later into a supporting pillar, still had a limited constructive application — only with grates of smaller pottery kilns.

There was also another tendency in the rationalization of production, noticed even in Hellas, namely firing of greater amounts of earthenware with only one heating of the kiln. This could be noticed especially in the big ceramic centres during the Roman era. Thus the two-chamber rectangular ovens with two supporting walls came into existence. One could notice the same development in this case as in the ovens with one supporting pillar. The supporting walls were shortened and transformed into two 'tongues'. Later they were torn from the wall, thus forming two supporting pillars.[29]

The construction requirements, especially in the Roman era, necessitated the building of larger facilities for firing bricks and tiles, as well as for firing potter's production with greater reserves.[30] Most suitable for baking rough building ceramics turned out to be the big kilns with rectangular grate supported not by pillars but by a sophisticated vault system.

The kilns were usually built on a slightly slanting terrain or near the banks of dry valleys and small rivers, so that the fireplace remained outside and the two chambers were dug into the ground. Constant thermal conditions were thus achieved during firing. However, where the grounds were not suitable (e. g. with rocks or underground water), only the lower chamber was dug into the ground, the excavated earth was heaped onto the outer walls of the second chamber and a stone 'jacket' was added.[31]

More than one hundred pottery kilns have been discovered, explored and registered so far in the ceramic centres near Hotnica, Pavlikeni and Butovo. They functioned at different times: from the first decades of the 2nd century up to the beginning of the 4th century. Some of them were very well preserved, whilst others had been destroyed already in ancient times and turned into

garbage pits, and a third group was destroyed in the last years during deep ploughing near Hotnica and Pavlikeni, as well as during the water supply campaign and housing construction in Butovo.

The results from the long exploration of the terrain in this area, together with the abundance of comparative material from other ceramic centres as well, provided a possibility to follow the stages of construction, to specify the typology of pottery kilns on the territory of Nicopolis ad Istrum, as well as to discover the general features relating them to the kilns existing at the same time elsewhere and point out their local distinctive characteristics.

The general layout of the kilns discovered is the same. They consist of two chambers arranged in tiers, like some other kilns known from the present-day Bulgarian lands. The warm air came from the fireplace and through a covered duct it reached the lower chamber. Then, through the perforations of the partitioning wall or the grate, it passed into the upper chamber, where raw ceramic products were arranged to be fired (Table X, 1).

## 1. CONSTRUCTION

The choice of a suitable place is a point of great importance in the construction of pottery kilns. The masters of the past chose slightly slanting terrains, dry valleys and solid ground with deep underground water. Ceramic requirements for fire precautions were also observed.[32] Ceramic production had to be fired as far as possible from farm buildings, where combustible materials were stored. That is why the potters' quarters were located in the outskirts of the ancient settlements.[33] However, these requirements were not always strictly observed, because the potters themselves were those who usually adapted themselves to the concrete conditions. Very often kilns have been discovered, built in unsolid ground or in the immediate vicinity of some farm or residential buildings. What is more, there are kilns built inside the workshops in the ceramic centre near Hotnica and Pavlikeni (Tables II, 3 and V, 3).

According to the way of construction, kilns are classified into:

a) kilns dug into the ground;
b) kilns half-dug into the ground.

### a. Kilns Dug into the Ground

Soil quality was of decisive importance in the construction of kilns dug into the ground. The potters used the same method when there was solid clay soil. However, if the terrain was not solid, they used various technical means and materials.

When a kiln had to be built into solid ground, two pits had to be dug out first, up to 2 m deep — one for the future working platform, and the other for the future kiln. The first pit was deeper and wider, and its walls were more steeply slanting. The second one started as a small round hole, widening downwards and forming an overarched space, designed for the lower and upper chamber of the kiln. Before that, however, the part between the two pits, which had not been dug up, was bored in order to form the overarched kiln duct.

The next step was the shaping of the small encircling wall and the supporting pillar upon which the grate of the kiln had to be placed. The supporting pillar was wider in its base, growing narrower upwards. After all this the grate or the partitioning wall was constructed. Smooth, pointed wooden

stakes were supplied for that purpose in advance, and fixed into concentric circles upon the bottom of the round pit. Meanwhile, the space between the fixed stakes was filled with bushes and leaves, so that the filling reached the height of the small encircling wall and the supporting pillar. This was done by the potters from Hotnica, while for the construction of the kilns near Pavlikeni radially arranged wooden stakes covered with straw were used instead of bushes. Well kneaded clay was applied in thin layers upon this 'framework'. The potters usually used the same clay from which they made earthenware, adding straw, burnt earth and potsherds. The straw acted as reinforcement before baking and prevented the clay from cracking, making the structure lighter to a certain extent.[34] Burnt earth and potsherds made the clay less oily and at the same time more fireproof.

Clay putty, 2—4 cm thick, was also applied on the side walls of the already formed upper chamber of the kiln. At the same time the fireplace and the duct were constructed. The fireplace was trough-like and the duct narrow in the beginning and wider inwards.

**b. Kilns Half-Dug into the Ground**

The difference between kilns dug and half-dug into the ground is that in the latter part of the upper chamber was above ground. The potters usually aimed at digging them as deep into the ground as possible in order to aviod sharp temperature fluctuations. The only reason for construction of kilns half-dug into the ground should be sought in the particular characteristics of the terrain (underground water, unsolid ground, etc.). In the construction of the kilns half-dug into the ground, they proceeded in the already described fashion, with some differences in making the lower chamber and especially the duct, the encircling wall, the supporting pillar and the grate.

The duct was made of pieces of tegulae and clay, heaped up haphazardly upon the wooden framework prepared in advance or of rough limestone tiles. The small encircling wall and the supporting pillar were constructed of waste materials. In some of the kilns the walls of the lower chamber were consolidated by means of big sun-dried bricks,[35] limestone tiles or imbrices set up straight and plastered on the outside with a thick coat of clay (Table VI, 6).

Water pipes were used as constructive elements for the supporting pillars of hypocaust pipes, filled up on the inside and plastered on the outside with clay.

There is also a difference in the construction of the grate. Imbrices were radially arranged on the previously prepared framework so that the narrow side could lie upon the supporting pillar and the wider one — on the edge of the small encircling wall. In some of the kilns, water pipes with small diameter were used instead of imbrices. The vents for the smoke were shaped between 'the ribs' constructed in that way and serving as frame of the grate. Layers of clay, mixed with small pieces of tegulae, were applied on the 'ribs'. The grate is thicker towards the periphery and very thin near the supporting pillar (25—12 cm). The grates of most of the pottery kilns in the ceramic centre near Pavlikeni were constructed in the same manner.

In the kilns half-dug into the ground, the construction of the second upper chamber took place after the grate had been finished. For this purpose, a framework of thin poles was prepared, plastered subsequently with a thick layer of clay. The second chamber was covered on the outside with turf and earth for better isolation. The height of the upper chamber of both types of kilns did not exceed 1 m.

### c. The Working Platform

The working platform was in front of the heart of the oven.It was dug deep into the ground in the kilns dug into the ground and resembled in shape an irregular oval with steep walls. The walls of some working platforms were consolidated by means of shapeless calcareous stones.

The kilns half-dug into the ground have smaller working platforms, slightly dug into the ground. The surface of any working platform does not exceed 5 $m^2$. This was space enough for the potter to work freely as well as to store part of the combustibles there.

One working platform was usually used for several pottery kilns, arranged in a circle around it. One is impressed by the fact that the pottery kilns arranged around one common working platform have different measurements. The bigger kilns were designed for baking large-sized earthenware and the smaller ones for firing fine earthenware. For instance, a common working platform was used by three kilns in Hotnica, differing in size, as is the case with the majority of the kilns from Butovo and Pavlikeni. Grouped in that way, the kilns were filled with various ceramic products and at the same time serviced by fewer people. This trend for more rational use of labour was also widespread in the ceramic centres discovered in the West Roman provinces.[36] Similar cases have been noted during exploration of the ancient ceramic production in the towns of the Northern Black Sea area.

### d. Protective Covers

Pottery ovens were vulnerable not only to fire but also to the moisture in the atmosphere. This compelled potters to search for ways to preserve them. Nearly all kilns discovered on the territory of Nicopolis ad Istrum were protected by light wooden structures, plastered with clay and covered with arched tegulae.

The protective shelters were high enough, so as to allow free work underneath. They were also sufficiently far off from the flames and the heat.

Large amounts of whole and fragmented tegulae and iron nails have been found on many working platforms. This gives grounds to consider that these shelters were used not only for the kilns, but they covered their working platforms as well.

## 2. Typology

Depending on the grate form and its support, the kilns from Hotnica, Pavlikeni and Butovo are classified in two groups: kilns with a round grate and kilns with a rectangular grate.

### a) Kilns with a Round Grate

The kilns of that group are subdivided into:

Ia. Kilns with a round grate supported by one pillar (Table X, 2a).

This type of kilns has been found only in the ceramic centres near Hotnica and Pavlikeni. The kiln grate is round or pear-shaped, most often slightly elongated towards the fireplace and supported by a tongue-shaped pillar. The latter is structurally connected with the rear wall of the lower chamber. In fact, it pertains to an improved variant of ancient kiln with a partitioning wall, which in our case does not partition the entire lower chamber, but reaches up to the middle of the kiln, thus ensuring better circulation of hot gases. We should mention as an example kiln No.6 in Hotnica whose grate diameter is 1.70 m.

This is one of the earliest kilns in that site. The lower chambers of two small kilns with tongue-shaped supporting pillars have been discovered in Pavlikeni. They probably belong to some fittings used for preparation of the additional materials in ceramic production.

Kilns similar to these are often to be found on the territory of Northern Bulgaria (Novae,[37] Pet Mogili, district of Šumen[38]), as well as to the south of the Balkan Mountains (Čatalka near Stara Zagora[39]). This type of kilns is seldom found outside the limits of present-day Bulgaria.[40] This gives grounds to consider them as a local variant of the pottery kilns with a round grate and a shortened partitioning.

IIb. Kilns with a round grate and supported by one pillar (Table X, 26)

These kilns are a further development of the type of pottery kilns with one tongue-shaped supporting pillar. The 'tongue' in them is divided from the rear wall of the lower chamber and turned into an elliptical or round supporting pillar, ensuring complete circulation of hot gases. This type of kiln is commonly discovered in the ceramic centres considered, and it is to be found either dug or half-dug into the ground. Their dimensions do not differ from those of the kilns with tongue-shaped supporting pillars, their diameter being between 0.83 and 1.90 m.

The kilns with one supporting pillar of the grate are the most common in all ancient ceramic centres on the territory of the Roman Empire. Kilns identical to these have been discovered in Novae,[41] Altimir,[42] Romula,[43] Olbia,[44] in Greece,[45] Gallia,[46] Germania, [47] etc.[48] Kilns of this type have also been depicted on the Corinthian tablets dating from the 6th century B. C.[49]

**b) Kilns with a Rectangular Grate**

The growth of ceramic production necessitated improvement of the facilities for earthenware firing. The aim of the potters apparently was to increase the efficiency of their production and to produce more and better-quality earthenware with fewer instruments and in less time. This was achieved by increasing the dimensions of the kilns. The rectangular shape of the grate turned out to be the most suitable here. In some of the kilns the grate corners are slightly rounded and in others they are almost rounded off, thus turning the rectangular grate into an ellipse.

Depending on the support of the grate, in this group of kilns one could distinguish:

IIIa. Kilns with a rectangular or elliptical grate with two tongue-shaped supporting pillars (Table X, 2C).

Only kiln №.7 in Hotnica belongs to this type. The same development is observed in this case as in the kilns of Ia, with one exception: the two supporting walls are shortened, and turned into two tongue-shaped supporting pillars, ensuring better circulation of hot gases (Table III, 1). Parallels to this type of kilns are known from the West Roman ceramic centres.[50]

IIIb. Kilns with a rectangular grate lying on two supporting pillars (Table X, 2d).

This type is a further development and improvement of the kilns with two tongue-shaped supporting pillars of the grate. They are found in the centres near Hotnica and in Butovo. There is only one example from Hotnica (kiln №.2, which is one of the latest on this site), while a considerable number of the kilns discovered in Butovo are precisely of that type. Their dimensions vary from 1.54×2.00 to 1.80×2.00 m. These kilns were used from the end of the 2nd

upto the beginning of the 4th century. The kilns from Olbia (type II) are completely analogous to them (dated to the lst century B. C. — lst century A. D.).[51]

IIIc. Kilns with a rectangular grate on a sophisticated vault system (Table X, 2e).

They belong to the receptacles designed for baking bricks and tiles, but sometimes they were also used for firing earthenware of larger size. The big rectangular grate of the kiln is supported by a sophisticated vault system, consisting of a main duct connected with lateral semi-arches. Kilns of this type are to be found often on the territory of Nicopolis ad Istrum — three in Pavlikeni, two in Bjala Čerkva and one in Butovo. The kilns in Bjala Čerkva and Pavlikeni were used for baking tegulae, while the kiln in Butovo was used only for baking earthenware of larger size. Grounds for such a hypothesis are provided by the great amount of discarded products — large vessels discovered both in the kiln and on the working platform. Similar examples are also known from other ceramic centres.[52]

The observations on the kilns from the ceramic centres in Hotnica, Pavlikeni and Butovo prove that most of them belong to the kilns with a round grate and one supporting pillar — the most widespread type during the Roman era. They are a further development of the kilns with a partitioning wall, shortened here in the form of one tongue-shaped supporting pillar. This type of kiln is typical of Thracia and Moesia Inferior (Čatalka, Novae and the village of Pet Mogili, district of Šumen).

The other type of kiln, also widespread in the three centres under consideration, is the kiln with a rectangular grate lying upon two supporting pillars. This type is not to be found in the West Roman provinces. The only parallels for the time being are to be found in Olbia, dated about two centuries earlier than our finds. It could be assumed that this type of kiln emerged under the influence from Asia Minor, but the lack of any explored ceramic centres in the East Roman provinces makes this statement hypothetical.

The observations on building equipment and building materials used in the construction of the facilities for firing of ceramics, have revealed a great difference between the kilns from Hotnica, on the one hand, and those from Pavlikeni and Butovo, on the other. A marked primitivism is to be noticed in Hotnica, both in the construction of the kilns and in the choice of building materials. For instance, calcareous stone was used on a mass scale. It is most abundant in this region, but not at all suitable for construction of equipment exposed to the direct influence of fire. This is the only plausible explanation for the great number of pottery kilns near Hotnica, which had been damaged already at the time of the firing and were subsequently turned into garbage pits. At the same time, the majority of the kilns in Pavlikeni had solid grates, constructed of radially arranged imbrices and water pipes.

Towards the end of the 2nd century a certain improvement of the pottery kilns is noticed in the ceramic centre near Hotnica. Two kilns were built then, completely imitating those from Pavlikeni and Butovo.

## III. BASIC MATERIALS FOR PRODUCTION

Clay, water and combustibles are the basic raw materials in ceramic production. Good-quality clay, suitable for earthenware moulding, as well as power sources used in firing of ceramic production, are more rarely found in

nature, unlike water sources which exist almost everywhere. That is why, in order to build their workshops the potters had made their way to places located near clay deposits.

**1. Clay**

The ceramic centres explored near Hotnica, Pavlikeni and Butovo are situated in areas rich in deposits of good-quality clay. Clay has been formed by gradual weathering and disintegration of rock material containing felspar. The turning of felspar rocks into clay is mainly due to mechanical and chemical factors. If clay remains in the place where it has been formed, it is called primary clay. However, clay had usually been washed away by water or blown by winds and precipitated for the second time at some other places. In this case it is called secondary or deposited (precipitated) clay.[53]

In Hotnica, the clay is in the immediate vicinity of the ceramic centre. The potters near Pavlikeni used the deposited clay found on both sides of the Vărbovsko Dere ravine. Four clay-pits, exploited and then turned into garbage pits already in ancient times, have been discovered here so far. One of the pits lies on the southwestern site, the other — between the pottery kilns and the western site, a third pit was found in the inner courtyard of the villa and a fourth one lies east of the brick-kilns. The raw material for the production of earthenware in Butovo was dug out near the very workshops, where rich deposits of secondary clay are still to be found.

Clay was usually dug in autumn, using spades and hoes for the purpose. An iron casing of a wooden spade was found near Vărbovsko Dere in Pavlikeni, an iron hoe was also found in Butovo (Table IX, 1 and Table XIII, 1). Natural grinding of the clay was achieved by repeated freezing and de-freezing, which also led to its increased plasticity.

Apart from useful soluble minerals, natural clay very often contains rock particles of larger grain, calcium carbonate, iron pyrites, organic substances, etc., which affect mostly fine ceramics. Especially harmful are the limestone particles, which after firing of the earthenware, turn into quicklime. It is highly hygroscopic and causes peeling, cracking and in greater amounts even complete destruction of the ceramic products. All this forced the potters to seek some new ways of removing the harmful particles. The most effective way to purify clay turned out to be to rinse it and to deposit it in special basins.[54] The basins, being at least three, were built in succession on slightly slanting ground in the vicinity of running water, which had been deviated by gravitation so that it could flow into them. The clay was transferred from the pit to the first basin, where it was soaked to its complete mechanical decomposition. Afterwards, the easily mobile turbid liquid entered the second basin, where the heavy clay particles fell to the bottom. Only fine clay suspension was allowed to pass into the third basin, where it was left for a long time to drain, the surplus water evaporated or was sucked into the soil. Special sifters, placed between the second and the third basin, were used for removing lighter organic additives like roots, dry leaves, etc., which had not settled in the second basin. Fragments of clay sifters were found near the Vărbovsko Dere ravine, where these basins for clay rinsing had probably been situated (Table XI, 91).

The clay prepared by freezing and rinsing was not yet sufficiently good to work with, that is why it was subjected to additional processing in the potter's workshop. Regular distribution of the solid particles and the water was achieved here by careful and continued kneading. This was the way to obtain 'the dough' — to use a contemporary term. Dough processing continued to the moment

when it could easily be moulded without sticking to the hands.[55] Sometimes the potter deliberately added sand or crushed brick in order to decrease the plasticity of clay. Similar additives functioned as a reinforcement of the vessel, making easier the process of its firing. This technology was generally applied in ordinary greyish-black earthenware and in the big vessels (amphorae, dolia, etc.).

**2. Water Sources**

The potters from Hotnica used the never-drying Karst spring Kaja Bunar and the waters of the Bohot River; the demand for water in the ceramic centres near Pavlikeni and Butovo were satisfied by the Vărbovsko Dere ravine and the Lomija River.

In Pavlikeni and Butovo more water, necessary for the ceramic production, was supplied from special wells dug up in the neighbourhood of the claypits.[56] This was the usual practice in most ceramic centres during Roman times (Aquincum[57], Weissenau[58], etc.).

In some potter's workshops discovered in Butovo water was supplied through ducts constructed of tegulae and bricks.

**3. Combustibles**

Timber was the only combustible used for firing earthenware in the ceramic centres explored so far. This is evidenced by the great amount of coals discovered in the very pottery kilns. Some coals are from hard tree species like hornbeam and oak, as well as trees with softer wood (linden and willow). In Bulgaria these trees grow in the low-mountain regions at a height of up to 700 m. Vast forests of oak, hornbeam, ash and linden have been preserved up to the present in the vicinity of Hotnica and Vărbovka. Timber for firing the ceramic production was sometimes supplied from these forests.

However, similar favourable conditions were not always available in the other ceramic centres. Most ofthen timber had been missing, which forced the potters to supply it from more remote places. For instance, the timber for the potter's workshops in Graufesenque (Southern Gallia) was transported from the forests of the Central French massif down the Tarn River.[59] The use of lower-calory heat sources was not excluded, e. g. vine-twigs and plant stems, which could develop temperature of up to 800—900° C.[60]

## IV. SPECIALIZATION OF PRODUCTION

Great variety on the production list of each ceramic centre was established during the long study of the ceramic material found on the territory of Nicopolis ad Istrum. The tendency to a relative differentiation and specialization of production has been established through detailed examination of the finds from each potter's workshop. This tendecy is, above all, expressed in the production of the two basic groups of ceramics: thin-walled and greyish-black earthenware used in everyday life. The former was mainly produced near Pavlikeni and Butovo, while the latter had remained the basic production of the centre near Hotnica.

Various earthenware, lamps, trays, terracotta and different objects related to construction (water-pipes, tubulae, etc.) were made of fine clay. This varied production was manufactured mainly in the specialized potter's workshops. For instance, in the workshops situated in the eastern and southwestern section of the ceramic centre near Pavlikeni, only fine earthenware was turned on a

potter's wheel (the majority of them being decorated by the Barbotine technique). Meanwhile, potter's workshops were discovered in the western part of the same site, which had used the potter's wheel for making only ordinary vessels of fine clay with no decoration — jugs, amphorae, pots, etc.

The specialization in ceramic production is best noticed in the Butovo ceramic centre, where specialized workshops producing trays, lamps, terracotta and ordinary fine ceramics have been discovered (workshops for trays have been discovered east of the square, workshops for lamps — near the road to Pavlikeni). There were also separate workshops for the production of clay moulds. This is confirmed by the fact that all lamps, terracotta and trays discovered in the different workshops are identical, as if they have been made in the same moulds. The potter's tools, manufactured in the specialized centre by qualified masters, satisfied not only the needs of the local workshops but they were also exported far beyond the borders of these provinces.

All the same, the differentiation of production in the explored ceramic centres is not so clearly discernible as in the big terra sigillata workshops in the West Roman production centres. That is why in most workshops producing mainly undecorated fine ceramic vessels, a few moulds used by the craftsmen for making clay lamps, children's toys, appliquéed ceramics, etc., have been found in limited quantities.

## V. THE PRODUCERS

The basic and most difficult operations in ceramic production were performed by the master-potter and his assistants. However, there are many moments in the sophisticated technological process, where participation of more people was required. Less qualified workers were usually employed for the primary processing of clay (digging and primary rinsing), as well as for applying the glaze on the earthenware or transferring the vessels to the kiln for firing.

The participation of many people in the production is testified by the presence of different human fingerprints on the surface of the fine earthenware (Table XIV, 1). It has been established from the dactyloscopic investigations that together with rough men's fingerprints on the ceramic material from Hotnica, Pavlikeni and Butovo, small fingerprints are also to be found, probably women's or children's. This is entirely explicable by the fact that most of the potter's workshops are situated in the courtyards of private owners, which include their lodgings as well. The observations made during the archaeological excavations show that some members of the family were directly engaged in pottery-making and the others in farm work, but at certain times they all had helped in the production of earthenware. Women and children also participated in the making of clay lamps and children's toys — products on which their fingerprints are most numerous.

Considering the archaeological finds discovered in the first place during the complex exploration of the ceramic centre near Pavlikeni, one comes to the conclusion that the makers of this various ceramic production were owners of one-family houses, where objects used in everyday life, as well as expensive metal works like bronze statuettes, lamps and ornaments, were found. It is obvious that the inhabitants were not slaves, but free people with their own initiative, standing higher than slaves in the social scale of the slave-owning society.

## VI. MODELLING

The various ceramic production from the centres near Hotnica, Pavlikeni and Butovo widely and rationally illustrates the use of the potter's wheel not only for earthenware modelling, but also for making the handles of smaller vessels, single moulds for earthenware, models for lamps and various objects, related to construction and potter's handicraft.

A completely preserved potter's wheel from Roman times had not yet been discovered; only separate parts have been discovered in Arretium[61], Lesoux[62], and other West-Roman ceramic centres.[63] Some scholars have succeeded in restoring the principal structure of the potter's wheel from this era[64], taking into consideration the archaeological finds mentioned above and compared to the images depicted on the Corinthian tablets from 6th century B. C.[65], as well as some contemporary etnographic parallels. The wheel apparently consisted of a vertical wooden shaft ending in its lower part with an iron point, fitting into a bed which had previously been dug into a quartz stone fixed into the ground. Similar stones bearing traces of the rotating movement of the shaft have been discovered in many ceramic centres.[66]

Two discs of baked clay were fixed to both ends of the wooden shaft. The lower one, being bigger and solid, served as a flywheel providing the rotating movement, while the upper disc served directly for moulding. The upper disc was usually turned on a potter's wheel. Fragments of similar discs have been discovered in Pavlikeni, reaching up to 20 cm in diameter, with an opening in the centre for the upper end of the wooden shaft.

Remains of a potter's wheel have been found in Hotnica in the very workshop: the wheel was placed in the southern part on an elliptical platform of rammed pebbles so as to get more sunlight. Iron points, probably of the vertical wooden shaft of a potter's wheel, were also found in the potter's workshops discovered in the western part of the site in Pavlikeni.

Discs from a potter's wheel, either of clay or marble, have been found in Greece and in the West Roman provinces.[67] There had been a tendency for the lower and upper discs to become heavier in order to ensure constant and continued rotation, which would not be affected by the irregular pressure applied during the modelling.

The process of modelling did not differ considerably from modelling in any contemporary potter's workshop. The potter set the lower disc in motion with his foot, meanwhile putting his two thumbs into the core of the clay ball, and started raising the walls of the vessel, gradually making them thinner and giving them the required shape.

A characteristic feature of the ceramics is Butovo in the thinness of the walls of the vessels, achieved during the first modelling on the potter's wheel. This is not to be noticed with the ceramic production of Pavlikeni. On the contrary, coarser and thick-walled earthenware is typical of this centre. This is probably a result of the individual abilities of the craftsmen from Pavlikeni, in contrast to those from Butovo, who had been masters of pottery handicraft. Certainly, this statement should not be taken at its absolute value, because there are some traces of the skill of good masters in Pavlikeni as well, but they never reached the standards achieved in Butovo.

## VII. ADDITIONAL PROCESSING

Nearly all fine earthenware, as well as a small part of the greyish-black ceramics used in everyday life, had been subjected to additional processing — bottom shaping, scraping and clipping of the walls, additional sticking of the neck in some of the vessels, applying of additional ornaments and retouching the defects.

Before that, however, the earthenware was left to dry and it was carefully watched for the moisture not to evaporate completely, i. e. the ceramic had to be not overdried. After overdrying, any additional operation on the ceramic products became impossible.[68]

### a) Bottom Shaping

After modelling, the clay vessel was removed from the potter's wheel by means of a thin thread, leaving concentric, arch-shaped, drawn-out circles upon the vessel. The thread traces are usually best preserved on the bottom of the earthenware and the tops of the lids of greyish-black ceramics. The reason for this is the presence of large-sized sand grains in the clay, which made difficult the further processing of this type of ceramics. This is not the case with fine earthenware, where the bottom had been additionally modelled by scraping and sticking of the pre-shaped feet.

Shaping was done in the following order: the craftsman put the vessel on the potter's wheel upside down, fixing it with clay (Table XV, 4, 8). Afterwards he started shaping the flat bottom with his fingers, forming the ring-shaped foot and the centre hollow. A relief spot was formed here during the modelling of the still wet clay, looking like a cone-shaped growth on the inside of the vessel.

Another method (scraping of the flat bottom) was used for shaping of the base ring of most cups produced in the ceramic centres near Hotnica, Pavlikeni and Butovo. For the purpose the ancient cpaftsmen used universal implements (Table XIII, 2).

The earthenware with narrow mouths and tall necks (amhporae, jugs, etc.) was also sujected to additional processing. The articles were attached to the potter's wheel by clay bases, i. e. implements with a cone-shaped upper part, standing on a widening foot with a hole in its centre (Table XV, 7). The implements were fixed to the potter's wheel with clay and the vessel neck was placed on the cone-shaped part of the base (Table XV, 5, 8).

The vessel bottom was also modelled by sticking a high hollow cylindrical foot, previously turned on the potter's wheel. Clay censers were made in that way, and their production was mastered in the potter's workshops near Hotnica, Pavlikeni and Butovo (Table XVI).

### b) Scrubbing and Clipping of the Walls of the Earthenware

A charasteristic feature of the earthenware from the three ceramic centres is the thinness of their walls. Thus, for example, the average thickness of the small earthenware is 2—3 mm, and in larger-sized earthenware 3—6 mm. This effect was achieved by the ancient craftsmen already while turning the vessel on the potter's wheel, but on small earthenware only; reduction of wall thickness of the big and shallow dishes and bowls was done additionally by scrubbing and clipping with special tools (Table XV, 1, 2, 3). In fact, this method is a continuation of bottom shaping in the technological cycle of ceramic production.

This operation had been done with sharp wooden and metal tools, the traces of which are preserved on the fine surface of the earthenware and especially in those cases when hard particles had come in front of the tool nib, leaving behind unevenly outlined furrows. Traces of the tool were also left by the additional scrubbing of the unevenly dried-up earthenware. Radial relief lines are usually observed in this case. Very often the thickness of some vessels was reduced by wall clipping by means of a sharp object. This method was used for the inner walls of the tall clay bases of censers and lamps, turned on a potter's wheel.

**c) Additional Neck Sticking**

Earthenware of quite large sizes, with tall and narrow necks, was produced near Hotnica, Pavlikeni and Butovo. The most significant feature observed during their study is the place on the inner side of the vessel where the body ends and the neck begins (Table XVII, 2). Quite a coarse wall thickening marks the place where the neck has been attached to the body. This clearly shows that this type of earthenware was made in two stages. The body and the neck were modelled separately. After slight drying of the two parts, the neck was stuck to the body on the slowly rotating potter's wheel (Table XVII, 1, 3, 4, 5).

What actually made the ancient potters resort to this method in making amphorae and jugs? According to the author, the first but not most significant reason was the large size of the earthenware for which more clay was required and the potters probably found it difficult to model it in one piece. However, the main reason for introducing this method should be sought in the fact that it had been difficult, even impossible, to retain the massive neck on the wide body whose walls were thin and still raw. All this forced the ancient craftsmen to model separately the body and the neck of this type of earthenware.

**d) Making and Fixing of Clay Handles**

A considerable part of the earthenware produced in the ceramic centres near Hotnica, Pavlikeni and Butovo have their handles additionally fixed. According to the way of making, handles are classified into handmade handles, handles turned on the potter's wheel or handles made in single moulds.

The flat, round or twisted handmade handles belong to the first type. One could presume that for the purpose the potter took quite a large piece of clay which he fixed firmly to the working table. Then he started drawing the handle with his left-hand fingers, supporting the movable end with his right-hand thumb. Depending on the pressure of the hand, two kinds of handles were obtained: flat handles with grooves or handles with a round cross-section (Table XVIII, 1).

The so-called twisted handles were shaped from the round one, but they are to be found comparatively more rarely. For the purpose the craftsmen used a grooved pattern. When run over the handle, it formed deep grooves, which turned into spirals when slightly twisted.

Single round handles are very rare. They are usually stuck in pairs. Stuck together with one twisted handle, they form the so-called triple handle. The latter was only used for large-sized earthenware. Separate fragments of these have been found in Hotnica, Pavlikeni and Butovo.

The handles were attached to the vessel in the following fashion: both ends of the handle being wet in advance in order to achieve better cohesion, one of them was stuck to the rim, the other to the body of the vessel. The craftsman pressed its lower end several times with his forefinger, leaving concave elliptical fingerprints (Table XVIII, 2, 3).

The horseshoe-shaped handles of jars and some wide shallow dishes were also handmade. They have semi-circular section and they were attached to the upper part of the vessel.

In his ambition to rationalize production, the ancient craftsman also used the potter's wheel for making clay handles. For that purpose he drew tall cylindrical vessel necks with deep flutes on the outside, which were cut out horizontally into narrow strips. The handles of all smaller vessels were made in that way. The same clay strips were also stuck to the deliberately thickened edge of some dishes, forming crimpled ribbon-like handles (Tables XVIII, 4, 9, XXXI, 37).

The third group includes handles made in single clay moulds. Here, the imitation of the metal vessels with relief ornaments is most clearly expressed. These handles are usually to be found on the shallow dishes and they are designed for decoration (Table XVIII, 15 and 16).

## VIII. DECORATION

### a) Incising with a Sharp Object

The incised line is the most widespread decoration upon fine ceramics. Usually, it encircles once or twice the upper part of the vessel. This was done already on the potter's wheel and it was the final stage of earthenware modelling.

Pointed wooden, bone or metal tools were used for this purpose. The concentric incised lines are most often to be found in combination with broken lines incised in the upper part of the vessels.

In the process of modelling the earthenware was decorated not only by means of some sharp tool, but with fingers as well, thereby obtaining wide and shallow parallel furrows. Vertical deep cuts were also made additionally by means of a sharp tool on some of the earthenware from Butovo, decorated with wide furrows. Concave spots, forming stylized grape clusters, most often in combination with other ornaments, were also carved on the wet vessel by means of a sharp tool (Table XIX, 1).

Earthenware decorated on the upper part by means of a comb are very often to be found. Decoration was done before taking down the vessel from the potter's wheel. A bone comb, used in the practice of pottery-making, has been found in Pavlikeni. It is made of an animal costal bone: small teeth, arranged at different intervals, are carved on the two edges of the comb (Table XIII, 2).

Additional decoration was also applied on the earthenware after taking it down from the potter's wheel. Small elliptical holes or wide furrows on the upper cylindrical part of the deep bowls were carved by means of special tools with a flat and rounded point. In other cases, stylized twigs were carved in combination with vertical lines all over the surface of the vessel. Vessels with such an ornament are often to be found in Hotnica and Pavlikeni. Small deep holes in combination with other ornaments — concentric rings and stamped rosettes — were used for making cylindrical cups in Pavlikeni and Butovo (Table XIX, 6). This type of decoration is an imitation of glass vessels.

The insised decoration is an essential feature of the fine earthenware products from Hotnica and Pavlikeni, and is rarely to be found on the products from the ceramic centre in Butovo. Although similar decoration could also be found on kitchen earthenware, it consists only of simple incised lines on the upper part of the vessel.

Earthenware with incised decoration is to be found in many ancient sites in Bulgaria.[69] It is one of the most widespread methods of decoration, used in all potter's workshops during the Roman era.[70]

**b) Incising with a Cogwheel**

The decoration obtained by means of a cogwheel is one of the easiest techniques and it was most used in ancient times in all potter's workshops.[71] A small movable cogwheel mounted to a wooden or metal handle had only to touch the still wet rotating vessel in order to produce stripes of small short lines arranged crosswise. Small cogwheels have been discovered in a number of West Roman ceramic centres. They were used for decorating both fine ceramics and moulds in which terra sigillata was made.[72] The small cross-line is most often narrow and sharply cut off, but there are also triangular segments or small concave rectangular holes.

In our ceramic workshops this type of decoration is to be found as single or double encircling line on the bottom of the shallow dishes. The whole upper cylindrical part of the deep bowls was decorated by means of a cogwheel. The whole inside of some small semispherical bowls from Butovo are thus decorated (Table XX, 2). Single or double stripes, drawn with a cogwheel, are to be found on the upper part of the earthen jugs and amphorae from Hotnica, Pavlikeni and Butovo. The cogwheel supplemented the relief decoration of the clay censers (Table XVIII, 6).

Usually only fine earthenware was decorated with a cogwheel, but under its influence this method was also used for decorating some vessels of greyish-black ceramics used in everyday life. For example, deep dishes used in religious rites, the bottoms of which are decorated with spirally arranged stripes, were executed in this technique (Table XLIV, 7).[73]

**c) Stamping**

The stamping of earthenware made on the potter's wheel by means of special seals was a widespraed technique during the Roman era. Initially, earthenware stamping simply had a practical purpose intended to show the name of the owner of the workshop or the craftsman who had made a particular piece. This is a usual phenomenon in the early Roman ceramics from Pergamum or on the terra sigilata produced in the Western workshops.[74] The name was most often included in a symbol representing a rectangle with rounded edges, human footmark, *tabula ansata,* ring, etc. Later on, the original meaning of the seal was forgotten — the name disappeared and stamping attained a simply decorative character.[75]

This technique for additional decoration was also used in the ceramic centres near Hotnica, Pavlikeni and Butovo, where six clay seals were found (Table XXI, 3, 6). They are cylindrical in shape, their lower base being elongated and the upper one round. A human footmark, a stylized rosette or a rhomboid form are depicted on the lower base, and a stylized rosette on the upper one. Similar seals have also been discovered near Mihailovgrad.[76] Usually deep dishes were stamped. These were made in the first half of the 2nd century and they had a cylindrical rim curved outwards (Tables XXVI, 2, 3, 6;

XXVII, 1). They were stamped mainly with single or double human footmarks. The stamp is in the centre of the vessel. One or two concentric rings are additionally drawn around it by means of a cogwheel.

Stamping was applied not only to the bottom of the earthenware, but on the whole surface as well, at which human footmarks were combined with multipetal rosettes (Table XXI, 4). Additional decoration by stamping is also to be found on the bases for small lamps. This technique for earthenware decoration had a particularly wide application in the ceramic centres discovered so far on the territory of Nicopolis ad Istrum in the second half of the 2nd century.

**d) Squirting (Barbotine Technique)**

Shaping of relief ornaments by squirting of liquid clay on the still wet earthenware surface is a technique widely used in nearly all Roman workshops known so far and dating from the second half of the 2nd up to the middle of the 4th century.[77] Actually, it was used as early as the Hellenistic period when the potters skilfully combined squirting with other techniques.

During the second half of the 2nd century the so-called Barbotine technique was introduced to the ceramic centre near Pavlikeni and towards the beginning of the 3rd century the ceramic centre in Butovo also started using it. A rich collection of earthenware decorated with squirted relief ornaments was discovered, originating from these centres, as well as the very tools by means of which this technique was applied. All this provides an opportunity to follow the development of squirted ornamentation and at the same time to clarify further some aspects of its technical realization.

Clay and special tools were required for squirting.[78] The ancient masters from Pavlikeni and Butovo used the same clay from which the rest of the ceramic production had been made, but it was subjected to additional processing by rinsing and filtering. Fine clay suspension was obtained in that way, devoid of any harmful organic or inorganic additives. It had to be neither too thick, nor too liquid, so that it could easily be squirted, and the relief ornament obtained had to remain intact on the earthenware.

Two narrow pipes were discovered in the centre near Pavlikeni through which squirting had been done (Table XIII, 2). One of them is made of a copper sheet, its one end thinner, the other one wider and curved outwards. The other narrow pipe is made of a femoral bone of a stork, its ends being cut off and polished by means of a sharp object. A funnel-shaped bag of textile or leather was fastened to one end of the pipe.

Squirting was done in the following way: the potter filled the bag with liquid clay, folded several times its open end and took it in his left hand. Then he levelled the bag at the slightly dired vessel prepared for decoration with his right hand, rhythmically pressing and releasing it, while turning slowly the potter's wheel. Slightly drawn relief ornaments were thus obtained.

The pipe was of great importance for the quality of the relief ornament. The potters from Pavlikeni used wider pipes; this is why the relief ornaments obtained there were larger than those found in Butovo, and moreover they had better outlined elements. The end of the narrow bone pipe being thinned out and obliquely cut off, it ended with a small point. In the process of squiring this point touched the clay drop and by dragging it left behind small concave stripes. The squirted ivy-leaves on the earthenware in Pavlikeni were formed in that way (Table XXII, 2).

Only plant ornaments were used for decoration in this technique in the centres near Pavlikeni and Butovo, the craftsmen from Pavlikeni preferred to squirt stylized ivy-leaves or small relief 'periwinkles' upon the inverted rim of the deep bowls and dishes and on the upper part of the cylindrical or greatly bulging cups (Table XXII, 1, 6).

The variety in Butovo is greater. The stylized ivy-leaves, rhythmically succeeding each other on the outside vertical edge of the deep bowls, are prevalent there. Quite often vine twigs with stylized grape clusters are to be found on the small cups, as well as successfully imitated pine cone scales on the entire outside surface of the vessel or arranged in chess-board order (Table XXII, 4). Squirted ornaments are also to be found on clay lids of fine thin-walled earthenware discovered near Pavlikeni and Butovo (Table XXIV, 4—6). Sophisticated combinations of various stylized ornamens, achieved in different techniques, are often seen on the same earthenware (Table XXII, 2, 4).

Squirting had been widely applied in Pavlikeni and Butovo. It represents a not always successful imitation of the embossed ornaments on the metal vessels. The reason for the failures can be sought, above all, in the clay, which cannot be processed as metal can be, and also in the individual skills and abilities of the craftsmen.

Earthenware with squirted ornaments, made in Pavlikeni and Butovo, are to be found on the territory of Nicopolis ad Istrum, as well as in Novae and to the north of the Danube.[79] This type of decoration on the earthenware is very seldom to be found in Southern Bulgaria. Separate fragments have been found in Serdica.[80]

**e) Appliquéing**

Appliquéing as a technique for applying an additional plastic decoration on the wheel-turned earthenware was widely used in Butovo and Pavlikeni and to a lesser extent in Hotnica. It was done by means of one or more single clay moulds. Clay moulds were found during the archaeological exploration in the ceramic centres, as well as in part of the discarded ceramic production manufactured in them; all this afforded an opportunity to follow and restore the whole production process of making appliquéed decoration.[81]

The moulds represent single negative prints, usually obtained either from metal, marble or ceramic objects with relief ornaments, or made from models produced by the potters themselves. The former are characterized by high artistic qualities and they are probably the work of skilled craftsmen, but they might have been imported as well. For example, there is a mould with the image of a Gorgon (Table XXIII, 4), found in Butovo, which differs considerably from the other moulds. It has been executed with greater diligence and on its exquisitely shaped handle there is a hole for stringing together with other moulds (Table XXIII, 5).

A clay mould was discovered in Pavlikeni with the image of Silenus, which has yielded the relief image appliquéed on a vessel made there (Table XXIII, 6). This image repeats an image of Silenus which was widespread as early as the Hellenistic era,[82] and it had most probably been copied from a metal vessel with a relief shape. Traces of the metal original of the models have distinctly been preserved on a single clay mould from Butovo with the image of a Gorgon (Table XXIII, 7). The greater part of the moulds found in Hotnica, Pavlikeni and Butovo were copies from models made by the craftsman himself, all of them bearing witnes of the work of someone unfamiliar with the canons of ancient art.

The copied mould was subjected to a number of additional processings before being judged to be suitable for work. Some of the elements of the relief ornaments were most often enhanced, retouched or additional decoration was applied.

The production of clay moulds for appliquéing was subjected to the same technological process as the rest of the earthenware, with one difference: glazing was not additionally applied on them. They were fired in the same pottery kilns and at the same temperature, which resulted in the same light brown colour.

Relief decoration was usually applied on the upper part of the vessel, the result being an uninterrupted ornamental band. This was achieved by the use of many moulds in the following way: the craftsman took with one hand the mould filled up with clay in advance and pressed it to the wall of the newly-made vessel. At the same time he had to support the inside of the vessel, leaving his fingerprints on the still wet clay. The same operation was repeated with the other moulds as well until the space designed for decoration was filled up. After some time, the well baked and dry clay moulds absorbed part of the water contained in the wet clay and came off very easily.

These moulds are the most striking illustration of what has been said so far. Two single moulds for a relief band on the upper part of the vessels originate from Butovo. A billy-goat was depicted on one of them and a satyr on the other. There is a part of a palmette in front of the two figures, which forms a whole relief ornament on the vessel when the two moulds are pressed to each other. A similar clay mould with the image of an animal (fawn) was also discovered in Hotnica. The image on the mould is rather disproportionate, the legs and the hooves being emphasized. It is odvious that the mould was made by an undistinguished craftsman who made his models himself.

A fragment of a small vessel from Butovo, decorated with a band of relief figures and rosettes, is also of interest. Only one figure and two rosettes were preserved during the baking process and the rest had come off, only their beds are to be seen (Table XXIII, 9).

The process of production of appliquéed ceramics is very clearly illustrated by a fragment of a vessel, discovered in an ancient settlement located between Butovo and the village of Vărbovka. The vessel produced most probably in Butovo, is made of fine clay on the potter's wheel. It belongs to one of the most common types in these ceramic centres: it has a lower conical and an upper cylindrical part, both ending with a widened and slightly turned outward rim (Table XXIV, 2). The relief image on the fragment from Butovo — Vărbovka is rather daubed as a result of a poor-quality mould in which it had been made, as well as thick, additionally applied glaze. Still it is not difficult to recognize in it the head of Dionysus — a rather frequently occurring image on the relief ceramics from Butovo.

Fragments of earthenware with relief decoration have also been discovered in Pavlikeni. The images of Dionysus and Heracles are prevalent among them. Plastic snakes, shaped by hand, have been additionally arranged round these moulded images (Table XXIV, 4).

A fragment of a vessel discovered on the territory of Hotnica is of particular interest. It was found in the ruins of an ancient settlement located 8 km northeast of the ceramic centre near Hotnica and is now kept in the local museum collection. It was wheel-turned, of fine purified clay, which had become light brown in colour after the firing. The fragment is coated with light brown glaze which has partially come off. A round medallion with a relief image

of Hercules is preserved on the fragment (Table XXIV, 7). A metal vessel with embossed decoration was probably used as a model for the mould, but lack of skill is apparent both in making the mould and appliquéing it on the vessel. This is more evident from the medallion which is rather distorted, with many of the details in the relief of the original daubed and worn off. All this would have made interpretation difficult if we did not have a votive tablet from Madara.[83] It is dated to the 2nd century and most probably originates from a local workshop. To the same century we could also date the medallion from Hotnica, which is undoubtedly from a vessel made here. Its artistic value is much higher compared to the relief from Madara. It is perfectly possible that a mould had been used for its making, copied from a metal vessel with embossed decoration — probably a work of some East Greek toreutikos.

Medallions on earthenware are also to be found in Pavlikeni and Butovo, depicting not only scenes from the mythology, but erotic scenes as well. We should mention as an example a clay mould for medallions discovered in Butovo (Table XXIV, 3). Here one could also notice the skill of the average craftsman, aimed at achieving a form and at the same time completely underestimating the quality of the relief image. It is evident that the mould from Butovo had also been copied from a clay image, the latter being too different from the original. A similar erotic scene is also depicted on a clay mould dating from the 2nd-3rd century and found in Gorsium near Balaton.[84]

The earthenware with relief decoration from Hotnica, Pavlikeni and Butovo represents a continuation of the Greek and Hellenistic traditions in this production in Roman times. They are an imitation of the expensive metal vessels and are designed for a wider circle of consumers.[85]

Earthenware with relief decoration was produced in the way described above in almost all ancient ceramic centres during the Hellenistic and the Roman epochs. As regards quantity, this type of ceramic objects represents an insignificant part of the whole earthenware production of a potter's workshop.[86] The techniques of making any additional plastic decoration on the wheel-turned earthenware proved to be rather unproductive, and this is probably why they were more reraly used.

Except for Hotnica, Pavlikeni and Butovo, production of earthenware with relief decoration in Bulgaria has been found so far only in Novae.[87] Such vessels were used only for religious purposes, which is confirmed by the relief images. Dionysian scenes or the feats of Hercules are usually depicted on the earthenware. The cult of these deities and especially of Dionysus had in ancient times been very widespread on the territory of Nicopolis ad Istrum.[88]

## IX. DEFECTS BEFORE BAKING

Defects are to be found on some of the studied earthenware, which, according to the author, had occurred before the process of baking, but had been eliminated by hand by the potter himself. For instance, when a larger-sized solid particle came under the polishing tool during the process of scrubbing, it dragged, leaving behind a deep furrow. The potter had to eliminate this defect by smoothing the furrow down by means of some sharp tool. Cracks resulting from irregular drying of the ceramic production were filled up with clay. Naturally, covering up of this kind of defects is possible only when the earthenware was not yet completely dry (Table XXV, 2, 3).

Sometimes, when carrying the finished earthenware from the potter's wheel to the place of their primary drying, damages were caused to the rims, which the potter hid by fixing a handle to the bent place. Even faulty earthenware, unfit for use, was baked and offered on the markets as *'bon marché'* or as grave offerings. This is confirmed by the faulty earthenware discovered in a number of ancient necropolises, which had been produced in the ceramic centre in Butovo.

## X. GLAZING AND WHITEWASHING

There was a certain decline with the Romans who in many respects accepted the cultural heritage of the Greeks in the production of ceramics. In contrast to the Greek earthenware, Roman ceramics were no longer essential in everyady life and became an imitation of the expensive metal and glass dinner sets. The so-called terra sigillata[89] had become typical of the Roman epoch, continuing the Hellenistic traditions in earthenware. Its most typical features are the red colour and the fine glossy glaze, the composition of which is not yet completely known.[90] During the Roman era all potter's workshops started to imitate the terra sigillata by using an additional coloured coating, which, however, never attained the quality of the shining glaze.[91]

The additional coloured coating on part of the earthenware produced in Hotnica, Pavlikeni and Butovo, was investigated by V. Načeva. In her opinion, the additional coating on the Roman earthenware has different names in the publications written so far: firniss, matt and glossy glaze. However, the name *glaze* gives the most correct definition. The author cited above attributes this name to the ordinary coloured clays melting at a temperature of 900—1250° C. These clays contain considerable quantities of quartziferous sand, felspars, iron oxides and calcium carbonate, which interact at the temperature mentioned above and form a glassy melt of auburn-reddish colour. However, V. Načeva accepts and uses the name *firniss* instead of *glaze*, because in many scientific publications, both in Bulgaria and abroad, the word *firniss* has established itself for denoting the coloured coating in the Greek and Roman ceramics. However, the author thinks that there is a difference between the Greek *firniss* and the coloured coating on the provincial Roman earthenware,[91a] which is rather a *glaze* coating. This term has already found confirmation in many scientific studies, especially on the ceramics from the workshops in Asia Minor. That is why, this term is also accepted here for denoting the coloured coating on the fine earthenware production.[92] It fulfilled two main functions: to give a beautiful and glossy appearance to the earthenware and at the same time to make it waterproof. Depending on the temperature reached during the process of baking, the colour of the glaze changed from light orange-reddish, brown-reddish to dark grey.

The glaze was achieved by repeated purifying of the clay. All organic residues, larger-sized rock particles, potassium carbonate, mica and, above all, the quartziferous sand, were removed during this process.[93]

The glaze was applied at the so-called 'leather hardness'(a term known in production), i. e. this is the moment when the vessel is not yet completely dried. Overdry, as well as wet products are not suitable for further processing. The coloured coating peals when the vessel is over-dried and in the case when it is still wet it leads to deformations; this is why, the Italic and Gallo-Roman earthenware, completely coated with firniss, are considerably thicker. In their case the coloured coating had been apllied twice.[94]

Techonology in the provincial ceramic centres was different. According to our observations, the vessel was taken by the foot and dipped into the glaze solution only once; the glaze thus covered the inside and to a certain extent the outer visible part of the vessel, after which it was upturned and placed on its dry foot. In this position, however, it often happened that part of the glaze which had not been absorbed in the vessel walls oozed down in thick wide stripes. The potter himself left his fingerprints on the article (Table XXV, 1).

Two aims were pursued by using this much faster method: to prevent the bending of the vessels during drying and their sticking during the baking process. All this was imposed by the demand for faster and more effective methods for creating cheaper and fine ceramic production which would be accessible for the populace.

The glaze in these ceramic centres is apparently very similar to the coloured coatings on the earthenware from the centres in Asia Minor and the Northern Black Sea coast, but it had not attained the fineness of the glaze from the workshops producing the terra sigillata in the West Roman ceramic centres.

A small part of the fine ceramic production, mainly funerary censers, was covered with lime.

## XI. DRYING, STORAGE AND FIRING

After modelling and glazing, the ceramic production was left to dry. According to the author, this was done on wooden shelves, fixed on the walls of the potter's workshop. As it has already been pointed out, definite temperature with no sudden draughts was required for the normal course of the drying. After drying, the production was arranged in the pottery kilns.

The discarded earthenware found inside the potter's workshops in the explored centres testify to the way the ancient ceramic production was arranged and provide also first-hand information about this important moment in the production. Moreover, there is an abundance of comparative material from other ancient centres.[95] The images depicted on the Corinthian tablets also offer information (seven centuries older that our kilns). In addition to all this are the observations made by the author on the ethnographic material related to the production of earthenware.[96] All this leads to some well-founded conclusions about the arrangement of the raw ceramic production. It was done by several people. The earthenware was brought in through a special opening, used at the same time as a vent for the smoke. The earthenware had been arranged in advance around the kiln for firing, but the biggest vessels were placed on the grate first and the smaller ones were arranged in them, the tendency being to use every free space as rationally as possible, without covering the vents for the smoke on the grate. The potter even arranged some of the earthenware upside down, with the aim of using the whole space of the kiln and thus creating an impression of disorder, which is also to be observed on the image of one the Corinthian tablets.[97]

The kiln was not filled up. The remaining space of about 15—20 cm was packed with pieces of discarded fine ceramics, stored in a special place by the working platform. 'Auxiliary warehouses' of this kind have been discovered in Pavlikeni and Hotnica. They represent conical pits dug in the immediate vicinity of the working platform.

The fine, thin-walled and glazed earthenware was arranged one on top of the other, alternating the glazed and unglazed parts in order to avoid sticking of the vessels together (Table XXV, 4—7). Additional bases and stems were not

necessary for this process, in contrast to those used in the firing of the Italic terra sigillata.[98]

During the Roman epoch, firing of the ceramic production was done in two types of kilns: kilns with open flame passing, and radiating kilns.[99] The kilns belonging to the first type are the most widespread ones. They are to be found in a number of varieties, but all of them are based on the same principle, i. e. free passing of the flame and smoke from the hearth through perforations of the grate into the upper chamber, heating the arranged production and going out through the upper vent. The structure of this type of kilns is such that there is inevitable alternation of reducing and oxidizing medium in the chamber.

The kilns belonging to the second type are very rarely to be found and they were used only for firing fine terra sigillata. A characteristic feature of these is the complete isolation of the atmosphere in the chamber containing the raw production, the flames being led into special pipes.

The other kilns discovered in Bulgaria, as well as those in the ceramic centres near Hotnica, Pavlikeni and Butovo, are related to the first type (Table X, 1). Two types of ceramics were fired in them: fine earthenware and earthenware used in everyday life, which were fired separately in the same kilns, but under different conditions.

The temperature at which greyish-black ceramics were fired in the explored centres reached up to 800°, while 800—1100° C was required for the firing of the fine earthenware.

The clay from Pavlikeni is the most easily meltable of all the clays to be found in the vicinity of Hotnica, Pavlikeni or Butovo. The silicate analysis shows presence of a great percentage of $CaCO_3$ which explains the greater amount of discarded production in this ceramic centre.[100]

## XII. DEFECTS DURING FIRING

Defects occurred as a result of disturbing the mode of firing of the ceramic production. This usually happened after the required temperature was exceeded and this resulted in partial or complete destruction of the production. The ceramic vessels arranged in the front part of the kiln in the immediate vicinity of the smoke vents, were usually subjected to the destructive effect of the fire.

A number of defects have been registered in the ceramic centres considered here, varying from the least significant ones, such as changing of the colour of the core and the glaze, to turning of the whole production into a shapeless glazed mass.

In the first case, the earthenware was sold, while in the second case the kiln, together with the ruined ceramic production, was abandoned and turned into a garbage pit. A kiln from Pavlikeni (Table VI, 1) is an indicative example, in which the grate, together with the glaze production, had collapsed into the lower chamber. Similar cases are also to be found in the centres near Hotnica and Butovo, as well as in a number of other ancient ceramic centres.

Defects during firing occurred when small particles of organic or inorganic origin got into the clay dough. The organic particles burnt completely, leaving shapeless pores, while the inorganic particles, being most often small calcareous formations, turned into quicklime. After the firing, it absorbed moisture from the atmosphere and turned into slaked lime, which had a catastrophic effect on the walls of the earthenware.

# NOTES TO CHAPTER TWO

[1] BLÜMNER H., 1879; DECHELETTE J., 1904; CHENET G. et G. GAUDRON, 1955; FREMERSDORF Fr., 1922; KUZSINSZKY B., 1932; CUOMO di CARPIO N., 1971—72, vol. 11, 317—462; PICON M., 1973, 2

[2] LOESCHKE S., 1912, 44 ff.

[3] ГАЙДУКЕВИЧ В. Ф., 1934.

[4] FLOCA O., F. ŠTEFAN et L. MARGHITAN, 1970; BICHIR Gh., 1973; POPILIAN Gh., 1976; HENNING J., 1977, 181—206

[5] ZIOMECKI J., 1965

[6] ДИМИТРОВА Ал., 1961, 27—33

[7] ДЖОНОВА-МИТОВА Д., 1966,38—44

[8] СУЛТОВ Б., 19726, 21—29

[9] The technological analysis of the red firniss-glaze from the Roman centres in Butovo, Hotnica and Pavlikeni were made by Veselina NAČEVA — Unpublished materials.

[10] СУЛТОВ Б., 1969а, 16, обр. 8

[11] ZIOMECKI J., Op. cit., 21—22, rys. 15, 17; FORRER R., 1911, 24, Abb. 5

[12] COMFORT H., 1940, 1351

[13] CUOMO di CARPIO N., Op. cit., 371

[14] IBIDEM, 372, tav. I, 2

[15] IBIDEM, 372, tav. I, 3

[16] FREMERSDORF Fr., Op. cit., 18—19, Abb. 19

[17] IBIDEM, 23, Abb. 22—24

[18] According to the calculations made by the Italian expert on ancient kilns, N. CUOMO di CARPIO, the partitioning wall bore 200 kg/m $^2$ on the average; Cf. Op. cit., 376, note 13

[19] ZIOMECKI J., Op. cit., 28, rys. 23

[20] HENNING J., Op. cit., 193—194, Abb. 7

[21] МОВША Т., 1971, 228—234

[22] ZIOMECKI J., Op. cit., 25—26, rys. 20

[23] FREMERSDORF Fr., Op cit., Abb. 19; KUZSINSZKY B., Op. cit., fig. 43

[24] ZIOMECKI J., Op. cit., 15, rys. 4

[25] IBIDEM, 85

[26] IBIDEM, 19, rys. 9

[27] BLÜMNER H., Op. cit., 27, Abb. 4; POPILIAN Gh., Op. cit., 139 ff., Pl. LXXXII; ГАЙДУКЕВИЧ В. Ф., Op. cit., 25 сл.

[28] ZIOMECKI J., Op. cit., 57 ff., rys. 47, 48, 49

[29] IBIDEM, 25, rys. 18

[30] KUZSINSZKI B., Op. cit., 139

[31] КОЗУБ Ю. П., 1966, 22 сл.; kilns isolated with stone are found in the ancient centre for ceramics near Hotnica

[32] SITTL K., 1895, 177

[33] ГАЙДУКЕВИЧ В. Ф., Op. cit., 35

[34] The clay prepared for the building of the kilns seldom contains sand

[35] For the use of adobe, Cf. ГАЙДУКЕВИЧ В. Ф., 1934, 99 сл., with literature

[36] LAUTIER R.,

[37] Unpublished materials from the archaeological exploration of Novae

[38] АНТОНОВА В. и Г. АТАНАСОВ, 1979,

[39] The archaeological exploration of the Roman *villa* near Čatalka, Stara Zagora District came by two kilns with tongue-shaped supporting pillars. For this unpublished information, the author is obliged to his colleague, Senior Research Associate D. NIKOLOV

[40] JONSTON D. E., 1969, 75, fig. 2, 4, 7

[41] ДЖОНОВА-МИТОВА Д., 1966, 39, обр. 3г

[42] НИКОЛОВ Б., 1961, 51—52

[43] POPILIAN Gh., Op. cit., 140, Pl. LXXXII

[44] КОЗУБ Ю. П., 1966, 11 и 22—23, kilns 1—8, T. 1, 3, 6а, 7, 8а

[45] ZIOMECKI J., Op. cit., 19, rys. 9

[46] DUHAMEL P., 1974, 60—66, fig. 5

[47] SCHORR H., D. BAATZ, 1967, 33—34, fig. 1

[48] FLOCA O., F. STEFAN, L. MARGHITAN, Op. cit., 45, fig. 19

[49] ZIOMECKI J., Op. cit., 75, rys. 51

[50] DUHAMEL P., Op. cit., 63, fig. 6

[51] КОЗУБ Ю. П., Op. cit., с. 11 и 23 — kilns 9, 12, Т. 1, 1; 12

[52] Cf. note 30

[53] ПЕЕВ В., 1966, 23—24

[54] Author's personal observations in the ceramic centre in Rosier near Graufesenque

[55] ГЕРАСИМОВ Е. и С. БЪЧВАРОВ, 1977, 46—47

[56] In the ceramic centre near Pavlikeni two wells were found on the eastern site; some traces of wells were also found south of the square in Butovo

[57] KUZSINSZKY B., Op. cit.

[58] FREMSDORF Fr., Op cit., 15

[59] VERNHET A., 1979, 16

[60] ПЕЕВ В., Op. cit.; ГАЙДУКЕВИЧ В. Ф., Op. cit., 39—40

[61] ZIOMECKI J., Op. cit., 14

[62] DECHELETTE J., 1904, 338

[63] RIETH A., 1939, 70, Abb, №.1, 2

[64] WIHR R., Op. cit., 17 sqq., Abb. 4, 5; PICON M., Op. cit., 32 sqq, fig. a, b, c.

[65] ZIOMECKI J., Op. cit., 91—93, rys. 55—58

[66] CHENET G. et G. GAUDRON, Op. cit., 33, fig. 9—i, k, m. p.

[67] RICHTER G. M. A., 1956, 261, fig. 238

[68] НАЧЕВА В., Cf. note 9; also author's personal observations in Oreše

[69] АЛАДЖОВ Д., 1956, 95, обр. 15, 6 и Табл. А, III, 4, 1; БУЮКЛИЕВ Хр., 1962б, 54, обр. 14; БАЦОВА-КОСТОВА Е., 1970, 31, обр. 14а; МИКОВ В., 1932—34, 108—121, обр. 103а, 104а, 105а.

[70] GOSE E., 1950 (1975), 350, 351—352; BOJOVIĆ Dr., 1977, Т. XXVII, 264, Т. XXVIII, 265; POPILIAN Gh., Op. cit. Pl. LX, 740—742

[71] BLÜMNER H., Op. cit., 37 ff.

[72] COMFORT H., Op. cit., 1339

[73] One of the reasons for not applying this technique on earthenware is the rough fabric of the vessels, containing large sand grains.

[74] LUTZ M., 1977, Pl. 12; CHENET G. et G. GAUDRON, Op. cit., 103, fig. 46; LOESCHKE, Op. cit., Abb. 6

[75] Stamped inscriptions have never been found either in Hotnica or in the other two ceramic centres

[76] ДИМИТРОВА Ал., 1961, 31—32, фиг. 7, 8, 9

[77] COMFORT H., Op. cit., 1338

[78] FARNOUX B. C., 1963 256—261

[79] Unpublished materials from archaeological excavations; POPILIAN Gh., Op. cit., Pl. XVIII, 218—222, Pl. XIX, 223—233, Pl. XX, 234—240; ДИМИТРОВ Д. П. et al., 1964, 234, рис. 19.

[80] БАЛКАНСКА А., 1964, 137—149, обр. 7б

[81] СУЛТОВ Б., 1972б, 21—29

[82] A similar mould for appliquéing relief ornaments has been found in Çandarli.

[83] ФИЛОВ Б., 1911, 85 сл., обр. 1

[84] A similar tablet is kept in the Szekesfehervar Museum in Hungary — author's personal observations

[85] ЗАБЕЛИНА В. С., 1968, 119—124; БЛАВАТСКИЙ В. Д., 1953, 248 сл; КНИПОВИЧ Т. Н., 1955, 373 сл.

[86] LOESCHKE S., Op. cit., 385 ff.; COMFORT H., Op. cit., 1343; VERTET H., 1969, 93—133

[87] ДЖОНОВА-МИТОВА Д., 1970, 5—8, обр. 1, 2

[88] Two votive tablets from Suhindol are dedicated to Dionysus and Hercules depicted together — Cf. MIHAILOV G., 1958, Nos. 696—697; One votive tablet with Hercules fighting the Nemean lion has been found in Bjala Čerkva — IBIDEM, No. 700. Many monuments dedicated to Dionysus were found on the territory of Nicopolis ad Istrum. Dionysus and his *thias* are represented on ancient monuments from Gradina village (unpublished), from Pavlikeni — IBIDEM, No. 699, from Nicopolis ad Istrum — IBIDEM, No. 673, from Momina Krepost, near Veliko Tărnovo — IBIDEM, No. 721, as well as from Pčlište — IBIDEM, No. 723. Besides the inscription featuring the members of the Dionysian *thias* from Butovo — Cf. ГЕРОВ Б., 1950—51, inscription No. 397, there is also another unpublished inscription containing the name Pautalus, son of Cornitus — priest of Dionysus.

[89] ШЕТЦЕР Л., 1962, 12.

[90] PICON M., Op. cit., 37 sqq.

[91] НАЧЕВА В., 1981, 1—7

[92] КНИПОВИЧ Т. Н., 1955, 290 сл.

[93] НАЧЕВА В., Op. cit.

[94] IBIDEM.

[95] CHENET G. et G. GAUDRON, Op. cit., 104; KUZSINSZKY B., Op. cit., fig. 42; for the mode of arranging, Cf. ГАЙДУКЕВИЧ В. Ф., Op. cit., ц. 89 сл., with literature

[96] In the course of our work we had the opportunity to see the ceramic production as represented in its various stages at the Museum of Arts and Crafts in the town of Trojan, etc. and to profit from the skills of the older potters

[97] ZIOMECKI J., Op. cit., 75, rys. 51

[98] BROWN P. D. C., 1971, 95—96, Pl. XXIXb

[99] CHENET G. et G. GAUDRON, Op. cit., 84 sqq.; PICON M., Op. cit., 55 sqq.

[100] НАЧЕВА В., Op. cit.