

## KEYS AND ELEMENTS OF LOCKING SYSTEMS FROM IBIDA (MOESIA INFERIOR /SCYTHIA PROVINCE)



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**Abstract:** The so-called `small finds` play an important role in the reconstruction of daily life in Ibida, a walled town in the province of Moesia Inferior that became part of the province of Scythia as early as the 4<sup>th</sup> century AD.

In this paper we refer to 15 metal items that are elements of the locking mechanisms used for room doors or for various pieces of furniture, boxes, chests, etc. There are 11 keys and four deadbolts discovered in the Ibida fortress or in its hinterland. The items were made of bronze and iron, probably in workshops in the province, with rather numerous analogies in the Roman settlements in the Lower Danube area.

The study of the role of keys and protection systems in general in an urban community such as Ibida can lead to certain conclusions, bearing on the intensity of economic activities carried out in a certain period of the city's existence, the prosperity of the community, and also provide interesting details about the evolution of social life in the province in general.

**Rezumat:** Un rol important în reconstituirea vieții cotidiene de la Ibida, cetate din provincia Moesia Inferior, iar din sec. al IV-lea parte a provinciei Scythia, îl dețin artefactele de tip "small finds".

În materialul de față facem referire la 15 piese metalice, reprezentând elemente ale sistemelor de închidere folosite la uși de acces în încăperi, dar și de la diferite obiecte de mobilier, casete, cufere etc. Sunt 11 chei și patru componente de încuietori – bolturi – descoperite în cetatea Ibida sau în arealul dependent de aceasta. Piesele au fost confecționate din bronz și din fier, probabil chiar în ateliere din provincie, cu similitudini destul de numeroase în așezările romane din zona Dunării de Jos.

Cercetarea rolului cheilor și a sistemelor de protecție, în general, într-o comunitate urbană precum Ibida poate să conducă spre anumite concluzii și relativ la intensitatea activităților economice desfășurate într-o anumită perioadă din existența cetății, la prosperitatea comunității, dar și la detalii interesante despre evoluția vieții sociale din provincie, în general.

**Keywords:** Roman locks, keys, Ibida, Moesia Inferior, Scythia, everyday life.

**Cuvinte cheie:** încuietori romane, chei, Ibida, Moesia Inferior, Scythia, viață cotidiană.

### INTRODUCTION

The archaeological research in Ibida has been able to confirm the existence of a well-knit community as early as the first two centuries of the Christian era.<sup>1</sup> However, one can only speculate about the legal-administrative status of the settlement in the current stage of research. It was not until the 4<sup>th</sup> century AD, when it became one of the largest cities in the province of Scythia, that one could assess the role and evolution of Ibida in the area. The few available literary sources, but particularly the archaeological excavations, in conjunction with the identified artifacts, are essential elements for the reconstruction of everyday life in this remote corner of the Roman Empire. An important role in this approach is also played by the items included in the "small finds" category. The numerous metal artifacts that could be

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<sup>1</sup> Opaț 1991, 23; Paraschiv *et alii* 2019, 432-434.

identified demonstrate a spectacular dynamic of daily life, over more than five centuries of existence of this settlement located between the Danube and the Black Sea. In addition to clothing accessories, jewelry, various tools, harness pieces and weapons, there are some more special categories of metal objects, in terms of their use in everyday activities, which are common in certain areas, but very interesting in the economics of everyday life research in such a Roman provincial community.

The subject of the present paper comprises the locking mechanisms and keys. The protection of personal property, the desire to block access to private spaces, the restriction of movement in certain areas of the city or home has led people to invent and improve various locking systems. Eustathius credits the Lacedaemonians with the first use of keys.<sup>2</sup> Pliny the Elder, on the other hand, attributed this merit to a certain Greek, Theodorus of Samos.<sup>3</sup> Archaeological discoveries have shown that door or container locking systems were used as early as the 14<sup>th</sup>-13<sup>th</sup> centuries BC, in the region of Mesopotamia, in Egypt, but also in China. The technological stages of these mechanisms are quite numerous and they have been addressed in the literature of the last two centuries.<sup>4</sup> The common opinion that emerges from all this research is that the Romans revolutionized these protection systems and made them accessible to a large part of the inhabitants of both urban and rural centers. With the expansion of the Roman Empire, the flourishing of trade, and the obvious prosperity of its inhabitants, the concern for the protection of goods and people increased exponentially. High demand for locking systems, both for exterior or interior doors, but also for boxes, cabinets, chests, etc. it also led to a refinement of the production technology, of the materials from which the locks and keys were made, but also to a hyper-specialization of the craftsmen. The "key" to the progress of Roman locking systems was the inclusion of metal springs made of cold-forged iron.<sup>5</sup> These springs made the respective mechanisms much more robust and, therefore, more efficient.<sup>6</sup>

What interests us in our current research is to identify the types of artifacts that played this role in the Ibida walled town, of course, correlating the general information known from literary sources with the archaeological discoveries, in this important site for Roman provincial life. In the present paper we will investigate a group of 11 keys and four lock components discovered in the fortified town of Ibida or in its hinterland. The items were made of bronze and iron, and are in general, often found in Roman settlements in the Lower Danube area, in terms of typology.<sup>7</sup>

## DISCUSSIONS

Although the locking systems were obviously invented long before the imposition of Roman power, however, the advanced technology of the Romans managed to significantly improve

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<sup>2</sup> Eustathius, *Commentary on the Odyssey*, p. 1603, 51; see also in Price 1856, 185.

<sup>3</sup> Pliny, VII, chap. 56.

<sup>4</sup> For an extensive investigation of technological developments in the field of door locking mechanisms see Haddad 2016, 53-74; particularly 66-67, with an extensive bibliography on the Egyptian and Mesopotamian closure systems. To add Pace 2014, 9-20 and Proffitt 2018, 44-45.

<sup>5</sup> Haddad 2016, 68.

<sup>6</sup> Proffitt 2018, 46-47.

<sup>7</sup> We will not refer in this material to the five casket locks discovered in Ibida, which are already in print as an article with the title *Some chest hasps of Ibida (Moesia Inferior province)*.

the locking systems, but generalized in particular the use of these protective systems on a large scale.

In Roman sites the keys are very common minor finds. There is practically no urban site where such artifacts have not appeared as a result of the excavations and often we have attestations in rural areas. Based on the dimensions of these items, the material used, the lockage system and even their precise destination, several useful typologies could be established, for the systematization of this category of artifacts. Thus, the classification of Roman keys was made according to their shape, respectively of the component elements (in the form of the letters L, T, Z, etc.), but also according to the material from which these were made (iron, copper alloys or compound).<sup>8</sup> Also, according to the locking-unlocking technique of the mechanism, and the shape of the active part respectively, another classification was made.<sup>9</sup>

Two main types of mechanisms were employed during the Roman period. The most ancient, called the tumbler lock, has roots that are lost in the Mesopotamian period. It is characterized by matching the tines on the useful part of the key (the bit) with a complimentary tumbler pin in the locking mechanism that holds the bolt until lifted by the key.<sup>10</sup> The closing-opening process is by sliding/pulling the device. The second mechanism, which became very popular especially during the Byzantine period, was the rotary lock. With this, as soon as the key was inserted into the lock-plate, by means of a simple left or right rotation the bit of the key is forced into contact with the deadbolt, pushing it out of the locked position. Characteristic of this last type of system is the existence of wards, which are elements that prevent the insertion of any key other than the intended one. These simple additions prohibit most keys from being inserted, other than the one prescribed.<sup>11</sup> Basically, this last type of locks was the basis for the development of modern locking systems.

The specialist literature, not very rich in regard to this specific type of material, had in general a technical approach, which was based on physical description. However, there is no lack of works that went as far as the analysis of their symbolic significance, the mental impact and the religious implications that such a seemingly banal object could have on the ancient people.<sup>12</sup>

The role of the keys in an urban community like Ibida should lead to certain conclusions, both in regard to the intensity of economic activities carried out in a certain period of the city's existence, and following the evolution of social life in this community. It is obvious that homeowners or the owners of chests, boxes, cabinets or other furniture, provided with such devices were trying to secure some material values that they possessed.

To get into the subject proper, it should be noted that most of the keys identified in Ibida are slide keys, in the shape of the letter L, components of tumbler locks.

A more detailed typology of the keys and elements of the locking systems found in Ibida, according to their shape, components, and manner of use, could be built as follows:

<sup>8</sup> Fernández Ibáñez 1999, 106-117; Fernández Ibáñez 2007, 220-223. For the artefacts in the Lower Danube region, and Dacia, respectively, see Gudea, Matei 1981, 195-196, as well as Ferencz 2010, 288.

<sup>9</sup> See Manning 1985, 88-97.

<sup>10</sup> Ward 1911, 231-239, Allen 1996-1997, 162-164, and see Pace 2014, 58-61 for a more detailed approach.

<sup>11</sup> Pace 2014, 72-74.

<sup>12</sup> For example, in the marriage rites, the husband offered his wife a key as a symbol of taking over his house; it was returned in the event of divorce: Rambaldi 2013, 194; see also Ciurletti 1996, 67-70 and Proffitt 2018, 83-92 for additional information related to the symbolism of the key to the Romans, especially from a religious perspective; see also *The Power of the Key*, 27-28 and Petcu 2019, 182-186.

## A. Keys

### I. Tumbler slide keys

1. Ring-keys (nos. cat. 1-2)
2. Ordinary tumbler slide keys (nos. cat. 3-10):
  - a. Keys with a plate on the handle:
    - a.1. Keys with rectangular plate (nos. cat. 3, 5-6)
    - a.2. Keys with trapezoid plate (no cat 4)
  - b. Keys with simple handle (nos. cat. 7-10)

### II. Tumbler L-shaped lift key (?) (no. cat. 11);

## B. Metal deadbolts for tumbler locks

1. Regular deadbolt (nos. cat. 12-14).
2. Deadbolt with a hook-shaped protrusion (no. cat. 15)

According to the material used, we have two main categories of finds: of copper alloy and of iron.

## A. Keys

### I. Tumbler slide keys

#### 1. Ring-keys (Pl. I/1-2a.-b., Pl. IV/1-2)

In the literature these items are also called finger-keys. They were worn on the finger for both functional and aesthetic purposes, as well as with, most likely, a symbolic meaning. Possession of such objects could symbolize authority and ownership over certain values or properties. They were keys to boxes, cabinets or other furniture pieces, generally not very massive objects.<sup>13</sup>

These consist of a ring large enough to insert the finger, from which starts a stem, which can be barely noticeable or longer, an element that continues, at a right angle, with the active part of the key (the bit), consisting of several tines arranged on one or more registers. This active part enters the deadbolt plate, provided with the appropriate holes for the respective teeth.

As for the moment of emergence of this type of key, some opinions indicate the Classical Greek period, respectively the 5<sup>th</sup> century BC.<sup>14</sup> However, the archaeological discoveries have shown that many such keys are recorded in Roman times, both in civilian and military contexts.<sup>15</sup> For example, in the *castrum* of Vindolanda, in Britannia, such keys have been identified, dated in from the 2<sup>nd</sup> to the 4<sup>th</sup> century AD, in an interesting variety, especially according to their number of tines or the shape of the bit.<sup>16</sup>

The ring-keys, made mostly of copper alloy, can also be categorized according to the way they are inserted into the lock and the mechanism it actuates, as follows: sliding keys, which are the most numerous, and shoving or rotary keys.<sup>17</sup> They work on the same principles as ordinary, larger keys, the only difference being related to their manner of carrying and their usage for cabinets and chests.

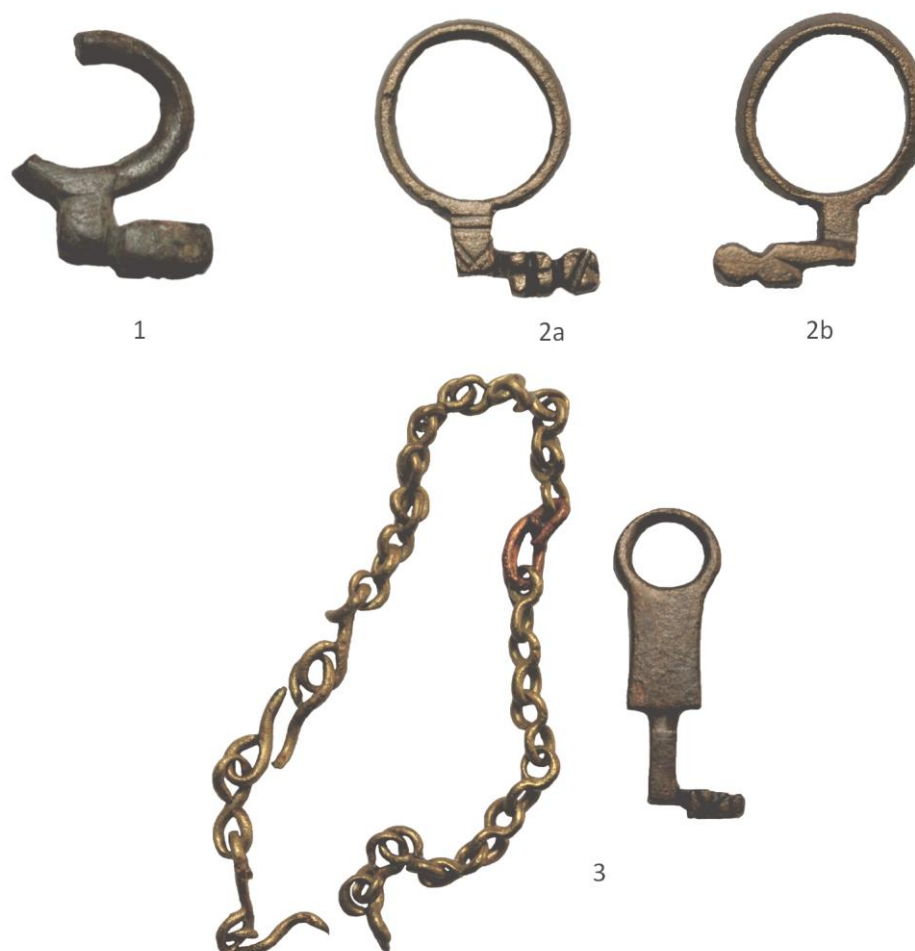
<sup>13</sup> Relevant are the archeological discoveries, quite rare, in which the key is even identified with the whole locking system and even with the object to which it was attached: Riha 2001, 56, fig. 27 a-b.

<sup>14</sup> Pulinas, Rocchetti 1958, 369.

<sup>15</sup> Galliazzo 1979, 151.

<sup>16</sup> Birley 1997, 20.

<sup>17</sup> For several relevant finds in sites of Moesia Inferior: Kyзов 2000-2001, 203-205.



Pl. I. Keys - photos (1-2. ring keys; 3. tumbler slide key, with chain).

These pieces were made by casting in bivalve molds, and in terms of archaeological evidence it is very possible that such pieces were produced even in local provincial workshops. In this sense, for Moesia Inferior, and Scythia for the period after the 4<sup>th</sup> century, respectively, there is an interesting and relevant specimen of a rejected ring-key, discovered in Durostorum.<sup>18</sup> One should add another fragment of ring-key, found in Dobrogea, also unfinished,<sup>19</sup> but which may suggest the existence of local workshops for the production of small metal parts.<sup>20</sup> Such ring-key discards have been identified in the neighboring province, Dacia,<sup>21</sup> a reality that leads to the same conclusion. The workshop in Drobeta stands out, where, along with fibulae with bent stem, keys of various types were also produced.<sup>22</sup>

As analogies in our area of interest one should mention, in addition to the specimens mentioned above, a piece from the quasi-urban or rural settlement of Telița–Amza, in the proximity of *municipium* Noviodunum,<sup>23</sup> but also other finds, from Tropaeum Traiani,<sup>24</sup>

<sup>18</sup> Elefterescu 2013, 202, no. 84, pl. XII, 2, a-c.

<sup>19</sup> Nuțu, Chiriac 2012, 248, no. 7, pl. I.7.

<sup>20</sup> Nuțu 2019, 83.

<sup>21</sup> Alicu, Țentea 2005, 68-69, fig. II/5 (la Micia), Tamba 2008, fig. VI/3, 30 (Porolissum).

<sup>22</sup> Bejan 1976, 262-263, fig. 2, f, pl. I; Curta, Gândilă 2011, 65, fig. 13.

<sup>23</sup> Baumann 1995, pl. XXIII, no. 6 and pl. XLIII, no. 5 (uncovered during the campaign of 1988 and dated, according to the author, in the 4<sup>th</sup> century AD.).

<sup>24</sup> Bogdan Cătănciu, Barnea 1979, fig. 155, 10.20; fig. 165, 10.28, 10.29; fig. 174, 10.8.

Sacidava<sup>25</sup> and Histria<sup>26</sup> (Constanța county). In the present territory of Bulgaria such finds have been better inventoried and published. In addition to quite a few specimens without a very precise place of discovery,<sup>27</sup> there are, however, many pieces from the Varna region<sup>28</sup> and the Dobrich region.<sup>29</sup> It is worth mentioning here the ring-key from the *castrum* of Barboși<sup>30</sup> (Galați county), an outpost of the Roman rule north of the Danube, as well as the piece from Șuletea (Vaslui county), in the middle of a “barbarian” area.<sup>31</sup> Certainly, discoveries of this type in Roman and Late Roman archeological sites in the Lower Danube region, whether these were part of the Empire or in its area of influence, are more numerous, but their publication is quite deficient. We add to those already mentioned the two finds from Ibida, both in the category of sliding keys, as follows:

**Cat. no. 1** is a ring-key preserved in fairly good condition, made of copper alloy. About a third of the ring's circumference is missing. It is connected to the bit by a very short rectangular stem, of 3 mm. The bit is rectangular with the larger side of 11 mm, and the smaller one of 9.40 mm. Although the piece is quite corroded, one can still see three grooves that marked the registers that entered the passive elements of the lock. It is a key from a box or a locking device of a small piece of furniture.

**Cat. no. 2** is a bronze ring-key, in which the ring has a semicircular profile. The item is whole preserved in very good condition, only the ring showing, probably during use, a small contraction. From the ring starts a short stem, 4 mm long, which has two parallel lines on the upper front side and two lines that form two angles at the base, at the intersection with the bit. The profile of the rod is rectangular, 4.80 mm thick. The bit that enters the lock, consists of two registers, both cubic, but slightly rounded outwards, one cut crosswise, with a cut deeper than the other, and the second in X, with different depths of cuts. The bit is 11 mm by 8.30 mm. It is a more carefully crafted item than no. 1, with simple decorative elements and was probably used to lock a casket.

## 2. Ordinary tumbler slide keys

The largest number of keys uncovered in the general area of the Moesia / Scythia province are in the category of tumbler lock slide keys. These are keys widely used in the Roman period and even in the Early Byzantine period. In general, for these, the stem (handle) that connects the ring and the bit bends to form a right angle, hence the name of L-shaped keys. Consequently, they required an L-shaped key hole. The bit had teeth that enter certain holes arranged on lock elements and that unlock, respectively block some vertical tumbler pins held by a spring.<sup>32</sup> It is the most common type of key in the Roman world, until the late period, when rotary locking systems become preponderant. These tumbler slide keys were made of bronze, by the technique of casting in bivalve molds, respectively of iron, by hot forging. Sometimes, the rings or handles of the keys were decorated, either with animal

<sup>25</sup> Scorpan 1978, pl. X.48 and XVIII.48.

<sup>26</sup> Suceveanu 1982, 125, pl. 23.lc.9; 127, pl. 24.lc.9, lb-c, 40 and 128, pl. 25 IIB.8.

<sup>27</sup> Кузов 2000-2001, 205-206, nos. 56, 60-64, 67, 69, 71-72.

<sup>28</sup> Кузов 2000-2001, 205-206, nos. 57-59, 65, 68, 70, 73.

<sup>29</sup> Кузов 2000-2001, 206, nos. 66, 74-75.

<sup>30</sup> Sanie 1981, 193, no. 42, pl. 49/9.

<sup>31</sup> Croitoru 2011, 250, cat. no. 3743, fig. 149.3743.

<sup>32</sup> Galliazzo 1979, 150.

heads (dogs, panthers, lions, horses, etc.),<sup>33</sup> or with different deities, or other elements,<sup>34</sup> both for aesthetic and symbolic purposes.

The eight Ibida finds are divided, depending on the existence or not of a plate that connects the ring with the bit, acting as a handle, in tumbler slide keys with trapezoidal or rectangular plate and simple tumbler slide keys.

### *2.a Keys with trapezoid or rectangular plate on the handle*

For this subtype of keys we have four items found in Ibida; two are made of copper alloy and two of iron. Of these, three are with a rectangular plate and one with a trapezoid plate.

As general analogies from the province of Moesia Inferior one should mention the finds from Nicopolis ad Istrum<sup>35</sup> and in the region of Varna.<sup>36</sup> For the iron items there is the key found in Tropaeum Traiani, which has a rectangular plate and a very short bit stem.<sup>37</sup> It is worth mentioning that such specimens also appear in *Barbaricum*, as is the case of the discoveries in Moldavia, of Pădureni<sup>38</sup> (Jariștea commune, Vrancea county) and Poiana<sup>39</sup> (Dulcești commune, Neamț county).

#### *2.a.1 Tumbler slide keys with rectangular plate (Pl. I/3; II/5-6; IV/ 3; V/5-6)*

**No cat. 3** is a bronze key with a rectangular plate, preserved in a very good condition and accompanied by a chain also made of bronze, preserved fragmentarily. The chain is visibly repaired and consists of three segments. Two of them have identical, double links, with a diameter of each link of about 7.20 mm, connected to each other by a 18.70 mm copper link. A double link is 11 mm long. The third segment consists of larger links, also double, 20 mm long and a diameter of a link of 8.20 mm. The key consists of a ring, attached to a fixed rectangular plate. This plate is connected to the bit by a rectangular stem, 17 mm long and 5 mm wide.

The bit, which measures 17.75 mm, consists of two registers; the closest to the stem is rectangular, with a slanted cut in the middle, and the second is triangular in shape, also with a cut. In fact, these tines formed the useful parts of the key and entered the holes of the passive element (deadbolt) in the locking system. It could be a key to a piece of furniture or even an access door.

**No. cat 5** is an item identified during the archaeological excavation in an extramural sector of the Ibida site.<sup>40</sup> The key, made of iron, is quite well preserved. The ring lacks only about 15% of its circumference. The ring is connected to a rectangular plate, and from the plate issues a long stem, trapezoidal in shape, with a width at the top of 8.70 mm, and 6.75 mm at the bottom. As with all keys of this type, the bit starts from this stem, which, in this case, is rectangular, with sides of 20.25 mm by 12.10 mm. This active part has three registers, separated by three grooves. Most likely, these registers, rectangular in section, also had

<sup>33</sup> Giovannini, Tasca 2016, 103; Rambaldi 2013, with extended bibliography, particularly on pages 189-191.

<sup>34</sup> Kozloff 1993, 368, fig. 1-3.

<sup>35</sup> Poulter 2007, 41, fig. 2.176, 2.177 (dated in the 4<sup>th</sup>-5<sup>th</sup> century AD).

<sup>36</sup> These are three specimens that can be classified with the type of ring keys, by means of the very narrow plate that connects the ring to the stem: Кызюв 2000-2001, 207, nos. 76-78.

<sup>37</sup> Bogdan Cătănciu, Barnea 1979, fig. 166, 10.37.

<sup>38</sup> Croitoru 2011, 243, no. 3838, fig. 152.3838. This piece is one of the few keys discovered in a tomb (no 34): see also Morintz, Bichir 1959, 491, fig. 3/2.

<sup>39</sup> Croitoru 2011, 164, no. 2319, fig. 88.2319.

<sup>40</sup> Iacob *et alii* 2005, 352.

specific tines, but, unfortunately, the corrosion of the piece no longer allows these details to be seen. It could be a key to a piece of furniture or even an access door key.



Pl. II. Keys – photos (4-8. tumbler slide keys).

**No. cat. 6** is an iron key with a rectangular plate, preserved in mediocre conditions. Only the part that is connected to the rectangular plate, respectively about 40%, is preserved from its ring. From the ring starts the rectangular plate that continues with a 32.50 mm long, trapezoidal stem, which starts from the plate with a width of 11.40 mm and reaches the bit with a width of 6.90 mm. It has a rectangular profile, with a thickness of 5.30 mm. Both on the plate and the stem one can see some dots arranged asymmetrically, with diameters of about 2 mm. There are four such elements on the plate, positioned two by two, and on the stem there are three that are attached together and one at the bottom, right at the junction with the functional part of the key. The bit is rectangular, with the sides 23 mm by 13 mm, and a thickness of 7.20 mm. Two registers separated by a groove are identifiable quite clearly, each with a rectangular tooth, cut obliquely. This item is noticeable of lower quality of craftsmanship, since the plate that connects the stem to the ring is uneven. Most likely, this key was used on a device to close a door or an access gate.

#### 2.a.2. Tumbler lock slide keys with trapezoid plate on the handle (PL. II/4; V/4)

**Cat. 4** is a bronze key preserved in perfect condition. The ring is intact and is continued with a trapezoidal plate. From the plate leaves a stem 12.50 mm long and 6.30 mm wide, which makes the connection with the bit. The stem is provided, in its lower part, right at the intersection with the bit, with two small grooves with a decorative role, and from the upper



part, from the connection with the trapezoidal plate, it has a rectangular cross-section, so that after about 5 mm this profile is rounded, to the decoration described above. The bit of the key is rectangular in shape, with a large side of 18.50 mm and a small side of 11.50 mm. It is composed of two teeth, one smaller, arranged further away from the stem, and larger one, separated by a deep groove, which goes beyond the middle of the bit. The connection with the stem is also made by means of a notch. On the back of this register there are two lines that make right angles, and right on the area with the teeth there are five other lines arranged somewhat parallel.

*2.b. Tumbler slide keys with simple handle* (Pl. II/7-8; III/9-10 a-b; V/7; VI/8-10)

Another subcategory of tumbler keys are the simple ones, without a plate on the handle. They are mostly made of iron, but there are also ones made of copper alloys. The stem connecting the ring to the bit are usually trapezoidal, and their crafting is standard, without spectacular finesse and decorations. For the simple tumbler lock slide keys from Moesia Inferior we can mention the specimens from Telița–Amza<sup>41</sup> and Histria<sup>42</sup>. From *Barbaricum* one should mention an iron specimen found in Poiana–Piroboridava (Galați county).<sup>43</sup> At Ibida we have four such items, three made of iron and one made of copper alloy.

**No. cat. 7** is a bronze key preserved in mediocre conditions. From the ring, only the stem part that connects with the bit is preserved, i.e. about 40%. The profile of the rod is rectangular, with a thickness of 4 mm. The bit is rectangular, with sides measuring 19.70 by 11.60 mm. It consists of two teeth that were used in the locking mechanism. One, the furthest from the stem, is smaller and is separated from the other by a barely perceptible notch, and the second, larger, is separated from the stem by a deeper notch. The key could have been used both for a furniture lock, but also for a residential door.

**No. cat. 8** is a simple key, made of iron. The width of the bar from which the ring is made is appreciable, which is about 9 mm. From this ring starts a trapezoidal handle, having at the upper end a width of 17.15 mm, and reaching 7 mm at the lower end, at the point of conjunction with the bit. The thickness of the stem is 5.20 mm. The bit is rectangular, with a large side of 27.30 mm and a small side of 14.30 mm. Even if the tines are quite corroded, one can still see four registers with teeth separated by small notches of different sizes. Given the larger size of the piece, but also the solidity of the work, one can ascertain that it could have been used to actuate a lock from a gate or a more solid access door.

**No. cat. 9** is an iron key preserved in perfect condition. The ring continues with the trapezoidal handle, measuring 13.00 mm in width at the top, from the intersection with the link and narrows to 6.00 mm at the junction with the tin. The useful part of the key is rectangular, with dimensions of 21.24 mm by 11.60 mm. You can see three registers, with one parallelepiped tooth each, cut obliquely in the middle, and between them there is a ditch of variable size. The first tooth, in the vicinity of the rod, has a cut that follows the direction of the rod, and the other two have those channels cut in the opposite direction. The piece is beautifully crafted, it has a special grace and is obviously different in terms of

<sup>41</sup> Baumann 1995, pl. XXIII, no. 8, pl. XLI, no. 3 (the author dates it in the 2<sup>nd</sup>-3<sup>rd</sup> century AD).

<sup>42</sup> Suceveanu 2007, 226, pl. LXXXII.12 (of bronze) and 227, pl. LXXXII.32 (of iron). In the case of these fragmentary items, one can only assume the type of key, because only a fragment of the connecting stem and the bit is preserved.

<sup>43</sup> Vulpe, Teodor 2003, 241, no. 564, fig. 129/36; Croitoru 2011, 249, cat no. 1506, fig. 60. 1506.

craftsmanship from the other iron keys described so far. It may have been used, rather, to actuate a furniture lock.



Pl. III. Keys and deadbolts – photos (9-10. tumbler slide keys; 11. L shape tumbler lift key(?)); 12-15. deadbolts for tumbler locks).

**No. 10** is an iron key preserved in good condition. The ring is intact and continues with the trapezoidal handle, which is 13.20 mm wide ringside, and at the conjunction with the bit reaches a width of 5.45 mm. The bit is rectangular, with sides of 16.20 by 10.30 mm and consists of three registers, each representing a rectangular tooth, which are unequal in size. Due to corrosion, the cuts that were made in these tines can no longer be seen. Like the previous piece, this key is quite well crafted and may have been used, rather, for locking a device from a piece of furniture.

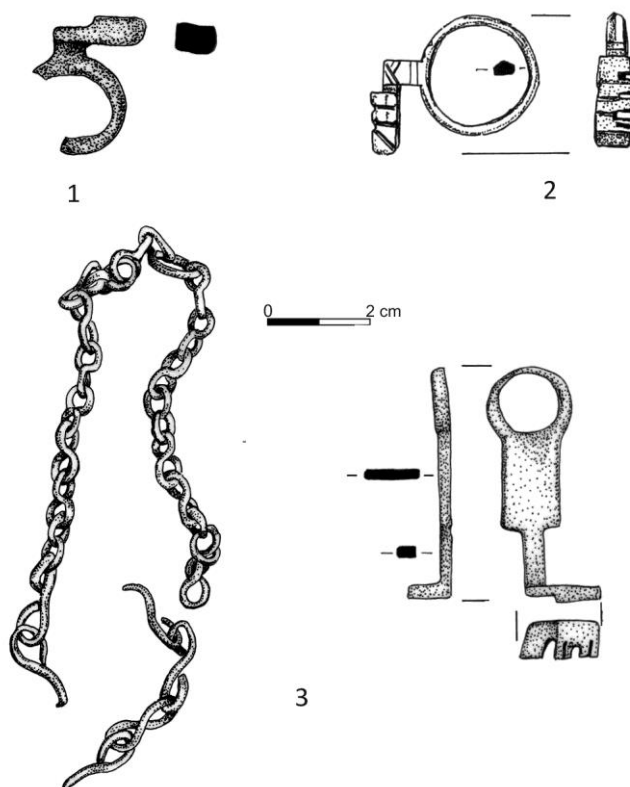
## II. Tumbler L-shaped lift key (?) (Pl. III/11; VI/11)

Tumbler L-shaped lift keys operated in relatively simple locking systems, which were actuated by pulling.<sup>44</sup> For such items, mostly made of wrought iron, the ring was quite small in diameter. It is continued with a stem with a rectangular or circular cross-section, either trapezoidal or straight, and which curves abruptly forming the bit, which could have a hook<sup>45</sup>

<sup>44</sup> See in Haddad 2016, 62, fig. 10.c.

<sup>45</sup> Giovannini, Tasca 2016, 133, 5B3, fig. 5B3.

or several teeth (two, three or four) arranged in a certain order, and which they entered the lock/unlock device of the door.<sup>46</sup> These keys originate from the so-called Laconian type keys, used from the early Hellenistic period, which had three teeth on the bit (on the active end of the key) but which were taken over and used quite a lot in Roman times and even later, from the Vikings to the modern era.<sup>47</sup>



Pl. IV. Keys – drawings (I).

In terms of similar pieces from the Lower Danube region one can mention an iron item from Porolissum, in the neighboring province of Dacia,<sup>48</sup> but also the finds in *Barbaricum*, from Drăgești (Todirești commune, Vaslui county), dated in the 2<sup>nd</sup> century or maybe at the beginning of the third,<sup>49</sup> and from Poiana–*Piroboridava* (Galati county).<sup>50</sup> From Moesia Inferior one should mention a discovery from Telița-Amza, also made of iron.<sup>51</sup>

**Cat no 11** could be part of such a tumbler L-shaped lift key. This find from Ibida is made of bronze, and preserves only a ring from which is attached a stem with a rectangular cross-section 3 mm thick. This stem is widened by about 2 mm at the end where the bit of the key should have been found, and which would have been composed of thin teeth that would

<sup>46</sup> Manning 1985, 90; Manning 1976, fig. 23. 144-145; Manning, Webster 1995, 265-267, pl. 82, 4-6; Birley 1997, 16-17, fig. 4.23-25, fig. 5. 26-36.

<sup>47</sup> Pace 2014, 61-63; Steele 2013, 21; Haddad 2016, 61- 63, fig. 10.a, e.

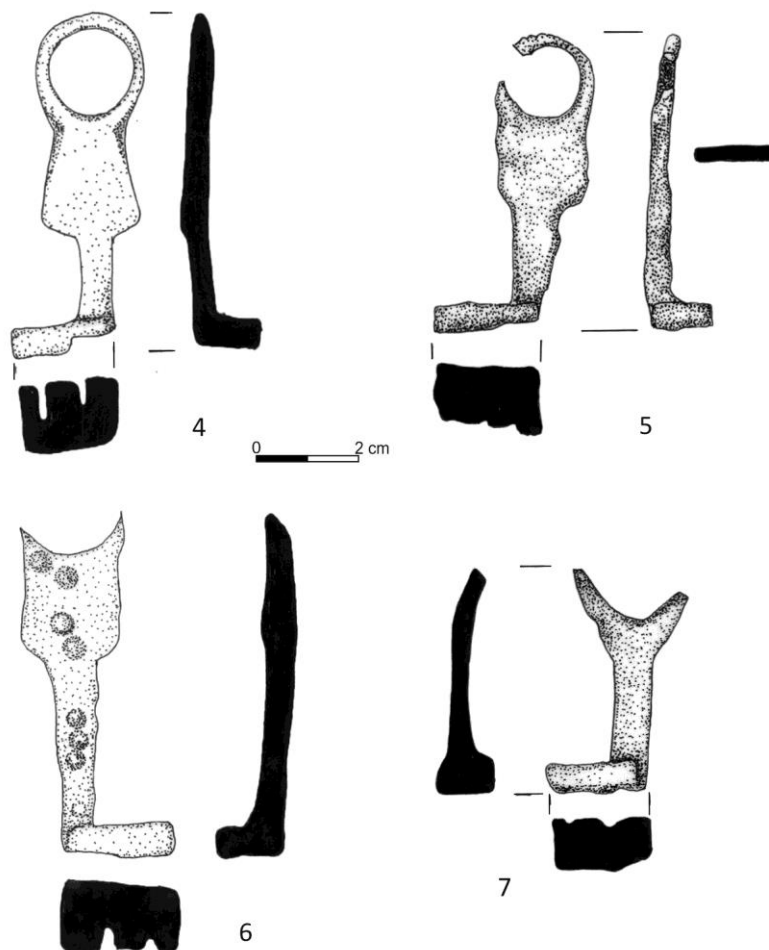
<sup>48</sup> Gudea 1989, pl. CXLVI, 9.

<sup>49</sup> Teodor, Coman 1981, 458.

<sup>50</sup> Vulpe, Teodor 2003, 327, no. 843, pl. 238/19; Croitoru 2011, 249, cat no. 1428, fig. 57.1428.

<sup>51</sup> Baumann 1995, pl. LXII.3, pl. LXX.8. The item is credited as a "metal stylus for decorating pottery" (p. 329), but despite its longer length (22 cm), its components lead us to believe that it is a tumbler lift L-shaped key. Moreover, in the same archaeological context, a T-shaped lift key was discovered. (pl. LXII.2 and pl. LXII.5): see for details Hübener 1973, pl. 32. 18-19, 27 and Birley 1997, 14-15, fig. 4.20-22.

have entered the locking device. Unfortunately, exactly where this stem bends to attach to the bit, it is broken, so one cannot know the arrangement or number of its teeth. In fact, our reluctance to include this piece in the respective key category is based precisely on the lack of its bit, as well as on the material from which it is made, which is bronze and not iron.



Pl. V. Keys – drawings (II).

### B. Metal deadbolts for tumbler locks

These locking system components are the plates provided with holes in which the tines of the key fit in. The metal deadbolts for tumbler locks of the Roman period are unique and characterized by the preservation of their form and use with specific slide keys.<sup>52</sup>

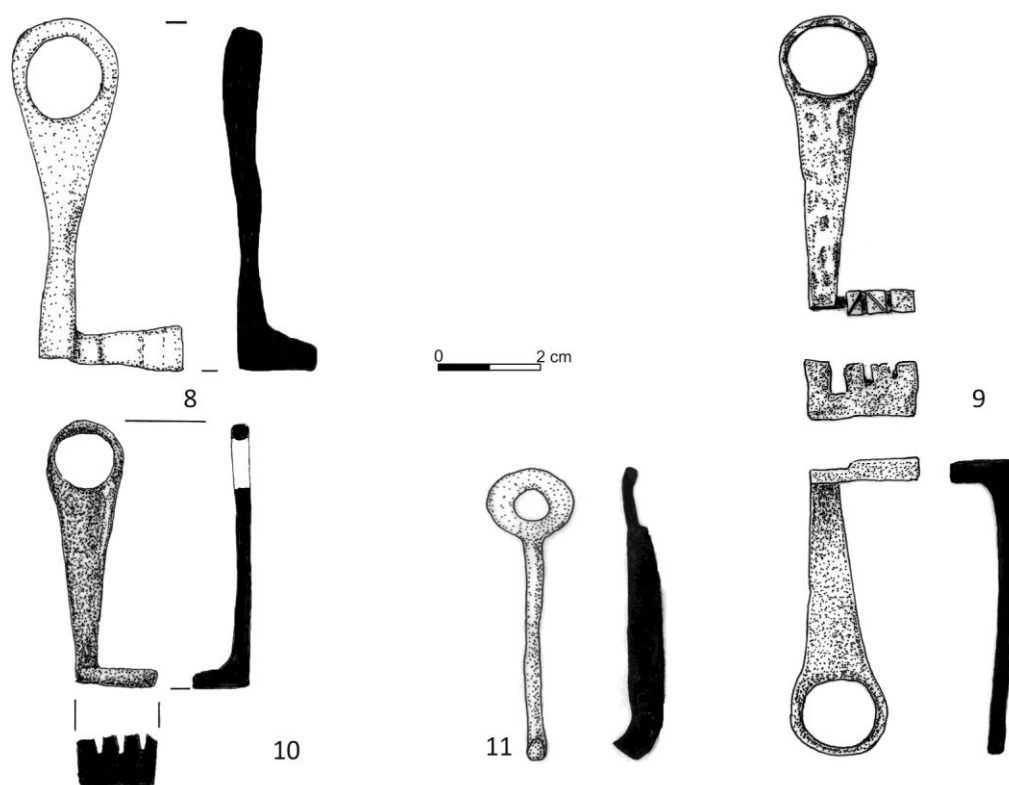
These locking devices in which the key teeth were made to move the locking mechanism of the lock had very different holes, both in arrangement and in shape (circular, rectangular, triangular or combined). The combinations of these elements had to correspond to the diversity of the keys, and with the arrangement of their tines. These elements were made, in a first stage, of wood<sup>53</sup>, and then, through the development of technology and pushed by the need for increased protection and robustness, they were made of bronze.<sup>54</sup> It should be noted that their density in Roman sites corresponds to the density of the

<sup>52</sup> Pace 2014, 43, fig. 4.

<sup>53</sup> For wooden locks, probably the first ever used and adapted and perfected, even in the Roman period, see Allen 1996-1997, 155-160.

<sup>54</sup> Ciurletti 1996, 74.

identified keys. We find the same situation in Moesia Inferior. In terms of analogies with metal deadbolts for locks from Moesia Inferior, one should point out the similar finds of *Nicopolis ad Istrum*<sup>55</sup> as well as the larger number of such finds from the north-eastern region of Bulgaria, especially in the Varna, *Oescus* and Dobrich areas.<sup>56</sup> In the proximity of the Ibida site we mention only the finds of *Telița–Amza*,<sup>57</sup> *Aegyssus*<sup>58</sup> (Tulcea county), *Sacidava*<sup>59</sup> (Constanța county), as well as the piece of Barboși (Galați county).<sup>60</sup> From Ibida we have four pieces, which we have included in two typological categories.



PL. VI. Keys – drawings (III).

#### 1. *Regular deadbolts* (Pl. III/12-14; VII/12-14)

**Cat. no. 12** is a deadbolt for a locking system, preserved in good condition, but broken at one end. It is made of copper alloy. As component parts we distinguish the active area, with the holes through which the key teeth entered to lock/unlock the locking system and which continue on one side with a rectangular plate about 21.50 mm long, and on the other side with a narrow rod, 5 mm, but 30 mm long and with a rectangular cross-section.

The part with the locking holes has four registers, as follows: the first, starting from the rod, is rectangular, well made, with dimensions of 7.00 mm by 4.00 mm, while the second consists of two small circular, almost aligned holes, each 4.00 mm in diameter, the third

<sup>55</sup> Poulter 2007, 41, fig. 2.178-179.

<sup>56</sup> Кузов 2000-2001, 197-203, pl. 3, 8-24, pl. 4, 25-39, pl. 6, 40-49.

<sup>57</sup> Baumann 1995, pl. XXI, no. 5, dated in the 2<sup>nd</sup> century AD after the finder and no. 6, dated largely in the 2<sup>nd</sup>-4<sup>th</sup> centuries AD; adds Baumann 2003, 193, no. 53.

<sup>58</sup> Such a component was identified during the archaeological research in 2021, in the Western sector, not yet published.

<sup>59</sup> Scorpan 1978, pl. X. 49-51; pl. XVIII, 50-51 (dated largely in the 4<sup>th</sup>-5<sup>th</sup> century AD).

<sup>60</sup> Sanie 1981, 193, no. 41, pl. 49/8.

register also has two circular holes, but arranged obliquely and intersecting at a point, with the same dimensions as the previous ones, and the fourth is rectangular in shape, 6.00 by 4.00 mm in size, but worked with quite a few imperfections. These holes received the teeth of the key bit for which this locking element of an access door was suitable.

**No. 13** is also a passive element (deadbolt) of a locking system, made of a copper alloy. It is in fairly good state of preservation, except for a break of at least one end and damage to the last register of the bit. From the part with holes, which is the active part, after 2 mm of thickness reduction, extends to the side a rod of the same width, but which narrows, after about 6.10 mm, to a width of 10.80 mm. On the other side there is a rod 8.30 mm wide and 6.70 mm thick, with a length of 23 mm. In fact, at the end of this last part there is a breakage, which suggests that this rod was longer.

Regarding the actuating part, it is composed of four registers, as follows: the first, on the side of the wider rod, is rectangular, measuring 9.90 mm by 5.20 mm but rounded as if it were two circular holes with the wall between them filed off; the second register consists of two aligned circular holes, one with a diameter of 5.30 mm and the other of only 4.00 mm; the third register contained only a circular hole, which is slightly damaged, with a diameter of 6.00 mm; the fourth was probably also made up of a circular hole, but one can only presume that, as this register is broken together with a part of the closing wall of this locking element.

**No. 14** is a deadbolt locking element made of a copper alloy. The actuating part of the item is a small blade, 3.90 mm thick, provided with locking holes. At one end leaves, after a withdrawal of 1 mm in thickness, a rod of the same width, 16.50 mm long, but narrows to only 7.50 mm. The rod that starts from the other side of the actuating blade is 22.25 mm long and 2.85 mm thick. The working part is composed of five registers, as follows: the first register, from the part with the widened blade, is rectangular and is the result of filing off the space between two holes. It is 7.42 mm long and 3.50 mm wide. The second register is located below the first, with two circular holes, but with the outer parts filed straight. The diameter of a hole is 3.28 mm, and the space between them is 1.23 mm. The following two registers are similar to the second one, respectively with two holes each processed as above. The last register, the fifth, is also rectangular, similar to the first described. As with previous items, this is most likely a component of a door locking system.

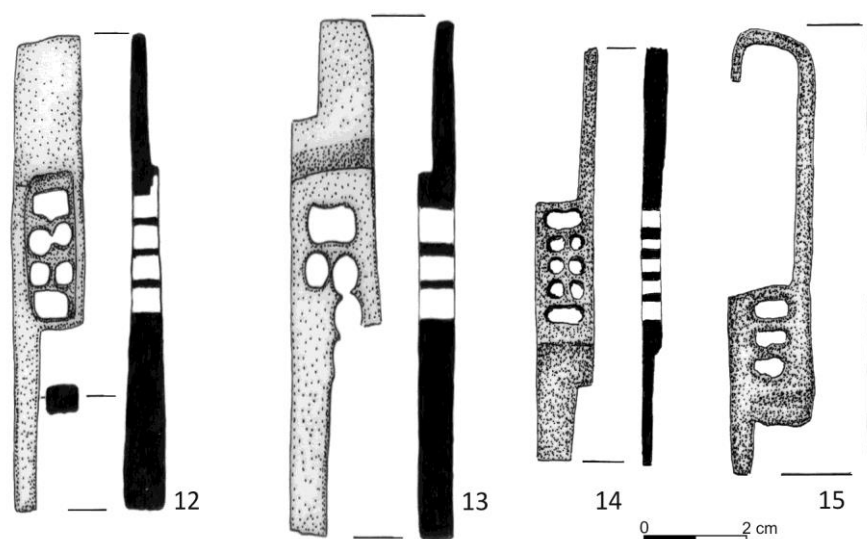
## *2. Deadbolt with hooked extension (Pl. III/15; VII/15)*

**No. 15** is a deadbolt from a locking system, preserved in good condition. It is different from the other pieces presented above, in the sense that the working part is composed of three registers, and the item is less thick than the other finds. However, the components are the same, and the material from which it is made is also copper alloy.<sup>61</sup>

From one end of the blade bearing the registers of the working part starts a rod 4.54 mm wide and 9.27 mm long. From the other side starts another rod that bends and forms a hook. The length of this component is 39.55 mm, with a rod thickness of 3.57 mm. The width of the hook, which creates a rectangular shape, is 17.80 mm.

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<sup>61</sup> Relevant to identify how this element works, even having that locking hook in the lock, along with the right key can be followed in Pace 2014, 70, fig. 14. For analogy see a tumbler lock with a similar deadbolt in Пуздровский 2007, pl. 131.2, of Ust-Alma, crypt 649.



Pl. VII. Deadbolts from locking mechanisms – drawings.

The actuating part includes of three registers, each consisting of a hole. The first, on the side with the wider rod, starts as a rectangular shape, but intersects with a circular hole. It is 6.65 mm long and 3.15 mm wide. The second hole is rectangular, with side dimensions of 6.20 by 3.20, and the last register is also rectangular, with dimensions of 7.50 by 3.60 mm.

## CONCLUSIONS

In Greco-Roman Antiquity, the key had, in addition to its practical function, an obvious symbolic value. In the end, however, the protection of one's own property was the essential purpose of installing locking devices that used different keys. Numerous epigraphic, iconographic or documentary sources attest that such an object, which allowed the access to a certain space or to a certain valuable, gave the owner an increased power in relation to the people surrounding him.<sup>62</sup>

The items that are part of locking systems, particularly the keys and deadbolts, are very common in Roman settlements, but it seems that these are not always given due importance when it comes to their publication. They are well attested archaeologically, and we saw from the present material that both the keys and the locking elements are found in urban areas, in important settlements of the province, but also in quasi-urban or rural areas, such is the settlement of Telița-Amza, intensively researched, in successive stages, by Dr. V.H. Baumann.

From the Roman settlement of Ibida we have been able to select so far a number of 15 artifacts which means 11 keys and four deadbolts for locks. These pieces were components of a type of locking system widespread throughout the Roman Empire, as early as the first centuries of the Christian era and until the 4<sup>th</sup>-5<sup>th</sup> century AD, i.e. the tumbler lock. Regarding the chronology of the finds of Ibida, according to the identified archaeological contexts, which are not so many, unfortunately, but especially based on analogies, one can date these mostly in the 3<sup>rd</sup>-4<sup>th</sup> centuries AD. Maybe the no. 11 fragment, about which it is quite difficult to make definite assessments, could be earlier.

<sup>62</sup> For a detailed analysis of the concepts of private or public ownership, security and management of household property see in Proffitt 2018, 92-106.

The keys of Ibida are made of both bronze and iron and do not have complex decorations, which suggests that these were common, everyday items, used in locking systems frequently used throughout this walled town. They were usually worn in bundles, hung by a chain (as in the case of no. 3) or by a rope tied to clothing or to the hand.

The task of crafting these items, as well as other common metal accessories, pertained most likely to provincial workshops, from where these were sold in almost all urban or rural centers. What is certain is that an extensive review of the locking systems in the province of Moesia Inferior is necessary, since many artifacts are not published or have benefited only from laconic mentions in specialist journals.

## CATALOGUE

### 1. Ring-key<sup>63</sup> (Pl. I/1; IV/1)

**Context:** Ibida, *passim* (donation Nechifor) (Opaiț 1991, 43, cat. no. 27, fig. 15.27).

ICEM Tulcea, inv. 40331.

**Dimensions:** L – 28.30 mm; w – 23.50 mm; diam. ext. of the ring – 19 mm; diam. int. of the ring – 12 mm; wt. – 11.10 gr.

**Literature:** Davidson 1952, 137-138, nos. 970-973, pl. 70. (3<sup>rd</sup>-4<sup>th</sup> c. AD); Bogdan Cătănciu, Barnea 1979, 189, fig. 165/10.29 (5<sup>th</sup>-6<sup>th</sup> c. AD); Кызоб 2000-2001, 205-206, nos. 56-75 (2<sup>nd</sup>-4<sup>th</sup> c. AD).

**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.

### 2. Ring-key (Pl. I/2.a-b; IV. 2)

**Context:** Ibida, 2013, *passim*, north-eastern part of the fortress, unpublished.

ICEM Tulcea, inv. 50390.

**Dimensions:** L – 34 mm; diam. ext. of the ring – 22.40 mm; diam. int. of the ring – 18 mm; wt. – 8.89 gr.

**Literature:** Davidson 1952, 137-138, nos. 970-973, pl. 70. (3<sup>rd</sup>-4<sup>th</sup> c. AD); Bogdan Cătănciu, Barnea 1979, 189, fig. 165/10.29 (5<sup>th</sup>-6<sup>th</sup> c. AD); Кызоб 2000-2001, 205-206, nos. 56-75 (2<sup>nd</sup>-4<sup>th</sup> c. AD).

**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.

### 3. Tumbler slide key with rectangular plate on the handle, and chain (Pl. I/3; IV/3)

**Context:** Ibida, 1987, L III, C5, -0.30 m (archaeological research A. Opaiț), unpublished.

ICEM Tulcea, inv. 42741.

**Dimensions:** L chain – 150 mm, L key – 56.70 mm; diam. of the ring – 16.50 mm; L plate 21 mm; w plate – 13.20 mm; wt. key – 17.54 gr.; wt. chain – 24.20 gr.

**Literature:** Hübener, 1973, pl. 32.14; Кызоб 2000-2001, 207, nos. 76-78.

**Chronology:** 2<sup>nd</sup>-4<sup>th</sup> c. AD

### 4. Tumbler slide key with trapezoidal plate on the handle (Pl. II/4a-b; V/4)

**Context:** Ibida, 2006, EM V3, S1, C10, -0.65 m, unpublished.

ICEM Tulcea, inv. 48231.

**Dimensions:** L – 58 mm, diam. ext. of the ring – 20.30 mm; diam. int. of the ring – 15 mm; L plate – 21 mm; w of the large side of the plate – 17.80 mm, w of the small side of the plate – 14 mm; wt. – 23.19 gr.

**Literature:** Davidson 1952, 137, no. 974.

**Chronology:** 4<sup>th</sup> c. AD.

### 5. Tumbler slide key with rectangular plate on the handle (Pl. II/5; V/5.)

**Context:** Ibida 2004, EM V I, S10, C4, -0.60 m, unpublished.

<sup>63</sup> Abbreviations: inv. – inventory; ICEM Tulcea – "Gavrilă Simion" Eco-Museum Research Institute of Tulcea. L – length; w – wide; d ext. – diameter exterior; d int. – diameter interior; wt – weight.



ICEM Tulcea, inv. 47041.

**Dimensions:** L – 57 mm; diam. of the ring – 17.50 mm; L plate – 19.00 mm, w plate – 16.00 mm; wt. – 18.55 gr.

**Literature:** Birley 1997, 12-13, fig. 3.14-19; Кузов 2000-2001, 207, nos. 76-78; Bogdan Cătănicu, Barnea 1979, fig. 166, 10.37; Giovannini, Tasca 2016, 133, 5B4, fig. 5B4.

**Chronology:** 4<sup>th</sup> c. AD.

**6. Tumbler slide key with rectangular plate on the handle (Pl. II/6; V/6)**

**Context:** Ibida, *passim*, unpublished.

ICEM Tulcea, inv. 42037.

**Dimensions:** L – 68.30 mm; diam. ext. of the ring – 20.50; diam. int. of the ring – 18 mm; L plate – 20 mm; w plate – 19 mm; wt. – 33.02 gr.

**Literature:** Birley 1997, 12-13, fig. 3.14-19; Кузов 2000-2001, 207, nos. 76-78; Bogdan Cătănicu, Barnea 1979, fig. 166, 10.37; Giovannini, Tasca 2016, 133, 5B4, fig. 5B4.

**Chronology:** 4<sup>th</sup> c. AD.

**7. Tumbler slide key (Pl. II/7; V/7)**

**Context:** Ibida, *passim* (donation Nechifor) (Opaïț 1991, 45, no. cat. 26, fig. 17.26).

ICEM Tulcea, inv. 40330.

**Dimensions:** L – 42.50 mm; diam. of the ring – 21.60 mm; L handle – 23 mm; wt. – 15.35 gr.

**Literature:** Poulter 2007, 41, 2.176.

**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.

**8. Tumbler slide key (Pl. II/8; VI/8)**

**Context:** Ibida *passim*, unpublished.

ICEM Tecla, inv. 42036.

**Dimensions:** L – 61 mm; diam. ext. of the ring – 21 mm; diam. int. of the ring – 15 mm; L handle – 38.20 mm; wt. – 29.67 gr.

**Literature:** Baumann 1995, pl. XXIII, no 8.

**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.

**9. Tumbler slide key (Pl. III/9; VI/9)**

**Context:** Ibida, 1984, *territorium* – K. Bair, C1, (archaeological research A. Opaïț), unpublished.

ICEM Tulcea, inv. 39592.

**Dimensions:** L – 56.70 mm; diam. ext. of the ring 18.28 mm; diam. int. of the ring – 14 mm; wt. – 15.25 gr.

**Literature:** Baumann 1995, pl. XXIII, no 8.

**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.

**10. Tumbler slide key (Pl. III/10a-b; VI/10)**

**Context:** Ibida, 2010, *passim*, fortress, unpublished

ICEM Tulcea, inv. 53253.

**Dimensions:** L – 50.26 mm; diam. ext. of the ring – 15.50 mm; diam. int. of the ring – 12.00 mm; wt. – 8.60 gr.

**Literature:** Baumann 1995, pl. XXIII, no 8.

**Chronology:** 4<sup>th</sup> c. AD.

**11. Tumbler L-shaped lift key (?) (Pl. III/11; VI/11)**

**Context:** Ibida, *passim* (donation Nechifor), unpublished.

ICEM Tulcea, inv. 40329.

**Dimensions:** L – 49 mm; diam. ext. of the ring – 14 mm; diam. int. of the ring – 7.00 mm; wt. – 8.11 gr.

**Literature:** Hübener, 1973, pl. 32. 18-19; Gudea 1989, pl. CXLVI, 9.

**Chronology:** 2<sup>nd</sup>-3<sup>rd</sup> c. AD.

**12. Metal deadbolt for tumbler lock (Pl. III/12; VII/12)****Context:** Ibida 2006, Curtain G, S3, C4, -3.30 m, unpublished.

ICEM Tulcea, inv. 48232.

**Dimensions:** L – 76.50 mm; L of the active plate – 25 mm, w of the active plate – 15 mm; wt. – 29.22 gr.**Literature:** Кузов 2000-2001, 197-203, pl. 3, 8-24, pl. 4, 25-39, pl. 6, 40-49; Pace 2014, 43, fig. 4.**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.**13. Metal deadbolt for tumbler lock – (Pl. III/13; VII/13)****Context:** Ibida 2006, Curtain G, S3, C4, -3.30 m, unpublished.

ICEM Tulcea, inv. 48233.

**Dimensions:** L – 68.50 mm, w – 16.90 mm; L of the active plate – 29.30 mm; wt. – 35.47 gr.**Literature:** Кузов 2000-2001, 197-203, pl. 3, 8-24, pl. 4, 25-39, pl. 6, 40-49; Pace 2014, 43, fig. 4.**Chronology:** 3<sup>rd</sup>-4<sup>th</sup> c. AD.**14. Metal deadbolt for tumbler lock – (Pl. III/14; VII/14)****Context:** Ibida 2019, Curtain G, level 8, on the bottom of Cx, -3.67 m, unpublished.

ICEM Tulcea, inv. 53447.

**Dimensions:** L – 62 mm; w – 11.51 mm; L of active plate – 23.17 mm; wt. – 10 gr.**Literature:** Кузов 2000-2001, 197-203, pl. 3, 8-24, pl. 4, 25-39, pl. 6, 40-49; Pace 2014, 43, fig. 4.**Chronology:** 3<sup>rd</sup> c. AD.**15. Metal deadbolt with hooked extension, for tumbler lock (Pl. III/15; VII/15)****Context:** Ibida 2010, Curtain G, intramuros, *passim*, unpublished.

ICEM Tulcea, inv. 53251.

**Dimensions:** L – 74.15 mm, w – 17.50 mm; L of the active plate – 23.30 mm; wt. – 6.10 gr.**Literature:** Pace 2014, 43, fig. 14; Пуздровский 2007, pl. 131.2.**Chronology:** 3<sup>rd</sup> c. AD.**BIBLIOGRAPHY****Primary sources***Eustathii archiepiscopi Thessalonicensis commentarii ad Homeri Iliadem pertinentes*, Marchinus van der Valk (ed.), Leiden, Brill, vol 1 (1971); vol. 2 (1976); vol. 3 (1979); vol. 4 (1987).*The natural history of Pliny*, translated with copious notes and illus., by John Bostock, and H.T. Riley, London, 1855-1857.**Secondary sources**Allen, M.L. 1996-1997. *"The Keys of the Kingdom": Keys from Masada*, Brigham Young University Studies Quarterly 36 (3), 154-169.Alicu, D., Țentea, O. 2005. *The Workshops of Bronze Craftsmanship in Micia*, in Mușețeanu, C., Bărbulescu, M., Benea, D. (eds.), *Corona Laurea. Studii în onoarea Luciei Țeposu Marinescu*, București, 67-78.Baumann, V.H. 1995. *Așezări rurale antice în zona gurilor Dunării. Contribuții arheologice la cunoașterea habitatului rural (sec. I-IV p. Chr.)*, Tulcea.Baumann, V.H. 2003. *Noi săpături de salvare în așezarea rurală antică de la Telița-Amza, jud. Tulcea*, Peuce, Serie Nouă 1, 155-232.Bejan, A. 1976. *Un atelier metalurgic din sec. VI e. n. de la Drobeta-Turnu Severin*, Acta Musei Napocensis 13, 257-278.

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