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KEYS, LOCKING MECHANISMS AND PADLOCKS FROM THE OLD COLLECTIONS OF THE NATIONAL MUSEUM OF BANAT, FROM POJEJENA AND TIBISCUM*

*Bogdan Lăpușan***

Keywords: keys, padlock, locking systems, small finds, Roman Dacia.

(Abstract)

The artefacts discussed in this article are related to keeping the privacy or security of properties and goods (keys, locking mechanisms, storage furniture, padlocks, handcuffs, some types of chains etc.). This category includes 21 artefacts (11 keys, nine bolts and one padlock) that come from the old collections of the National Museum of Banat (16 artefacts), auxiliary fort and *vicus militaris* from Pojejena (four artefacts) and *vicus militaris* from *Tibiscum*-Jupa (one artefact). The objectives of this study are to analyse the artefacts from a functional and typological point of view. Furthermore, the examination and study of use-wear marks may provide insights and information about how these artefacts were used.

This study discusses 21 Roman artefacts which belong to objects related to keeping privacy or security of properties and goods. This category encompasses keys, locking mechanisms, storage furniture, padlocks, handcuffs and various types of chains. The primary objective of this study is to analyse these artefacts from a functional and typological perspective. In addition, the use-wear marks of the artefacts will be examined to elucidate how these objects were used and functioned over time. These observations need to be done cautiously because some traces may appear as a result of time degradation¹.

The artefacts have been abbreviated based on their functionality, followed by the artefact number (Kr: rotary keys; Pr: padlock with a rotary locking mechanism; Kt: slide keys for tumbler locks; Bt: bolts for tumbler locks; Ki: incerta key). Technical abbreviations: L: length, OD: outer diameter, T: thickness, TL: total length, W: width.

I. Typology and functionality of the artefacts

The artefacts were typologically classified according to the typology created by J. P. Guillaumet and

G. Laude. Each type represents a locking system, determined by the interaction of the key with the locking mechanism and the method by which the mechanism is locked or unlocked².

1. Guillaumet/Laude 01 type

This type corresponds with rotary keys and locking mechanisms³. The mechanism could be operated by inserting the bit of the key into the keyhole, matching it with the wards of the mechanism (which varied depending on the mechanism) and engaging the hollow piped stem of the key with the spring pin. After this step, the key is rotated to force the bit of the key to contact the bolt, thus unlocking the mechanism. To lock the mechanism, the previously described process was repeated, except that the key must be rotated in the opposite direction⁴. The purpose of the wards was to enhance the security of the mechanism⁵. The rotary locks could be fixed, mounted on furniture

recently at Pojejena, as well as to Dr. Andrei Georgescu (National Museum of Banat) for valuable discussions and advices.

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¹ For more information about use-wear analysis of artefacts, see Swift 2017, 18–31.

² For more details, see Guillaumet-Laude 2009, 13–15.

³ Guillaumet-Laude 2009, 17–26.

⁴ Guillaumet-Laude 2009, 17–26; Pace 2014, 72–73.

⁵ Manning 1985, 84–86.

(such as chests, cabinets and shelves) or portable, in the form of a padlock. Probably, this type of lock had a single side⁶.

a) *Keys (Pl. 1)*

Kr1: 1. Unspecified; 2. TL_{handle}: 3.2 cm, OD_{handle}: 2.82 cm, T_{handle}: 0.36 cm, TL_{stem and bit}: 2.53 cm, L_{bit}: 2.78 cm, W_{bit}: 0.76 cm, OD_{head of the stem}: 0.83 cm; 3. Intact; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4049; 7. Unpublished.

Kr2: 1. Unspecified; 2. TL: 4.01 cm, OD: 2.43 cm, T_{handle}: 0.23 cm, L_{bit}: 1.89 cm, W_{bit}: 1.15 cm; 3. Intact; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4109; 7. Unpublished.

From this type, two rotary keys can be identified. They are quite similar, both of them have a movable round handle with rounded ends.

Kr1 has a rounded handle decorated with two knobs (probably representing two stylized dolphins). These knobs are similar to the schematic representations of dolphins, a tendency observed at many artefacts dated in Late Roman contexts, between the 5th and 7th centuries AD. In addition, Roman folding keys are generally dated in the same chronological interval⁷. The ends of the handle and the head of the hollow piped stem are connected through a clamp. The form of the bit is rectangular and has an incision at the end.

Kr2 has a rounded handle. The ends of the handle and the head of the hollow piped stem are connected through a thin rod. The form of the bit is rectangular and has a tooth on the bit. Initially, the key had two teeth, but only the socket of the second tooth remains.

One question remains regarding the functionality of the folding keys. According to T. D. Pace, the folding functionality was designed to stabilise the rotary keys due to their fragility, as evidenced by keys with broken handles and stems⁸. Researcher G. Vikan suggested that the folding functionality was used to wear the key on a finger. The handle was used as a ring and the stem and bit were folded alongside the finger⁹. Unfortunately, the researcher did not take into account that in the Roman world exist key-rings with fixed hoops that could be worn on a finger¹⁰. Moreover, the lower

part of the key could not remain stable alongside the finger since it is movable. With the movement of the hand or finger on which the key was worn, the lower part of the key could shift from its initial position, potentially causing discomfort for the wearer. However, this hypothesis could only be applied if the hollow piped stem was not tightened enough to the rod/clamp between the rounded ends of the handle.

Most probably, the moving handle was primarily used in a practical manner. For example, in Fig. 1, the handle could be gripped by two fingers (Fig. 1A) or worn on a finger (Fig. 1B) to operate the locking mechanism. Furthermore, the handle could be suspended on a chain loop or another hoop, like other types of keys with ring handles¹¹.

Regarding analogies for this type of artefact, similar keys were discovered at *Drobeta* (Mehedinți County) in the province of *Dacia Superior* (specifically, in the “Theodora Tower”). More precisely, those finds were casts containing brooches with bent stems and keys altogether. A total of five casts were found, but only two of them contained keys¹². These objects were cast using moulds that allowed for the simultaneous casting of two or three brooches along with this type of key. These casts could be imported objects, as this particular type of brooch was predominantly found in the northeastern Balkans. Therefore, the casts represented pre-manufactured objects that could be assembled, finished and decorated locally¹³.

b) *Padlock (Pl. 1)*

Pr1: 1. Pojejena fort (Caraș-Severin County); 2. TL: 6.75 cm, OD: 5.56 cm, L_{upper orifice}: 1.86 cm, L_{lower orifice}: 1.96 cm, L_{handle}: 2.88 cm, W_{handle}: 1.15 cm; 3. Intact; 4. *porta praetoria*, burnt layer; 5. Bronze and iron; 6. Museum of the Highland Banat (Reșița); 7. Cristea 2022, 135.

The padlock has a cylindrical shape. The upper part has a lug to which a chain was attached. The body of the padlock has three rounded bands made of bronze sheet, positioned in the centre and at the edges. The lower part has five perforations: three perforations for attaching the lid to the body of the padlock using rivets, one perforation serving as the keyhole and the last one as a perforation for inserting the chain (*auberonnrière*). Furthermore, the lower part has a rounded protuberance in the

⁶ Guillaumet-Laude 2009, 18, 25; Swift 2017, 116.

⁷ Examples of movable round handle with two stylized dolphins could be found at *Gerasa/Antiochia ad Chrysohoam* (Eger 2020, 34–35) and *Sardis* (Waldbaum 1983, 75–76).

⁸ Pace 2014, 78.

⁹ Vikan 1980, 4.

¹⁰ The key-rings could be considered objects with double

functionality, such as jewellery and key. For more details about the typology of key-rings, see Guiraud 1989, 191–193.

¹¹ For examples, see Gáspár 1986, taf. CCLXXIII/967; Torbatov 2013, 222.

¹² Bejan 1976, 257; Curta-Gândilă 2011, 65.

¹³ Curta-Gândilă 2011, 64–65.

middle. Inside the keyhole, a pin is noticeable. Perhaps, a X-ray analysis could reveal other metal components of the mechanism. If the metal components are not preserved in the padlock, they may have been made of wood¹⁴.

The functioning of the rotary mechanism of the padlock is similar to the operation described above but with some differences. The functionality of a padlock was to retain a chain to protect a gate, door, piece of furniture, cargo or to hinder a person or animal¹⁵. To accomplish this action, the end link of the chain was inserted into the *auberonnière*, while the bolt was in the open position. To unlock the padlock, the key was inserted into the keyhole¹⁶ to match the wards and rotated at 125°–130°, allowing the bolt to move into the unlocked position. Simultaneously, a spring held the bolt, which was lifted by the bit of the key when the bolt was moved to the unlocked position. Once the key reached this position, it remained locked inside the mechanism. Subsequently, once the end link of the chain was inserted into the *auberonnière*, the key was rotated in the opposite direction to swing the bolt to the locked position. In addition, the spring engaged the bolt to secure it. After this action, the chain was locked within the padlock and the key could be extracted¹⁷ (Fig. 2).

Similar padlocks of this type were not found in the province of *Dacia*, but only in Late Roman contexts at Gornea¹⁸.

2. *Guillaumet/Laude 04–04 type*

This type corresponds with the tumbler key and lock¹⁹. Depending on the faces of the mechanism, they could be single-sided or double-sided. The tumbler locks could be differentiated by the pattern of the bolt (the pattern and number of the tumbler holes placed on the surface of the bolt). In addition, the pattern of the bit could also indicate how many faces the tumbler lock could have.

¹⁴ Examples of padlock with wood locking mechanisms were discovered in the province of *Germania Superior* at *Augusta Raurica*/Augst (Furger *et alii* 1990, 156).

¹⁵ Guillaumet-Laude 2009, 138.

¹⁶ At the same time, the hollow stem of the key was penetrated by the pin.

¹⁷ Schauerte-Steiner 1984; Dieudonné-Glad *et alii* 2013, 131–132.

¹⁸ Hamat 2018.

¹⁹ The tumbler locks were also compatible with the 04–01, 04–02, 04–03, 05–01 and 05–02 types. These types have keys designed differently compared to 04–04 type. Furthermore, some aspects related to the operation of the locking mechanisms and pattern of the locks differ. For more details, see Guillaumet-Laude 2009, 32–47.

Therefore, the symmetric pattern may be characteristic of a double-sided locking mechanism because the key could be used on both sides of the lock, while asymmetrical patterns could be characteristic of single-sided mechanisms²⁰.

From a functional point of view, the one-sided tumbler lock had tumblers that fell into the pattern of the bolt, either due to gravity or under the pressure of springs, thus locking the bolt²¹. Unlocking the lock required inserting the key into the L or Z-shaped keyhole. After this action, a lifting movement followed, during which the teeth of the bit engaged the tumblers out of the bolt. Subsequently, the key swung the bolt to the left or the right (depending on the specificity of the mechanism), unlocking the mechanism. Once the lock was unfastened, the key was impossible to extract due to the configuration of the keyhole. Therefore, the key could only be extracted if the bolt was returned to its original position²². Consequently, this type could be mounted on furniture or on interior doors that could only be opened on one side, such as storage rooms, prison cells etc.²³.

The use of a double-sided mechanism was laborious. In addition to the steps mentioned above, once the bolt was unfastened and the door was open, the bolt had to be swung into the locked position while the door was open to extract the key. On the other side of the door, the process of inserting the key and swinging the bolt was repeated to unlock the mechanism. Finally, to close the door and remove the key, the bolt was swung into the locked position²⁴. The double-sided mechanisms could be mounted on gates²⁵ or both exterior²⁶ and interior doors, such as various rooms or bedrooms that require a higher level of security or privacy. A symmetrical pattern may have been used for the furniture as well, but the locking mechanism was necessarily single-sided. The tumbler system locking appeared in the 6th–5th centuries BC in the Mediterranean world²⁷. In the Roman world, the tumbler keys, also named slide keys, became more prevalent from the 1st century BC and persisted

²⁰ Swift 2017, 116.

²¹ Iliş 1999, 122–123.

²² Gaheis 1930, 236–240; Guillaumet-Laude 2009, 40–41; Pace 2014, 57–60; Lăpuşan 2022b, 302.

²³ Swift 2017, 117.

²⁴ Gaheis 1930, 241; Guillaumet-Laude 2009, 41; Swift 2017, 116; Lăpuşan 2022a, 38–39.

²⁵ Lăpuşan 2022a, 40.

²⁶ Swift 2017, 116.

²⁷ Guillaumet-Laude 2009, 41. For more details about the evolution of slide keys from Hellenistic to Roman period, see Haddad 2016.

until the 12th century AD, particularly in the Eastern Roman Empire/Byzantine Empire²⁸.

a) *Keys (Pl. 2)*

In this category could be classified eight keys. Consequently, there are two categories of keys: keys with ring handles (Kt1, Kt2), and keys with rectangular and trapezoidal plates (Kt4, Kt5, Kt6, Kt7, Kt8).

Keys with ring handles

Kt1: 1. Pojejena – fort; 2. TL: 5 cm, OD_{handle}: 2.47 cm, L_{bit}: 1.55 cm, W_{bit}: 0.7 cm; 3. Intact; 4. *porta praetoria*, burnt layer; 5. Bronze; 6. Museum of the Highland Banat; 7. Unpublished.

Kt2: 1. Unspecified; 2. TL: 2.89 cm, OD_{handle}: 2.1 cm, L_{bit}: 1 cm, W_{bit}: 0.62 cm; 3. Intact; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 2038; 7. Unpublished.

In this category, two artefacts were included, each with some variations in design. Kt1 consists of a ring handle connected to a trapezoidal plate, decorated with three incised horizontal lines. In the extension of the plate is situated a trapezoidal stem, decorated with two incised vertical lines. The bit starts from the stem and has two teeth. The first tooth is incised with a X symbol. Kt2 consists of a ring handle connected to a rectangular stem. The bit starts from the stem and has three teeth. The pattern of the bits is asymmetrical which means that these keys were used to operate single-sided locking mechanisms mounted on furniture on interior doors that could only be opened from one side.

This type of artefact has been erroneously classified as a “key-ring” because of the assumption that it was worn on the finger due to the ring-like shape of the handle. These misconceptions occurred due to the absence of standardized terminology in archaeology related to the category of objects associated with the keeping privacy or security of property and goods in general, as well as the lack of analyses concerning the way of key-rings and keys with ring handles were carried or worn. Most probably, the keys with ring handles were not meant to be worn on the finger for aesthetic reasons, because the stem and bit would not align with the finger, causing discomfort for the wearer. Consequently, the ring handle was used for practical reasons. The handle could be held by two fingers or worn on the finger in order to operate the locking mechanism (similar to folding keys, see Fig. 2). Furthermore, the handle could be suspended on a chain or another hoop²⁹.

Worth mentioning is a discovery from a funerary context, in the province of *Moesia Inferior*. This example comes from an inhumation grave in a cemetery situated southwest of *Tomis* (Constanța County), where a key with a ring handle was found on the finger of a deceased individual³⁰, without specifying on which finger it was found on. This aspect cannot illustrate how the object was worn or used, but only can illustrate the symbolic functionality of the object. The keys in the funerary contexts could have various significances, but in general, they represent objects of transition to the underworld due to their duality of opening and closing. Furthermore, these objects represented attributes to certain deities related to the underworld or the keys, locking mechanisms and chests may guard symbolically the possessions of the deceased individual in the afterlife³¹. The slide key found in the grave situated at *Tomis* has a symmetrical pattern of the bit, suggesting it could operate a double-sided tumbler locking mechanism that could be mounted on doors or gates. The decision to place this type of key in the grave, whether at the request of the deceased person or mourners, could illustrate the belief that the key could open the gates of the underworld³².

Regarding Kt1 and Kt2, they have traces of use-wear. Kt1 presents wear-use marks in the upper part of the handle, where it appears to have thinned over time. This detail could suggest that the key was hung on a chain loop or another type of hoop for an extended period³³. Furthermore, both Kt1 and Kt2 present traces of use-wear on one of the sides of the bits. These traces are vertical incisions, most probably scratches since their shapes are not uniform. Probably, the keys were scratched by the edges of the keyholes when they were inserted or extracted from the locking mechanisms. In addition, they could have accidentally scratched against the walls of locking mechanisms

²⁸ Bucovală-Pășca 1991, 235.

²⁹ See Lăpușan 2022b.

³⁰ Other examples of placing the key with ring handle in graves were mentioned in the cemetery situated at Galați (province of *Moesia Inferior*), where a key with ring handle was discovered in an inhumation grave, positioned in front of the left hand of the deceased individual (Brudiu 2004, 33–34). Additionally, a similar finding occurred at *Sopianael Pécs* cemetery (province of *Pannonia Inferior*) in another inhumation grave, where a key with ring handle was found near to the skeleton of the deceased individual, an adult male (Fülepe 1977, 33). The keys mentioned before were discovered in association with the remains of chests and locking mechanisms.

³¹ Swift 2017, 23–24.

²⁸ Pace 2014, 63.

²⁹ Lăpușan 2022a, 24–26.

during the lifting of keys into bolts, even though there might be a gap between the bolt and the wall of the mechanism. Other use-wear marks on the bits are observed at the corners, which appear to be slightly rounded. These marks could appear during the insertion of teeth into tumbler holes and lifting the tumblers out of the bolt over an extended period³⁴ (Fig. 3).

Regarding the pattern of the bit, there are the following types of analogies: rectangular bit with teeth arranged in a single row, with analogies in the provinces of *Britannia*³⁵, *Dacia*³⁶, *Moesia Inferior*³⁷ and *Moesia Superior*³⁸; rectangular bit incised with a X symbol, with analogies in the provinces of *Achaia*³⁹, *Britannia*⁴⁰ and *Moesia Inferior*⁴¹.

Keys without plates and rectangular stems (Kt3).

Keys with rectangular or trapezoidal plates (Kt4, Kt5, Kt6, Kt7, Kt8) (Pl. 2)

Kt3: 1. Pojejena – fort; 2. TL: 6.22 cm, OD^{head}: 2.02 cm, L^{bit}: 2.36 cm, W^{bit}: 0.44–0.67 cm; 3. Fragmentary; 4. *porta praetoria*, burnt layer; 5. Iron; 6. Museum of the Highland Banat; 7. Unpublished.

Kt4: 1. *Tibiscum*-Jupa (Caraş-Severin County); 2. TL: 6.15 cm, OD^{head of the handle}: 1.64 cm, L^{body of the handle}: 2.15 cm, W^{plate of the handle}: 1.3–1.44 cm, L^{stem}: 2 cm, W^{stem}: 0.5 cm, L^{bit}: 1.3 cm, W^{bit}: 0.4–0.84 cm; 3. Fragmentary; 4. *vicus militaris*, building VIII/”pottery workshop” (“clădirea VIII/atelierul de olărie”); 5. Iron; 6. National Museum of Banat; 7. Cristea 2022, 135.

Kt5: 1. Unknown location; 2. TL: 8.76 cm, OD^{orifice of the head}: 1.35 cm, L^{bit}: 1.7 cm, W^{bit}: 0.7 cm; 3. Intact; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 2635; 7. Unpublished.

Kt6: 1. Unspecified; 2. TL: 4.13 cm, OD^{head of the handle}: 1.18 cm, L^{bit}: 1.05 cm, W^{bit}: 0.54 cm;

³⁴ Researcher E. Swift studied keys-ring belonging to Guiraud 5b type that have rounded corners of the bit, concluding that this type of use-wear marks appeared during the operation of key into the locking mechanism (Swift 2017, 28–30).

³⁵ <https://finds.org.uk/database/artefacts/record/id/383337> (accessed at 29.03.2022), no. SWYOR–1DE7D3; <https://finds.org.uk/database/artefacts/record/id/124768> (accessed at 29.03.2022), no. SUSS-DB3897; <https://finds.org.uk/database/artefacts/record/id/388447> (accessed at 29.03.2022), no. NLM–291297.

³⁶ Alicu *et alii* 1995, 621; Tamba 2008, 191.

³⁷ Cătănciu-Barnea 1979, 185; Suceveanu 1982, 125.

³⁸ Bogić 2017, 35–37.

³⁹ Davidson 1952, 138.

⁴⁰ <https://finds.org.uk/database/artefacts/record/id/619316> (accessed at 29.03.2022), no. ESS–857F54.

⁴¹ Suceveanu 1982, 127; Baumann 1995, 87.

3. Intact; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 1961; 7. Unpublished.

Kt7: Unspecified; 2. TL: 4.84 cm, OD^{head of the handle}: 1.41 cm, L^{bit}: 1.12 cm, W^{bit}: 0.47 cm; 3. Intact; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 2071; 7. Unpublished.

Kt8: 1. Unspecified; 2. TL: 3.76 cm, OD^{head of the handle}: 1.57 cm, L^{bit}: 1.05 cm, W^{bit}: 0.55 cm; 3. Intact; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 2107; 7. Unpublished.

In this category, six keys could be included. One key (Kt3) has a rounded head connected directly to a rectangular stem. The bit starts from the stem and has probably two teeth. Four keys (Kt4, Kt5, Kt6, Kt7) have rounded heads connected to rectangular plates. One key (Kt8) is similar to the previous artefacts but has a trapezoidal plate. In the extension of the plates are situated rectangular stems. The bits start from the stems and have between three to eight teeth. In the case of Kt3, Kt4 and Kt5, the pattern of the bits is symmetrical which means that these keys were used to operate double-sided locking mechanisms mounted on doors or gates, or less likely on furniture (although the locking mechanism was necessarily single-sided). In the case of Kt6, Kt7 and Kt8, the pattern of the bits is asymmetrical which means that these keys were used to operate single-sided locking mechanisms placed on furniture on interior doors that could only be opened on one side.

These artefacts have traces of use-wear marks. At Kt4, the use-wear marks in the upper part of the handle, resulting from thinning, were observed. The traces of use-wear on one side of the bit were observed at Kt5, Kt6 and Kt7. Another type of use-wear mark is the rounded corners of the bit, observed at Kt6, Kt7 and Kt8. For an explanation of these traces, see below at keys with ring handles (Fig. 3).

These types of keys are widespread in the provinces of the Roman empire and a list of all analogies would be too extensive to be mentioned here.

b) Elements of locking mechanisms (bolts) (Pl. 3)

Bt1: 1. Unspecified; 2. TL: 2.68–3.1 cm, W: 1.35 cm, T: 0.41 cm; 3. Fragmentary; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 2630; 7. Unpublished.

Bt2: 1. Prahovo, Kostol, Kurvingrad (Serbia); 2. TL: 3.1–3.7 cm, W: 0.34 cm, T: 0.43–0.51 cm; 3. Fragmentary; 4. Pongrácz Imre Collection; 5.

Bronze; 6. National Museum of Banat, inv. no. 1724; 7. Unpublished.

Bt3: 1. Unspecified; 2. TL: 6.8 cm, W: 1.27 cm, T: 0.3 cm; 3. Fragmentary; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4104; 7. Unpublished.

Bt4: 1. Unspecified; 2. TL: 1.66 cm, W: 0.86 cm, T: 0.27–0.39 cm; 3. Fragmentary; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4104; 7. Unpublished.

Bt5: 1. Unspecified; 2. TL: 4.68 cm, W: 1.55 cm, T: 0.37–0.55 cm; 3. Fragmentary; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4104; 7. Unpublished.

Bt6: 1. Unspecified; 2. TL: 6.4 cm, W: 1.5 cm, T: 0.54 cm; 3. Intact; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4104; 7. Unpublished.

Bt7: 1. Unspecified; 2. TL: 5.7 cm, W: 1.41 cm, T: 0.34–0.64 cm; 3. Intact; 4. Ormós Zsigmond Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 4104; 7. Unpublished.

Bt8: 1. Unspecified; 2. TL: 2.79–4.1 cm, W: 1.42 cm; 3. Fragmentary; 4. Pongrácz Imre Collection; 5. Bronze; 6. National Museum of Banat, inv. no. 1818; 7. Unpublished.

Bt9: 1. Pojejena – *vicus militaris*; 2. TL: 8.6 cm, W: 2 cm; 3. Fragmentary; 4. stray find; 5. Bronze; 6. Museum of the Highland Banat; 7. Timoc *et alii* 2018, 64.

The nine bolts belong to the tumbler locking mechanism type. The form of the bolts is rectangular with two legs. The long leg was used to enter into the doorframe, whether it was part of a piece of furniture or a simple door or gate, in order to lock the mechanism and ensure security. The bolt has holes with various patterns into which the teeth of the key lift the tumblers of the mechanism, in order to swing the bolt. Therefore, the pattern of the bit must match the pattern of the tumbler holes. Hypothetically, if the teeth of the key are smaller than the tumbler holes, then the tumblers remain blocked in the bolt. Conversely, if the teeth of the key are much longer than the tumbler holes, then the key cannot swing the bolt due to the lack of space inside the mechanism⁴².

The symmetrical pattern of the bolt was observed at Bt3 which means that this bolt was from a double-sided locking mechanism placed on doors or gates, or less likely on furniture (although

the locking mechanism was necessarily single-sided). The asymmetrical patterns of the bolt were observed at Bt5, Bt6, Bt7, Bt9 and probably Bt8 which means that these bolts were from single-sided locking mechanisms placed on furniture on interior doors that could only be opened from one side. The bolts that have not been included in the previous description are fragmentary, making it impossible to reconstruct the pattern of the bolt.

These types of bolts are widespread in the provinces of the Roman empire and a list of all analogies would be too extensive to be mentioned here.

3. *Incerta*

The key from this category operates an uncertain type of locking mechanism. It represents a stylised form resembling a human body. The rounded head is perforated and elongates to a rectangular neck. The necks present two collars. The bit starts from the last collar and has an irregular form.

The historiography does not provide many details about the locking mechanism that could have been operated by this type of key. Various hypotheses claim that they operated padlocks⁴³, but without details of the type of padlock or that they operated rotary locking mechanisms⁴⁴. One hypothesis about the type of mechanism that could be operated by this type of key is the capucin lock (Guillaumet/Laude 07 type). To unlock the mechanism, the bit of the key was inserted into the T-shaped keyhole. The bit has perforations corresponding to the wards. After matching the bit into the wards, the key had to be lifted. The edge of the bit pushed up the latch, making it mobile. To close the mechanism, the key was pushed down, an action which allowed the latch to be put in the initial position. This type of mechanism was in most cases a fixed one, being placed on furniture (especially chests) or in some cases it was mobile, in the form of a padlock⁴⁵.

Other similar keys were found in the provinces of *Dalmatia* at Gradac, Mogorjelo, Panik, Sarajevo, Velika Kladuša⁴⁶; *Moesia Superior* at Svrlijig⁴⁷; *Pannonia Superior* at Gorica⁴⁸.

a) *Keys (Pl. 3)*

Kil: 1. Unspecified; 2. TL: 9.22 cm, OD_{head}: 1.75 cm, L_{bit}: 4.68 cm, T_{bit}: 0.5 cm; 3. Intact; 4. Ormós Zsigmond Collection; 5. Bronze; 6.

⁴³ Bogić 2017, 35.

⁴⁴ Busuladžić 2018, 129.

⁴⁵ Guillaumet-Laude 2009, 49–51.

⁴⁶ Busuladžić 2018, 134.

⁴⁷ Bogić 2017, 41.

⁴⁸ Busuladžić 2018, 134.

⁴² Conzémius 2013, 70.

National Museum of Banat, inv. no. 4060; 7. Unpublished.

II. Contexts of discovery

Unfortunately, a large part of the artefacts lack information about their contexts of discovery. Most of them originate from private collections that were subsequently donated to the National Museum of Banat. These collections originally belonged to Ormós Zsigmond and Pongrácz Imre⁴⁹. As for Pongrácz Imre's collection, the artefacts were discovered in the Danube Gorge area or on the right shore of the Danube. In addition, some artefacts were acquired from collectors⁵⁰.

The key (Kt4) was found at *Tibiscum*-Jupa in the *vicus militaris* area. More precisely, it was found inside building VIII⁵¹, also known as the "pottery workshop"⁵². Unfortunately, other further details about the context of discovery were not mentioned in the artefact record. The building was generally dated in the chronological interval between the 2nd–4th centuries AD⁵³. Furthermore, the artefact could be dated to this period.

At Pojejena were discovered four artefacts: one padlock (Pr1), two keys (Kt1 and Kt3) and one bolt (Bt9). The bolt was found by chance during the non-invasive investigations of the *vicus militaris*⁵⁴. The padlock and keys were found during the archaeological excavation of *porta praetoria* in a burnt layer⁵⁵. The burnt layer was dated starting with the reign of Emperor Gallienus⁵⁶.

III. Concluding remarks

The artefacts discussed in this study belong to the category of objects related with the keeping privacy or security of properties and goods. They were classified according to the Guillaumet/Laude typology. In the Guillaumet/Laude 01 type (rotary locking systems) were included two folding rotary keys (Kr1 and Kr2) and one padlock (Pr1). In

the 04–04 Guillaumet/Laude type (tumbler locking systems) were included eight keys (Kt1, Kt2, Kt3, Kt4, Kt5, Kt6, Kt6, Kt7 and Kt8) and nine bolts (Bt1, Bt2, Bt3, Bt4, Bt5, Bt6, Bt7, Bt8, Bt9). The last artefact represents a key that operates an uncertain type of locking mechanism, probably a capucin lock (Guillaumet/Laude 07 type).

The rotary locks could be either fixed, mounted on furniture (such as chests, cabinets, shelves) or mobile, in the form of a padlock. The tumbler locks could also be fixed, or placed on furniture or doors/gates. The type of locking mechanism (single-sided or double-sided) could be determined based on the pattern of the key's bit or the bolt. In the case of Kt1, Kt2, Kt3, Kt4 and Kt5, the pattern of the bits is symmetrical, indicating that these keys were used to operate double-sided locking mechanisms placed on doors or gates, or less probably on furniture (but the locking mechanism was necessarily single-sided). The bolt with a symmetrical pattern is Bt3 and was probably used in this type of locking mechanism. In the case of Kt6, Kt7 and Kt8 the pattern of the bits is asymmetrical, indicating that these keys were used to operate single-sided locking mechanisms placed on furniture on interior doors that could only be opened on one side (storage rooms, prison cells etc.). The bolts with an asymmetrical pattern are Bt5, Bt6, Bt7, Bt9 and probably Bt8 and were probably used in this type of locking mechanism.

Unfortunately, most of the artefacts do not have contexts of discovery, which makes it difficult to date them precisely. Only three artefacts (Pt1, Kt1 and Kt3) discovered in the auxiliary fort of Pojejena were dated more precisely starting with the reign of Emperor Gallienus.

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- ⁴⁹ For more information about Ormós Zsigmond, see Medeleț – Toma 1997, 13–54.
⁵⁰ Medeleț – Toma 1997, 75.
⁵¹ Unpublished information provided by Dr. Călin Timoc (National Museum of Banat).
⁵² For more details about this building, see Benea-Bona 1994, 61–66.
⁵³ Benea-Bona 1994, 66.
⁵⁴ Although, the artefact was listed as a key (Timoc *et alii* 2018, 59, 64, note 9).
⁵⁵ Unpublished information provided by Dr. Călin Timoc (National Museum of Banat). The archaeological report from the 2020 campaign mention that in the burnt layer were found metal artefacts including several iron and bronze keys and a bronze lock (Timoc *et alii* 2021, 226)
⁵⁶ Timoc 2022, 176, note 12.

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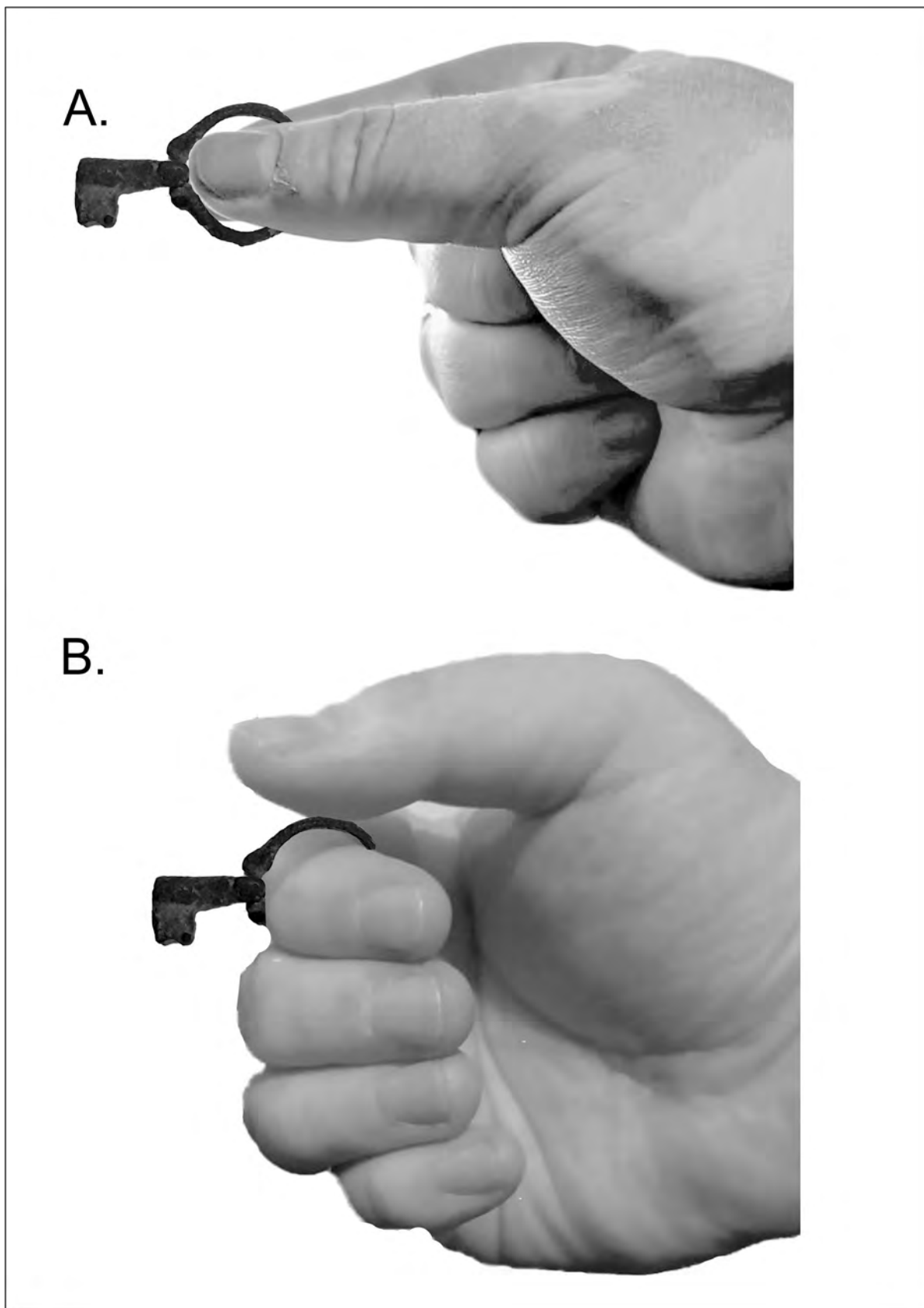


Fig. 1: The use of the rotary folding keys (made by the author).

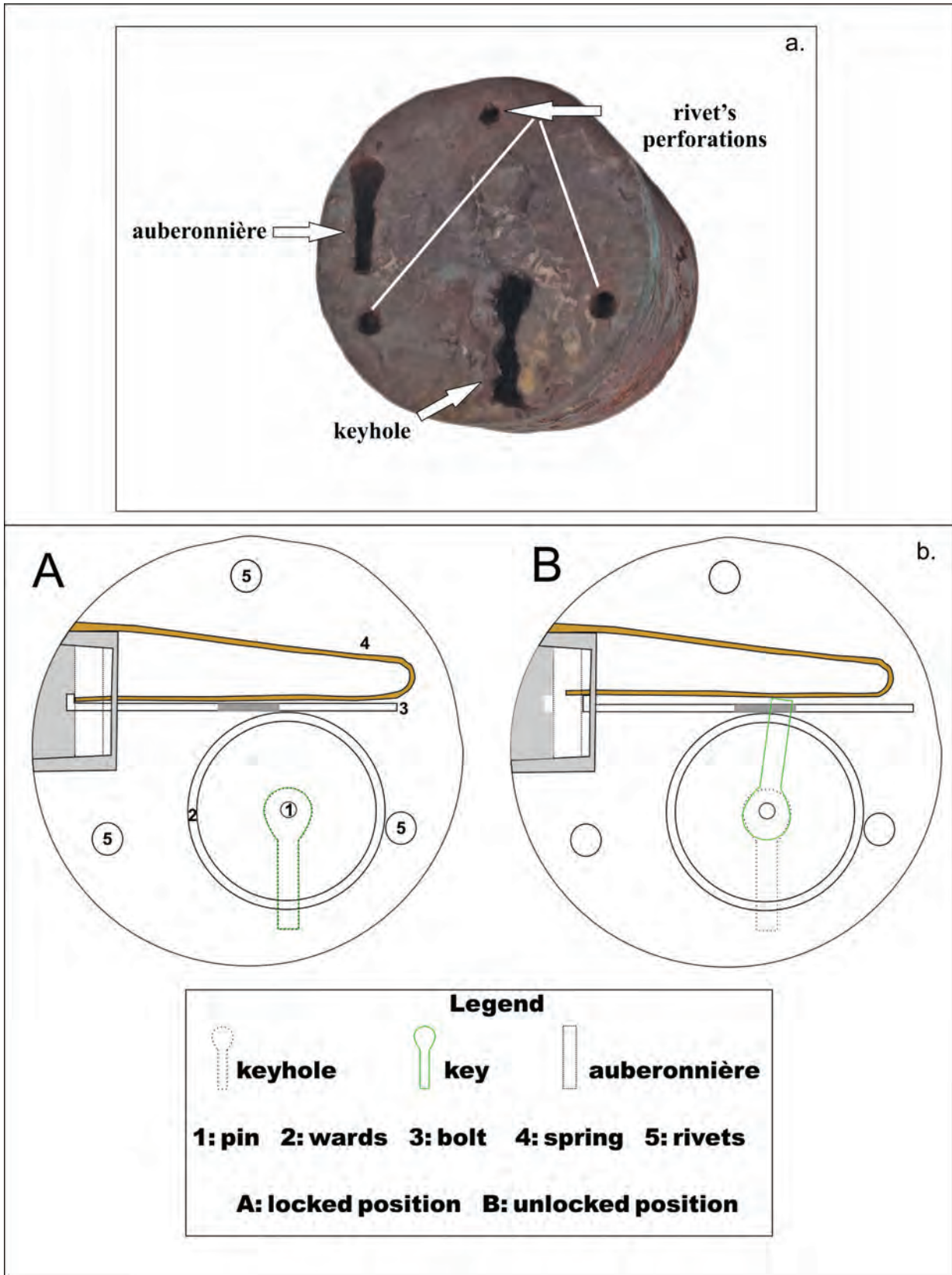


Fig. 2: The components of the lock and how it could be used (a. made by the author; b. adapted after Schauerte-Steiner 1984, 377).

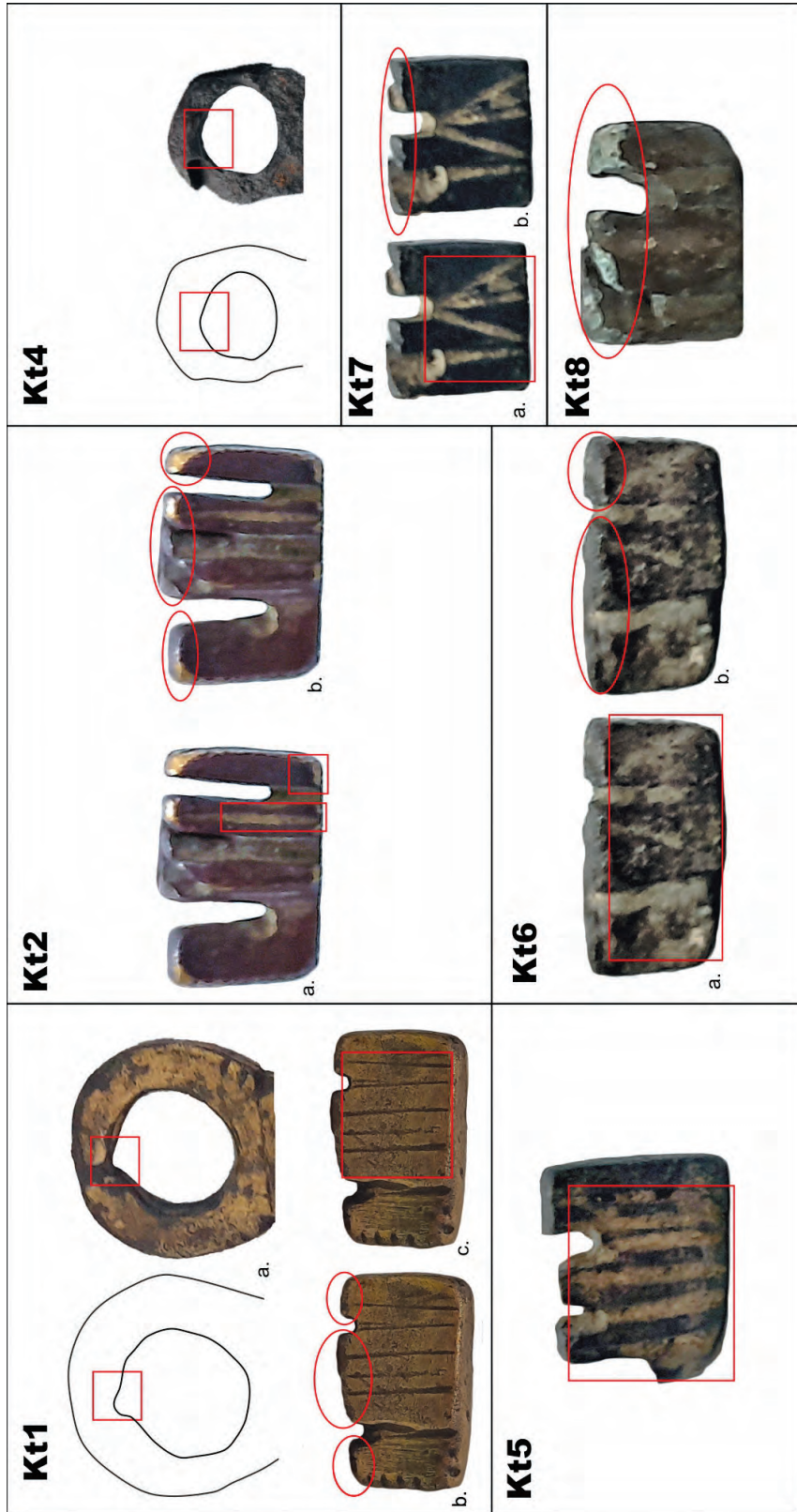
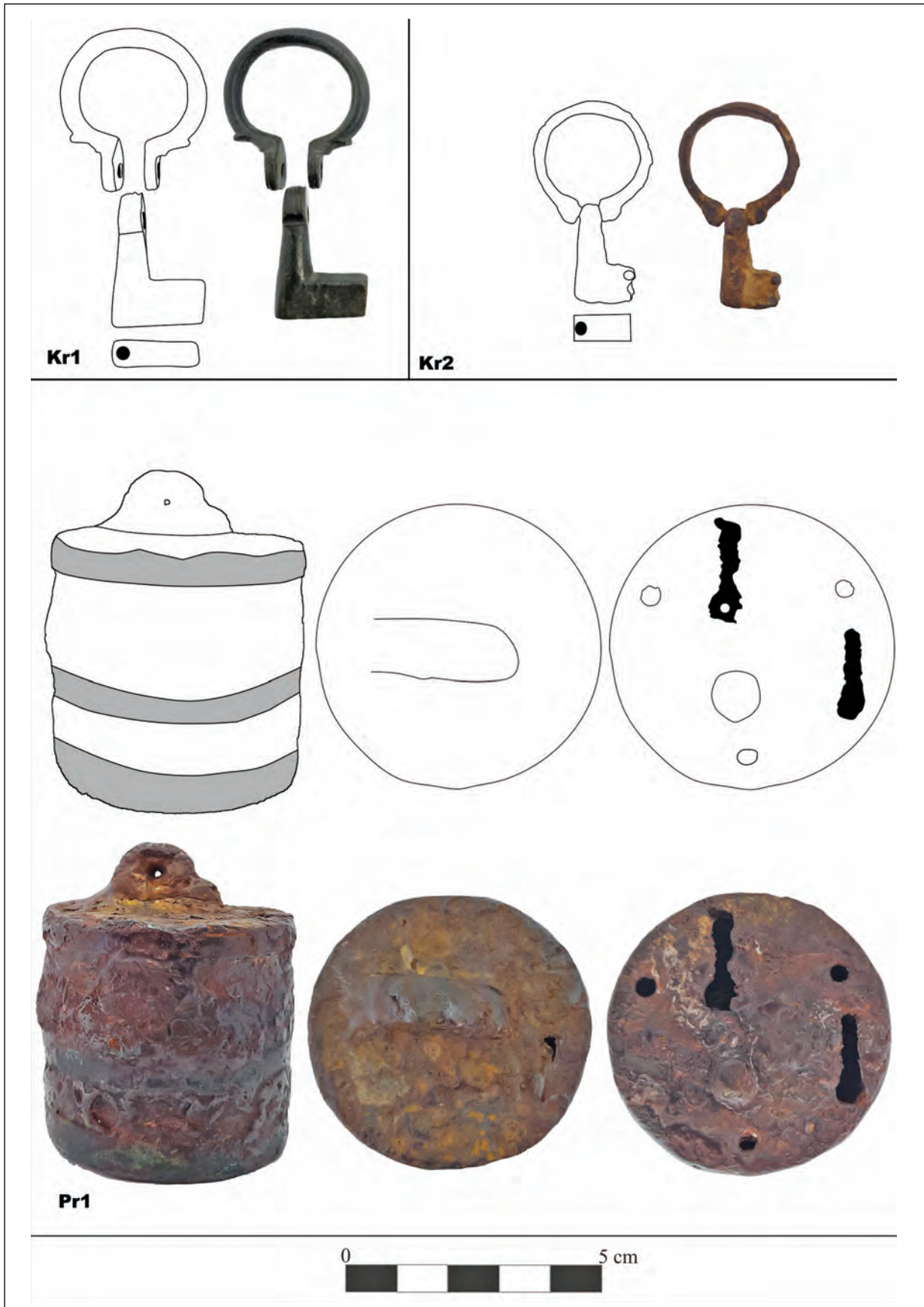
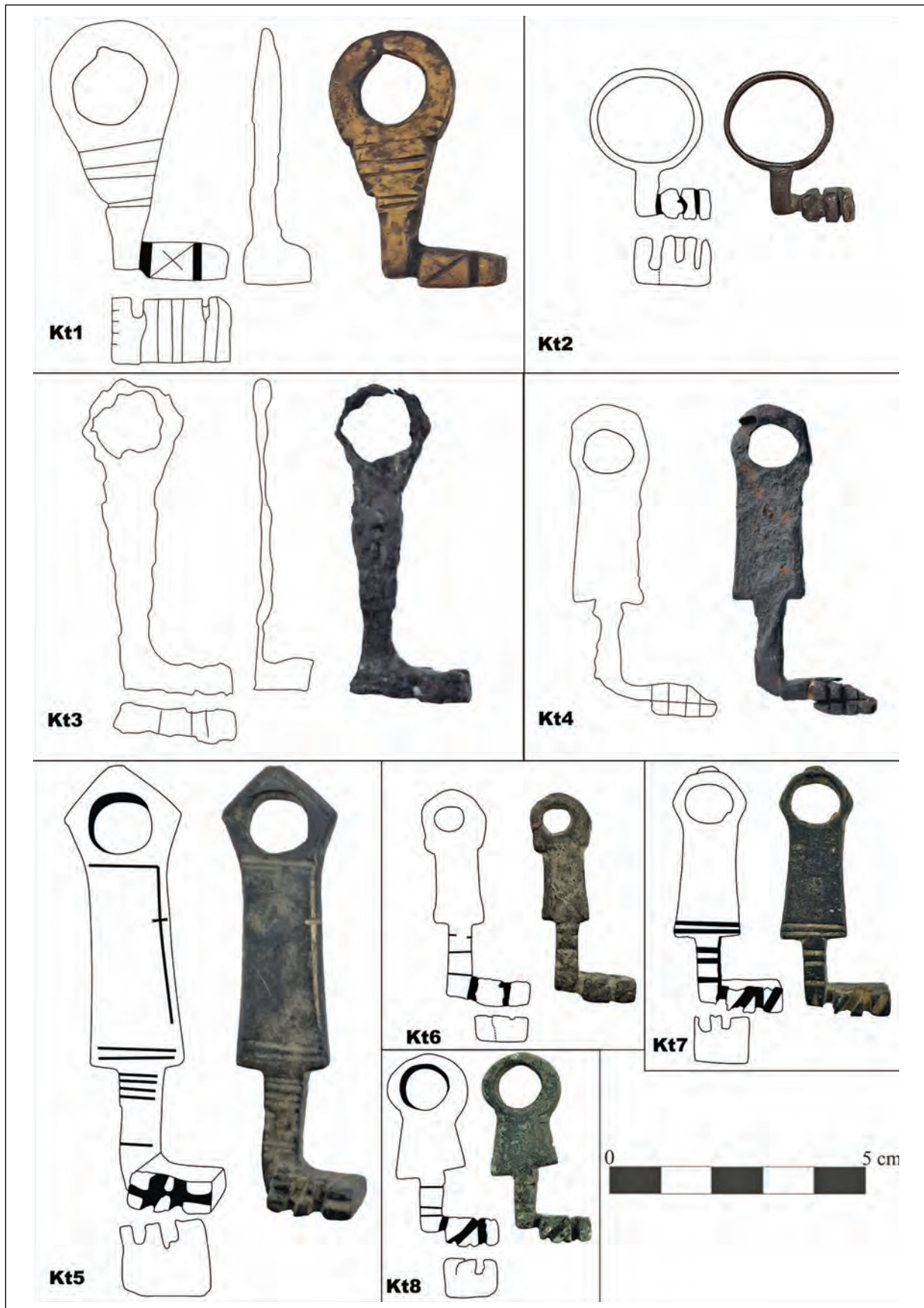


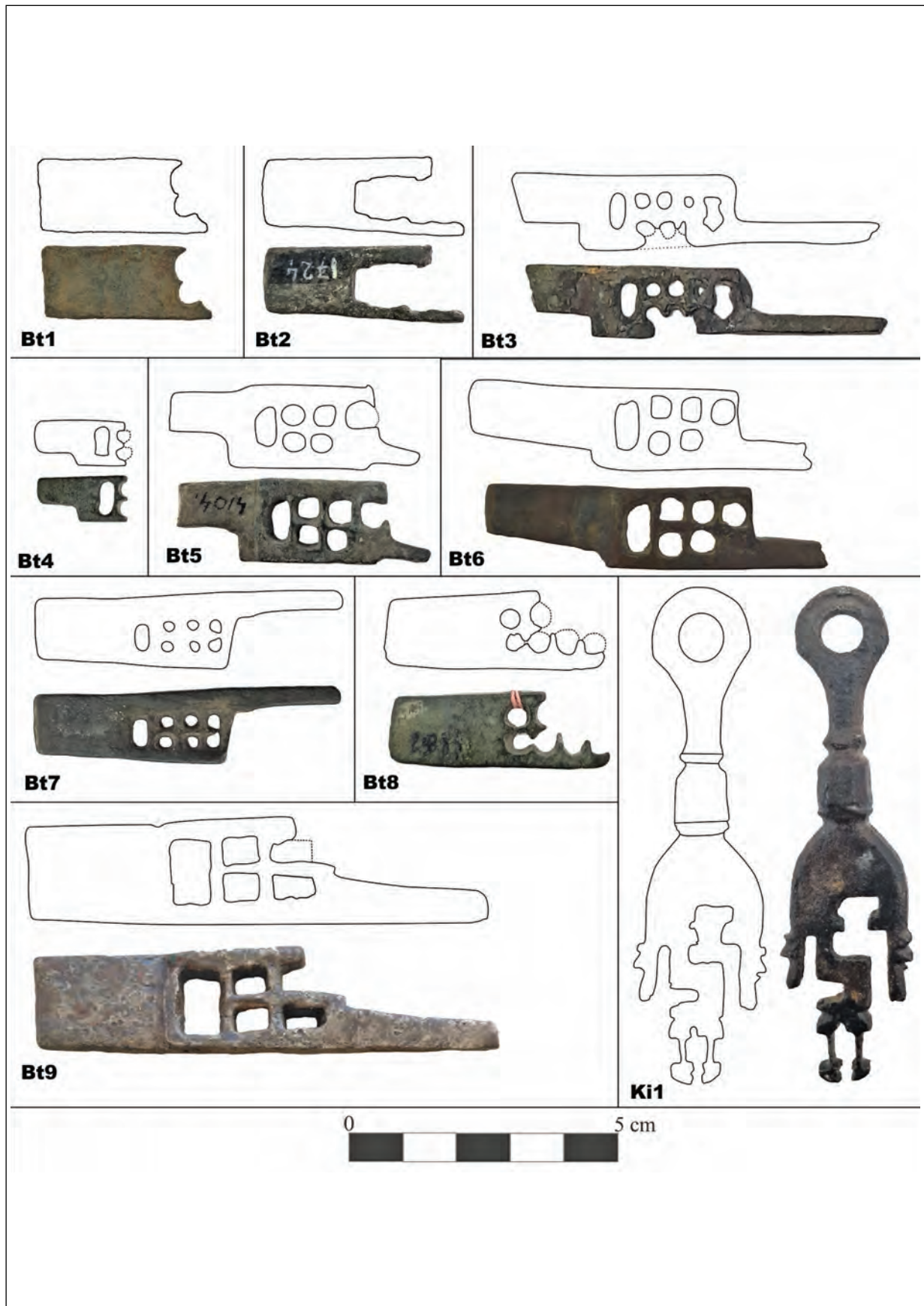
Fig. 3: The use-wear marks of the artefacts (made by the author).



Pl. 1: Kr1, Kr2: rotary folding keys; Pr1: padlock with a rotary locking mechanism (photos and drawings made by the author).



Pl. 2: Kt1, Kt2, Kt3, Kt4, Kt5, Kt6, Kt7, Kt8: slide keys for tumbler locks (photos and drawings made by the author).



Pl. 3: Bt1, Bt2, Bt3, Bt4, Bt5, Bt6, Bt7, Bt8, Bt9: bolts for tumbler locks; Ki: incerta key (photos and drawings made by the author, except Bt9 after Timoc *et alii* 2018, fig. 7, with modifications).