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ROXANA DOBRESCU, ADINA BORONEANȚ, ADRIAN DOBOȘ

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**MARIA BITIRI**

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# THE GLINA-TYPE FLANGED AXES REVISITED

**Radu BĂJENARU**
*"Vasile Pârvan" Institute of Archaeology, Bucharest, e-mail: radu.bajenaru@gmail.com*

***Keywords:*** *Early Bronze Age, Lower Danube area, flanged axe blades, Glina culture, chronology*
***Abstract:*** *The Glina-type flanged axes were acknowledged as such in 1975 by Alexandru Vulpe. Seventeen artefacts of this type exist up to the present moment, distributed in south-eastern Transylvania and south of the Carpathians, mainly in the Olt and Argeş basins. The finds here suggest the presence of several typological variants, while their inclusion in one main type is indicated by their general aspect and proportions. All are cast in closed bivalve moulds with the metal poured through the butt. Some were subjected to compositional analyses, such as the axe from Râşnov (cat. no. 14) with 5% Sn. In the case of two artefacts, the conditions of discovery are unknown, three are isolated finds, two are part of a hoard alongside a shaft-hole axe, and the remaining nine originate from various occupation contexts. Geographically-wise, two finds from south-eastern Transylvania come from Schneckenberg or Jigodin-type contexts and seven artefacts recovered south of the Carpathians originate from Glina-type settlements. We may thus conclude that the Glina-type flanged axes represent a consistent group, well individualised in time and space. They constitute one of the arguments (alongside the Dumbrăvioara-type shaft-hole axes, the Runcuri-type pottery etc.) for the very close links between the Glina-type communities and those on the Upper Olt Basin, within a chronological horizon dated, most probably, between 2700 and 2500 BC.*

***Cuvinte-cheie:*** *perioada timpurie a epocii bronzului, Dunărea de Jos, topoare plate cu margini ridicate, cultura Glina, cronologie*
***Rezumat:*** *Tipul Glina al topoarelor plate cu margini ridicate a fost definit de Alexandru Vulpe în 1975, astăzi fiind cunoscute un număr de 17 exemplare răspândite în sud-estul Transilvaniei şi la sud de Carpaţi, în principal în bazinele Oltului şi Argeşului. Piesele prezentate indică mai multe variante tipologice, însă includerea lor în cadrul aceluiaşi tip este susţinută de aspectul general şi de proporţiile pieselor respective. Toate sunt turnate în tipare bivalve închise cu metalul turnat pe la ceafă. Câteva dispun şi de analiza elementală, remarcându-se toporul de la Râşnov (cat. no. 14) cu 5% Sn. Pentru două exemplare nu se cunosc condiţiile de descoperire, trei sunt descoperiri izolate, două fac parte dintr-un depozit împreună cu un topor cu gaură de înmănuşare transversală, iar celelalte nouă pot fi puse în legătură cu diferite contexte de locuire. Astfel, două piese din sud-estul Transilvaniei se leagă de contexte cu descoperiri de tip Schneckenberg sau Jigodin, iar şapte de la sud de Carpaţi de aşezări de tip Glina. Se poate concluziona că topoarele plate cu margini ridicate de tip Glina formează un grup consistent, bine individualizat în timp şi spaţiu. Ele se constituie (alături de topoarele cu gaură de înmănuşare transversală de tip Dumbrăvioara, ceramica de tip Runcuri etc.) într-unul din argumentele relaţiilor foarte strânse dintre comunităţile de tip Glina şi cele din bazinul superior al Oltului, într-un orizont cronologic ce poate fi stabilit, cel mai probabil, între 2700–2500 BC.*

The Glina type flanged axes were defined by Alexandru Vulpe in 1975, based on the five finds existing at the moment. Their main characteristics were the almost rectangular shape of the body, the straight or arched butt and the slightly flaring cutting edge[1]. Subsequently, the finds were discussed several times, either with the publication of newly discovered artefacts[2] or integrated into a larger context[3]. The purpose of the present paper is to bring into discussion a previously unpublished flanged axe, found (probably) near Drăgăşani (Vâlcea County), part of the collections of the Museum of Oltenia in Craiova (Romania)[4]. This brings the present-day number of Glina-type flanged axes to 17[5].

## CATALOGUE OF FINDS

1. **Boişoara** (Vâlcea County) (Fig. 2/4). Complete flanged axe cast in bivalve mould. Well worked, smoothed and finished, with slightly irregular and rough surfaces; occasionally small chips can be observed, caused by the finishing process through hammering; dark brown colour with traces of greenish patina. Trapezoidal body with slightly concave sides, arched butt and cutting-edge, the latter with prominent tips. Biconvex cross-section (bulging in the middle) with slightly raised flanges, profile tapering towards the butt. Probably used, the cutting edge exhibits an oblong bevel at the middle, and several chips. l. (length) = 10.8 cm; c-e w. (cutting-edge width) = 6.1 cm; th. (thickness) = 0.7 cm; W. (weight) = 253.5 gr. Chance find of August 1975, recovered from a stone slab on the riverbed of Valea Cerbului,

[1] Vulpe 1975, p. 64–65, cat. no. 326–330, pl. 36/326–330.
[2] See Băjenaru 2006, p. 129–133, 139–140; Costea, Rusu 2007.
[3] See Klimscha 2010, p. 114–115; Băjenaru 2014a, p. 237–238; Schuster 2015, p. 10–11.
[4] The find was mentioned in Băjenaru 2013, p. 76, cat. no. 180.
[5] The present catalogue does not include a yet unpublished artefact from Feldioara (Braşov County), presented by Anca-Diana Popescu (forthcoming paper) at the Annual Session of the "Vasile Pârvan" Institute of Archaeology in March 2018.

approximately 150 m from the confluence with Boișoara stream. "Gh. Petre-Govora" Museum of Archaeology and Religious Art, Govora, inv. no. 202[6].

2. **Bulgaria** (probably north-eastern Bulgaria) (Fig. 1/8). Complete flanged axe cast in bivalve mould. Very well worked and finished, with slightly rough surfaces; brownish-grey colour with traces of green patina on one of the faces. Rectangular body with slightly arched sides; the butt corners are raised; the cutting edge slightly flaring and arched, well defined; biconvex cross-section with very slightly raised edges (on one of the faces, flanges do not extend along the entire length) and profile tapering towards the butt. No evident use-wear traces. l. = 12 cm; c-e w. = 7.7 cm; th. = 0.8 cm; W. = 590 gr. Conditions of discovery unknown; acquired by the Museum of Archaeology Varna from treasure hunters, inv. no. I 3853[7].

3. **Căzăneşti** (Râmnicu Vâlcea, Vâlcea County, findspot known as *Cărămidărie*) (Fig. 1/3). Fragmentary flanged axe cast in bivalve mould; broken intentionally in prehistoric times, only the distal half (towards the cutting-edge) is preserved; one of the cutting-edge tips is broken. Well worked, smoothed and finished with rough and corroded surfaces; green uneven patina. The preserved part is trapezoidal with a flaring edge, well defined; biconvex cross-section with raised sides. The cutting edge displays several chips. Preserved l. = 6.7 cm; c-e w. = 6.2 cm; gr. = 0.8 cm; preserved W. = 214 gr. Chance find from an area of the settlement with materials originating from several periods among which Coțofeni-type pottery fragments, and a cultural layer of ca. 0.30-0.40 cm yielding Glina-type pottery. "Gh. Petre-Govora" Museum of Archaeology and Religious Art, Govora, inv. no. 201[8].

4. **Crivăţ 01** (Călăraşi County, findspot known as *La Izlaz*) (Fig. 1/5). Complete flanged axe cast in bivalve mould. Very well worked and finished, with polished surfaces; several stroke marks are present on one of the sides and a row of dents on the butt; brown colour with traces of green patina. Trapezoidal body with slightly concave sides; the butt is also concave with bevelled but protruding butt corners; the cutting-edge is very slightly arched; biconvex cross-section with raised edges, with the profile tapering towards the butt. The cutting edge is chipped but no evident use-wear is visible. l. = 12.6 cm; c-e w. = 6.4 cm; th. = 0.7 cm; W. = 292 gr. Chance find. The *La Izlaz* settlement occupies a terrace erosion remnant on the Genta Valley, terraced for vineyard purposes between 1961 and 1964 when several prehistoric metal finds were discovered. The subsequent archaeological excavations indicated the presence of Cernavoda III pottery and a consistent Glina-type horizon with several occupation levels. National Museum of History of Romania, inv. no. 14045[9].

5. **Crivăţ 02** (Călăraşi County, findspot known as *La Izlaz*) (Fig. 2/7). Complete flanged axe cast in bivalve mould. Several dents and irregularities can be observed on the butt corners; green patina; strongly concave sides; the butt is also slightly concave with blunted corners; flaring and arched cutting-edge; biconvex cross-section with raised edges; profile tapering strongly towards the butt. Probably used, the cutting edge has been "eaten in" by use-wear in the central area. l. = 11.9 cm; c-e w. = 7.2 cm; th. = 0.7 cm; W. = 262 gr. For conditions of discovery see Crivăţ 01. Museum of the Gumelnița Civilisation, Olteniţa[10].

6. **Drăgăşani** (Vâlcea County) (Fig. 1/1). Flanged axe with both a corner of the butt and a tip of the cutting edge recently damaged by cutting; cast in bivalve mould. Well-worked and smoothed, with rough uneven surfaces; several traces of hammering marks on one of the faces; slightly irregular butt; brown colour with copper-coloured shades. Trapezoidal body, the preserved butt corner appears blunted, slightly arched cutting-edge, well defined, biconvex cross-section with slightly raised flanges; the profile is tapering strongly towards the butt. No evident traces of use-wear. l. = 9.4 cm; c-e w. = 5.6 cm; th. = 0.6 cm; preserved W. = 206 gr. Conditions of discovery are unknown; the find comes from Col. I. Rădulescu collection, donated to Museum of Oltenia, Craiova, inv. no. 25351[11].

7. **Gemenea-Brătuleşti** (Voineşti com., Dâmbovița County, findspot known as *Mâzgan*a) (Fig. 1/6). Complete flanged axe cast in bivalve mould. Very well worked and finished, polished surfaces with a few irregularities; cleaned, brown

[6] Budoiaş 1982, p. 27, Fig. 3; Tuţulescu, Părăuşanu 2015, p. 213–214, no. 1, pl. 1/1.
[7] Slavchev 2006, p. 32, no. 52; Băjenaru 2013, p. 48, cat. no. 88.
[8] Petre-Govora 1976, p. 11, Fig. 3/3; Petre-Govora 1995, p. 27, Fig. 3/3; Tuţulescu, Părăuşanu 2015, p. 214, no. 2, pl. 1/2.
[9] Berciu 1964, p. 270, Fig. 1/2; Berciu 1966, p. 529, Fig. 1/1; Vulpe 1970, p. 35–36, cat. no. 72, pl. 65/G2; Vulpe 1975, p. 64, cat. no. 326, pl. 36/326.
[10] Şerbănescu, Trohani 1975, p. 531, no. 6, Fig. 2/3; Vulpe 1975, p. 64, cat. no. 326.
[11] Băjenaru 2013, p. 76, cat. no. 180. I would like to thank Florin Ridiche for the permission to document and publish this find.

colour. Slightly trapezoidal body with blunted but protruding butt corners; the cutting-edge is arched and well defined, very slightly flaring, with one elongated tip; biconvex cross-section with slightly raised flanges; profile tapering towards the butt. Several hammer strokes can be observed on the cutting-edge. l. = 11.7 cm; c-e w. = 6.5 cm; th. = 0.7 cm; W. = 271 gr. Chance find from 1978. "Curtea Domnească" National Museum Complex, Târgovişte, inv. no. 3292/VI[12].

8. **Glina** (Ilfov County) (Fig. 2/1). Flanged axe cast in bivalve mould; broken on one side, towards the cutting edge. Based on the published illustration, the artefact appears unfinished, with uneven and irregular areas. Almost square body with flaring cutting edge; biconvex blade cross-section with slightly raised flanges. l. = 11.6 cm; c-e w. = 8.5 cm (after the published drawings). Discovered in 1943 during systematic excavations at the Glina-tell, in the Glina cultural layer. National History Museum of Romania (?)[13].

9. **Ocnele Mari** (Vâlcea County) (Fig. 2/6). Flanged axe broken transversely in two parts during prehistoric times, approximately at the middle of its length; cast in bivalve mould. Very skilfully worked and finished, smoothed surfaces, with very few irregularities on the body; several recent strokes on the butt and sides, which determined the exfoliation of the green patina in those areas; the butt corners and cutting-edge tips are partly worn. Trapezoidal body with slightly concave sides; the butt is also concave; the blade cross-section is biconvex with slightly raised flanges. The profile is tapering towards the butt. The cutting-edge appears used, heavily worn and bevelled. l. = 10.4 cm; c-e w. = 5 cm; th. = 0.7 cm; W. = 136 gr. Chance find recovered as a result of metal detection. "Aurelian Sacerdoţeanu" County Museum, Râmnicu Vâlcea[14].

10. **Odaia Turcului** (Mătăsaru com., Dâmboviţa County) (Fig. 1/4). Fragment (part of the cutting edge and respective side) of a flanged axe cast in bivalve mould; broken in prehistoric times; well worked, smoothed and finished; cleaned, copper-coloured. Non-flaring, arched cutting edge; the blade has a biconvex cross-section with slightly raised flanges. Preserved l. = 3.2 cm; preserved w. = 3.2 cm; preserved W. = 35.34 gr. Discovered in 1987 during systematic excavations at Odaia Turcului, in trench S.I, square 9, Pit 2, at -1.40 m, associated with Glina-type ceramic fragments; the pit was observed at -0.78-0.85 m and belongs to the second level of the Glina horizon. "Vasile Pârvan" Institute of Archaeology, Bucharest[15].

11. **Prundu** (Giurgiu County, findspot known as *Botul Ursoaicei*) (Fig. 2/5). Complete flanged axe cast in bivalve mould. Covered with green patina. Slightly trapezoidal body with arched butt; the cutting-edge is also arched and well defined; the blade cross-section is biconvex with slightly raised flanges; the profile is tapering towards the butt. l. = 9.3 cm; c-e w. = 5.8 cm; th. = 1.1 cm; W. = 303 gr. Chance find recovered during field surveys. The place known as *Botul Ursoaicei* is an erosion remnant of the high terrace east of the village, suffering terracing works on its northern slope in 1962; the field survey took place in April 1963 and Glina typical pottery and the flanged axe were found, having been disturbed by the terracing works; following a small excavation in autumn 1963, a Glina-type settlement was uncovered with only one occupation layer, 0.20 m thick. Museum of the Gumelnița Civilisation, Oltenița, inv. no. 1382[16].

12. **Râncăciov 01** (Călineşti com., Argeş County, findspot known as *Dealul Săracului*) (Fig. 1/2). Flanged axe with the butt recently broken, cast in bivalve mould; recent chips are visible on the butt; two other recent ones can be observed on one side. Well worked and smoothed, partially finished, polished on one face, the other being left rough, with casting irregularities; brown colour with copper-coloured shades. Trapezoidal body, slightly asymmetric, with very slightly concave sides; arched cutting edge, well defined, very slightly flaring, with one tip more prominent than the other; the blade cross-section is biconvex with unequal flanges. The cutting edge shows some nicks, but no evident traces of use-wear. l. = 11.7 cm; c-e w. = 6.8 cm; th. = 1 cm; preserved W. = 307 gr. Part of a hoard discovered by chance in 1976 on Dealul Săracului, consisting of two Glina-type flanged axes and an Izvoarele-type shaft-hole axe;

[12] Muscă 1979, p. 116, no. 2, pl. 1/2–2a; Băjenaru 2014a, p. 67, cat. no. 306, Fig. 72/4.
[13] Junghans *et alii* 1968, p. 238, no. 8551; Vulpe 1975, p. 64, cat. no. 327, pl. 36/327.
[14] Tuţulescu *et alii* 2020, p. 6, no. 2, Fig. 2. I would like to thank Ion Tuţulescu for the permission to document and publish this find.
[15] Băjenaru 2006, p. 129, no. 1, Fig. 1/3; Băjenaru 2014a, p. 89, cat. no. 477, Fig. 66/3; Pernicka *et alii* 2016, p. 75, tab. 4, no. MA-092914.
[16] Morintz, Ionescu 1968, p. 118, no. 13; Vulpe 1975, p. 64, cat. no. 328, pl. 36/328; Şerbănescu, Trohani 1975, p. 529–530, no. 3, Fig. 2/4.

following a small excavation by E. Popescu and R. Maschio in 1979 at the very findspot, only some traces of burnt daub were reported. Argeș County Museum, Pitești, inv. no. 2577[17].

13. **Râncăciov 02** (Călineşti com., Argeş County, findspot known as *Dealul Săracului*) (Fig. 2/8). Flanged axe recently broken into two parts, cast in bivalve mould; two cracks are visible on the butt and two recent indentations on one of the sides. Well worked, smoothed and finished. Reddish-brown colour with traces of brown patina. Trapezoidal body with strongly concave sides; the butt is arched, convex with the corners well defined and raised; the cutting-edge is also arched and defined; the blade cross-section is biconvex with raised edges; the profile is tapering towards the butt; there is an elongated depression on each side, near the centre. No evident traces of use-wear. l. = 13.6 cm; c-e w. = 7.1 cm; th. = 1 cm; W. = 379 gr. For the conditions of discovery see the previous find (Râncăciov 01). Argeș County Museum, Pitești, inv. no. 2576[18].

14. **Râşnov** (Braşov County, findspot known as *Cetate*) (Fig. 1/7). Complete flanged axe cast in bivalve mould. Green uniform patina on one face and irregular and exfoliated on the other. Slightly trapezoidal body; the butt has blunt but raised corners and the cutting-edge is flaring; the blade has a biconvex cross-section with raised edges, with the profile tapering towards the butt. No evident traces of use-wear. l. = 11.3 cm; c-e w. = 6.5 cm; th. = 0.8 cm; W. = 257 gr. Discovered in 2000 during systematic excavations at the Râșnov fortress, in trench S.49, square 1 at -1.00 m, in the small Dacian fortification's earth bank (exterior); other than the Latène and the medieval occupations, there was also an Early Bronze Age layer (Schneckenberg culture), destroyed by the subsequent occupations of the site; the axe, as the rest of the Early Bronze Age material, was found in a secondary position. Brașov County History Museum[19].

15. **Sf. Gheorghe** (Covasna County, findspot known as *Örkö*) (Fig. 2/3). Complete flanged axe cast in bivalve mould. Rectangular body, straight butt with blunted corners, and flaring and arched cutting-edge; the blade has a biconvex cross-section with raised sides. l. = 12.2 cm; c-e w. = 7.3 cm (after the published drawings). Chance find from the *Örkö* settlement, where subsequently were uncover several layers yielding Early Bronze Age pottery (Jigodin-type and Schneckenberg). Lost (?) (previously in the Székely National Museum, Sf. Gheorghe)[20].

16. **Verbicioara** (Verbiţa com., Dolj County, findspot known as *La Trestii*) (Fig. 2/2). Complete flanged axe cast in bivalve mould. Rectangular body, the butt is slightly arched and concave, flaring and arched cutting-edge; the blade has a biconvex cross-section with raised sides, the profile is slightly tapering towards the butt. l. = 9.4 cm; c.e w. = 7.4 cm (after the published drawings). Discovered during systematic excavations at the Bronze Age settlement from *La Trestii*, at the base of the Verbicioara layer and immediately above the horizon containing the Glina-type pottery. National History Museum of Romania (?)[21].

The Glina-type flanged axes also used to include the artefact from the Schitu hoard (Pângăleşti / Cămineasca, Giurgiu County)[22] (Fig. 3/1). The axe was attributed by A. Vulpe to the category of axes with double cutting edge (*Doppelbeil*), with both short sides sharp, and is the only find of this type in our area of interest[23]. What must be taken into account is the fact that the find was mutilated by the discoverer, one of the blade tips having been recently cut, therefore we cannot exclude that the sharpening of both sides is the result of recent interventions[24]. From a typological point of view, the axe from Schitu is similar to the finds from Crivăţ 02 (Fig. 2/7) and Râncăciov 02 (Fig. 2/8), having the long sides strongly arched and concave. The sides are well defined, especially in the central area, without being raised (no flanges), thus the inclusion of this axe in the type discussed here remains problematic. The find is part of a hoard, having been discovered together with a shaft-hole axe, also mutilated by the discoverer, of the

[17] Vulpe 1988, p. 207, Fig. 1/2; Soroceanu 2012, p. 156, no. 2, pl. 63/2; Băjenaru 2014a, p. 101, cat. no. 588, Fig. 71/B3.
[18] Vulpe 1988, p. 207, Fig. 1/3; Soroceanu 2012, p. 156, no. 2, pl. 63/3; Băjenaru 2014a, p. 101, cat. no. 588, Fig. 71/B4.
[19] Costea 2004, p. 28, Fig. 22/2; Costea, Rusu 2007, p. 28–32, Fig. 1/1; 2.
[20] Roska 1942, p. 146, Fig. 305; Vulpe 1975, p. 64–65, cat. no. 329, pl. 36/329.
[21] Berciu 1961a, p. 231, Fig. 1/3; Berciu 1961b, p. 128, Fig. 1/3; Junghans *et alii* 1968, p. 242, no. 8670; Vulpe 1975, p. 65, cat. no. 330, pl. 36/330.
[22] Schuster 2015, p. 11, pl. 1/1 (Cămineasca-*Măgură*). For the axe see also Berciu 1956, p. 501–502, Fig. 12; Vulpe 1975, p. 63, cat no. 325, pl. 36/325; Soroceanu 2012, p. 156–157, pl. 63/4.
[23] Vulpe 1975, p. 63.
[24] Berciu 1956, p. 502.

Veselinovo I type[25] (Fig. 3/2). This association suggests a date sometime during the first half of the 3rd millennium BC, therefore there is a possible contemporaneity with the Glina-type flanged axes[26].

## TYPOLOGY AND TECHNOLOGY

From the very beginning of the type's definition, Vulpe observed the presence of two typological variants: the first one comprising axes with rectangular wide body (the finds from Glina – Fig. 2/1 and Verbicioara – Fig. 2/2), and the second including the finds with a slender body and an elegant contour (the finds from Crivăţ – Fig. 1/5, Prundu – Fig. 2/5 and Sfântu Gheorghe – Fig. 2/3)[27]. To date, the number of Glina-type flanged axes is at least three times larger, and as such, the typological diversity is much more evident.

- Variant 1: axes with a rectangular body and flaring cutting-edge (the finds from Glina, Verbicioara and Sfântu Gheorghe – Fig. 2/1–3);
- Variant 2: axes with a trapezoidal body, sometimes with slightly concave sides and flaring cutting edge; based on the aspect of the butt, three sub-types can be distinguished:
  a. axes with a straight butt (the finds from Drăgăşani, Râncăciov 01, and probably Căzăneşti – Fig. 1/1–3);
  b. axes with rounded butt (the finds from Boişoara, Prundu and possibly Ocnele Mari – Fig. 2/4–6);
  c. axes with raised butt corners (the finds from Crivăţ 01, Gemenea-Brătuleşti, Râşnov and possibly NE Bulgaria – Fig. 1/5–8);
- Variant 3: axes with pronounced concave sides, flaring cutting-edge and butt corners more or less raised (the finds from Crivăţ 02 and Râncăciov 02 – Fig. 2/7–8).

Despite the apparent typological diversity among the flanged axes presented above, however, their inclusion in the same type is based on the general aspect of the finds and the similar way in which the flanges were manufactured (very thin and slightly prominent in most cases). Regarding the general aspect, all axes are wide, of similar dimensions (length between 9.3 and 13.6 cm, and width between 5 and 8.5 cm), forming a rather compact group measurement-wise (Fig. 4). What can be noted, however, is the ratio between the length and the maximum width (of the cutting-edge), in most cases the latter being more than half of the length, a rather rare ratio for flat metal axes[28]. The only exception is the axe from Ocnele Mari (cat. no. 9, Fig. 2/6), whose width is 2 mm smaller than half of the length, perhaps accounted by the fact that the sides of the cutting edge are badly preserved. The typological variation mentioned above indicates, thus, that there were probably several production centres in the distribution area of the Glina-type axes, however, at the moment, discrete groups differentiated regionally or chronologically cannot be established.

All finds presented here were cast in bivalve moulds, with the metal poured through the butt area, a frequent technology for Bronze Age flat axes. For Kurt Kibbert, the first raised edges of the metal flat axes were accidentally or unintentionally obtained, through the finishing process after casting, by hammering the blade[29]. Next, raised edges were intentionally obtained by hammering following the casting, and finally, the raised edges were obtained directly through casting[30]. Lacking imagistic analyses, it is difficult to securely establish the way in which the Glina-type axes flanges were manufactured. The thinness and un-accentuated profiling plead for the hammering of the flanges after casting. What cannot be denied is, however, that they were intentionally manufactured, which would imply a casting process facilitating the hammering and finishing of the flanges.

[25] Vulpe 1970, p. 36, cat no. 73, pl. 5/73.
[26] From the available data, it seems more likely that the shaft-hole axes like the one from the Schitu hoard to have been produced in the first quarter of the 3rd millennium BC, while the Glina-type flanged axes are linked to contexts mainly datable to the second quarter of the 3rd millennium BC (see the discussion below), however a finer chronology only on the basis of the typology of the metal finds and their associations cannot be sustained.
[27] Vulpe 1975, p. 64.
[28] What must be remarked is that the same ratio is found in the case of the flat axe from Schitu: l. = 13.5 cm, c-e w. = 7.3 cm.
[29] Kibbert 1980, p. 95.
[30] See also the critique at Klimscha 2010, p. 102–103.

| Item / Laboratory | Cu | As | Sn | Pb | Sb | Ag | Ni | Fe | Bi | Obs |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Boişoara (Măgurele) | 98.5 | traces | - | traces | - | traces | 0.1 | - | - | Cleaned area |
| 1. Boişoara (Mannheim) | 98.5 | 0.73 | 0.01 | 0.16 | 0.06 | 0.12 | 0.05 | 0.17 | 0.09 | Patina |
| 3. Căzăneşti (Măgurele) | 99.7 | - | - | - | - | Traces | - | - | - | Cleaned area |
| 3. Căzăneşti (Mannheim) | 99.5 | 0.01 | 0.01 | 0.01 | - | - | - | 0.33 | - | Patina |
| 4. Crivăţ 01 (Mannheim) | 99 | 0.38 | 0.07 | traces | 0.006 | 0.039 | 0.11 | <0.02 | <0.005 | Patina |
| 8. Glina (Stuttgart) | 99 | 0.88 | 0.01 | - | traces | 0.05 | 0.02 | - | 0.004 | Material sampling |
| 10. Odaia Turcului (Măgurele) | 98.1 | 0.45 | - | 0.05 | - | - | - | - | - | Cleaned area |
| 10. Odaia Turcului (Mannheim) | 100 | 0.19 | 0.02 | 0.06 | 0.022 | 0.038 | 0.061 | <0.02 | <0.005 | Patina |
| 14. Râşnov (Univ. of Braşov) | 94 | ? | 5 | ? | ? | ? | ? | ? | ? | Patina? |
| 16. Verbicioara (Stuttgart) | 99.5 | 0.11 | 0.02 | 0.004 | - | 0.04 | 0.12 | - | 0.016 | Material sampling |

Table 1. Elemental composition of the Glina-type flat axes.

Compositional analyses were performed on seven artefacts only, three of which benefited from two sets of measurements, during two different projects (tab. 1). The axes from Glina (cat. no. 8) and Verbicioara (cat. no. 16) were intrusively sampled during the *Studien zu den Anfängen der Metallurgie* project initiated in Stuttgart[31]; the ones from Boişoara (cat. no. 1), Căzăneşti (cat. no. 3) and Odaia Turcului (cat. no. 10) were analysed at the "Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering" (IFIN-HH), Măgurele, during the *Arheomet* and *Romarheomet* projects, by surface measurements (*X-ray fluorescence*) on cleaned areas[32]. The same finds, together with the axe from Crivăț (cat. no. 4), were also analysed in Mannheim during a project coordinated by Ernst Pernicka, through the same (last mentioned) method, but on patinated areas[33]. Taking into account the diverse methods employed, a comparison of the obtained results is not possible. The elemental composition of the analysed finds fits well within the general picture of the Early Bronze Age in the Carpathian-Balkan area, with the possibly intentional presence of arsenic at Odaia Turcului and Glina. What is worth mentioning is the presence of tin in a proportion of 5% in the composition of the axe from Râșnov (cat. no. 14). The analysis was performed at the laboratory of the University of Brașov, but the method employed remains obscure[34]. We may presume surface analyses on the patina, thus explaining the high percentage of tin[35]; it is obvious, however, that for the casting of the axe from Râșnov, the Cu+Sn alloy was intentionally used.

## DISTRIBUTION, CONTEXTS AND CHRONOLOGY

The spatial distribution of the Glina-type flat axes indicates a well-defined area covering Oltenia, western and central Muntenia and south-eastern Transylvania (Fig. 5). In fact, the majority of the finds are distributed in the Olt Basin (mainly in its middle segment) and the Argeş Basin (the Argeş-Dâmboviţa interfluve). The exception is the axe from Verbicioara (cat. no. 16), found westward of the Jiu River. The axe from the collection of the Varna Museum of Archaeology (cat. no. 2) has no precise place of discovery, although its provenance from north-eastern Bulgaria is probable, but not certain. The resulting map is also consistent culturally, and it is thus worth highlighting that such a compact and well-delimited distribution is a rare situation when it comes to Bronze Age metal find types.

Two of the axes have no clear contexts and conditions of discovery (north-eastern Bulgaria – cat. no. 2 and Drăgăşani – cat. no. 6). Five of them can be considered depositions, with three isolated finds (Boişoara – cat. no. 1, Gemenea-Brătuleşti – cat. no. 7 and, probably, Ocnele Mari – cat. no. 9) while the two from Râncăciov (cat. no. 12–13) were part of a hoard together with a shaft-hole axe (Fig. 3/3). The other nine artefacts associate with various occupation structures dated to the Early Bronze Age. Four axes were discovered in secure contexts during systematic excavations at different Glina-type settlements: Glina (cat. no. 8) and Odaia Turcului (cat. no. 10); the axe from Verbicioara (cat. no. 16) was discovered at the base of the Verbicioara layer and immediately above the one with Glina-type ceramic material, while the axe from Râşnov (cat. no. 14) was found in secondary position within a settlement with Schneckenberg-type ceramic fragments. Lastly, five axes are chance finds recovered from the perimeter of various settlements: Căzăneşti (cat. no. 3), Crivăţ (cat. no. 4–5) and Prundu (cat. no. 11) but from an area of settlements where the most consistent discoveries belong to the Glina culture; the axe from Sfântu Gheorghe (cat.

[31] Junghans *et alii* 1968.
[32] Results communicated by Anca-Diana Popescu, whom I thank also with this occasion.
[33] Tuţulescu, Părăuşanu 2015, p. 212, footnote 1; Pernicka *et alii* 2016.
[34] Costea, Rusu 2007, p. 28.
[35] Due to *copper depletion*, the quantity of tin in the patina is much higher than the real one measured inside of the artefact (Mödlinger, Piccardo 2013, p. 1073).

no. 15) originates from the area of the settlement at the *Örkö* findspot, where Jigodin and Schneckenberg type pottery was found. Thus, seven finds south of the Carpathians have a fairly clear link with the Glina-type sites, while the two from south-eastern Transylvania are connected to the Schneckenberg and Jigodin type pottery sites.

The close relation between the Glina-type discoveries and the cultural phenomena of the Early Bronze Age in south-eastern Transylvania was pointed out early on (the term *Glina III-Schneckenberg culture*[36], for example, used until recently in the archaeological literature). Although used from the beginning of the last century when referring to a series of finds from Ţara Bârsei[37], the term *Schneckenberg culture* still lacks a clear definition, one based on the habitation structures and the associated ceramic material[38]. Much better defined are the Jigodin type discoveries in the Upper Olt Basin, primarily due to the specific pottery, richly decorated with corded motifs[39]. What is to be noted is that the Jigodin-type corded ware is found at all Early Bronze Age sites in the Upper Olt Basin, but its frequency decreases from north to south. One of the clearer connections between the Early Bronze Age phenomena from south-eastern Transylvania and the Glina type discoveries south of the Carpathians is the Runcuri-style decorated pottery from Govora Sat[40], Valea Calului[41] and Odaia Turcului[42]. This is a good quality pottery, quite rarely present, and, unlike the general Glina ceramics, is richly decorated with incised motifs filled with white paste. The motifs and decoration registries of the Runcuri type pottery in the Glina *milieu* is almost identical to the Jigodin-type ceramics from south-eastern Transylvania, with the exception that for the latter, the corded technique was used[43]. What is interesting is that all three Glina sites mentioned above which yielded the Runcuri-type ceramics, have a similar distribution to the majority of the Glina-type flanged axes south of the Carpathians, namely in the Olt and Argeş Basins[44], following the same north-south dynamic indicated for most of the Glina settlements in Oltenia and Muntenia[45]. Therefore, the flanged axes discussed here represent a strong argument in identifying the relations established between the various cultural areas on the Lower Danube during the Early Bronze Age. To the same discussion must be integrated the shaft-hole axes of Dumbrăvioara-type with a wider spatial distribution, most of them, being, however, connected to the same cultural areas north and south of the Carpathians[46].

The Runcuri-type decoration, along with all the other ceramic elements which indicate the relations between the Glina type settlements and those from south-eastern Transylvania, are characteristic of an early Glina period (phase) as indicated by the stratigraphy at Odaia Turcului[47]. Although no radiocarbon dates are available, the present author estimated the evolution of the Glina type settlements between 2750 and 2300 BC, with an increased probability within the 2650–2450 BC interval[48]. This was partially confirmed by the dating of some Glina culture related finds such as those from Uivar[49], in the Banat, or the grave from Târgşoru Vechi, Prahova County[50]. Recently, a consistent lot of radiocarbon samples covering all layers from Odaia Turcului was dated; the results for the lower layer, the earliest, which contains Runcuri-type ceramics, indicated the interval of 2700–2500 cal BC as the most probable[51].

The two flat axes from the Râncăciov hoard (cat. no. 12–13) are associated with a shaft-hole axe of the Izvoarele type Fig. 3/3). The axe is cast in a bivalve mould with the metal poured through the lower part of the butt, where a partly finished elongation can be observed. This represents a technology in use at the Lower Danube beginning with the middle of the 3rd millennium BC, replacing the casting manner in bivalve moulds, either through the lower side (the Baniabic, Corbasca and Veselinovo types), or the upper side (the Dumbrăvioara type)[52].

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[36] Nestor 1960, p. 98–99.
[37] Teutsch 1900.
[38] See the critique of the finds at Vulpe 1991 and Băjenaru 2014a, p. 212–214.
[39] Roman *et alii* 1992.
[40] Roman 1985; Petre-Govora 1986.
[41] Tudor 1982b; Tudor 1987.
[42] Tudor 1982a; Băjenaru 2014a, p. 150–151, Fig. 21–24.
[43] Băjenaru 2003 with the entire discussion and literature; see also Băjenaru 2014a, p. 181–182, 215.
[44] The same distribution was observed for the other sites included in the Runcuri-type discoveries, but which do not meet all the characteristics of the three mentioned above (see Băjenaru 2003, p. 16). Two ceramic fragments apparently part of the same pottery species of the Runcuri-type were published from Şoimeşti (Ceptura com., Prahova County), from a site with several types of discoveries dated to the Early Bronze Age, among which Glina-type ceramic sherds decorated with button-holes (Frînculeasa *et alii* 2015, p. 138, pl. 8/5, 7).
[45] Băjenaru 2014a, p. 180.
[46] Vulpe 1970, p. 31–32; Vulpe 1988, p. 210–212; also Băjenaru 2014b.
[47] Băjenaru 2014a, p. 181–182, 215–216.
[48] Băjenaru 1998, p. 15–16.
[49] Woidich, Szentmiklósi 2013 with the literature; Frînculeasa *et alii* 2015, p. 141; Gogâltan 2015, p. 58.
[50] Frînculeasa *et alii* 2015a, p. 140.
[51] The $^{14}C$ dates were obtained at the RoAMS Laboratory in Măgurele; the results will be published in a forthcoming paper.
[52] On the casting technology of shaft-hole axes at the Lower Danube in the Early Bronze Age, see Băjenaru, in print.

As resulting from the data presented above, the most probable production period of the Glina-type axes is the second quarter of the 3rd millennium BC, but they were probably circulating also during the second half of the same millennium, especially if we accept the context of the axe from Verbicioara (cat. no. 16).

## FLANGED AXES AT THE LOWER DANUBE – A BIGGER PICTURE

It is largely accepted that the earliest flanged axes in Europe appeared in central and northern Italy, from where they rapidly spread in the whole Circum-Alpine area[53]. A grave from the cemetery at Casetta Mistici (Rome) attributed to the Rinaldone facies, which contains such an axe, is dated to the second quarter of the 4th millennium BC[54]. Most similar finds from the Alpine area of Central Europe are dated in the second half of the same millennium[55], however, a relation between these and the ones from the Carpathian-Balkan area is difficult to establish.

The number of flanged axes in the Lower Danube area dated to the Bronze Age is relatively high[56], several typological variants having been established[57] (Fig. 6). One of the earliest contexts for such an axe is grave 4a from tumulus I at Ploieşti-Triaj[58] (Fig. 6/1), dated (with the highest probability) at the beginning of the 3rd millennium BC[59]. Publications also mention two axes from the Yamnaya type funerary contexts from northern Muntenia (tumulus IV from Păuleşti and tumulus VII from Ariceştii Rahtivani, both in Prahova County)[60], dated similarly to the one from Ploieşti-Triaj. Among the grave goods of a tumular grave from Kamen, Sliven District (in Thrace)[61] was found a similar axe (Fig. 6/8). M.30 was the central grave of the tumulus with four adults and two children skulls; a radiocarbon date on one of the adult skeletons indicated the second half of the 4th millennium BC[62], an identical date to that suggested for the flat axes from the Circum-Alpine area. The axe from Kamen is similar to several finds from the Lower Danube area, such as those from Imrenchevo (Fig. 6/3) and Mogila, both in the Shumen district[63], Popovo, Târgovishte District[64], to which we may add the one from Grădina, Constanţa County[65] (Fig. 6/2). Thus, a typological variant is apparent, comprising axes with a trapezoidal body, a flaring cutting-edge (at variable degrees) with thin flanges, very slightly profiled, similar to the Glina-type axes[66]. Based on the two funerary contexts mentioned above, this variant seems to indicate an earlier chronological period than the contexts of the Glina type axes.

Another variant of flanged axes at the Lower Danube is represented by the find from Bucureşti-Fundeni (Fig. 6/4), originating from a settlement with Glina and Tei type material[67], and also by the recent isolated find from Tohani, Prahova County[68]. A similar axe, but with widened cutting-edge comes from Thrace, from the settlement of Dăbene-Sarovka (Fig. 6/10). Its somewhat unclear context may be dated to the first half of the 3rd millennium BC[69]. All these indicate that the circulation of this axe variant during the Glina culture chronological horizon (ca. 2700–2400 BC) is most likely[70].

A well-individualised group of axes is distributed mainly in north-eastern Bulgaria, especially in the Varna district, and consists of trapezoidal axes with prominent sides and more or less concave long edges, an arched or flaring cutting edge (north-eastern Bulgaria[71] – Fig. 6/6), as well as straight (the two finds from Vălchi Dol, Varna district[72] – Fig. 6/5, Beloslav, Varna District[73] and Mogila, Shumen District[74]). While the finds with a straight cutting

[53] Klimscha 2010.
[54] Cultraro 2020, p. 517, Fig. 5.2. 1.
[55] Gross *et alii* 2017.
[56] The present author estimated a number of approximately 40 such finds, most mentioned in Băjenaru 2013.
[57] Vulpe 1975, p. 64–68; Черных 1978, p. 153–156; Nikolova 1999, p. 299–301.
[58] Vulpe 1975, p. 66, cat. no. 342, pl. 37/342; Băjenaru 2014, p. 96, cat. no. 549, Fig. 65/2; Frînculeasa *et alii* 2015b, p. 62, pl. 18/3; Frînculeasa 2020a, p. 155, pl. 16/9. The find illustrated in Frînculeasa *et alii* 2013, pl. 17/3, as coming from T.I, M.4a at Ploieşti-Triaj is different and probably matches some other discovery in Prahova County.
[59] Frînculeasa *et alii* 2015b, p. 59, tab. 2, no. 16 (sample DeA 5390 returning 4318±43 BP).
[60] Preda-Bălănică *et alii* 2019, p. 325; Frînculeasa 2020b, p. 43, footnote 108.
[61] Димитрова 2014, Fig. 5/1; Stos-Gale, Băjenaru 2020, Fig. 6/6.
[62] Modi *et alii* 2019, p. 3, tab. 1, GM 30.3 (sample LTL 16866A returning 4463±45 BP).
[63] Băjenaru 2013, p. 106, cat. no. 277 and p. 138, cat. no. 378.
[64] Черных 1978, pl. 27/9.
[65] Irimia 1977.
[66] The axe from Ploieşti-Triaj was included by Vulpe and Lolita Nikolova in the Şincai-type (Vulpe 1975, p. 66–67; Nikolova 1999, p. 301).
[67] Vulpe 1975, p. 65, cat. no. 331, pl. 36/331.
[68] Preda-Bălănică *et alii* 2019, p. 323–326, no. 7, pl. 2/1.
[69] Nikolova 2002.
[70] The same chronology at Vulpe and Nikolova, who include the finds in the variant of the slender axes with raised edges (Vulpe 1975, p. 65), and the Fundeni-Dubene-type, respectively (Nikolova 1999, p. 301).
[71] Băjenaru 2013, p. 47, cat. no. 86; Stos-Gale, Băjenaru 2020, p. 278, Fig. 6/2.
[72] Черных 1978, pl. 27/12, 16; Băjenaru 2013, p. 242–243, cat. no. 736–737.

edge seem to be characteristic only to north-eastern Bulgaria[75], the one with flaring cutting edge has its best analogies in Thrace, in the hoard from the 4th Ezero level[76] (Fig. 6/11), in the settlement from Ovcharitsa II, Stara Zagora District[77], and also in several discoveries in the area[78]. Their contexts were dated to the first half of the 3rd millennium BC, with a higher probability towards the middle of the millennium, as suggested by the position of the hoard from Ezero[79]. The axe from Retevoieşti, Argeş County [80] (Fig. 6/8) is similar to those mentioned above, but indicates an evolved type with good analogies in central and western Europe, datable at the earliest in the second half of the 3rd millennium BC[81]. Lastly, the axe found at Gradeshnitsa, Vratsa District[82] (Fig. 6/7), attributed by Nikolova to the Şincai type[83], suggests the same cultural orientation towards the Middle Danube basin.

## CONCLUSIONS

Within the context of a quite evident typological variation of the flanged axes at the Lower Danube during the Early Bronze Age (ca. 3500/3400–2100/2000 BC), the Glina-type axes form a consistent and well-individualised group in space and time. Their distribution suggests a dispersion from north to south, mainly in the Olt and Argeș basins, from the metallurgical centres of the Jigodin area (south-eastern Transylvania) to the Danube, in the Glina cultural area south of the Carpathians. This argues for the very close links between the Glina communities and those from the Upper Olt Basin, along the Dumbrăvioara-type shaft-hole axes, the Runcuri-type ceramics etc., during a chronological horizon which can be dated, most likely, between 2700 and 2500 BC. Furthermore, the substantial number of such axes south of the Carpathians suggests their production in the Glina area also, probably in several centres, taking into account the existence of several variants within the type.

It is also worth mentioning the association of a large number of such axes with habitation structures (settlements) by comparison with those from hoards and isolated depositions. In fact, there is quite an accentuated variation of the deposition contexts of the flanged axes at the Lower Danube, especially by comparison with other categories of metal finds, particularly the shaft-hole axes and the daggers. While the greatest number of Early Bronze Age daggers comes from settlements, followed at a considerable distance by those found in funerary contexts and isolated depositions, the frequency of shaft-hole axes from hoards or isolated depositions is overwhelming. By comparison, the contexts of the flanged axes indicate different frequencies from one period of the Early Bronze Age to the other. Therefore, during the first period (ca. 3500/3400–2900/2800 BC), the number of finds originating from graves is largely equal to those from isolated depositions; it should be noted that this is the only chronological period, at least until the present moment, when this type of finds were placed in graves. During the second period (ca. 2900/2800–2500/2400 BC) the axes found in settlements hold the first place, while during the third period (ca. 2500/2400–2100/2000 BC), the isolated finds become prevalent.

I believe that such a variety of contexts indicates a certain variation in the social function of the axes, from one period to another. The appearance of the flanged axes usually has a functional explanation, the raised edges providing increased resistance and better stability after hafting[84]. These arguments are not entirely satisfactory. A strictly functional perspective implies a production stop for the simple flat axes, without raised edges at the time of the appearance of the flanged axes, of increased performance. However, they continued to be produced in parallel for a long time, probably in the same metallurgic workshops, the simple flat ones even to a higher degree. Alongside the shaft-hole axes and daggers, the metal flat axes had foremost a social function, therefore, their production, the technological and typological choices, the distribution and contexts should be analysed from a social perspective, not a functional one.

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[73] Черных 1978, pl. 27/10; Băjenaru 2013, p. 28, cat. no. 20.
[74] Черных 1978, pl. 27/15; Băjenaru 2013, p. 138–139, cat. no. 379.
[75] These were included by Nikolova in the Vălchi Dol-type (Nikolova 1999, p. 301).
[76] Stos-Gale, Băjenaru 2020, p. 268, no. 1, Fig. 5/1 (with the literature).
[77] Leshtakov *et alii* 2001, p. 21, Fig. 30/q; Băjenaru 2013, p. 119–120, cat. no. 318.
[78] Stos-Gale, Băjenaru 2020, p. 278.
[79] Görsdorf, Bojadžiev 1996.
[80] Vulpe 1975, p. 65, nr. 332, pl. 37/332, who included it in the variant of the slender flanged axes.
[81] Nikolova 1999, p. 301, who includes it in the Griesheim A type.
[82] Николов 1970, p. 250, Fig. 24/b; Черных 1978, pl. 27/13; Băjenaru 2013, p. 97, nr. 249.
[83] Nikolova 1999, p. 301.
[84] Klimscha 2010, p. 101.

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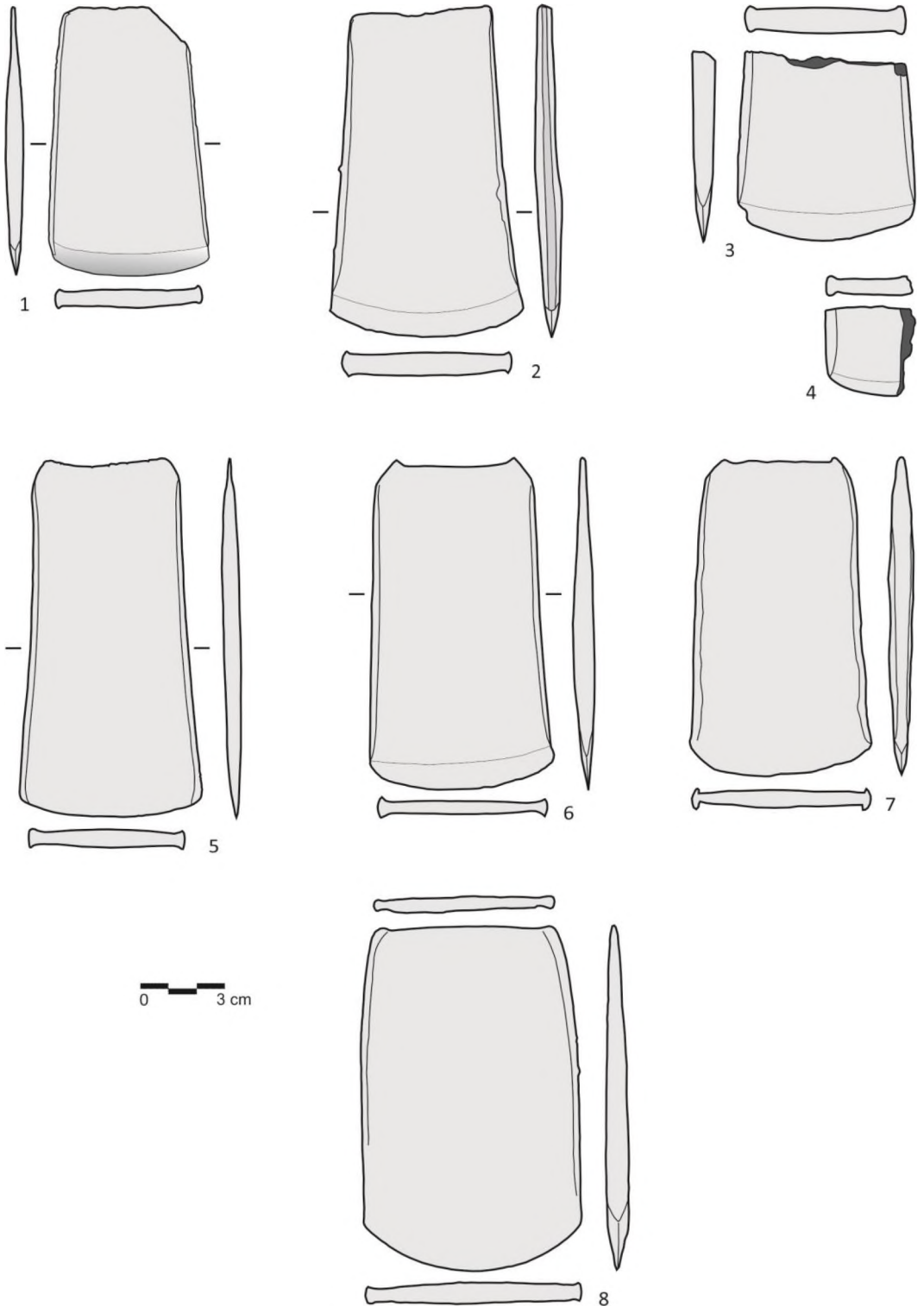


Figure 1. Glina-type flanged axes. 1: Drăgășani; 2: Râncăciov; 3: Căzănești; 4: Odaia Turcului; 5: Crivăț; 6: Gemenea-Brătulești; 7: Râșnov (adapted after Costea, Rusu 2007, Fig. 1/1); 8: Bulgaria.

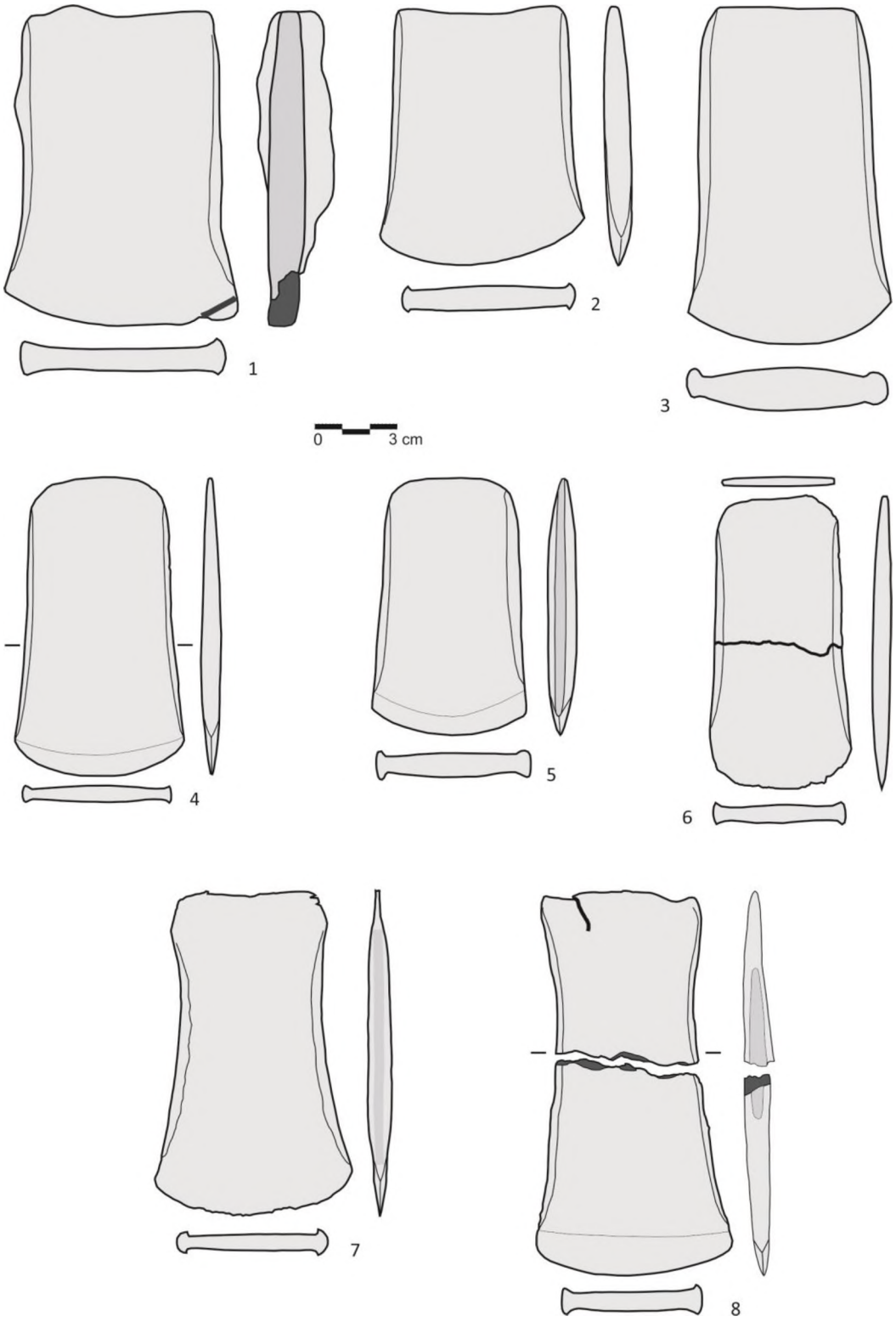


Figure 2. Glina-type flanged axes. 1: Glina (adapted after Vulpe 1975, pl. 36/327); 2: Verbicioara (adapted after Vulpe 1975, pl. 36/330); 3: Sf. Gheorghe (adapted after Vulpe 1975, pl. 36/329); 4: Boișoara; 5: Prundu (adapted after Vulpe 1975, pl. 36/328); 6: Ocnele Mari; 7: Crivăț (adapted after Șerbănescu, Trohani 1975, Fig. 2/3); 8: Râncăciov.

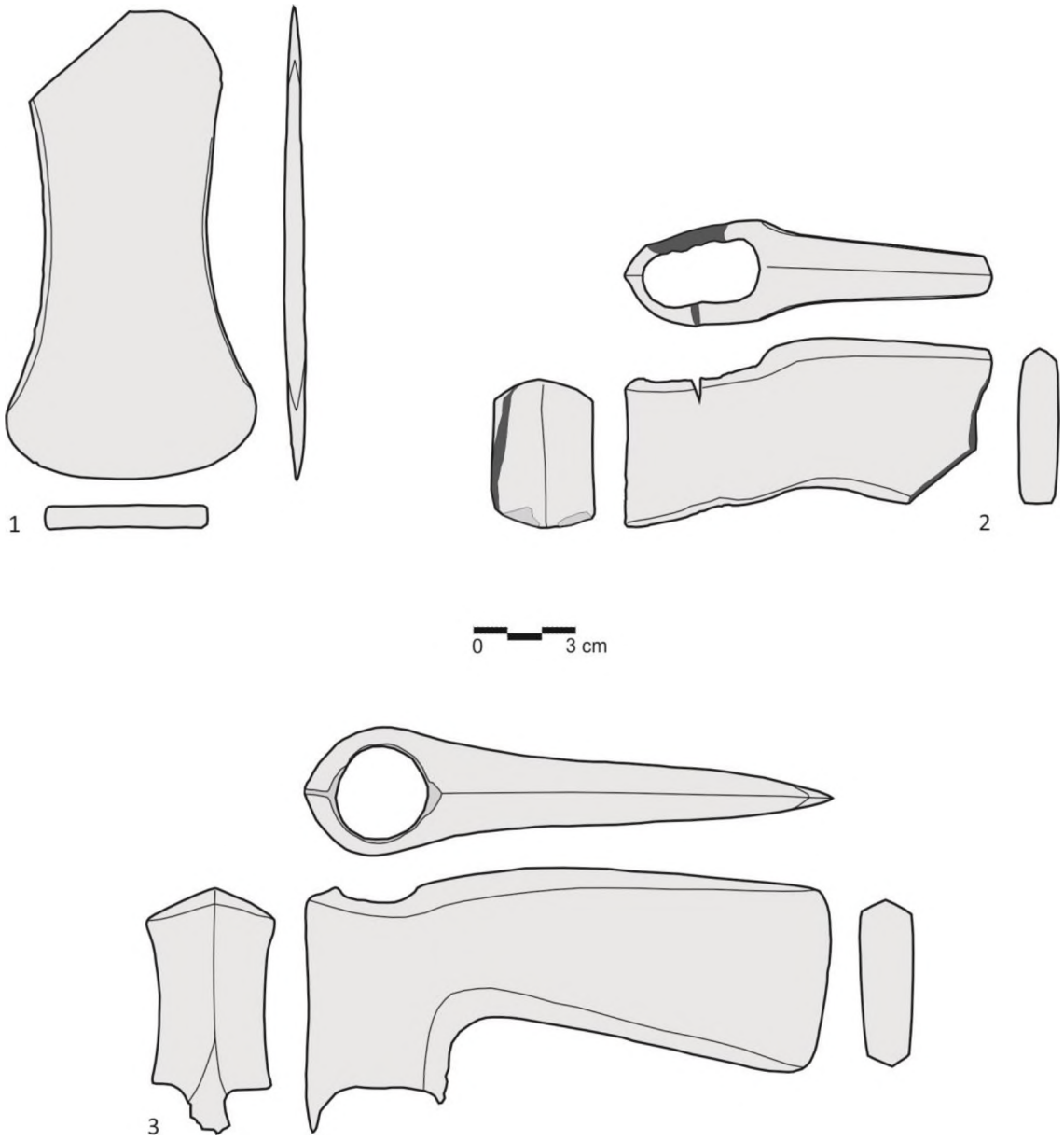


Figure 3. 1–2: The hoard from Shitu (jud. Giurgiu); 3: the shaft-hole axe from the hoard of Râncăciov (Argeş County).

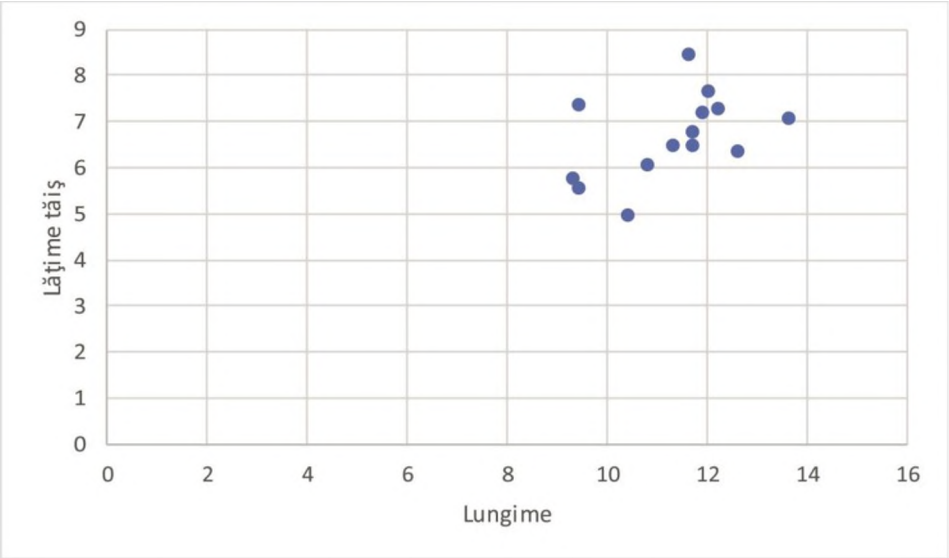


**Fig. 4.** Distribution of Glina flat axes based on length and breadth of the cutting edge.

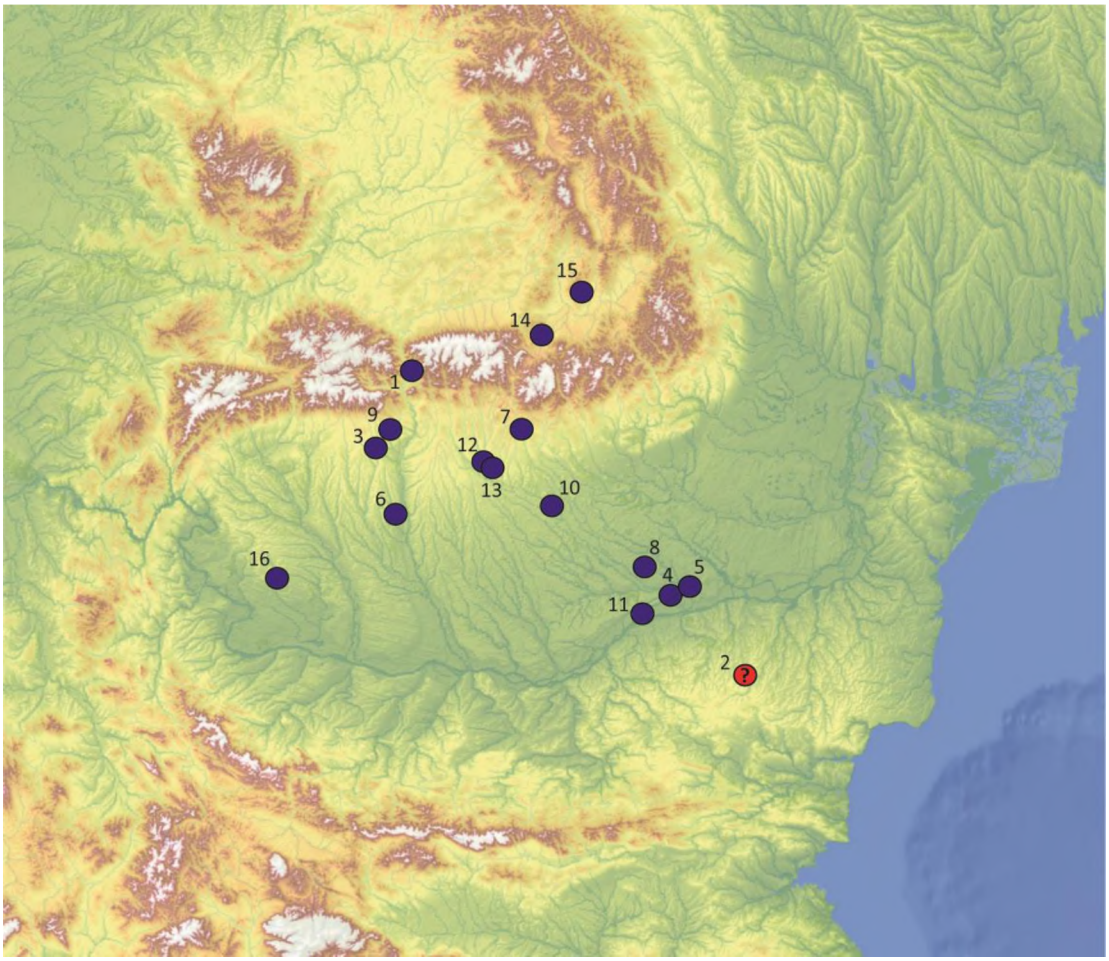


**Figure 5.** Distribution of Glina flat axes (numbers on the map correspond to catalogue numbers).

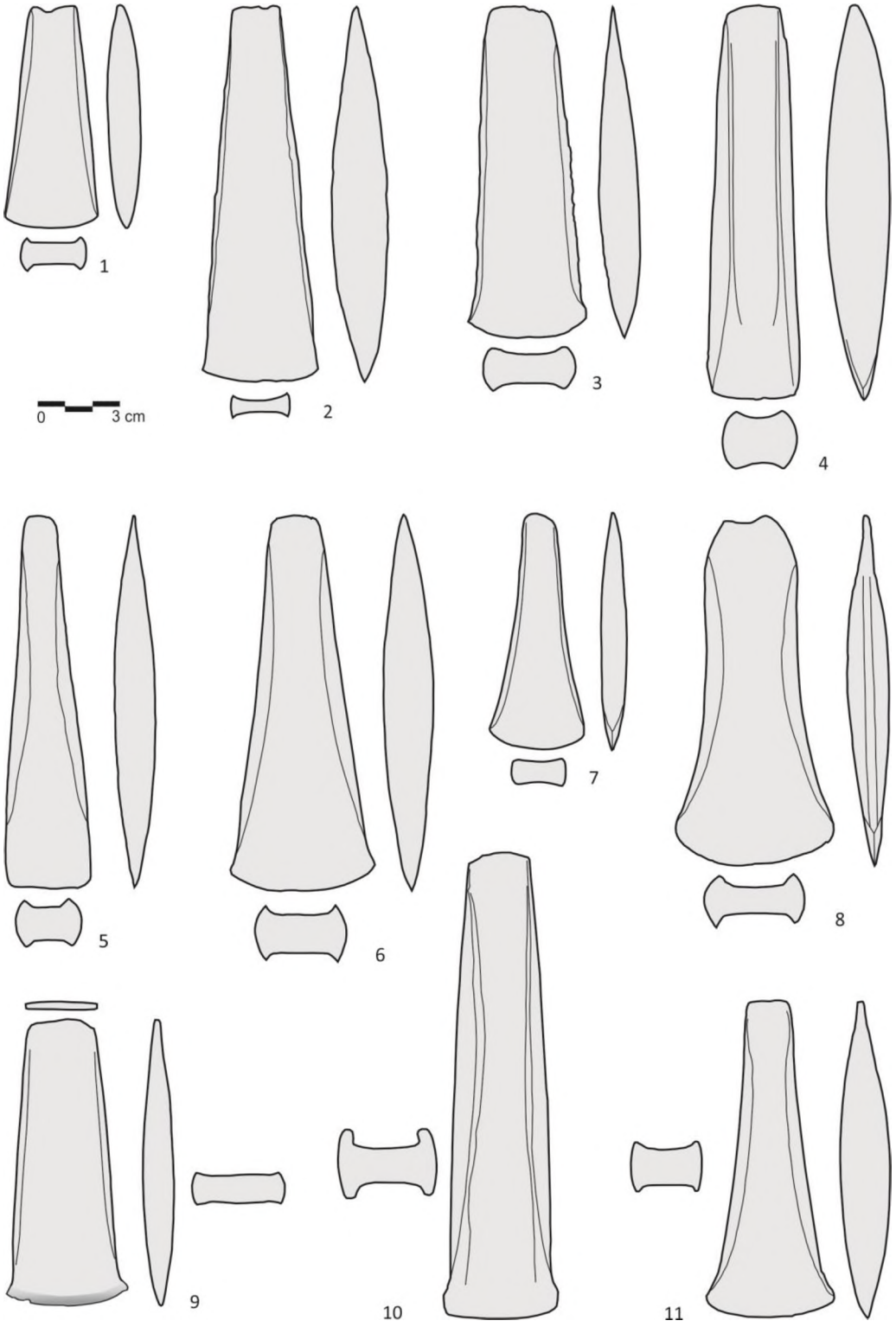


Figure 6. 1–8: variants of flanged flat axes at the Lower Danube; 9–11: flanged flat axes from various contexts in Thrace. 1: Ploieşti-Triaj, Prahova County (adapted after M. Schröder's drawing in *SAM*); 2: Grădina, Constanţa County (adapted after Irimia 1977, Fig. 1/3–4); 3: Imrenchevo, Shumen District; 4: Bucureşti-Fundeni (adapted after M. Schröder's drawing in *SAM*); 5: Vălchi Dol, Varna District; 6: North-eastern Bulgaria; 7: Gradeshnitsa, Vratsa District; 8: Retevoieşti, Argeş County; 9: Kamen, Sliven District; 10: Dăbene, Plovdiv District (adapted after Nikolova 2002, Fig. 2); 11: Ezero, Stara Zagora District.