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HALF-FINISHED KNOBBED BROOCHES WITHIN ONE OF THE HOARDS AT SACALASĂU NOU (BIHOR COUNTY)

CORINA TOMA

Abstract: This article revives attention to one of Dacian jewellery hoards discovered close to the settlement at Sacalasău Nou (Bihor county). The resumption of the debate is the result of the completion of the lot published in 1975 by two novel items, which, briefly mentioned as parts of fragmentarily preserved knobbed brooches, eluded the specialists' attention. The re-identification of the items as half-finished brooch parts invalidates, at least in this case, the hypothesis of the knobbed brooches' making out of a single silver bar.

The analysis of semi-finished items and, in parallel, of certain either repaired brooches (Mediaş, Cehețel) or finished (Sacalasău, Tăşad) revealed a few technological details related to the way knobs were obtained and the fashion the brooch foot was joined to the bow. Inevitable imperfections resulted from the hammering processing of the knobbed foot and the cracks noted by microscope on the foot rod of one finished brooch, make plausible the possibility it was silver foil plated.

The presence in the jewellery lot, entered in the collection of the Museum of Oradea in 1979, of certain half-finished brooches, beside a brooch exhibiting clear traces of repair intent and the multiple finds of Apollonia and Dyrrhachium drachms, which likely served as source of raw material, evidence the existence of a metalworking workshop in the Dacian inhabitancy area at Sacalasău Nou.

Keywords: the Dacians; hoard; knobbed brooches; processing techniques; metalworking workshop.

Rezumat: Articolul readuce în atenție unul din tezaurele de podoabe dacice descoperite în apropierea aşezării de la Sacalasău Nou (jud. Bihor). Reluarea discuției se datorează completării lotului publicat în anul 1975 cu două piese noi, care, semnalate succint drept părți ale unor fibule cu noduri păstrate fragmentar, au scăpat atenției specialiştilor. Reidentificarea pieselor ca părți de fibule în curs de prelucrare infirmă, cel puțin în cazul de față, ipoteza obținerii fibulelor cu noduri dintr-o singură bară de argint.

Analiza pieselor semifinite şi, în paralel, a unor fibule reparate (Mediaş, Cehețel) sau finite (Sacalasău, Tăşad) a relevat câteva detalii tehnologice legate de modul de obținere a nodurilor şi de felul în care se realiza îmbinarea piciorului cu arcul fibulei. Imperfecțiunile inerente prelucrării prin batere a piciorului cu noduri şi fisurile observate cu ajutorul microscopului în cazul tijei piciorului uneia din fibulele finite, fac plauzibilă posibilitatea placării acestuia cu o foaie de argint.

Prezența în lotul de podoabe intrat în colecția muzeului orădean în anul 1979 a unor fibule în curs de prelucrare, alături de o fibulă ce poartă urme evidente ale intenției de reparare şi multiplele descoperiri de drahme de Apollonia şi Dyrrhachium ce au servit probabil ca sursă de materie primă, scot în evidență existența unui atelier de orfevrerie în zona locuirii dacice de la Sacalasău Nou.

Cuvinte cheie: daci; tezaur; fibule cu noduri; tehnici de prelucrare; atelier de orfevrerie.

Among the multiple chance finds of metal objects in the Sacalasău Nou area (Bihor county), the single lot of items which was published in detail is the hoard, discovered in 1972, on the hill called *Burcărar*.

The hoard salvaged by E. Molnar, a teacher from the neighbouring locality, Derna, contained a "necklace", two bracelets, three brooches and the "bar of silver item"[1]. Three years later, S. Dumitraşcu together with E. Molnar published two knobbed brooches (one fragmentary), a knobbed foot of another brooch, a massive bracelet with snake *protomae* and a fragment of a silver[2] "adornment (?)". When discussing the natives' accounts, according to whom, 20 years before, the 1972 hoard discoverer's father had found, on the same *Burcărar* hill, a hoard composed of eight knobbed brooches, the article authors merge the two hoards into one and locate the find place "inside or close the Dacian fortress at Sacalasău Nou"[3], which was placed at approximately 300 m from *Burcărar* hill[4].

A few years later (1981), in an article referring to coin and jewellery finds in the Sacalasău Nou village area, the two hoards deemed to originate from *Burcărar* hill are tackled separately[5]. Moreover, the lot discovered in 1972 is completed by two "recently recovered" items, unknown to the authors of the previous article: "a brooch foot with three disk knobs and a fragment of a brooch spring of which part of the coil was preserved"[6]. It was specified, erroneously, that the hoard is housed in the collection of the Secondary School of Derna.

According to the inventory register of Ţării Crişurilor Museum of Oradea (MŢCO), at least part of the items had already been, as of December 1979, in its collection, having been donated by the police following their seizure from E. Molnar. The report and inventory register show that then, the following pieces had been inventoried:

- *Dacian brooch with broken body* (inv. no. 10.951);
- *brooch pin* (inv. no. 10.954);
- *foot of brooch with three bulbs "with recent filing traces"* (inv. no. 10.952);
- *foot of Dacian brooch with three bulbs* (sic!) (inv. no. 10.953);
- *pin* (sic!) *of Dacian brooch with the sharp end pressed by recent hammering* (inv. no. 10.955);
- *a jewellery fragment made of a bar in twisted state* (inv. no. 10.956, later 10.956a).

The snake ended bracelet and the entirely preserved knobbed brooch had been, until the spring of 1979, in the collection of the Secondary School of Derna, from where they were fetched in order to take part in a series of international exhibitions held between April 1979 – November 1980[7]. Most likely, after such wandering, at

[1] Dumitraşcu, Molnar 1975, 59.

[2] Dumitraşcu, Molnar 1975, 45-67.

[3] Dumitraşcu, Molnar 1975, 59, 64.

[4] The special reports in the Sacalasău Nou area a Dacian fortress "damaged by treasure hunters". Indication concerning its existence count a ditch, "possibly accompanied by a rampart", cutting entrance to the headland plateau, and a few Dacian potshards found, beside Bronze and Medieval pottery, subsequent to an archaeological sondage performed in 1971 (Dumitraşcu 1972, 136, catalogue no. 7, 137; Glodariu 1983, 109, repertory no. 4).

[5] Săşianu, Konewalik 1981, 331-332.

[6] Săşianu, Konewalik 1981, 332, catalogue no. 10, 13.

[7] During 1979-1980 a series of exhibitions were held in Belgium, Italy and France intended to mark

an uncertain date, the two items entered the collection of MȚCO, the bracelet being added under the inventory number 10.956 (b), and the brooch, inexplicably, remaining uninventoried until 2013 (inv. no. 23.129).

Pieced together, we note that the two sources – the literature and the inventory register – do not entirely agree, on the contrary, they provide ambiguous, contradictory information, which raises the question on the composition of the hoard discovered in 1972 at Sacalasău Nou (Bihor county).

The later addition, insufficiently argued, of two novel items, discovered in an area where several finds remained unknown were recorded, of which one of special character – "eight knobbed brooches" –, calls for caution[8]. The interest for the hoard composition issue increases should we take into consideration that the two items recorded in 1981, by Al. Săşianu and his collaborator, are half-finished knobbed brooch elements found precisely in their production area (current counties of Bihor and Sălaj). Poorly described and lacking, when published, photos or drawings, the half-finished brooch/brooches remained unknown[9].

The condition of the knobbed brooches discovered at Sacalasău Nou

Returning to the hoard's composition, we note that the lot published in 1975 comprised, beside complete or restorable brooches, also disparate parts originating in damaged pieces. The single entirely preserved brooch had, when published, deformed spring since the iron rod, whose prints are still visible here and there inside the coils[10], was rusted. Sometime during 1975–1979, the brooch was restored, its spring being replaced in its natural position[11] (Pl. I/1).

a. *Damaged or half-repaired brooches*

The second brooch, the pair of the above, was preserved only fragmentarily, missing part of the knobbed foot[12] (Pl. I/2). The foot was broken by its joining part with the catchplate[13] and cut near the second intermediary knob. The bow plate exhibits, in the area overlapped by the intermediary knob and the rod part remained after cutting, an orifice made by a punch by hammering from foot pinwards (Pl. I/2 a; Fig. 1 a). When the item was published, the hole on the bow was interpreted as a rivet slot fixing, beside the claw-shaped sides of the last knob, the foot to the brooch bow[14]. The orifice

2050 years from the establishment of the Dacian state: *La civilisation classique des Daco-Gètes*, 71, catalogue no. 321; *I Daci*, 80, catalogue nos. 333, 138; *Trésors des Daces*, 337.

[8] Dumitraşcu, Molnar 1975, 59; Săşianu, Konewalik 1981, 332, catalogue no. 10.

[9] Rustoiu 1997, 96, catalogue no. 27; Spânu 2012, 239–240, catalogue no. 98B.

[10] Dumitraşcu, Molnar 1975, 60, Fig. 1 a-c.

[11] The brooch spring was probably reconditioned when the piece was displayed in above exhibitions (see note 7).

[12] When published, the spring chord was broken into two segments; one of them, completely detached from the brooch bow, was lost.

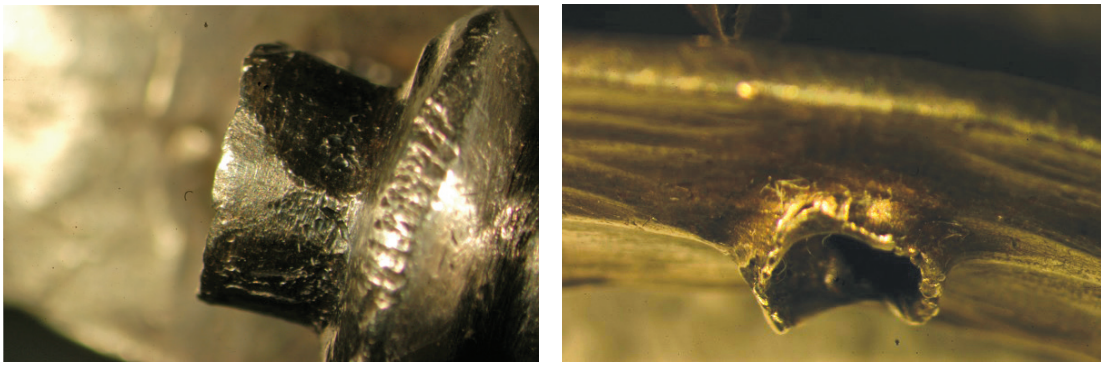
[13] Similar splits in the joining area of the foot with the catchplate, are present also on the brooches in the hoards discovered at Şărmăşag, Sălaj county (Glodariu 1968, 411, catalogue no. 9, Fig. 2/7; 4/9) and Cehețel, Harghita county (Spânu 2012, 219, catalogue no. 24, Pl. 19/2), and a brooch with unknown find spot preserved at MNIT – inv. no. V 446 (Rustoiu, Călian 2010, 191 catalogue no. 26).

[14] Dumitraşcu, Molnar 1975, 60, catalogue no. 2, Fig. 2b.

position, over the foot rod, and the hammering blow from foot to the bow indicate it was made either prior the attachment of the knobbed foot or after the temporary removal of its remaining part. The last version is highly likely, since such an attachment rivet would have been necessary only after breaking the foot, the remaining part being supported rather loosely by the last knob acting as a sleeve.

An attempt to recondition the damaged brooches with the aid of rivets was noticed in one of the brooches at Mediaş, where the segment formed by the foot base, catchplate and part of the bow was completely detached by the piece body. The repair was made in the bow area by overlapping, piercing and joining by riveting the broken parts[15]. Knobbed brooches discovered in Transylvania and preserved in the collection of the National History Museum of Transylvania (inv. nos. V 430, V 435, V 446) also show repair traces by riveting. The spring detached from the brooch bow was flattened in the attachment area, the widened part being fixed behind the bow plate, both being later pierced and riveted[16].

The means that the rivet could have served in the repair of the brooch foot at Sacalasău Nou remains inexplicable, despite various brooch rivet-reconditioning examples. The bow perforation and rod filing near the cut (Fig. 1 b)[17] suggest the intention to repair the brooch, rather than to voluntarily damage it[18].



a **b**

Fig. 1. Miscroscopic details of the foot **(a)** and bow of the brooch under repair **(b)** (MȚCO, 10.951)[19].

Beside the brooches or their easily recognisable parts, both the first publishing of the hoard at Sacalasău Nou (1975) as well as when its composition was reviewed (1981), mentioned a "jewellery? fragment, with thinned and bent ends", worked

[15] Mărghitan 1976, 35, Pl. X/2; Rustoiu 1997, 26; Spânu 2012, 109, Pl. 75.

[16] Popescu 1941, 191-192, Fig. 11/1, 7-8; Rustoiu, Călian 2010, 191, catalogue no. 25-26; 192, catalogue no. 28; Spânu 2012, 109, Pl. 178/1-2; 180.

[17] The file traces are visible, in the form of small parallel grooves, also on the neighbouring knob.

[18] The fragmentation of the brooch at Sacalasău Nou was interpreted as intentional deterioration, being stated that "all three knobbed brooches" were damaged by bending, breaking or cutting (Spânu 2012, 107). We mention that one of the brooches was preserved complete, while the other displays prints of repairing. On the other hand, in the hoard at Sacalasău Nou, as we shall see below, there is no damaged third brooch, but component parts of several knobbed brooches belonging to different subtypes.

[19] We thank herein my colleague Erika Posmoşanu, for the opportunity to analyse the items with the aid of the microscope in the laboratory of the Natural Sciences Department of MȚCO.

by hammering[20] (inv. no. 10.956a). The item is in fact the bow-rod of a knobbed brooch, broken near the catchplate and ended by the other extremity with the first two coils, deformed, of the spring (Pl. II/1a-f). The item was identified as such also by D. Spânu, who, erroneously associating it with the broken foot brooch pin and the foot of the four large-knobbed and other three intermediary knobs brooch preserved in the hoard (Pl. I/3), mistakenly restored a novel variant of a brooch with bow-rod and foot decorated with four knobs[21]. It is possible that the bow-rod had belonged to a richly decorated foot brooch[22], however the foot preserved in the Sacalasău Nou hoard comes, in our view, due to the span between the claw-shaped sides of the knob fixing the foot to the bow, from a brooch with widened bow, flattened springwards.

b. *Half-finished items*

According to Al. Săşianu and Şt. Konewalik, the lot of Sacalasău Nou also comprised a fragment of a "*brooch spring preserving part of the coil*"[23]. The inaccurately described item is another bow-rod together with the catchplate and part of the spring of a half-finished brooch (Pl. II/2 a-c). It preserves one of the spring arms obtained by twisting a thick silver wire, joined vertically with the brooch bow, the spring not being yet perpendicular on the bow. In this preliminary stage, the bow-rod is oval in profile, narrowing and flattening towards the catchplate. The bow body exhibits chisel and anvil-hammering traces, the edges of the resulted sides not being yet bevelled. The catchplate area, strongly thinned, is in this finishing stage a segment flattened by hammering, having a straight edge, and the other, dented.

The second item briefly mentioned in the article published in 1982 by Al. Săşianu and Şt. Konewalik as "*the foot of a brooch with three disk knobs*"[24] is also a half-finished item (Pl. II/3a-f). The brooch foot displays three large knobs and an ending knob, small, interposed between two belts, all placed on a straight rod ending by one of the extremities with a rectangular bar in section, gradually narrowing, becoming sharp. By the other end, that from the spring, the intermediary knob was not finished, while the last knob, for attaching the foot to the bow, is missing. By the attachment place of the knob-sleeve lies a massive rectangular bar, with and arched lower side ending with a folded extension. The central knobs were cut by chisel in the area intended to overlap the brooch bow, a hemispherical part being firstly removed, while, later, another V-shaped piece, with the tip towards the rod (Fig. 2 a) was cut from the remaining part. The entire item has a coarse, unfinished appearance, the imperfections resulted from hammering being mended by polishing (Fig. 2 b).

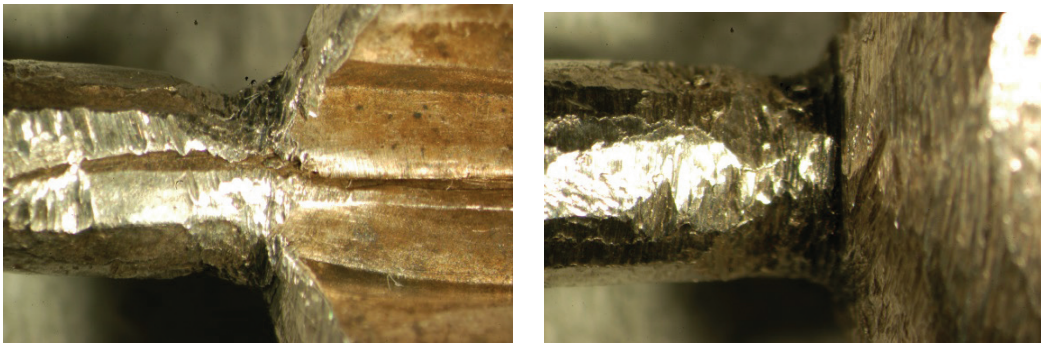
[20] Dumitraşcu, Molnar 1975, 64, Fig. 5; Săşianu, Konewalik 1981, 332.

[21] Spânu 2012, 43, 240, catalogue no. 98, type 1.4.2, Fig, 4, Pl. 106.

[22] Brooches of the type (Rustoiu 1997, 31, type 1c; Spânu 2012, 44, type 1.4.2) appear in the hoards at Oradea-Sere, Bihor county (Fettich 1953, 160, Pl. XXIV/1-2; Chidioşan, Ordentlich 1973, 98, catalogue no. 3), Drăgeşti, Bihor county (Chidioşan et alii 1978, 29, Pl. I/2) or Moigrad, Sălaj county (Pop 2008, 51, Fig. 42).

[23] Săşianu, Konewalik 1981, 332.

[24] Săşianu, Konewalik 1981, 332.



a b

Fig. 2. a-b. Chisel filing and cutting prints on the half-finished brooch foot at Sacalasău Nou (MȚCO, inv. no. 10.952).

The single unpolished portions are the area of the intermediary knob and the place where the knob-sleeve was intended to be attached. The knobs number[25] and the way they were cut indicate the intention to make a bow-rod brooch, while in the case of a bow-plate, only the removal of the hemispherical part being sufficient, without the need to intervene in the foot rod area.

Preliminary stages in the making of knobbed brooches

The two parts of half-finished brooches provide additional information on the fashion knobbed brooches with bow-rod were made, illustrating two preliminary technological stages invalidating, at least in this case, the hypothesis of their making of a single silver bar[26].

As finished product, the bow-rod brooch appears in two of the three hoards discovered at Oradea, as well as in the hoards at Drăgeşti (Bihor county) and Moigrad (Sălaj county)[27], whose publishing gave opportunity for expressing various hypotheses concerning the technical procedures used in their making. In the case of the brooch at Oradea-Sere, N. Chidioşan and I. Ordentlich argued it was made by a composed technique, which supposed the assembly of the knobbed foot obtained by casting, with the bow and fastening spring worked by hammering. The joining of the two parts was made by hot soldering, hammering, in the portion close to the first disk[28]. Later, when the hoard at Drăgeşti was published, this view was reviewed, arguing that knobbed brooches were made of a single piece, while the knobs were hammered in a bivalve mould and then corrected by filing[29]. The idea of the knobs hammering into the mould

[25] The presence on the foot of four large knobs and of a single intermediary knob is specific to bow-rod brooches. We mention though the exceptions illustrated by the bow-plate brooches in the hoard at Mediaş (Mărghitan 1976, Pl. X/2; Spânu 2012, 228, type 1.4.3, Pl. 74–75).

[26] When knobbed brooches from various finds were published, it was argued, in general, they were made of a single wire/segment or bar/silver piece by hammering (Floca 1956, 8–9; Székely 1965, 52; Dumitraşcu, Molnar 1975, 60; Iaroslavschi 1982, 271; Rustoiu 1997, 31; Spânu 2012, 42 etc.).

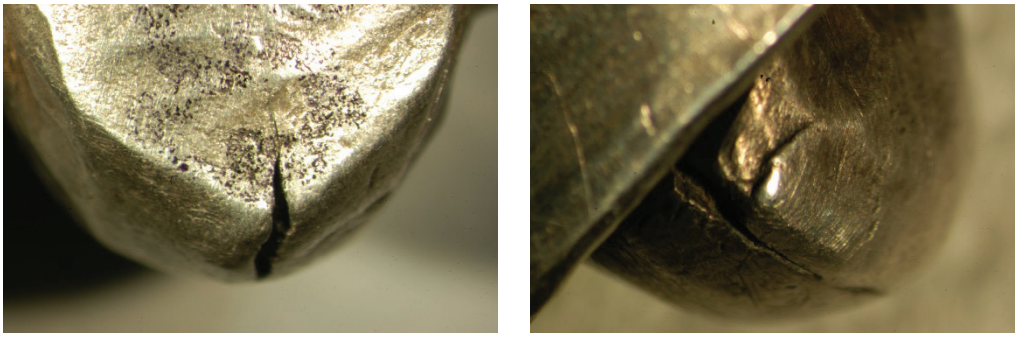
[27] See note 22.

[28] Chidioşan, Ordentlich 1973, 97–98.

[29] Chidioşan et alii 1978, 28–29. The hypothesis of the making of the brooch of a single bar by hot hammering and of the knobbed foot matrix hammering had already been stated in occasion of the publishing

was amended by A. Rustoiu, who agreed on the hypothesis of the separate working of the knobs and their attachment by hammering, without excepting the possibility that the knobbed foot was cast according to the *lost-wax* method[30].

Following the analysis of the two half-finished items at Sacalasău, the hypothesis launched by N. Chidioşan and I. Ordentlich proves partially correct. The knobbed foot and bow were processed separately, being joined near the first knob, however the knobbed foot was made by hammering and not casting or matrix hammering. Visible cracks in the knobs maximum diameter area suggest the possibility they were obtained by the hammering of two halves, the imperfect soldering leaving traces especially in the part towards the bow. Cracking is noticeable both in the case of the half-finished knobbed foot as well as in the bow-plate finished brooches from Sacalasău Nou (Fig. 3 a-b).



a **b**

Fig. 3. a-b. Microscopic details of the knobs of the brooches at Sacalasău Nou (MȚCO, inv. nos. 10.953, 10951).

The knobs were hammered separately, or, at least, previously prepared, and later attached on the rod by hammering; otherwise, the silver bar of which the foot would have been made, would have had a thickness equal to that of the knob with maximum diameter. Evidence to this effect is provided by the knobbed brooches at Tăşad, where the forced folding led to the bow bending in the knob-sleeve area at an almost straight angle, which resulted in the foot rod curving by the second last knob, which was detached from the rod leaving an empty spot[31](Pl. III/1 a). Depending on the bow shape and the arching degree of the foot rod, the middle knobs were occasionally cut by chisel in order to interlock the rod or to be placed on the widened bow plate. The attachment of the knob-sleeve belonged, as shown by the half-finished foot, to a subsequent stage, being modelled by hammering on the core formed by the thickened end of the rod. Its appearance is rather of a ring, of open belt wrapping the foot, extending thinned towards the bow. Its role is functional, the "knob" appearance being given for aesthetic reasons.

N. Chidioşan has deducted the foot joining with the bow near the first knob, without yet providing technological details. The morphology of the half-finished items

of the brooches in the inventory of the house-workshop discovered by N. Chidioşan in the settlement at Tăşad (Chidioşan 1977, 30).

[30] Rustoiu 1997, 22, 28-29, note 17. See also Săşianu, Konewalik 1981, 331-332.

[31] MȚCO, inv. no. 9693.

discovered at Sacalasău and the direct notes on the finished brooches imperfections in the collection of MȚCO make us suppose that the connection between the foot and bow was made with the aid of a silver plate, which covered the core of the future catchplate and interlocked, like a sleeve, the thinned, sharpened foot rod. The ingenious means by which the bow and foot rod might have been thus assembled is also supported by the grooving, appearing on the lower part of the rod, before the first knob, with the bow-plate finished brooches in the hoards at Sacalasău Nou and Tăşad (Pls. I/1 a; III/2 a).

The sleeve method was used, in different manner, to repair of the knobbed and bow-plate brooches in the hoards at Cehețel (Harghita county) and Mediaş (Sibiu county). The repair of the brooch at Mediaş was made by the gradual widening of the plate of the catchplate just after the curving towards the foot, in the form of a scabbard interlocking the knobbed rod end (Pl. III/3, 3 a)[32]. In the bow area, as shown above, the brooch was riveted. If the traces of the double repair are perfectly visible, its causes are much harder to guess[33]. Most likely, the brooch broke in the area between the catchplate and the foot rod, the repair supposing the removal of the older catchplate and its replacement with one new, which also provided the opportunity to make the sleeve[34]. In the case of the two brooches at Cehețel, the sleeve was obtained by flattening in the joining area with the foot rod, in the form of two free wings, not soldered, of the silver plate of which the catchplate is made (Pl. III/4, 4 a)[35]. The single ancient intervention seems to be in the sleeve area, which supports the assumption that, in order to make the repair, the foot was "likely, detached from the original brooch body and subsequently assembled on another bow with catchplate, pin and spring made separately"[36].

Except the brooch reconditioning cases, the half-finished knobbed foot at Sacalasău Nou and the imperfect soldering noticed in the case of the finished items prove that the procedure was used with much more skilfulness in the making of brooches and was not only an improvised technique for their repair[37].

[32] MNIR, inv. no. 47.494. We thank our colleague Rodica Oanța-Marghitu from MNIR for the sent photos.

[33] A. Rustoiu supposed that the brooch had a broken bow, its riveting by hammering requiring the removal by cutting of the brooch foot. After riveting, the foot was attached to the brooch body with the aid of the sleeve obtained by hammering one of the cut extremities (Rustoiu 1997, 26, Figs. 13/5; 80/3). At his turn, D. Spânu spoke of a double break – one in the bow area, the other in the foot area – "at a certain point, the catchplate, part of the bow and the foot base were probably completely detached from the rest of the brooch body" (Spânu 2012, 109, 228, catalogue no. 69, lot Mediaş-Bucureşti, Pl. 75).

[34] In our view, the bow, and not the foot, was intentionally cut near the catchplate. The stake was the foot repair, as regardless its intentional cutting or break due to use, it is hard to believe that the part remaining near the catchplate, was large enough to be transformed into a sleeve.

[35] MMI Cristur, inv. nos. 1050, 1058. I thank Mrs. Sándor-Zsigmond Ibolya, curator at the Molnár István Museum of Cristuru Secuiesc (Harghita county), for his benevolence and sent photos.

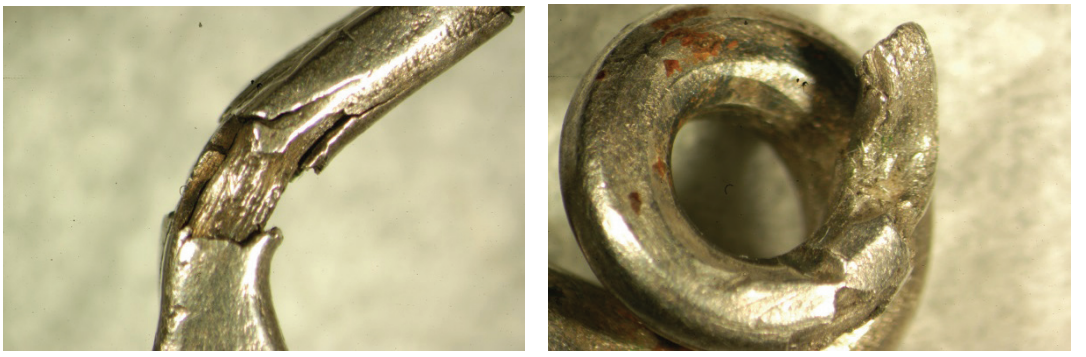
[36] Székely 1965, 52–53, Fig 4/1, 4; Spânu 2012, 109, 219, Pl. 18/1–2. The extreme frailty of the plate compared to the foot massiveness and the colour difference between the two parts of the brooches (bow, catchplate, spring and pin, on one hand, and the knobbed foot, on the other hand) compelled D. Spânu to assume the separate working of the two parts.

[37] A. Rustoiu assumed that the repair of the brooch at Mediaş was made by a bronzesmith, familiar with the riveting technique, however unfamiliar with the hot soldering the metal, operation well known to a silversmith (Rustoiu 1997, 26).

The issue of the items with core

The general appearance of the knobbed foot, given among other, by the rod of irregular section or by the obvious filing traces, suggests workshop scrap or a piece in progress. The imperfections inherent to only the hand, hammer processing of the brooch, were not fixed or entirely hidden by the simple filing action of the item surface. From this view, should we agree with the idea of a half-finished item, also given the silver foil plating of the catchplate core and foot base, we wonder whether the knobbed rod is only a core which at its turn would be covered with silver foil to mask hammering imperfections[38].

The silver foil core plating was noted, decades ago, with the brooch-rod in the hoard at Oradea-Sere. The presence in curve areas[39] of a core, deemed a silver and copper alloy[40] (Fig. 4 a-b), made N. Chidioşan and I. Ordentlich explain the use of this technique for purely functional reasons, the core providing higher flexibility to mobile elements[41]. The authors' view is yet undermined by the existence of the core along the entire bow, noticeable due to a modern cut made likely after the hoard was published. In conclusion, the foot base, catchplate, bow and spring[42], and not only the curved or bent parts, were made of a core over which a silver plate was applied.



a **b**

Fig. 4. Structure details of the brooches in the hoard at Oradea-Sere (MȚCO, inv. nos. 6453, 6452).

It was proven also in other hoards that the core plating technique was used in making adornments that did not require elasticity (brooch bows and pins, nail-pendants).

[38] In the case of the brooch in the Mediaş lot, preserved with MNIR (inv. no. 47.494), the rod segments between the larger knobs are wound with thin silver plates, soldered in the form of tubes (Pl. III/3).

[39] The presence of a silver foil covering a core was apparent to the naked eye in the area where the foot joins the catchplate, in the curving portion between the catchplate and bow, as well as inside the spring coils.

[40] We underline that the brooches at Oradea-Sere were not subject to either metallographic or chemical analyses that would clearly show the composition of the core alloy and its covering plate. Likely, the authors had in mind the analysis report on a few pieces in the hoard at Şărmăşag, showing an inhomogeneous composition and a silver content varying from 87.8% (21.1 carats) to 58.7% (14.1 carats). The copper presence was detected inside one of the analysed pieces (MNIT, inv. no. 5523) (Glodariu 1968, 418, Annex. Analysis report made by E. Stoicovici).

[41] Chidioşan, Ordentlich 1973, 97-98.

[42] The brooch bow is missing, yet in the cracking of one of brooch pins preserved in the Oradea-Sere lot the core is noticed (MȚCO, inv. no. 6457/1).

Starting from the premise that the respective adornments' core is made of a silver and copper alloy and the plate is of good quality silver, the use of the plating technique was attributed to the silver crises in pre-Roman Dacia, rather illustrative for the intention to save good quality silver[43].

Should the archaeologists' hypothesis on the silver crises in pre-Roman Dacia be accurate, the following question arises: why the Dacian artisans invested their skills in plating small-sized elements, of modest weights, yet wasted good quality silver in making massive knobbed foots weighing approximately half the total weight of the item[44]?

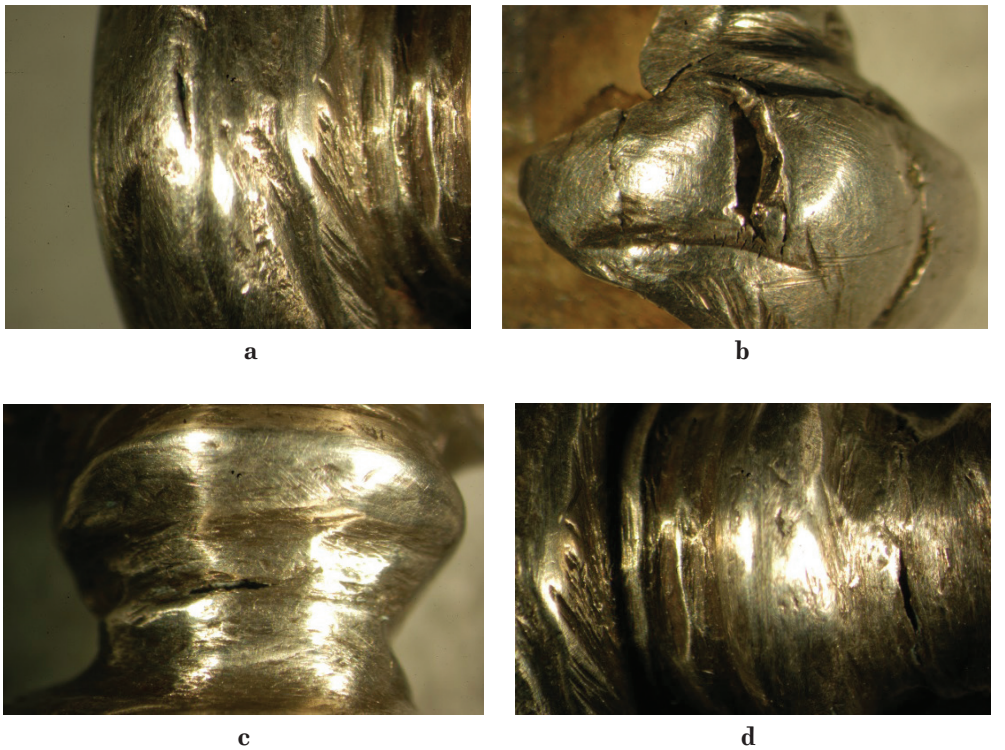


Fig. 5. a-d. Cracks on the knobbed foot surface in the hoard at Sacalasău Nou (MȚCO, inv. no. 10.953).

The presence of the core over which a silver foil was applied was noted, for the lack of analyses, only in damaged brooch portions. The knobbed foot, sufficiently robust, was preserved in most of the cases intact[45], however, direct observations on the

[43] Glodariu 1968, 415; Rustoiu 1996a, 43-54; Rustoiu 1996b, 49-51; Spânu 2005, 67-68. From the reviewed specialty literature, it results though that only the pieces in the hoard at Şărmăşag (Sălaj county) were investigated from a metallographic point of view until the publishing of these views on the hypothesis of silver saving in the case of core-jewellery.

[44] The half-finished knobbed foot in the lot at Sacalasău weighs 50.018 gr., and the knobs diameter varies between 1.41 and 2.14 cm, while the fragmentary bow-rod brooch (missing the spring and pin) at Oradea Sere weighs 85.155 g and has knobs with diameters between 0.95 and 1.92 cm (MȚCO, inv. no. 10.952), and the complete brooch with bow-rod at Drăgeşti is 83.306 g. and the knobs are between 1.25 cm to 1.70 cm (MȚCO, inv. no. 10.155).

[45] There are two cases where the knobbed foot of the brooches was sectioned: the brooch at Sacalasău

knobbed foot, detached from a bow-plate brooch body in the hoard at Sacalasău Nou (MȚCO, inv. no. 10953, Pl. I/3) in the curving area towards the catchplate, may be interpreted as landmarks for silver foil plating.

In its upper part, in the knob-sleeve area, appear cracks, small fissures, indicative of the presence of a silver plate, attached likely, on a support, a rectangular bar of the type identified in the case of the half-finished foot (MȚCO, inv. no. 10.952, Pl. II/3, Fig. 5 a-b). The emergence of cracks also on the curved rod between the second last knob and the intermediary knob (Fig. 5 c-d) suggests that the knobbed rod might also have been plated.

Reverting to the half-finished knobbed foot, past the raw, unfinished condition of the item, at first glance, we noted the darker colour of the alloy of which it was made, slightly different from that of the finished brooches in the hoards at Sacalasău Nou, Oradea-Sere or Drăgeşti. It is possible that this colour difference, unless due to the contact with the sulphur vapours in the air, is the result of the conscious use of a silver and copper alloy[46], which the artisans intended to hide under a silver foil of a higher finesse. Hypothetically, this is possible, yet colour differences, naked eye or microscope observations do not provide sufficient evidence. Only metallographic and chemical analyses can confirm or invalidate any assumptions made.

We do not know to what extent, even if the half-finished foot in the lot at Sacalasău Nou would be a core, it is indeed made of silver and copper alloy. Although less likely, we cannot self-evidently dismiss the hypothesis of aesthetic plating[47], the semi-finished condition of the item, the hammering errors and polishing traces requiring a possible concealing by applying a silver foil, a plate that would remedy foot imperfections.

The hoard/jewellery lot at Sacalasău Nou – inventory of a metalworking workshop

The inclusion in the Sacalasău Nou hoard composition of the two half-finished brooch parts, recovered by their seizing in 1979, provides the jewellery lot a special character. We do not know for what reasons Al. Săşianu and Şt. Konewalik[48] added the two items, "unknown" to the authors of the article issued in 1975[49], although the

Nou and the three brooches in the grave at Tilişca (Lupu 1989, 34, Fig. 9/1, 4, 6–7). In the case of the brooch at Sacalasău Nou, the foot rod was facetted by filing, while for the brooches at Tilişca we have no direct observations on the outer appearance of the items or their sectioned parts.

[46] Analyses made on various Dacian jewellery objects indicate that the artisans could either decrease or increase the silver content of the alloy, the copper addition being "perfectly controlled and applied occasionally by choice" (Stoicovici 1973, 542).

[47] Jevtić et alii 37, 66. Brooches of Jarak type, produced in the 1st century BC in the area of the Scordisci and Transdanubia, had the widened part of the bow between the attachment knob and the spring covered with a silver plate whose edges, not soldered by hammering to the bow body, remain visible in the lower part.

[48] Şt. Konewalik, the co-author of the notes regarding the finds in Sacalasău area, was a teacher at the General School of Sacalasău Vechi. In August 1976, he attended a sondage made by Al. Săşianu on hill Chereches, which resulted in six Dyrrhachium and Apollonia drachms (MȚCO, inv. no. N 812). In January 1979, he donated the Museum in Oradea a knobbed brooch and five Apollonia drachms (MȚCO, inv. nos. 10.784, N 966; Săşianu, Konewalik 1981, 332, Pl. I/A).

[49] Săşianu, Konewalik 1981, 332, note 19.

items were confiscated, according to the delivery report of the items, precisely from one of them, E. Molnar[50]. The mentioned contradiction and the multiple jewellery finds coming from the hills around Sacalasău Nou, call for caution. Practically, there are two working hypotheses concerning the structure of the hoard entered in 1979 in the MȚCO collection:

i. A lot consisting of items coming from two independent finds, one made in 1972, on *Burcărar* hill and the other, at a date and place remained unknown.

ii. A single hoard discovered in 1972, on *Burcărar* hill, whose structure comprises knobbed brooches in various conservation states (finished, damaged, half-repaired, half-finished), two bracelets and a chain.

The first hypothesis cannot be, according to the available data, either invalidated or confirmed, however the discovery of half-finished brooches points to the existence of a metalworking workshop in the area of the Dacian settlement at Sacalasău Nou. The second hypothesis reinforces, by associating half-finished items with items bearing obvious traces of the intent for repair, the idea that respective hoard is the inventory of a workshop functioning in a settlement located precisely in the production area of the knobbed brooches[51].

A peculiar aspect of the settlement at Sacalasău Nou is the frequency of jewellery and coin finds, either in mixed or separate hoards[52]. Even though the number and precise composition of these hoards remain unknown, attention is drawn by the supposed find of the 50'ies, made on the same *Burcărar* hill: a homogenous hoard made of eight (?) knobbed brooches, today lost[53]. On the other hand, the discovery in the settlement and nearby, of many drachm hoards struck by the cities of Apollonia and Dyrrhachium, within an environment lacking monetary economy, suggests the possibility of the brooch production out of the silver obtained from coin recycling. The hypothesis on the making of Dacian jewellery out of the import coins' silver is not new[54], yet the chronological synchronism between the two object categories (the emergence of the knobbed brooches coincides with the inflow of drachms in pre-Roman Dacia) and the finds clustering in a micro area are only general, indirect arguments.

Metallographic analyses carried out on a lot of drachms belonging to the hoards at Sacalasău Nou and Dieci (Arad county)[55], compared, for the lack of analyses on the

[50] When the hoard was published, only a bracelet and one chain were recorded as lost (Dumitraşcu, Molnar 1975, 59, 64).

[51] Rustoiu 1997, 31-32; Spânu 2012, 148-149.

[52] Săşianu 1980, 146-148; Săşianu, Konewalik 1981, 336, Fig. 2. According to the repertory based on the literature and field research, in the Sacalasău area were discovered six hoards that contain dress and adornment objects (knobbed brooches, bracelets and a decorative chain).

[53] See note 8.

[54] Téglás 1892, 408-409; Popescu 1941, 197; Preda 1958, 113-124; Pârvan 1982, 312-313; Spânu 2012, 89-90.

[55] In 1997, Al. Săşianu sorted a lot of 48 drachms belonging to the hoards at Dieci (Arad county) and Sacalasău Nou, which was subject to analyses performed by B. Constantinescu at the Institute of Atomic Physics. The coins were analysed by two complementary methods of elementary composition analysis: particle-induced x-ray emission (PIXE) and x-ray fluorescence (XRF). The results were published in various specialty journals between 1999-2001, unfortunately not accessible to us. Our notes regarding the coins' composition are based strictly on the results sent to Oradea, during 1997-1998, by B. Constantinescu; the fax being preserved in the MȚCO archive.

adornment objects at Sacalasău Nou, with the results of the investigations carried out on other Dacian hoards[56], prove similar silver and copper concentrations, however also the presence of same trace-elements, gold and lead[57]. Without jumping to conclusions, we believe that the correct answer, strictly concerning the issue at hand, may be given only following a comparative analysis of the entire lot of objects (coins and jewellery) discovered at Sacalasău Nou.

Conclusions

The republishing of the jewellery hoard discovered in 1972 in the area of the Dacian settlement at Sacalasău Nou is the result of the two brooch parts introduced, after almost a decade, in its composition. Briefly mentioned as knobbed brooch foot and spring fragment, without having been rendered by drawings or photos, the two items passed unnoticed. Their identification as parts of half-finished knobbed brooches brings into discussion a few aspects related to the technique and production stages of this artifact:

– the knobs were made of two parts by hammering on the foot rod;

– the brooches were obtained following the separate processing of the knobbed foot, on one hand, and of the bow together with the spring and catchplate, on the other hand; they were joined with the aid of a plate both covering the catchplate and interlocking the foot rod, like a sleeve;

– the possibility of silver foil plating of the knobbed foot, either for aesthetic purposes to conceal hammering imperfections or mask a core made of a lower silver content alloy.

The presence of half-finished knobbed brooch elements brings into discussion the existence of a metalworking workshop or at least the presence of a metalworking artisan near the find spot of the items. The chance find, by the members of the same family, of two hoards containing brooches, of which one lost, on the same *Burcărar* hill nearby the Dacian settlement at Sacalasău Nou, questions the composition of the

[56] We take into account the analyses made in '60–'70, by chemical and classical spectrographic methods, of the items in the hoards at Sâncrăieni, Surcea, Bistriţa, Cojocna, Stăncuţa, Bălăneşti (Stoicovici 1973, 541; Stoicovici 1974, 20). Recently, with the aid of atomic methods (XRF), were carried out investigations of the Dacian hoards at Coada Malului, Lupu, Senereuş, Slimnic, Mediaş, Sărmăşag, Sărăcsău etc. (Oberländer-Târnoveanu et alii 2010, 5–9).

[57] The results of the investigations, though similar, were differently interpreted. E. Stoicovici and his collaborators, related the copper presence to controlled introduction and, in parallel, correlated the constant presence of gold with the nature of the local ore from where the metal came. The lead present as accompanying element and the information on the gold present in the content of the Greek coins, revealed by nuclear analyses made outside Romania, were not discussed. By the opposite end, the team of researchers from Bucharest, interpreted the joint presence of the four elements (Ag, Cu, Au, Pb) as evidence of the use of the Greek coins (the Thasian tetradrachms, those of Macedonia Prima type and the Adriatic cities drachms) as raw material source for the Dacian jewellery and dress accessories (Oberländer-Târnoveanu et alii 2010, 5–9). Following the metallographic analyses made on the items in the hoard at Bucureşti-Herăstrău, D. Spânu and V. Cojocaru concluded that they cannot either confirm or dismiss the hypothesis on the coins' recycling for obtaining adornment objects. The difference between the metallographic structure of the coins and that of the jewellery is given by the bronze quantity (Cu and Sn), purposefully introduced by the metalworking artisans in order to ensure the rigidity of certain items (Spânu, Cojocaru 2009, 100–116; Spânu 2012, 90–91).

hoard discovered in 1972. The hypothetical introduction in the hoard structure, which already contained a damaged brooch with repair traces, of the semi-finished brooch parts, highlights the idea that a metalworking workshop functioned in an area deemed as the knobbed brooches' production area. The discovery in the surrounding area of many hoards of drachms issued by the Adriatic cities of Apollonia and Dyrrhachium and the results of the metallographic analysis of such coins' composition supports, indirectly, the idea of a workshop operating there.

Since the presence of semi-finished knobbed brooches, unique in the repertory of metalworking item finds in pre-Roman Dacia, challenges a series of previous assertions related to the way the brooch were made, the interpretation file remains open.

In what the raw material issue is concerned, the vicinity between the many finds of knobbed brooches, among which some half-finished, and coin hoards (drachms, Republican denarii), presumable raw material sources, provides the opportunity for a punctual analysis that would verify indirect comparisons only partially supporting the idea of import coins recycling in order to make Dacian jewellery in the workshop at Sacalasău Nou.

Addendum

Technical data concerning the items discovered at Sacalasău Nou (Bihor county)

1. Knobbed brooch. Silver; hammering, stranding, soldering, incising, punching, polishing. G = 194.60 g; brooch L = 14.52 cm; spring L = 8.76 cm; knob diam. = 0.98–2.03 cm; max. bow width = 4.70 cm; MȚCO, inv. no. 23.129; Pl. I/1. Brooch with four large and three intermediary knobs placed on the foot withdrawn on the bow. Mid knobs are cut by chisel in the contact area with the bow, and the knob towards the spring widens and is attached to the bow by two extensions. After attaching the foot, the bow gets the form of a rhombic plate, decorated with stripes of incised lines and small stamped circles. The bilateral spring incorporates a circular iron bar, preserved fragmentarily.

2. Knobbed brooch**.** Silver; hammering, stranding, soldering, incising, punching, polishing, finishing, piercing. G = 131.173 g; brooch L = 14.17 cm; knob diam. = 1.04–1.98 cm; max bow width = 4.83 cm; MȚCO, inv. no. 10.951; Pl. I/2. Brooch, identical with the previous, is preserved fragmentarily. The foot area preserves only the upper part, with the last two large knobs. In the foot break area, the bow has an orifice. The bilateral spring of the brooch is preserved partially, part of the outer chord being lost after discovery. Inside the coils, rust traces coming from the iron bar designed to reinforce the spring are noticeable. The pin displays a series of incisions. The chord being broken, the brooch was preserved in two pieces.

3. Knobbed brooch foot. Silver; hammering, finishing, polishing. G = 86.149 g; brooch L = 9.64 cm; knob diam. = 0.99–1.92 cm; MȚCO, inv. no. 10.953; Pl. I/3. Brooch foot with four large knobs and other three intermediary, set on a bar which upon finishing became cylindrical. After the first knob, the bar gradually flattens towards the catchplate arching. Before such arching, the foot is slightly deformed and, a centimetre below, it is broken. Two of the large knobs, those by the middle, are cut straight by chisel in the area near the bow.

4. Half-finished knobbed brooch foot. Silver; hammering, finishing. G = 50.018 g; brooch L = 9.66 cm; knob diam. = 1.41–2.14 cm; MȚCO, inv. no. 10.952; Pl. II/3. Half-finished brooch foot with three large knobs, placed on a rod ending towards one of the ends with a rectangular bar, narrowing gradually. By the opposite end, the knob-sleeve was

unfinished and a massive rectangular bar, with the side towards the bow slightly concave, lies by the attachment spot. The central knobs were cut by chisel in sharp angle for attachment to the future brooch bow.

5. Spring, bow and catchplate of a half-finished brooch. Silver; cold hammering, twisting. G = 35.894 g; brooch L = 15.51 cm; bow l = 0.35–1.09 cm; MȚCO, inv. no. 10.955; Pl. II/2. Part of the spring coils are preserved, made by twisting a thick silver wire, located in the extension of the brooch bow. In this processing stage, the bow-rod has an ovoid profile, narrowing and flattening towards the catchplate. The catchplate area, strongly thinned, is a triangular plate with a straight edge and the other, dented.

6. Brooch bow. Silver; twisting, cold hammering, polishing. G = 26.888 g; brooch L = 12.68 cm; MȚCO, inv. no. 10.956a; Pl. II/1. The item is a bar-shaped part of the spring and bow of a knobbed brooch. The spring preserves only a deformed coil and the bow bar exhibits the specific curves of the areas near the foot. Towards the catchplate, the bow body is broken. The bow was slightly deformed.

7. Bracelet. Silver; hammering, incising, punching. G = 113.117 g; D = 8.43 × 8.68 cm; unwound bracelet L = 39.5 cm; body thick. = 0.93 × 0.71 cm; ends thick. = 0.51 × 0.70 cm; MȚCO, inv. no. 10.956b. Bracelet made of a massive silver bar, which by hammering became cylindrical. The loose and overlapped ends have a rectangular profile. The bracelet body is smooth, yet the extremities are decorated by dots, punched circles and incised lines rendering stylised, snake heads.

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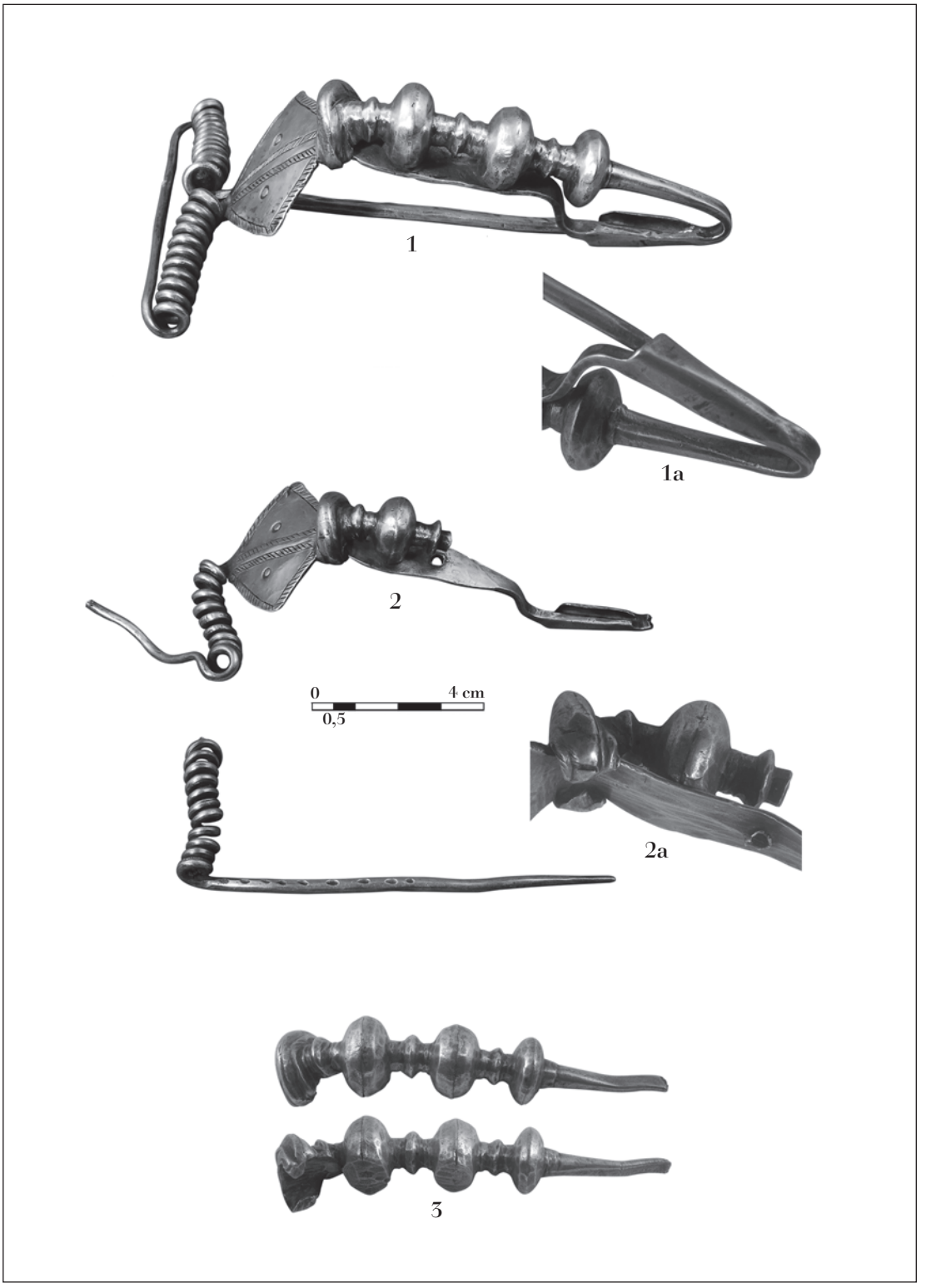
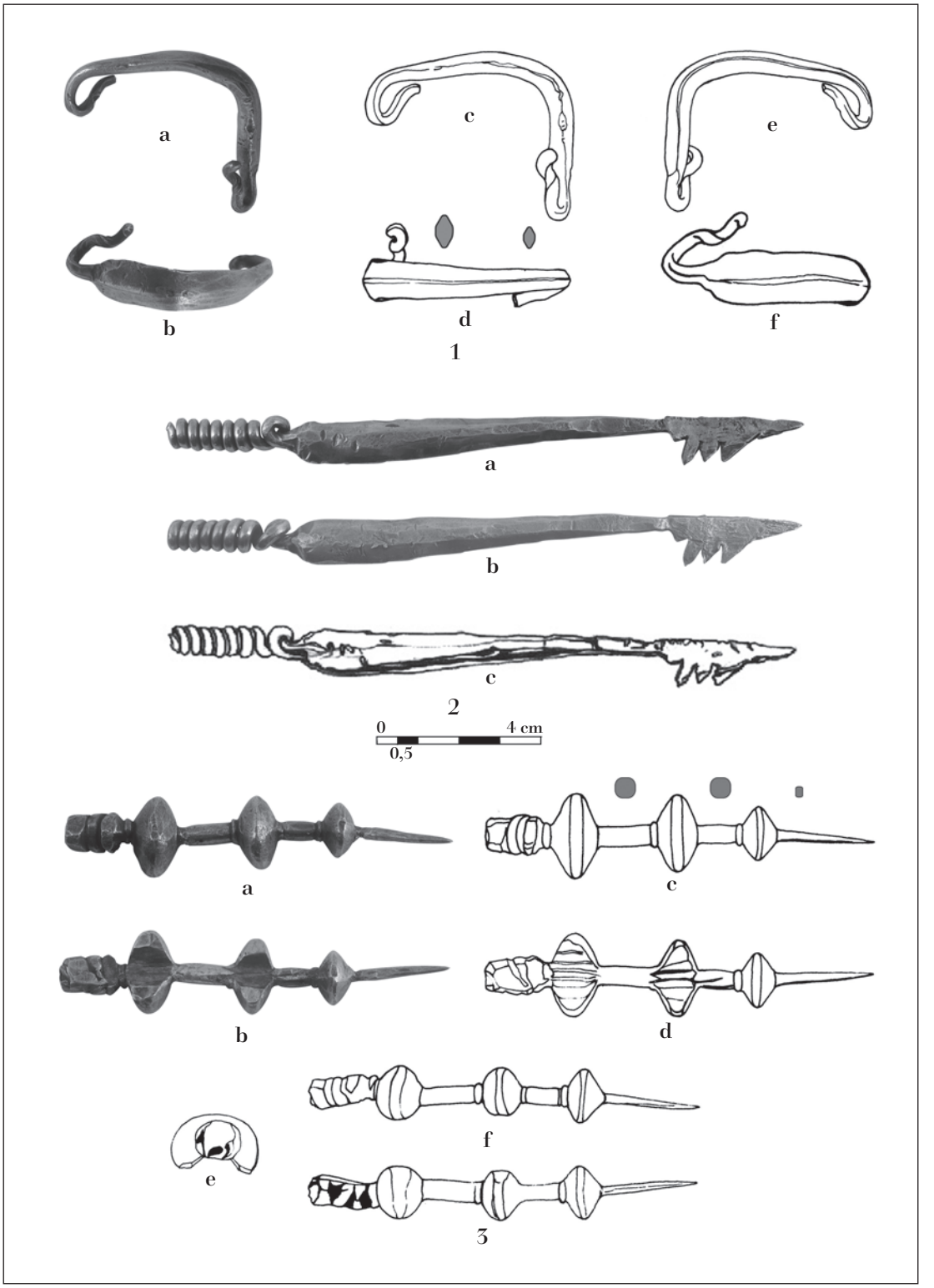
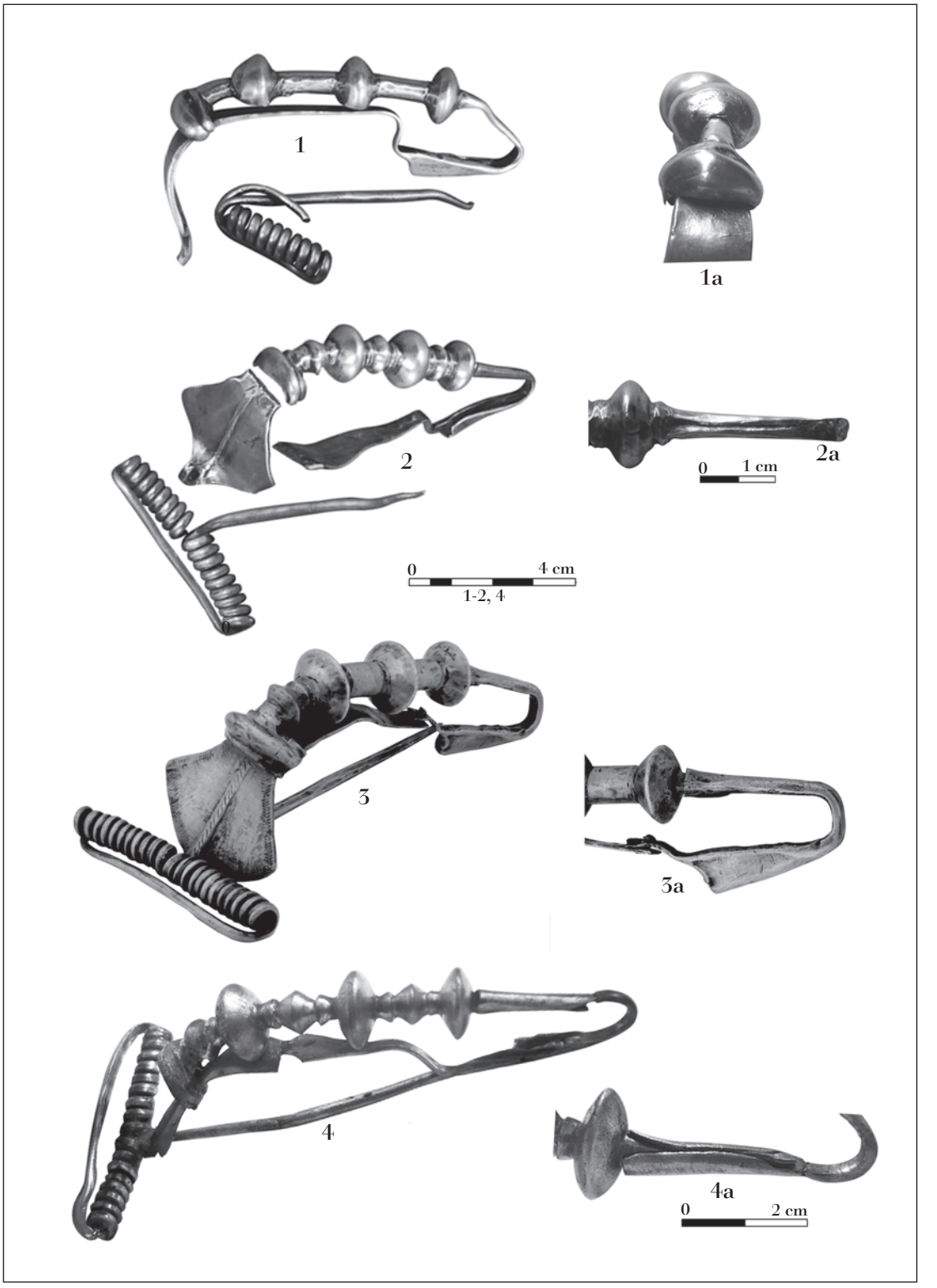
Corina Toma
Muzeul Țării Crişurilor, Oradea
corinatoma00@yahoo.com



Pl. I. 1. Knobbed bow-plate brooch; **1a.** Foot rod detail (Sacalasău Nou, MȚCO, inv. no. 23.129); **2.** Fragmentary knobbed bow-plate brooch; **2a.** Brooch foot and bow detail (Sacalasău Nou, MȚCO, inv. nos. 10.951, 10.954); **3.** Knobbed brooch foot (Sacalasău Nou 1972, MȚCO, inv. no. 10.953). Photo: Ovidiu Pascu; photo processing: Lucian Mărcuşiu (MȚCO).



Pl. II. 1 a-f. Bow-rod of a knobbed brooch (Sacalasău Nou, MȚCO, inv. no. 0.956a); **2 a-c.** Spring, bow and catchplate of a half-finished brooch (Sacalasău Nou 1972?, MȚCO, inv. no. 10.955); **3 a-f.** Half-finished knobbed foot brooch (Sacalasău Nou, MȚCO, inv. no. 10.952). Drawings: Mariana Mechiş (nos. 1, 3); Oana Georgescu (no. 2); photo: Ovidiu Pascu, Lucian Mărcuşiu; photo processing: Lucian Mărcuşiu (MȚCO).



Pl. III. 1. Bow-plate knobbed brooch in the hoard at Tăşad; **1a.** Detail of the knobs (MȚCO, inv. no. 9693); **2.** Bow-plate knobbed brooch in the hoard at Tăşad; **2a.** Foot rod detail (MȚCO, inv. no. 9692); **3.** Bow-plate knobbed brooch in the hoard at Mediaş; **3a.** Detail of repaired parts (MNIR, inv. no. 47.494); **4.** Bow-plate knobbed brooch in the hoard at Cehețel; **4a.** Detail of the sleeve interlocking the foot rod (MMI Cristuru Secuiesc, inv. no. 1058); Photos: Ovidiu Pascu (MȚCO), Sandor-Zsigmond Ibolya (MNICS), Marius Amarie (MNIR); photo processing: Lucian Mărcuşiu, Oana Georgescu (MȚCO).