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The technical level of small-town shoemaking in Gdańsk Pomerania in the 14th century

Abstract. Based on the late medieval leather artefacts from Puck, Gniew, Lębork and Chojnice, an attempt was made to assess the level of shoemaking production at that time. Microscopic analyses of leather goods and production waste proved that in the field of tanning the activities related to the mechanical treatment of leather were carefully performed, although with insufficient professional knowledge concerning the process. The results of the identification of the animal origin of the leather confirmed the purposeful selection of raw material with different properties for individual footwear elements and the ability to properly cut it. The quality of the shoemaking products was highly rated in terms of technology and style. However, in the analysed collections a clearly perceptible difference in craftsmanship and assortment of products from Gniew and the other three towns was noticed.

Keywords: leathercraft, medieval shoemaking, tanning, footwear, late Middle Ages, small towns, Gdańsk Pomerania (Pomorze Gdańskie).

The importance of archaeological artefacts in research on the late medieval leathercraft cannot be overestimated. They enable to deal with issues that are only scarcely presented in written sources, concerning, among other things, the location of workshops, the type of raw material, the reconstruction of the chaîne opératoire as well as the assortment of products and changes taking place within it. The gradually increasing set of archaeological assemblages enables comparative studies and the extension of the scope of research questions, including the level of technological development of production in urban centres of various sizes.

This article is the result of studies on leathercraft in small towns of Gdańsk Pomerania, initiated as an effect of many years of excavation works in the area of the medieval town of Puck (Blusiewicz *et al.* 2014; Starski 2017). In their course, the remains of leather goods and significant amount of offcuts were obtained, confirming the existence of local leather processing workshops (Blusiewicz 2017a). The analyses performed led me to consider to what extent the production

of Puck craftsmen was typical of shoemakers from similar urban centres, and their skills presented the level of professional knowledge commonly found at that time. This question led me to the problem of assessing the quality of products as well as the technical level of leather production in small towns. The solution could only be provided by comparative studies. They were carried out on assemblages of leather artefacts from excavations in Puck (Blusiewicz 2017a), Gniew (Choińska-Bochdan 1990; Wiklak 1993; Blusiewicz 2020a), Lębork (Longa 2015), and Chojnice (Kurdwanowski, Miścicki 2016) – small towns of Gdańsk Pomerania, shaped in similar legal-organisational conditions and representing a similar level of economic development (Fig. 1). The collections were obtained from well-dated layers developed since the settlement of the area in the process of town incorporation – in the case of Gniew already from the end of the 13th century, in Chojnice from about the second quarter of the 14th century, in Lębork from the 1340s, and in Puck from about the middle of this century. They consisted of remnants of identified products, mainly dispersed elements of multi-piece footwear, and assemblages of waste from production in local leather workshops. In total 946 fragments of various products and 2.159 production waste were subjected to detailed microscopic analyses[1]. In the course of the research, I recorded features related to the subsequent stages of the manufacturing process: raw material tanning, selection and use of leather in the finished product, the way of cutting out and joining its individual elements. The indicator of both the quality and the level of shoemaking craftsmanship was the correctness and diligence of each of these production stages, and the resulting product's attractiveness in terms of quality and aesthetics.

The durability, functionality and comfort of the footwear largely depended on the leather – the type of raw hides and skins, the method of tanning and the appropriate use of leather properties. The preparation of the raw material was part of the shoemaker's duties. Numerous references in written sources, especially in documents of shoemakers and tanners guilds, as well as the results of archaeological research prove that in the late Middle Ages and in the following centuries, the processing of skin and making shoes could have been combined within one tanning and shoemaking workshop (Wiklak 1967, p. 140; Kaźmierczyk 1970, p. 222; Turnau, 1975, pp. 40–41; Wywrot-Wyszkowska 2008, p. 102; Blusiewicz 2017b). Small-town shoemakers could have dealt with vegetable tanning, satisfying their own needs for leather, and even in the case of a shortage of tanners, tanning skins for sale. Their skills in this area can be assessed based on microscopic analyses of the remains of leather products, and above all, offcuts – waste from their production, in which the traces of processing were not been obliterated as a result

[1] Random, statistically reliable samples from much larger assemblages of production waste of new leather from Puck, Gniew and Chojnice were assigned for microscopic analysis of the offcuts. No remains of shoemaking workshops were found during the research in Lębork, but their activity is confirmed there by mentions in written sources (Cramer 1858, p. 244).

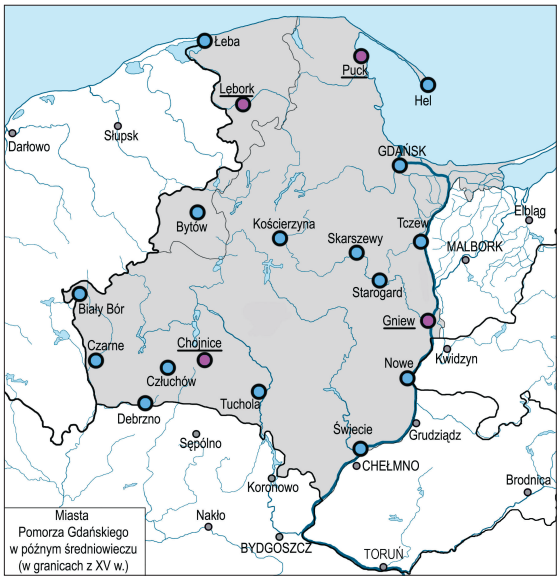

Fig. 1. Location of Gniew, Chojnice, Lębork and Puck against the background of the urban network in Gdańsk Pomerania within the borders from the 15th century (edited by M. Starski)

of use. The characteristics of the leather, such as delamination, presence of hair residues in follicles, smoothing the hair orifices and natural skin folds, damage, and the way of finishing both surfaces indicate that individual stages of the tanning process (beamhouse operations, tanning and finishing) were carried out correctly or inadequately (Radek 1999a; 2009; Kowalska, Radek 2015).

The most important issue in the tanning process seems to be the appropriate saturation with tannins, protecting against rotting and giving appropriate physical properties. The indicator for assessing the skills of late medieval shoemakers in this regard was the frequency of fully tanned raw material and delaminating as a result of incomplete tanning of the tissue among the remains of shoemaking products and offcuts. In this respect, the quality of the raw material for products from Lębork and Gniew was the best among the collection from the towns in question. Almost half (45.1%) of the Lębork products from the second half of the 14th century and over one-third (36.3%) of all 14th-century products from Gniew were characterised by high compactness, durability and flexibility of the raw material, preserved until now. In the case of a small collection from the second and third quarters of the 14th century from Chojnice, these features characterised slightly more than a quarter (27.2%) of shoemaking products, and only one-tenth (10.9%) of products from the second half of the 14th century from Puck. At the same time, a significant share of the delaminated leather was recorded in the analysed collections. This phenomenon may be the result of tanning shortcoming: insufficient deliming or bating of hides and skins, inadequate regulation of acidity and concentration of the first tanning liquors in the initial tanning stage, or too short tanning time (Krzywicki 1947, pp. 243, 301, 310). However, the delamination of the sole leathers and the soft

uppers should be assessed differently. The former were the most degraded. In the collection from Gniew, as much as 90.0% of the soles from the end of the 13th century underwent delamination, and slightly less from the first (83.3%) and second (74.3%) half of the 14th century. In the collections from the second half of the 14th century from Puck and Lębork, this defect was noted in about 65% of the soles, and in 40% from Chojnice. However, in the case of thick, sole leather, delamination may be a side effect of the intended action, aimed at obtaining a hard and water-resistant material (Krzywicki 1947, p. 303; Radek 2009, p. 141). Therefore, it cannot be properly assessed whether it is the result of a deficiency in the ability to control tanning processes or, on the contrary, deliberate treatment with full awareness of the consequences (Wywrot-Wyszkowska 2008, p. 98; Kowalska, Radek 2015, p. 232). However, in the case of soft leathers and these intended for footwear uppers, delamination should be considered as the result of improper tanning. Their highest percentage, amounting to 34.2%, was recorded among the footwear uppers from Puck – almost twice as high as in Gniew (20.5%) and Chojnice (17.4%) and three times higher than in Lębork (14.7%).

The results of the analysis of offcuts from the 14th-century layers from Gniew, Chojnice, and Puck, interpreted as the remains of local production, also present a not very favourable picture. A very high percentage of delaminated waste was noted – in the Puck collection as much as 70.2% in the third and 54.6% in the fourth quarter of the 14th century. These data indicate that the local craftsmen either did not have sufficient knowledge and practice in tanning, or deliberately lowered leather quality, for example by reducing the necessary soaking time in tanning pits. An equally high percentage of delaminated offcuts was recorded in the 14th-century collections from Gniew and Chojnice, indicating a similar level of tanning competence of local craftsmen. Difficulties with the proper selection of the tanning liquor may be demonstrated by occasional offcuts of leather with a deformed grain side, which were probably treated with too high concentration of the first tanning solution, recorded in all three towns.

A separate issue is the correctness of the treatment of the skin surfaces during the beamhouse operations and finishing the leather. It resulted as much from the knowledge of tanning in the field of proper preparation of the raw material as well as the conscientiousness and precision of the craftsman in the mechanical treatment of the leather surface. Despite the incorrect saturation with tannins of a large part of the Puck products, they were characterised by carefully carried out beamhouse operations: dehairing, defleshing and smoothing, indicating great care, and perhaps skills of craftsmen. Only slightly worse surface finishing was recorded in the correctly tanned leather of the 14th-century products from Gniew, Lębork and Chojnice. Individual specimens showed some remnants of hair, but they were sparse hairs in the creases and wrinkles of the leather, visible only when magnified. They were mostly found on complementary elements cut from

the peripherical parts of the hides, such as heel stiffeners, heel seats and rands, exceptionally on vamps. The accuracy of the dehairing treatment is confirmed by the observations of the surface of intersectional offcuts – waste from the central part of the leather, created during cutting[2]. The percentage of inaccurately dehaired offcuts in the 14th-century collections from Gniew and Puck ranged from 3.1% to 8.7%, while in the collection from the second quarter of the 14th century from Chojnice, not a one was recorded.

The direction of tool, consistent with the layout of the hair coat, was important during the dehairing. When moving the unhairing knife against the hair, the hair orifices are not properly smoothed, resulting in a matte, rough finishing of the grain. The observation of the production waste from the Chojnice workshop indicates that the soft leather surfaces were treated with great care, as well as the poor knowledge of the rules of proper processing, as the skins were dehaired very carefully but in the wrong direction. The defect concerned as much as 40% of intersectional offcuts from the second and third quarters of the 14th century. In the collections of this category of waste from Gniew, their percentage was nearly a half lower, and from the end of the 13th century through the entire 14th century, it ranged from 20.6% to 23.4%, while in the second half of this century from Puck – 15.0%.

Preparation and finishing of the raw material also included trimming the thickness of the skin from the flesh side with a two-handled fleshing knife. Leather cuts lowered its strength, hence they had to be avoided or cutting should have been planned in such a way that they would not affect the quality of the finished product. It was therefore surprising to find this kind of damage on the remains of the footwear, and especially on the sole parts. In the 14th-century collections from Gniew, Chojnice and Puck, the percentage of products with cuts ranged from 9.2% to as much as 16.2% from the second quarter of the 14th century from Chojnice and as much as 21.6% from Lębork, which proves the inexperienced use of the fleshing knife. However, shallow cuts on the flesh side of thick and fleshy soles, complementary elements or uppers apparently did not reduce the durability of the analysed footwear. Usually, it was damaged earlier for other reasons resulting from intensive use, such as wearing out the soles or the lower parts of vamps on the grain side. Only in individual specimens it can be assumed that the cuts of leather accelerated its destruction.

The observation of the surface finishing also showed that in Chojnice and Gniew a noticeably different method of working the surface of thick sole and soft upper leather was applied. Significantly less work was put into the finishing of the former, the consequences of which can be seen in the form of a rough grain

[2] The assessment did not take into account the edge offcuts (primary offcuts), which, due to irregular edges and distortions, constituted a necessary waste when cutting leather. The defects observed on them, such as hair residues or careless defleshing, can be regarded as the result of deliberate omission.

with unsmoothed wrinkles and furrows and long, poorly compacted flesh side fibres in the sole leather. No such differentiation was noted in the remaining collections.

Regardless of the differences observed in the quality of the individual stages of the skin processing, in all analysed collections were recorded defects currently considered unacceptable, such as hair residues, undertanning or delamination of the tissue. Recorded cases of waste with scalded or delaminated grain, resulting from errors such as too high concentration of the initial tanning liquor, indicate poor skills in appropriate selection of tanning solutions and control of the course of the tanning process. Few results of analogous analyses prove that in the second half of the 14th century the methods of its correct conduct were known and used. In a similarly dated collection of artefacts from Więzienna Street 11 in Wrocław, no such defects were found (Radek 1999b, p. 100), and in Kołobrzeg collection they were registered much less frequently (Radek 2016, pp. 130–136). It proves the lack of skills and experience of small-town leather producers in relation to the professional tanning knowledge existing in the second half of the 14th century.

Nevertheless, the results obtained do not put small-town craftsmen in a particularly bad light. Apart from the aforementioned exceptions, leather delamination seems to be a fairly common phenomenon, occurring regardless of the type and dating of leather finds, conditions of deposition and species affiliation of the raw material. The delamination underwent most of the late medieval Szczecin products, and thick sole leathers delaminated twice as often (57.6%) as the soft upper leathers (32.0%) (Kowalska 2013, p. 92; Kowalska, Radek 2015, p. 232). These proportions are similar to those observed in the collection from the second half of the 14th century in Puck. In the case of footwear obtained from excavations on Szewska Street in Wrocław, dated to the end of the 13th and the 14th century, 22.7% of the uppers were delaminated (Radek, Chrószcz 2010, pp. 339, 342) – similar to that of Gniew. In this modest context, the tanning skills of small-town leather producers would not differ from that of craftsmen from much larger urban centres.

Undoubtedly, in the 14th-century leather manufacturing of all four towns, the method of tanning of the sole leather and the one intended for footwear uppers was differentiated, which proves a slightly greater than basic scope of professional knowledge. This is evidenced by soles made of the hard sole leather found in all analysed 14th-century collections, as well as several times greater degree of delamination of sole leathers, most likely as a result of other tanning treatments.

In the small-town shoemaking production in Gdańsk Pomerania, bovine leather was most often used, mainly from adult individuals, characterised by high compactness and durability. In Puck, Lębork and Chojnice, in the second half of the 14th century, its share (including juvenile individuals) ranged from 67.7% to even 89.9% among production waste, and from 59.8% to 69.4% among leather items (Fig. 2). All elements of sole parts and most of footwear uppers were made of it. In the collection from Gniew offcuts of cattle hides constituted from 52.6%

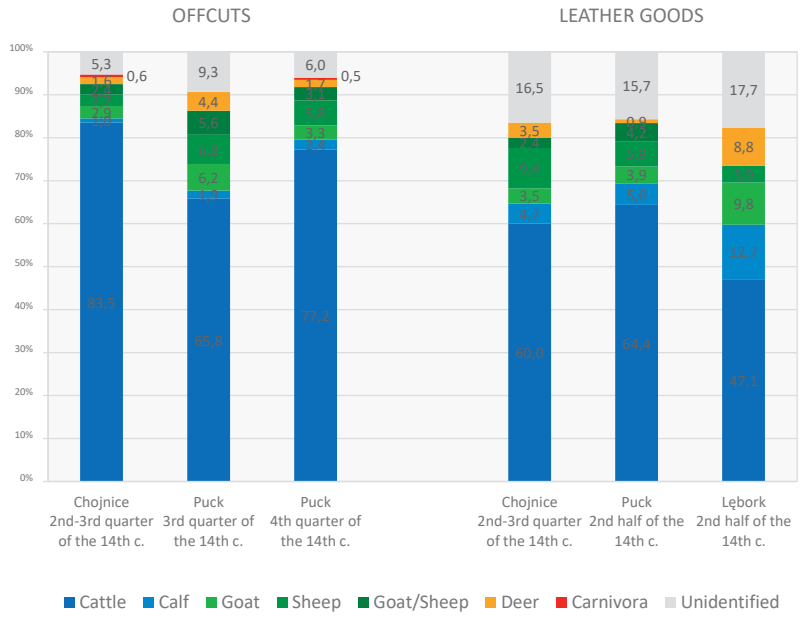

Fig. 2. Species classification of leather in the collections of production waste and products from individual chronological levels in Chojnice, Puck and Lębork (edited by K. Blusiewicz)

at the end of the 13th century to slightly over 60% in the second half of the 14th century (Fig. 3). In turn, a clearly lower share of cattle hides was recorded among leather products than offcuts (Fig. 3). They ranged from 25.2% to a maximum of 29.3%, which was a similar or smaller percentage of the raw material than the one from small ruminants in total[3]. The dominance of goat and sheepskin was clearly visible among the remains of the uppers.

Undoubtedly, cattle hide, with a large surface and various physical properties of its individual parts, became a universal raw material in the 14th century. Its overwhelming share can also be interpreted as an indicator of good knowledge of methods of tanning, enabling the obtaining of raw material with different properties, adapted to the production needs (Radek 1996, p. 287; 1999a, pp. 73–75). This is evidenced by the production waste of cattle hides tanned for sole and hard sole leather, Russia leather, soft leathers, as well as very thin and delicate lining leathers. At the same time, the results of qualitative analyses show numerous shortcomings in the tanning process, contradicting this thesis. In turn, the analysis of the collection from Gniew, which was dominated by goat, sheep and deer skins,

[3] Also in the group of artefacts unspecified in terms of species, the share of leathers which fibers' sort excludes their origin from cowhide was higher or similar to those that could have come from such a material.

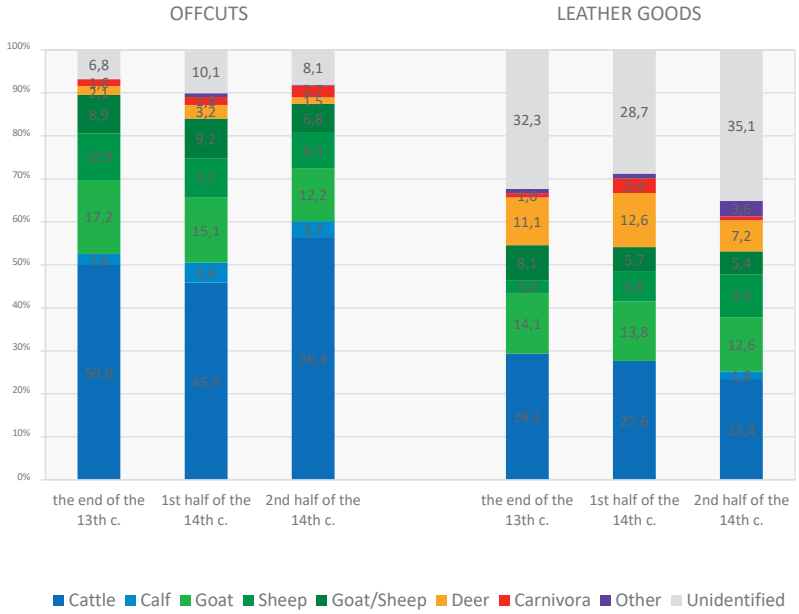

Fig. 3. Species classification of leather in the collections of leather products from individual chronological levels in Gniew (edited by K. Blusiewicz)

showed that most of them were properly saturated with tannins and probably tanned as high quality raw material. In terms of quality – compactness, thickness and flexibility, they were of a similar quality to the few products of deerskins from Lębork, and they stood out in comparison with the skins of the same species of animals from Puck and Chojnice. In the collection from Gniew, the greatest species diversity of tanned leather was also noted, including fragments of horse and pig leather as well as carnivores (Fig. 3). Therefore, it does not seem that the proportions of skins of different animals types are decisive in the assessment of tanning skills. They may also be the result of other aspects related to the production of leather crafts, such as the availability of raw material, focusing the workshop's production on specific products or different groups of customers.

Selection of leather with appropriate properties for individual elements of the products and its appropriate cutting was important for the assessment of leather producers' skills.

The correct cutting of tanned hides and skins affects the footwear durability, its appearance, and at the same time the efficiency of the cut material. In the late medieval multi-piece footwear, it was possible not only to cut its elements from the appropriate parts of the hide, but also to use leather of various types, thickness or quality. Analyses of the raw material confirm deliberate selection of leather with different properties for individual parts of footwear. The most important structural

elements of adult footwear – soles and vamps, were cut out of the best, most durable and compact dorsal part of the hides. Single soles were made of specially tanned hard sole leather, and the use of this raw material is also evidenced by production waste tanned this way. The uppers were cut out from looser parts of hides and skins, the neck or the sides. Supplementing them small inserts were placed in less visible places on the medial side of the foot, hence there were used waste pieces from cutting of larger elements or outlying parts of skins which were difficult to use otherwise. For this reason, in some shoes there was a noticeable difference in the density of the leather of the upper and the insert which complemented it. The peripheral parts of the hide were intended for complementary elements which were little or completely invisible in footwear. The heel seats and linings were made of a raw material with a loose weave of fibres, with a distinct, less careful finishing and unsmoothed natural skin folds. For heel stiffeners were intended leathers with different properties, both compact ones, as well as very thin and pliant of various species of animals, apparently using any available raw material left from cutting, including defective one, with hair residues or from the pubic part of the skin (Blusiewicz 2020a, p. 339, Fig. 1). Lace hole bindings were made of thin, lining leathers, usually 1.0–1.2 mm thick, of sparsely hairy, delicate parts of the skin, most likely the abdomen and groin. All this indicates, on the one hand, the care for the appropriate durability and functionality of the finished footwear, and on the other hand, efforts to maximal use of the raw material. In most cases this compromise did not lower the quality of the products.

In order to obtain a durable product, leather of different animals types were also combined. The soles were always made of the most durable adult cattle hides and joined with the uppers of soft leather of various species of animals. Vamps and inserts were made of the same species and similar properties raw material, regardless of the type of leather used. In turn, the leather of reinforcements was often differentiated (Fig. 4). Vamps were deliberately finished with top bands of delicate goat, sheep or deerskins, giving a soft and distinctive in colour finishing. In other cases, the intentionality of combining different types of leather cannot be clearly stated. The uppers of bovine leather were usually reinforce with heel stiffeners made of the same material, but relatively often, in a quarter of specimens, thinner and more delicate leather of small ruminants and deer were used for this purpose. In turn, in the uppers made of soft goatskins, sheepskins and deerskins, the heel stiffeners made of thicker bovine and small ruminants leather were used equally. It seems that the selection could have been deliberate and complemented the properties of the raw material used for the structural elements of the upper, but confirmation of this requires similar observations on much larger collections of artefacts.

A slightly different selection of the raw material was used for small, children's footwear, up to 215 mm long. It was made of thick but not very compact as well as soft and pliant leathers. The soles of children's shoes were characterised by

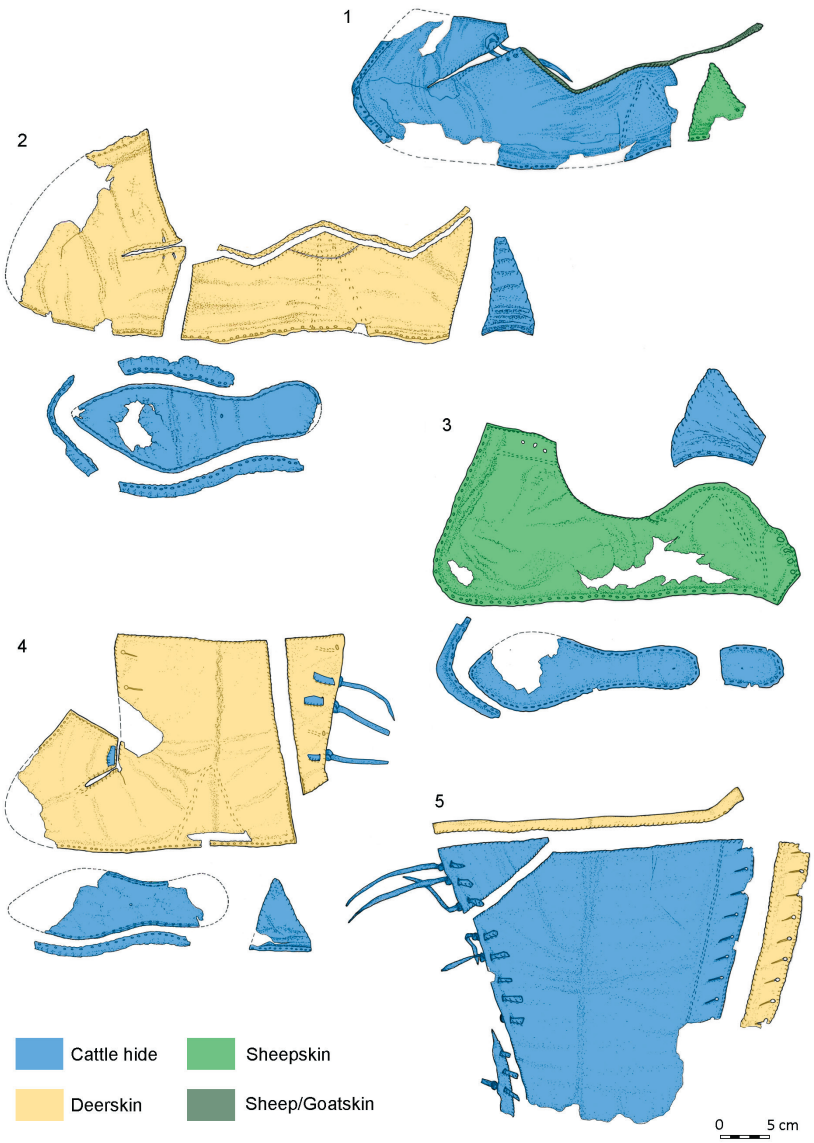

Fig. 4. Combining different types of leather in late medieval footwear (selection). 1 – Chojnice, 2–3 quarter of the 14th century; 2–4 – Puck, second half of the 14th – first half of the 15th century; 5 – Lębork, second half of the 14th century (drawing by K. Blusiewicz, G. Zborowska)

fleshiness and looser interlacing of fibres, indicating that they were cut from a softer than the dorsal, probably the neck part of cattle hide. For uppers, goat and sheep, as well as deerskins, were mainly used. Among all the children's shoes obtained from Puck, Chojnice and Lębork[4], less than one third of vamps were made of cattle hide, dominant in the products from these collections. The vamps were cut from parts with looser interlacing of the flesh side fibres, from necks and sides, as well as from the weakest, mediocre quality leather from the groin and abdomen area (Fig. 5). Probably more difficult to plan, smaller skins and peripheral parts of hides, left after cutting the uppers of large size shoes, were used. As a result the preserved children's shoes were largely damaged and deformed by use. Clearly, the quality and durability of the raw material were not as important as in footwear for adults, but the softness and fleshiness of the leather were probably features the attention was paid to.

While being worn, the footwear is constantly subject to various types of strain. In order not to deform as a result, the pattern of its individual elements should take into account the directions of the highest strains and adjust the layout to the properties of the leather. Contemporary shoemaker's textbooks precisely define the rules for the arrangement of patterns on the leather according to the directions of its lowest ductility/maximal strength (among others Rerutkiewicz, Rekwart 1955, pp. 108–111; Rerutkiewicz 1963, pp. 137–144). To find out whether the medieval shoemakers considered these factors, attempts were made to determine the directions of the original hairs' growth on the leather used for the uppers. The arrangement of the hair coat correspond to the direction of most collagen fibre bundles and yet the direction of the lowest extensibility (Haines 2006, p. 19). The observations of the grain pattern and the directions of hair growth made it possible to reconstruct the probable arrangement of the cutting pattern on the hide or skin and to assess the direction of its lowest extensibility compared to the currently recommended ones. It was possible only for a few specimens of uppers with well-preserved, not deformed or worn by use hair follicle pattern of the grain. Nevertheless, almost all of the analysed footwear uppers from Puck, Lębork and Chojnice were cut in a way that, according to the current recommendations, would be considered correct or acceptable – toe to heel, in line with the greater strength. The toe was placed closer to the compact, central part of the skin, while the quarter and the shaft were in its further part. With this arrangement, the direction of the lowest stretchiness of the vamp leather on the lateral side of foot corresponded to the one recommended by modern textbooks, and the more intensively working front part of footwear was cut from stronger leather (Rerutkiewicz 1963, Fig. 149). Some single-piece vamps were cut from the area of leather with changing properties, with the heel part being placed in the looser portion and the toe part in the tighter

[4] In the analysed collection of shoes from Gniew, no uppers of children's shoes were found.

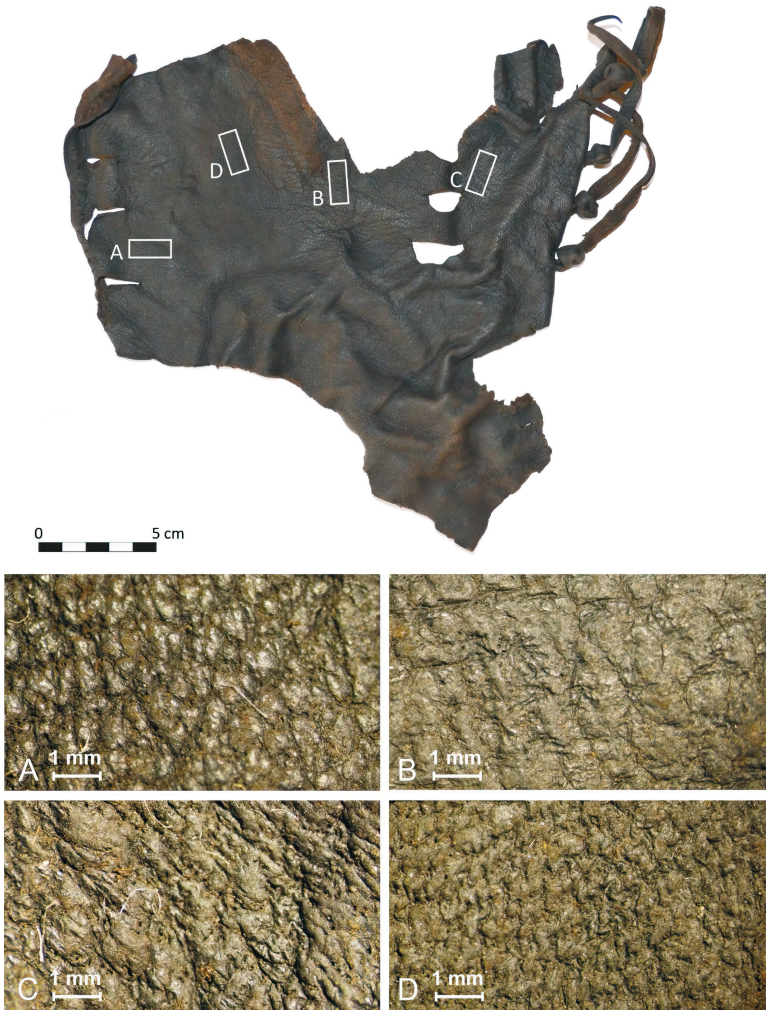

Fig. 5. Upper of a children's shoe from the second half of the 14th century from Lębork, made of goat leather with changing properties. A–D – hair follicle pattern (magnified 10x). Photo by K. Blusiewicz

one. Derogations from these rules concerned, as in the case of the selection of raw materials, most often children's shoes, which together proves that for these shoes were used larger waste pieces left after cutting. Their arrangement, inconsistent with the appropriate directions of strength, rather can be considered a deliberate action aimed at using all parts of the leather, than a lack of knowledge of cutting principles and the ability to assess the properties of the raw material. The results obtained for the collection from Gniew differ from these observations. The third

part of the footwear uppers intended for adults was cut in the wrong way – the direction of hair growth indicated that the sole part was further from the centre of the skin than the upper part of vamp, hence it was cut out irrationally and contrary to the rules applicable today. Based on the observations, it is possible to assume a good knowledge of the desired directions of footwear ductility and the principles of the correct arrangement of its patterns on the leather by the Puck, Lębork and Chojnice craftsmen, while in the case of the Gniew ones it cannot be confirmed.

In cutting, its efficiency was important, i.e. the ability of the cutter to maximal use of valuable raw material. Production waste from Puck, Gniew and Chojnice shows the great thriftiness of the craftsmen, which indirectly proves their professional skills. Hides and skins were almost completely used. Its defective or less valuable parts, for example, nipples or limb protrusions, were cut off at a very close distance (Blusiewicz 2017a, pp. 345–351, Fig. XII.23–25; 2020a, pp. 343–345, Figs. 5, 6). Measurements of the size of offcuts from Puck and Chojnice indicate a very close distribution of patterns and minimizing the inevitable waste. Again, the skills of the Gniew shoemakers should be assessed worse in this respect, because the average size of the surface of the analysed sets of offcuts indicate that they caused greater losses of raw material during cutting.

An equally important activity in the production of footwear was joining the cut elements with appropriate seams, ensuring strong and tight connections. The evenness of the seam, its appropriate distance from the edge and the stitch density adjusted to the thickness and firmness of the leather were important for the durability and quality of the product. Certainly, this skill should be assessed highly among small-town shoemakers. The joints used belong to the typical, commonly used in late medieval shoemaking products. If the thickness of the leather allowed it, they were hidden in the leather thickness and it remained almost invisible on the right side of the footwear. Their density was adjusted to the thickness and durability of the raw material, so that they do not weaken and tear the edges of the joints. In the analysed footwear, the seams were damaged mainly in the seat or tread of the sole, due to treading and abrasion of the leather in the parts most frequently in contact with the ground. This was due to prolonged use, shoe size mismatch or improper gait and did not depend on the quality of sewing. The measurements of the evenness of the stitches[5] show great care or skill of the craftsmen in all four towns. They sewed the shoes with a regular, rhythmic stitch. The values of the evenness coefficient showing high sewing correctness were recorded in 98.4% of seams on footwear from the second half of the 14th century, as well as on all 14th-century shoes from Lębork and almost all from Chojnice. An equally high percentage of even seams was recorded among the footwear from Gniew and it amounted to 97.5% at the end of the 13th century, and 92.5% and 93.5% in the first and the second half

[5] According to the method of Martyna Milewska (1980, pp. 125–126).

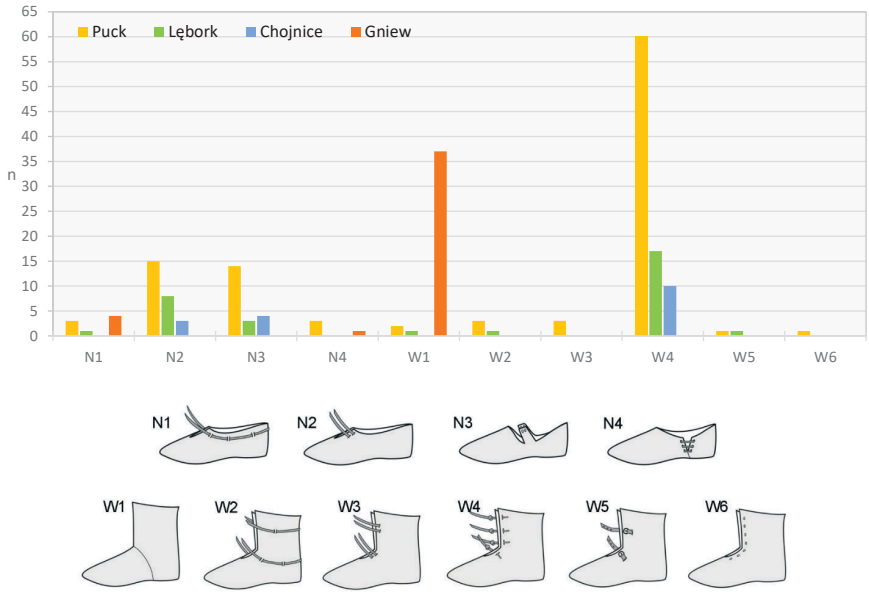

Fig. 6. Frequency of individual types of late medieval footwear from Puck, Lębork, Chojnice and Gniew (edited by K. Blusiewicz)

of the 14th century. Uneven stitches constituted rare, isolated cases, only slightly more common in the 14th-century footwear from Gniew. In individual cases, based on the differences in the evenness of different seams in one piece of footwear, it can be assumed that the footwear was sewn by two people – less and more skilled ones, which may indicate the work of an apprentice along a more experienced craftsman. This proves the usefulness of the method, which, with a wider application, could be used to try to distinguish professional and amateur/home production; a problem that often appears in the context of research on early medieval footwear or poorly recognised rural production of that time.

The method of connecting uppers with soles – the turnshoe construction with rand, with a seam hidden in the thickness of the sole leather, used in almost all shoes found in the towns in question, was one of the typical features of late medieval footwear[6] (Goubitz *et al*. 2001, pp. 91–92). With the exception of the diligence of workmanship assessment, it cannot therefore be a determinant of the skills of 14th-century shoemakers. Almost all of their products were also equipped with reinforcements, such as heel stiffeners, lace hole bindings, top bands or cord, as well as rands and, slightly less frequently, additional internal and external

[6] The exception were two shoes from Puck, with an outer sole, attached to a wide rand, which became the subject of a separate article (Blusiewicz 2020b). It can be assumed that they were not made in local workshops.

sole reinforcements. Their common use is one of the determinants of technical advancement and high standard in the production of good-quality footwear, which also positively proves the level of shoemaking production in the studied towns (Wywrot-Wyszkowska 2009, pp. 157–159; Kowalska 2014, p. 203).

Shoes manufactured in the second half of the 14th century and in the following century in small-town shoemaking workshops represented the most popular forms at that time in the towns of the Baltic Sea and the North Sea basin, both in terms of types, distinguished by the method of fastening, as well as the shape of the upper, with a raised heel and a narrowing toe (inter alia, Goubitz *et al*. 2001; Volken 2014). The choice of types offered to the inhabitants of Puck, Lębork and Chojnice seems to be similar (Fig. 6). Two types of low-cut shoes were dominant: tied on the instep with split shoelaces passing through pairs of holes at the vamp opening (N2) or at the ends of separately cut straps (N3). High shoes were dominated by ones fastened with tailed toggles (W4). The remaining types were represented by single, clearly less popular specimens, and the greatest variety, probably due to the size of the collection, was recorded in Puck.

Interesting observations were provided by the juxstaposition of finds from Puck, from the period since the incorporation in the mid-14th century to the beginning of the 16th century, with similarly dated collections, obtained from archaeological research in the then largest port city of Gdańsk: the wharf of the late medieval port of Gdańsk (Wywrot-Wyszkowska 2010) and the quarter of town houses on Powroźnicza Street (Trzeciecki 2003). The frequency of occurrence of particular types of footwear in the collections from the small-town Puck reflects similar trends with the production of the largest city in the region (Fig. 7). The discrepancies concern the proportions of low and high footwear finds. In both Gdańsk collections, low-cut shoes outnumbered the high ones, accounting for over 55% of all identified items. Its high share is considered to be a characteristic feature of late medieval collections, and a similar share was noted, among others, in the port town of Kołobrzeg (Wywrot-Wyszkowska 2008, p. 63; 2009, p. 160). In the case of finds from Puck, the percentage of low-cut shoes in the collection was lower and amounted to 36.4%, but the range of Puck leather products did not differ significantly from the offer of Gdańsk shoemakers. In small collections of shoes from Lębork and Chojnice, from the second quarter and the second half of the 14th century, the variety was slightly smaller, however, noted there types of low-cut shoes, tied on the instep with split shoelaces (types N2 and N3) and high shoes fastened with tailed toggles (type W4) are among the most widespread specimens in northern and central Europe towns at that time. Finds from three small towns indicate a good understanding of small-town shoemakers in shoe fashion and providing users with shoes made in the current design. However, this statement cannot be made with reference to the Gniew shoemakers. Among the artefacts dated from the end of the 13th century to the beginning of the 15th century, an exceptionally small

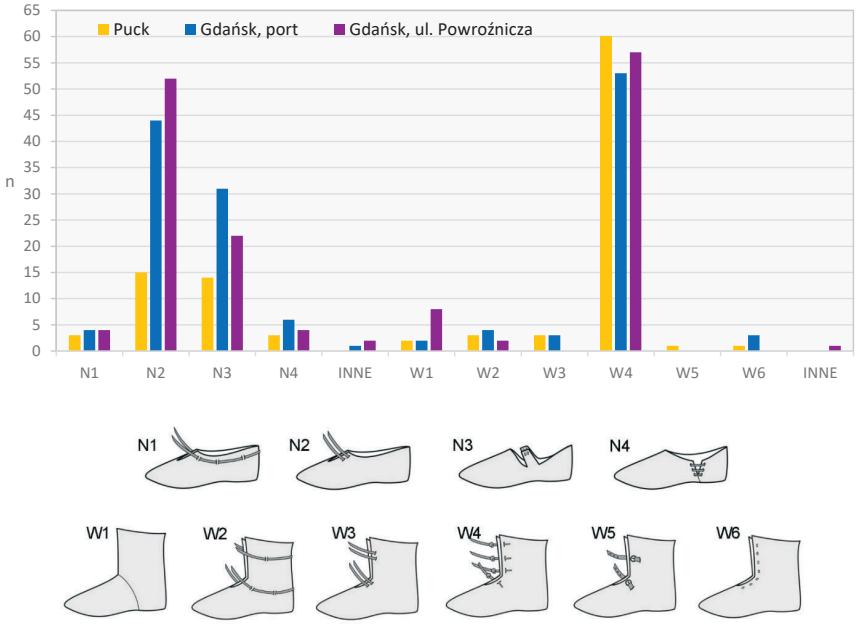

Fig. 7. Frequency of types of footwear in the collections of leather artefacts from the archaeological research of the historical centre of Puck (second half of the 14th–15th century), the port of Gdańsk (second half of the 14th–mid-16th century (after Wywrot-Wyszkowska 2010) and the burgher's plots on Powroźnicza Street in Gdańsk (14th–15th century (after Trzeciecki 2003)

differentiation of shoes was noted, limited to three types – single specimens of two types of low-cut footwear (type N1, N4) and the dominant boots (W1). It presented both: the types of low shoes and the shape with straight lines of the upper that fell out of use after the mid-14th century and deviated from the trends in the footwear fashion of the Baltic Sea zone (Wywrot-Wyszkowska 2008, pp. 59–66).

The separate and specific nature of the Gniew collections was noted many times during the research. Analyses, investigating such issues as the quality of tanning and the selection of raw materials, the types of the produced shoes and the way they were made, indicate a slight variation in the shoemaking production in Gniew at least from the end of the 13th century to the beginning of the 15th century, as well as its clear distinctiveness, or even delay in the second half of the 14th century in comparison to the production of Puck, Lębork and Chojnice. It is difficult to clearly point out the reasons for this. First of all, one should consider the early medieval traditions of leather production, possibly continued by craftsmen in the incorporated town, as well as the origin of finds from one workshop, perhaps with a strictly defined production profile. It is also possible that

the remains of almost only one type of high shoes, found among the waste from the Gniew workshop, are the result of the deliberate collection of a specific type of footwear in it in order to recycle leather from its high uppers (Blusiewicz 2020a). The analyses of the obtained waste assemblages prove that in the shoemaking production of the workshops in Gniew, Puck, Lębork and Chojnice, secondary raw material recovered from better preserved parts of already damaged products was quite commonly used. Its subsequent application is rarely observable in footwear, however, there are cases of heel stiffeners or patches which bear traces of older seams, indicating reuse of the leather.

Undoubtedly, the assessment of the level of shoemaking in the late Middle Ages in urban centres of various sizes requires further research and an increase in the analysed assemblages of artefacts. Issues related to the quality of the leather – the correct tanning and finishing have been the subject of methodical, detailed research for a relatively short time, which, unfortunately, differ in the scope of the observed features, the method of classification of collections and presentation of results. The scarcity of the results of specialised analyses available, prevents extensive comparative studies[7]. For this reason, the obtained results do not allow for the formulation of definitive conclusions, although it seems that certain regularities can already be noticed.

Certainly, the small-town shoemakers showed high skills related directly to the footwear production technique. They knew how to select a leather with appropriate properties for the most important parts of the footwear, and how to properly plan a cutting pattern on hides and skins, while using it as economically as possible. They were able to reinforce them with the necessary elements increasing its durability and comfort of use (rands, linings, heel stiffeners, top bands) and to produce footwear of various purpose and fashion, with style features such as type of fastening or shape, in line with the then footwear fashion. Therefore, in terms of planning and making footwear, their qualifications should be assessed highly. Such conclusions are clearly justified based on the analysis of the collections from Puck, Lębork and Chojnice. In all four studied towns, shoemakers also showed great proficiency in activities that required diligence and meticulousness, observed mainly in the regularity of stitches in joining individual elements of footwear.

Much less professionalism is visible in the preparation of hides and skins. It took a lot of experience to properly carry out a complex cycle of activities related to leather tanning. A high level of understanding of the processes involved allows to adjust the concentration of liquors or the duration of individual stages of tanning to the properties of the tanned leather and external conditions, such as water hardness

[7] Raw material analyses including, apart from the species identification of leather, also the features of tanning, have been made to date for finds from Kołobrzeg (Radek 1996; 1997; 2016), Szczecin (Kowalska 2010; 2013; Kowalska, Radek 2015) and Wrocław (Radek 1999b; Radek, Chrószcz 2010). These are the closest and probably the only references for the results obtained.

or ambient temperature. In the case of shoemakers from small towns, the stages of tanning, which depended on the accuracy of the mechanical treatment of skin (e.g. dehairing, smoothing), were more correctly performed than the ones related to the knowledge of the physicochemical processes taking place. Based on the results obtained, it can be assumed that these skills were mastered by small-town leather craftsmen on a rather basic level. To be fully legitimate, such a statement must be verified, however, by the results of analogous analyses of production waste from late medieval workshops with tanning specialisation.

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