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DAMASK, INLAY AND KOFTGARI: A CALL FOR A DEFINITION OF TERMS

Abstract

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Accurately describing the techniques used to decorate a weapon is imperative for furthering research. This paper will primarily concentrate on the methods and materials used in Persia, Middle East, Central Asia and India to produce so-called «Damascus Steel» weapons, as well as those used to embellish the weapon: i.e. inlay and koftgari. The benefits of systematically recording the process used to decorate the blade leads to additional information about the object and this offers the potential to learn more about weapons «life history» and the lives of the people it touched.

Keywords: damask, inlay, koftgari, damascus steel.

ДАМАСК, ТАУШУВАННЯ ТА КОФТГАРИ: ЩОДО УТОЧНЕННЯ ТЕРМІНІВ

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Анотація

Автор пропонує звернутися до проблеми використання термінів «дамаскування» та «кофтгарі». У каталожних описах термінологія оздоблення булатних виробів використовується довільно. Клинкова орнаментика, символіка та епіграфіка, пов'язана з регіональними виробничими традиціями, писемні джерела свідчать про поширеність цих технік на величезних територіях, значну кількість ремісників, та методів виконання. Дослідивши експонат, спосіб його виготовлення та оздоблення, можемо встановити шляхи міграції ремісничих технік, місце виробництва, особу самого майстра тощо, врешті укласти коректний провенанс пам'ятки. Автор аналізує методи виробництва зброї дамаської сталі та її декору на теренах Персії, Середнього Сходу, Центральної Азії та Індії. Розглянуті методи всічки (таушування), амальгамування, наплавлення металу, та інші, серед яких сам «кофтгарі» та його різновиди. Запропоновано дослідникам приєднатись до досліджень і створити базу даних, де будуть задокументовані усі відомі методи.

Ключові слова: дамаська сталь, дамаскування, кофтгарі, оздоблення зброї.

ДАМАСКИРОВАНИЕ, ВСЕЧКА И КОФТГАРИ: К ВОПРОСУ ТЕРМИНОЛОГИИ

УДК 903.05; 739.7

Аннотация

Автор предлагает обратиться к проблеме использования терминов «дамаскирование» и «кофтгарі». В каталожных описаниях терминология декорирования булатных изделий используется произвольно. Клинковая орнаментика, символіка, эпитагфика, связанные с местными производственными традициями, письменные источники свидетельствуют о распространности этих техник на огромных пространствах, значительное количество исполнителей и методов. Изучив экспонат, способы его изготовления и украшения, можем установить пути миграции ремесленных техник, место производства, наконец составит корректный провенанс памятника. Автор анализирует методы производства оружия из дамасской стали, ее декора на территории Персии, Среднего Востока, Центральной Азии и Индии. Рассмотрены методы всечки, ртутного амальгамирования, наплавления и прочие, среди которых сам «кофтгарі». Автор предлагает исследователям создать единую базу данных методов декорирования исторического оружия.

Ключевые слова: дамасская сталь, дамаскирование, кофтгарі, украшение оружия.

INTRODUCTION

It is not uncommon for a weapon to have inscriptions, names, or other motifs decorating its surface. All too often the decoration on arms and armour is broadly described as or «damascening» or «inlay», but these terms are uninformative because they are too broad. Very different technological traditions are grouped under these general terms, thus limiting their usefulness in furthering our understanding of the object's «life history». Accurate recordings of decoration can be used to help advance numerous studies including provenance, dating, authenticity, transmission of technical knowledge, economics, and stylistic studies to name a but a few. For example, a 19th century flintlock rifle from Europe, and a 15th century dagger from Persia, can both be described as being made of damascus steel with gold inlay. These descriptions imply that they are made of the same materials and thus it could be concluded that they are from a closely related technological tradition, but the assumption would be incorrect. However, if the objects were described as a pattern-welded damascus steel barrel with mercury gilding, and a crucible damascus steel dagger with cross-hatch koftgari, it would be very clear that the two weapons were made and decorated using very different technological traditions. Thus, more precise descriptions would minimize ambiguity and confusions and be particularly useful for those people who cannot view the object firsthand, but need to depend on the accuracy of written descriptions to further their research.

There is evidence that blades were reused, re-hilted, and re-decorated; thus a blade could be in use for a very long time and by different cultures. The most famous examples of rehilding are the blades of the Prophet Muhammad and other important early religious figures, currently stored in

the Topkapi Museum and Armoury in Istanbul, Turkey. The blades may be early Islamic but the mountings and hilts belong to a later period [12, p. 175]. Apparently, this practice has a very long history which continues to this day. It is quite telling that in 1872 Baden Powel [1, p. 293] wrote «The few remaining workmen (who hold licenses for the purpose, and tell you that they are «license-dár» are ready to furbish up and inlay with gold, such weapons, on the conditions of an advance wherewith the purchase the necessary gold wire and other material, and a good long time to do the work. The latter condition is indispensable, for the work is, in its nature, one of great delicacy, and required the deliberate and patient work of an oriental hand, and the workmen knowing that they have a monopoly, indulge their fancy as to the amount of labor they choose to undergo in the day. This is said mostly of the few old armourers who remain at Lahore and Amritsar, reminiscence of the Sikh times, as they have each a few apprentices, who will no doubt pursue the trade after they have gone as long as European travellers visit India and demand such wares». Indeed, this practice is still going strong today in India.

Using textual evidence, and a small number of objects, different methods of applying gold or silver have been identified. However, additional methods may be found if more objects are studied. There are difficulties associated with defining the various methods of decoration and, while there are a number of apparently firsthand accounts, there is little consistence with the terms and level of details used in the description of these methods. The reasons for this may be the observer's lack of understanding of the subtleties between the different processes, different local traditions and use of terms, as well as differing transliterations and the misuse of terms as synonyms, perhaps due

to lack of understanding the specifics. The purpose of this paper is to suggest standard terminology, which can be used to describe the different decorative methods.

DAMASCENING

Common terms used to denote a pattern on a weapon are «damascus», «damask», and «damascene», but these terms are misleading for numerous reasons. Firstly, it implies an association with the city of Damascus, Syria. Undoubtedly Damascus was a major distribution center for millennia and decorated weapons, were likely passed through the markets; however, there is no evidence that they produced weapons made of so-called «Damascus steel» in the city [3, p. 103-108]. Secondly, the term «Damascus steel» is imprecise because it refers to virtually any type of iron and steel object with a decorative surface appearance. The decorative pattern can be inherent in the steels microstructure or it can be made in numerous ways including forge-welding, etching, or by various method of inlay. The various types of «Damascus steels» have been described elsewhere [7] and therefore will only be summarized below.

There are different types of steel that are often referred to as «Damascus» but they are made by very different methods. Two types of steel that are most often referred to as «Damascus» are crucible damascus steel and forged welded damascus steel, also referred to as pattern welded damascus steel. As the name implies, crucible steel is steel melted in a crucible; the result is a comparatively slag free homogeneous steel which, under certain conditions, can exhibit a pattern resulting from the steel's particular inherent microstructure. This type of steel is often referred to as «wootz», if it is from South India or «pulad», if it is from Central Asian or Middle Eastern lands, depending upon its origin. Unless the provenance is

known, these terms should not be used as they imply a specific geographic location and cultural and technological differences (Feuerbach *et al.* 2008). The second type of damascus steel pattern is created by forge welding pieces of iron and steel together. This method was commonly used in many locations throughout Europe and Asia. It is vital to correctly identify which type of steel the term is referring to because these steels are made by very distinct methods and were produced in very specific locations, and thus both descriptions are from two completely different metallurgical traditions.

APPLIED DECORATION

Decorating arms and armour with hunting scenes or religious images and verses is a practice as old as arms and armour itself. According to Baden Powell [1, p. 292] in India, a blade with a fine water pattern will not be elaborately decorated with gold or silver because it would detract from the appearance, but blade without a pattern can be highly decorated. He states that «common sword blades are frequently inlaid all over, and especially hunting swords, called *talwár shikárgáh*, which are worked all over with figures of tigers, dogs, antelopes, etc.».

Rather than being an integral part of the metal body, the decorative elements can also be applied to the surface of the weapon. Often the decoration might be described as «inlay» or «koftgari», however, there are important differences. While the style of the decoration can be used to suggest date of manufacture and provenance, the technique and materials used to create the decoration can also be indicative of a particular place, time period and tradition. For example, the metal inlay itself can provide information on recycling and trade. Olmer states that the silverwork performed in Shiraz and Isfahan used recycled silver or sil-

ver from India, and gold was also recycled and imported. Many nationalities were also involved, such as Jewish metal trades [9], and Armenian silversmiths at Tabriz [9, p. 224]. When used together, the evidence can be used to support or refute the conclusions made purely on stylistic attributes. In addition to date and provenance, noting the method of decoration can help us better understand textual descriptions, transmission of textual knowledge and change over time and place. Furthermore, the decoration of blades, handles, fittings and other items could be performed by the smith, yet often it was done by specialist groups of metalworkers. According to Floor [9, p. 223-226] in Persia during the Qajar period «the gold engravers' guilds (*naqqash-e zargar*) engraved and inlayed ivory bones and «lion fish-teeth» for the grips of daggers (*khanjar*). Other potentially valuable information can be learned, such as economic concerns, as different techniques require more or less of the applied metal. Gold wire inlay would likely cost more than the same area covered using koftgari or stamp-melt method.

Inlay

In India, Persia and regions of Central Asia, one of the most common methods of arms and armor decoration was the inlay of gold or silver wire. There are three related, yet distinct, methods of inlay used in all these regions. They are: 1) applying wire into a groove; 2) applying wire into perforated holes and; 3) koftgari. The visual appearance of the finished product can be virtually identical but the main differences are the cost and the durability of the adhesion of the decoration to the metal. At this time there are no known characteristics which can be used to distinguish between applications performed in specific locations, but perhaps with the examination of more objects with well documented provenances,



Fig. 1. Inlay of gold wire.

characteristic attributes from specific locations may be identified.

In Persia and India, inlaying gold or silver wire into a groove was the most expensive method of decoration because it required the greatest amount of precious metal. It is also more durable because the metal fills the groove or trough. In Persia it is called *zar-neshan* (*zarkhondan*) if the wire stands proud of the surface, whereas if the wire is burnished flush with the surface, it is called *teh-neshan*. According to Khorasani [13, p. 183], Zeller and Rohren [16, p. 174] state that *tab-neshan* is used in India and there it is called *tah-i-nishan*, a variation of the Persian term. The inlay process as performed in Persia, is described by Olmar (translated by de Rochechourt and

found in [9, p. 224]). The process begins with drawing the desired decoration onto the blade, and the metal is then removed using an engraving tool, thus leaving a recessed trough in which the gold or silver will sit. In Qajar Persia, the tool used by the gold engravers was called a *pardaz e qalam* [9, p. 225]. The edges of the trough are left rough which will help key in the wire. The gold or silver wire may be pre-cut to size or cut as needed, and this is then pushed into the recess. The wire may be polished to become flush with the surface or it can be left raised to give a relief effect. The raised wire can then be engraved to further enhance the decoration [9, p. 245; 13, p. 183].

The next technique involves applying gold into perforated holes, and Olmar calls the method *zarkoufte* [9, p. 246]. This method involves drawing the design with a punch to create «imperceptible small holes» over the surface that is chosen to be gilded. Granulated gold is placed on the area and covered with a piece of jade then heated. The gold melts and keys into the small holes, and then the process is repeated until the desired effect is completed. Not surprisingly, the gold design was reported not to be very durable [9, p. 225].

Koftgari

The third method is koftgari. While there are a number of apparently firsthand accounts of koftgari, there is little consistency with the terms used or the level of details of the methods described. Steingass [14, p. 1062] states that koftgari is a Persian word. In India the term koftgari (Kuftgari, Koftgari, Koft work, or kar-i-tila) is generally used to describe gold or silver applied to steel. Both silver and gold koftgari are called *ganga jamni* [1, p. 167]. There are two types of applications that have been called koftgari. While each of the techniques are related, they are certainly not the same from a technology point of view, thus a description of each is given here, along with a descriptive term, to distinguish between the processes.

Koftgari can be subdivided into different types; shallow inlay koftgari, and leaf and wire cross-hatched koftgari. The first sub-category of koftgari is fundamentally a shallow inlay. Baden Powell describes this type of koftgari and states that it was used in Gujrat, Sealkot, Nizamabad, Wazieabad and Multan. He describes the technique used there as follows: «Koft-gari is done by first drawing out the pattern on the steel



Fig. 2. Shallow inlay koftgari.

surface with a hard steel needle or silai. This leaves a line sufficiently deep to catch the very fine wire laid on. The wire is of pure gold... The wire is then hammered into the iron according to the pattern and lines already drawn, the whole is then heated and again hammered, and the surface is polished with a white porous stone; whereas the soft gold is required to be spread, the rubbing and hammering are repeated with greater force. The gold used is pure and very soft» [1, p. 168]. Baden Powell [1, p. 169] records that he was told the technique for this type of koftgari was introduced to the area of Multan in the 1600's by Muhamad Murad.

Baden Powell continues to give more details about the process. «The method of working is as follows: suppose a hand axe is to be inlaid. The blade of the axe is first made smooth with a *tawati* or file, after which it is polished with the *khingri* or pumice stone, on this being done a rough wooden handle is inserted in the hollow part of the hatchet; the outer end of the handle is pressed inside the arm, and the hatchet is placed on a stool one and half feet high, and then the process of carving is done with the steel pen, according to the design which the workmen is furnished with. The hatchet is then heated for a few minutes in a fire of charcoal, quite free from smoke, until the steel changes its natural color into azure blue. The fold wire is then also heated so as to make it soft, and is coiled on a reel. Again the hatchet is placed on the stool in the manner above described; the artist takes the wire and presses it in the lines with the iron pencil, *pathraini*, following the outline design engraved with the style. When one flower or the whole work is completed, it becomes necessary to cut the wire, which is done with «*kath*» or gold smiths' scissors. Should the wire, after being first fixed, becomes loose in any part of the

hatchet, it is again heated in the coals, and the wire is beaten with a small hammer which refixes it. The hatchet is then rubbed with *mohari* or stone rubber, so as to draw out its brilliancy and luster. After the above process is completed, the hatchet is well rubbed with sour lime juice, but this changes the color from azure to white, it becomes necessary again to put it on a clear fire, so that it may resume its former color of azure, together with its brightness and luster» [1, p. 170]. Similar tools described by Baden Powell are still being used in India today.

The second method is the cross-hatched koftgari method and this method can be further subdivided into leaf and wire, reflecting the form of the gold that is applied. Baden Powell refers to this process as «gilding» and describes the method as follows «If an article is to be plain gilt all over, it is first smoothened with the *rawati* or file, and afterwards cleaned with *khingri* or pumice stone; it is then drawn over with chequers with the carving style, and sprinkled with lime juice, after which it is heated; gold or silver leaves (as the case may be) are then applied with pincers, and lightly hammered, and are rubbed with the *mohari* or stone rubbers, which causes the gold to adhere to the surface roughened by the chequered lines- and then the soft gold spreads out under the rubber, and covers the whole surface» [1, p. 171]. He later clarifies the process and he recorded, «Where gold and silver leaf is required to be applied to an iron surface, as in the case of armor, knives, or ornamental work, the surface is scratched over with chequered lines, this process is called ('*khizan*'), and washed with hot solution of *kish-ta*; and then dried it is heated to what the workmen called «*shitab*» (corruption of *siya tab*, 'black heat') i.e. the greatest heat it will reach without becoming red hot.

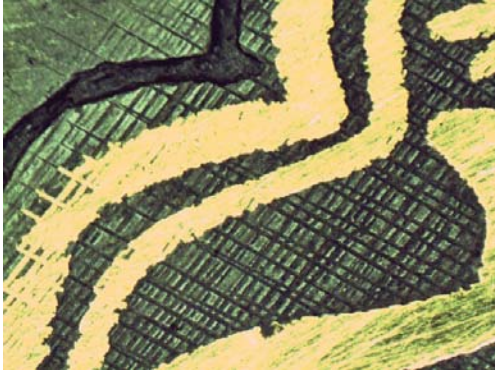


Fig. 3. detail of cross-hatch wire koftgari.

In this state leaves of gold or silver, as required are layed on, and rubbed in with a *mohari*» [1, p. 172].

The wire cross-hatched wire koftgari method is performed in a similar way. However, instead of applying leaf to the entire surface, wire is used to create the decoration. In Persia it is called *talakub* (*telā-kūb*, or *talakhubi*).

The process was described by Wulff [17, p. 41-42] who states that the gold-inlayer (*telā-kūb*, or *mākū-kūb*) uses a the sharp short edged knife (*kārd-e telā-kūbī*) to produce a cross-hatched pattern which roughens up the surface (*zabr kardan*). One or more gold or silver wires are then hammered into place

with a pointed hammer (*čakoš-e telā-kūbī*) [17, p. 41]. The inlay of silver wire is called *noghrekub* or *noqrehkub* [9, p. 225]. Sometimes the metal would be burnished to lay flush with the surface while other times, it would be left in relief [9, p. 225].

Mercury Gilding

In India mercury gilding (plating) «*thanda multamma*» was also used. Baden Powel [1, p. 172] describes the technique as follows: «If the article be of copper, it is to be well scraped, cleaned and polished, and then heated in the fire to remove all oil or dirt that may have been left on the surface by polishing. After this it is dipped in an acid solution of the '*kishta*', or dried unripe apricots. After this it is rubbed with the powder of half burned bricks or some other earth. The surface is then rubbed with mercury, which adheres by combining with the metal. The article is next placed in clean water for some hours, and again washed in the *kishta* solution, and dried with a clean cloth. Gold leaf is now applied to the surface, to which it adheres, being adjusted by the workmen by blowing it with his mouth or touching it with a cloth. The gold then, by reason of the effect of the mercury coating, appears all white. The article being subjected to heat, the mercury sublimes, and

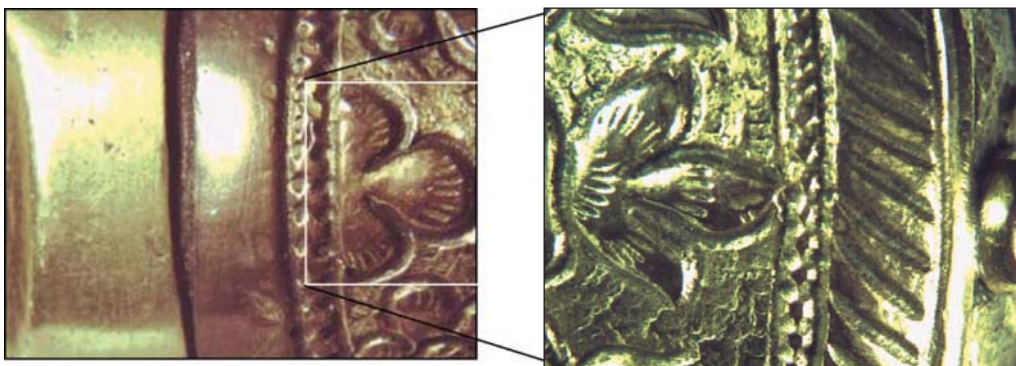


Fig. 4. Mercury gilded grip.

the dull yellow metallic tint returns; more gold leaf is now applied, and is all rubbed and ground into the surface by means of agate rubbers called '*mohari*'. The quantity of mercury used is always double in weight that of the gold: the plating is of course done more lightly or more heavily as the work requires.» This method was used to decorate the handle of the dagger from Mysore. On a side note, Baden-Powell mentions that water-gilding with a solution of gold in nitro-muriatic acid was introduced by the British [1, p. 173].

Stamp-melt method

A method currently being used by blacksmiths in Yataghan, Turkey is called here the stamp-melt method. The smiths have a selection of dies which they use to create

the recess in the blade. After completing the stamped design, they cover the recessed area with a piece of brass or similar copper-alloy. The blade with the brass on top is then heated for a few minutes. Some of the brass melts and fills the stamped cavities. The blade is cooled and the area burnished and polished.

CONCLUSION

The above discussion has illustrated the need for more detailed descriptions and standardized terminology in the description of decorative patterns on blades and other weapons. The regular practice of recording this type of information will lead to a better understanding of the transfer of materials, technologies and finished artifacts over time and space.



Fig. 5. Using a stamp to create the recess.



Fig. 6. Melting the brass inlay so it fills the recess.



Fig. 7. The finished inscription.

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