

Italian firesteel flints and gunflint workshop traces

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Abstract – The oldest Italian wheel-lock on an arquebuse was cited in 1547, in a document where also a ‘flint-lock’ gun is mentioned, probably equipped with an early snaphaunce-like mechanism. With the exception of the wheel-lock, the gunflints used in these earliest muskets were probably homemade (or handcrafted on a small scale). Only since the end of the 17th century, the Venetian Republic infantry seems to have been the first to adopt military muskets equipped with flintlocks, so triggering the development of a standardized manufacture of gunflints in the Lessini Mountains (in the Verona hinterland; **fig. 1**), being the largest flint/chert outcrops in northern Italy. However, by the end of the 18th century, Verona was occupied by French troops. And the knappers of military gunflints from Central France were the monopolist exporters up to the end of the 18th century. Notwithstanding this potential competition, during the Napoleonic occupation of the Venetian region (1799-1815), nearly 200.000 gunflints were exported daily from Verona. This lasted up to the year 1817 when the local gunflint wholesaler complained to the Austrian Commission that their recent suspension of orders would cause the unemployment of 500 local gunflint knappers. Later, by 1830-40, most of the European armies adopted the percussion cap ignition system (this chemical system works without gunflints), so causing a sudden decline in gunflint production. Nevertheless, still in 1886, large amounts of gunflints, packed in baskets (each one containing 2.000-3.000 pieces) were exported from Verona to the Adriatic ports (and also to Tyrol), probably for a use as fire-flints (‘strike-a-lights’). The present paper describes the rise and fall of Veronese gunflint production during 200 years, also in order to promote a better documentation of Veronese gunflint distribution into other European countries.

Key words – archaeology; gunflint; knapper; military musket; wheel-lock; flint-lock; fire flint; strike-a-light; Lessini Mountains; Verona; Venetian Republic; Italy

Titel – Werkstätten für Feuerschlagsteine und Flintensteine in Norditalien

Zusammenfassung – Der früheste italienische Hinweis auf ein Radschloss an einer Arkebuse stammt aus einem Dokument aus dem Jahr 1547, in dem ebenfalls ein Gewehr mit einem Steinschloss erwähnt wird. Möglicherweise wird es sich um ein frühes Schnapphahnschloss gehandelt haben. Bei den in diesen frühesten Musketen – mit Ausnahme des Radschlusses – verwendeten Flintensteinen dürfte es sich um vom Schützen nach Bedarf selbst gefertigte Exemplare gehandelt haben. Anscheinend war die Infanterie der Republik Venedig die erste militärische Einheit, die mit Steinschlussmusketen ausgestattet wurde, und zwar erst gegen Ende des 17. Jahrhunderts. Dies war der Auslöser zur Entwicklung einer standardisierten Flintensteinindustrie im Lessinischen Gebirge (im Hinterland von Verona; **Abb. 1**) mit den größten Feuerstein-/Hornsteinvorkommen Norditaliens. Allerdings wurde Verona am Ende des 18. Jahrhunderts von französischen Truppen besetzt, und die Hersteller von Flintensteinen aus den zentralfranzösischen Manufakturen besaßen beim Export militärischer Steinmodelle bis zum Ende des 18. Jahrhunderts eine Monopolstellung. Unbeschadet dieser potenziellen Konkurrenz wurden während der napoleonischen Besetzung der Region von Venedig (1799-1815) täglich annähernd 200.000 Flintensteine aus den Manufakturen von Verona exportiert. Das dauerte bis zum Jahr 1817, als sich der örtliche Flintenstein-Großhändler bei dem österreichischen Einkäufer darüber beklagte, dass die kürzlich gestoppten Bestellungen zu 500 arbeitslosen Steinschlägern führen würden. Später, im Zeitraum von 1830-1840, wurden die meisten europäischen Armeen mit Feuerwaffen mit Perkussionszündung (dieses chemische Zündsystem benötigt keine Flintensteine) ausgerüstet, was zu einem abrupten Niedergang der Flintensteinproduktion führte. Trotzdem wurden noch 1886 größere Mengen in Körben verpackter Flintensteine (jeder Korb enthielt 2.000-3.000 Exemplare) von Verona in adriatische Häfen (aber auch nach Tirol) exportiert, möglicherweise zum Gebrauch als Feuerschlagsteine für Schlagfeuerzeuge. Der vorliegende Beitrag behandelt den Aufstieg und Niedergang der Veronesischen Flintenstein-Industrie über einen Zeitraum von 200 Jahren. Dies soll auch zur Verbesserung einer Dokumentation der Verbreitung von Flintensteinen aus der Region von Verona in andere europäische Länder beitragen.

Schlüsselwörter – Archäologie; Flintenstein; Steinschläger; Muskete; Radschloss; Steinschloss; Feuerschlagstein; Lessinisches Gebirge; Verona; Republik Venedig; Italien

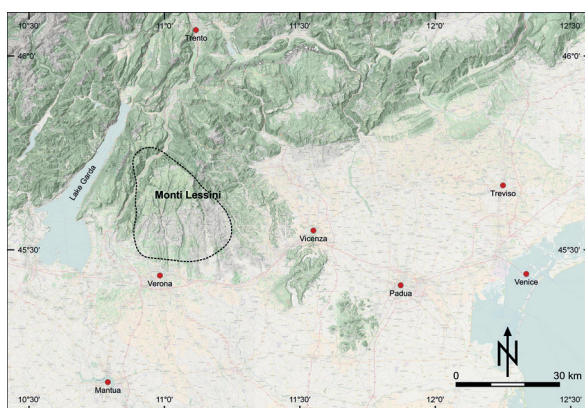


Fig. 1 Area of gunflint production in the Verona hinterland (Monti Lessini) and part of Monte Baldo.

Introduction

The oldest Italian reference to ‘focile’ (meaning gun or musket in Italian, but which previously meant arquebuse) dates to 1547, in Florence, where fire-arms were banned: “archibugi da ruota, da focile o vero da pietra, o da acciajuolo.” However, the word “focile” was formerly used as a synonym of fire-steel or strike-a-light, as cited in the 14th century “Divine Comedy”⁽¹⁾: “s’accendèa, com’esca sotto focile”, meaning “it ignited as tinder under firesteel.” That is why the abovementioned 16th century quote has been interpreted as referring to the wheel lock arquebuse (MORIN, 1982) or, possibly, as evidence for early snaphaunces (CALAMANDREI, 2003). In the Museo di Artiglieria di Torino collection, a firearm

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plate (equipped with both wheellock and flintlock) has been referenced to 1550 (CALAMANDREI, 2003). By the latter half of the 16th century Venetian gunsmiths in Brescia manufactured an archaic type of snaphaunce-like flintlock, called "*alla fiorentina*" (CALAMANDREI, 2003), which was also manufactured in small quantities in Tuscany and Emilia. The production of Spanish miquelet flintlocks seems to be documented in Lombardy at the same time, as well as in the Naples area, where some miquelet flintlocks were provided with deeply crenated frizzens, said to have been more easily replaced when heavily worn (CALAMANDREI, 2003). This detail may suggest that a crude type of gunflint was used with the locks of 16th century firearms, but there is presently no evidence relating to any gunflint 'cottage industry' (that is, small-scale and non-industrial). It is worth mentioning that the Venetian Republic infantry seems to have been among the first to adopt, in the second half of 17th century, muskets equipped with a new kind of flintlock called "*alla romana*" (or "*alla Montecuccoli*"): its lockplate was equipped both with flintlock and matchlock, with a frizzen deeply crenated (CALAMANDREI, 2003) (fig. 2), and it is yet another example of flintlocks using non-standardized gunflints. There is another interesting piece of evidence concerning early gunflint use in northern Italy in the late 17th century:

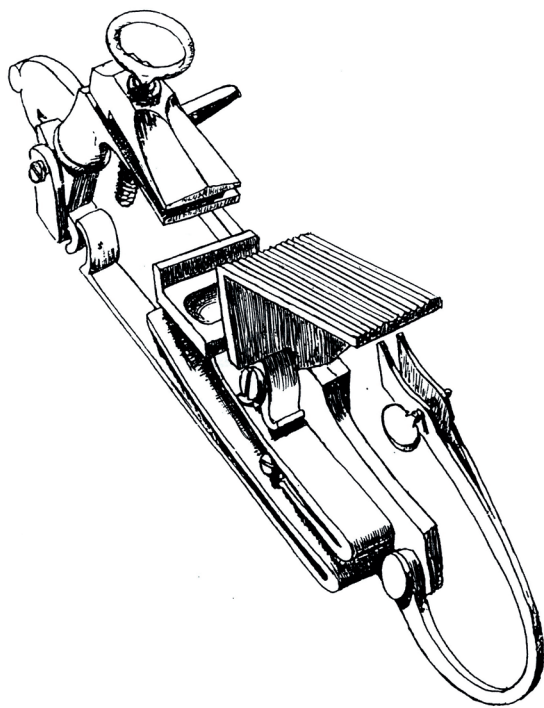


Fig. 2 The flintlock called "*alla romana*" (or "*alla Montecuccoli*"): its lockplate was equipped both with flintlock and matchlock, with a frizzen deeply crenated.

In 1678 a gunsmith in Turin produced 500 "*alla Montecuccoli*" lockplates to be mounted on muskets supplied to the Guards of the Duke of Turin (BARBIROLI, 2012). In spite of the varied quantity and types of muskets and pistols manufactured during the 17th century by the Venetian firearms workshops (especially in Valtrompia/Brescia) no information on gunflint knapping is yet available. Obviously, any gunflints that were used from the northern Italian workshops (if not imported, possibly from Meusnes workshops which were already active; EMY, 1978) would have required access to outcrops of good flint/chert probably mainly in the Verona mountains, the largest flint outcrops in the region. In this regard, a village in the northeastern Lessini Mountains should be noted, now named San Mauro di Saline (Verona, Italy). In old Venetian, "*saline*" meant "*pière assaline*", that is, "*fire flints*" (SORMANI MORETTI, 1904), mentioned in a 12th century document ("*Ecclesia Sancti Mauri in Salinis*", 1165; AVE-SANI & CHELIDONIO, 2006).

18th-19th century "*venetian*" gunflints

A dowry document is presently the oldest Italian piece of evidence referring to gunflints: dated to 1726 (or maybe to 1766 - the date is difficult to read) it describes a sock full of locally manufactured gunflints. The dowry site was Camposilvano di Velo (Roveré Veronese/VR), and the document gives the name of the flintknapper ("*barba Batista*", i.e. uncle Baptist), as well as the production site ("*soto al Bà*"), a small alpine village (1260 meters AMSL) situated at the southern limits of the wide Cretaceous flint outcrops of Monte Bellocca, in the eastern Lessini Mountains. Obviously, it is not possible to infer the techno-typology of these gunflints, but their function is certain due to an expression used in the dowry text "*folènde da sbaràr*", which means "*firearm gunflints*", the term "*folènde*" specifically referring to flints. "*Folèndari*" was the name for flintknappers in the Lessini Mountains, well documented since the early 19th century. Tommaso Bertoldi, a citizen living then in this same area in the early 19th century, reported that his grandfather was an entrepreneur running a small flint workshop, employing two "*catàori*" (individuals procuring the local flint/chert) and three skilled "*bataòri*", that is the actual flintknappers (BENETTI, 1977). Topographical surveys have so far found evidence for at least four main gunflint workshops (two of them under rockshelters) in the Camposilvano area. On the basis of techno-typological attributes typical of the main local knapping tradition, it is possible to define the gunflints as belonging to the so-called "*platform type*"

(WOODALL & KIRCHEN, 1999/2000), which are based on the production of blade-like flakes (CHELIDONIO, 1987). No older gunflint technology has so far been documented in northern Italy, where the so-called gunspall typology seems to be completely absent. However, a much older piece of evidence may exist, namely a notarized document from 1582 written by Agapito Borghetti, a notary of Lugo. This document is a “*sentential arbitralis*”, which could be translated as “*declaratory judgment*” (AVESANI & CHELIDONIO, 2006). This public servant, acting according to the laws of the Republic of Venice, inventoried the real estate of two brothers, and mentioned a field named “*campo dalli folendari in pertinentia Stallavenae in ora Arzeredi*”, a place still mapped as *Vallenara* near Arzaré, a village on the middle slopes of the central Lessini Mountains, where there is a notable outcrop of flint/chert. When considering the older place name, could we be confident that this is evidence that gunflint (or fire flint) production started in the Verona Mountains this early? Unfortunately not completely, as the term “*folènde*” was used as an adjective linked to “*piéra*”, i.e. stone. In the old local dialect “*piéra folènda*” referred to a specific quality of stone then called “*folènda*”, a term which it has so far not been possible to associate with the Venetian “*piéra assalina*” (that is fire flints), nor the old German “*schripfästàn*” (MARTELLO MARTALAR, 1999). The latter term was used by a Bavarian community settled in the eastern Lessini plateau since the end of 18th century. Apart from this late 16th century toponymic evidence, what style of gunflints were produced in the Venetian Republic before the abovementioned 1726 (or 1766) document? We only know that by the middle of 18th century some kind of fire flints (and/or gunflints) were commonly traded. In a book published in 1754, dealing with various peddlers’ activities in Venice, an engraving portrays a peddler selling flints, firesteels, tinder and sulphur matches and while shouting “*E léscia, e pière, e solfarini in mazzo e azzalini mi gh’ò per batèr fuoco e pur che venda, vivo senza impazzo.*” (ZOMPINI, 2009; **fig. 3**) [*‘I’m selling tinder, flints and sulphur matches by the dozen and strike-a-lights to ignite fire; as long as this commerce would continue it will allow me to live without trouble.*” (transl. G. Chelidonio 4.6.2016)]. The main evidence for gunflint workshops has been found within the Lessini Mountains, but also in the Monte Baldo area where, beginning in 1775, the Rudari family (Avio/TN) was authorized by the Habsburgian government to quarry flint/chert (and produce gunflints) in Pian della Cenere, a flat valley on the north-eastern slopes of Monte Baldo. Techno-typological assessment of an assemblage of waste flakes and cores collected in the area indicates the application of the blade based



*E léscia, e pière, e solfarini in mazzo
E azzalini mi gh’ò per batèr fuoco
E pur che venda, vivo senza impazzo.*

Fig. 3 A Venetian peddler selling flints (fire flints and/or gunflints), firesteels, tinder and sulphur matches (1754).

method (**fig. 4**). Recently ‘Venetian’ style gunflints were also collected in Cavaso del Tomba (Treviso, eastern Veneto region), in a place called Caniezza, confirming that Venetian flintknappers were active almost wherever suitable flint/chert was available. The latter small sample of gunflints (**fig. 5**) includes one French style (D-shaped) specimen, probably made by copying, in local flint/chert, the “*pierres à fusil*” widely exported at least since the middle of 17th century from France (EMY, 1978).

Gunflints in the Lessini Mountains: production chronology and typo-technology

As already mentioned this local craft started at least as early as the middle of the 18th century, and just 50 years later Verona’s gunflint workshops reached an incredible level of productivity. From 1799 up to 1815 (the Napoleonic Era) one hundred barrels, each containing 20.000 gunflints, were exported daily (“*È memoria che al tempo delle guerre napoleoniche esportava da Verona cento*

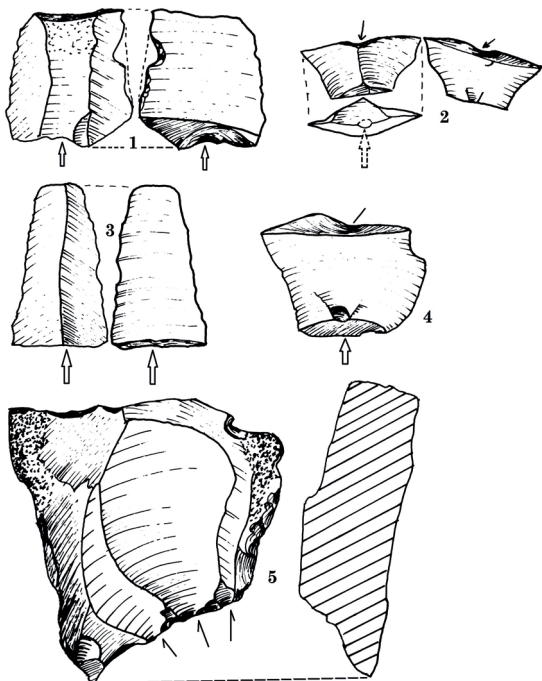


Fig. 4 Techno-typological assessment of an assemblage of waste flakes and a core collected in the area of Pian della Cenere/Monte Baldo indicating the application of the blade based method.

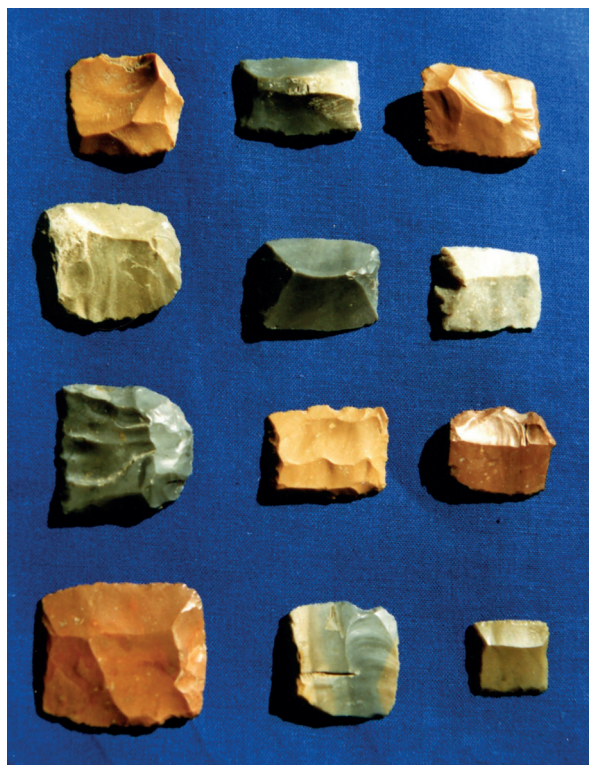


Fig. 5 Sample of Venetian type gunflints from Caniezza-Cavaso del Tomba/Treviso, including one French style (D-shaped) specimen, probably copied from local flint/chert.

barili al giorno di pietre da fucile, contenenti ognuno ventimila pezzi") (ORSI, 1886; SOLINAS, 1964). While no contemporary document is available to confirm this level of production, in 1816 gunflints were amongst the main export items traded from Verona. However, in 1817 Gaetano Boldrini, the principal local wholesaler of gunflints, wrote to the Habsburg Chamber of Commerce complaining that suspension of the Austrian commission would cause the unemployment of 500 flintknappers ("sarebbero periti forse li 500 circa persone che vivono su tal lavoro") (ANDREIS & CHELIDONIO, 2008). By 1830-40, when most of the European armies adopted the percussion cap ignition system, all European gunflint production declined, but still in 1886 baskets containing 2.000-3.000 fire flints were exported to Trieste and other Adriatic ports, and a few gunflints were still sold to Tyrol, Bavaria, Dalmatia and Montenegro (ORSI, 1886). In 1890 the famous French archaeologist Adrien de Mortillet wrote to his father Gabriel: "*après avoir vu a Cerro la fabrication de la pierre à feu actuelle, industrie aujourd'hui presque éteinte...*" (fig. 6) ["...after having watched the production of contemporary fire flints at Cerro (Veronese), an industry nearly extinguished today." (transl. J. Weiner 18.6.2017).], that is to say he had the chance to see one of the very last Lessini flintknappers still working. The considerable number of flintknappers known from the early 19th century corresponds well to the hundreds of workshop traces so far detected. These are mainly located near the main Cretaceous flint outcrops, but they are also associated with some Eocene oolitic formations rich in opaque chert. The main types of workshop locations are:

1. under rockshelters, in cave vestibules or in rocky areas covered by chestnut trees;
2. alongside anciently cultivated fields;
3. near small country houses;
4. in alpine meadows associated with summer pastures, a specific environment where gunflint production may have been a seasonal part-time activity, alongside small charcoal pit ledges like in Ausele (1250 meters AMSL; CHELIDONIO & SAURO, 1996) and Malga Brol (1468 meters AMSL; CHELIDONIO ET AL., 2011). Due to their local geological setting, assemblages from these two gunflint sites include low numbers of blade-like blanks, and the production was based entirely on oolitic greyish-brown flint/chert.

There is no evidence of any flint/chert mining or quarrying in this area: all raw material was surface collected, probably in connection with the yearly clearing of stone from cultivated fields. Historically, fields are known to have been ploughed up to heights of 1.200 meters AMSL. Regarding the va-



S. Anna d'Alfacedo, 18 mai'.
Cher père.
Après avoir vu à Cerro la fabrication
de la pierre à feu actuelle, industrie
aujourd'hui presque éteinte...
Kerr a pu voir de Cerro à S. Anna
centre de mes recherches, j'ai visité
dans la journée les alios de environs
de Molina. Ce sont de superbes alios
sous roche, sous lesquels on a recueilli
de objets d'époque divers. Les
objets lithiques à la partie supérieure
peut au dessus doit se trouver
des Languisim, quelque chose
de correspondant au magdalénien
et de bon solutréen. La couche
archéologique a déjà été bien remaniée
j'espère cependant sans encore que
quel trouvaille d'un certain intérêt.
Je dois commencer à fouiller
demain, si me suis entendu avec
le propriétaire. Parmi les objets
déjà recueillis se trouvent quelques
pièces monétaires de points au
dessus de l'aurore et de tranchet,
mais tout cela est archaïque ou
trouvé à la surface et dans la
terre remaniée. J'ai aussi quelques
pièces curieuses: poignée, flèches à
4 ou 6 barbelures et croix, j'ai recueilli
par la recherche de De Stefano et moi
par moi. L'état des recueils
plus complet. Amitié à toute la

Fig. 6 Letter of the famous French archaeologist Adrien de Mortillet, which he wrote to his father in 1890: "après avoir vu a Cerro la fabrication de la pierre à feu actuelle, industrie aujourd'hui presque éteinte..."

rious flint/chert outcrops, the Lessini Mountains' geological formations form part of the Fore-Alps' neo-tectonic uplift, which explains the scattering of different flint/chert varieties at different altitudes. Here are some examples:

- outcrops of reddish-brown Eocene chert were available at the Coghetta gunflint workshop (155 meters ASLM, near Santa Maria di Negrar (Valpolicella /VR) (SOLINAS, 1964), but other large siliceous nodules of a similar geological age (although grey-ocraceous in color) were available on the Cà Palui-Moruri area (between 580 and 470 meters AMSL), a dorsal ridge where this kind of chert was exploited as early as the Lower Palaeolithic to produce Acheulean tools.
- vitreous multicolored Cretaceous flint was used by the flintknappers in the Torrazzine cave (160 meters AMSL, near Mezzane/VR), but the same kind of siliceous stone also was knapped at Mount Bellocca (1370 meters AMSL, Roveré Veronese).

In terms of typo-technology, the main operative scheme followed by the gunflint knappers pro-

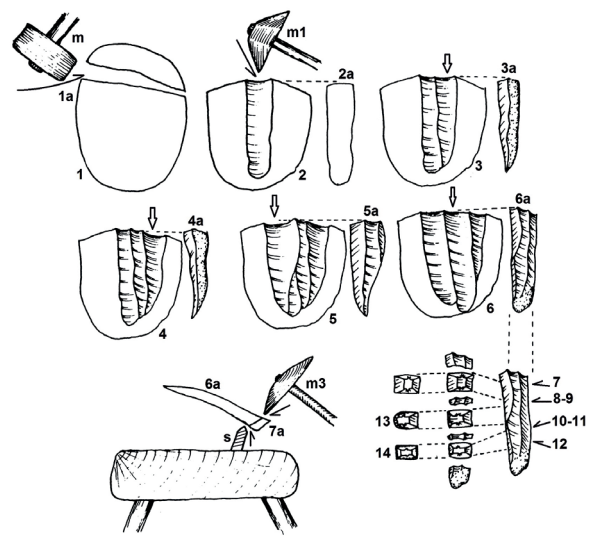


Fig. 7 Blade-like flakes segmented into geometrical pieces, forming rectangular double-sided gunflints, ideally trapezoidal and flat in section.

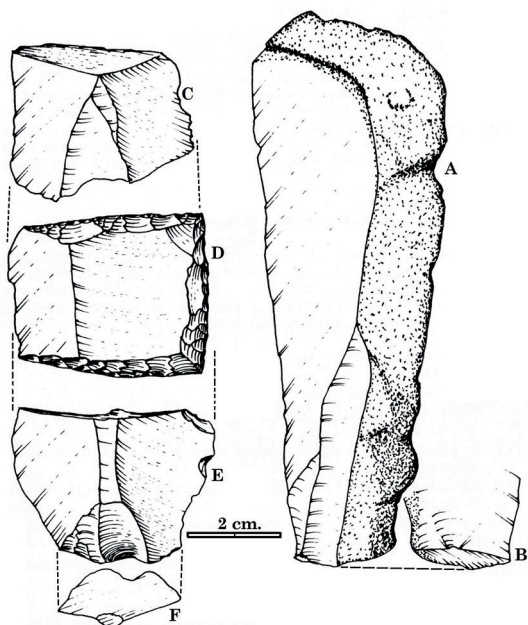


Fig. 8 Cà Palui (Verona Hills) gunflint blade-like type and its relevant waste chips.

duced elongated blade-like flakes, by percussion with an iron hammer. These blade-like flakes were then segmented into geometrical pieces, forming rectangular double-sided gunflints, ideally trapezoidal and flat in section (fig. 7). Cores are usually unidirectional, with plain striking platforms and lacking predetermining distal scars. They often display circular impact points with micro-traces of metal from contact with a hammer; at the proximal end, ventral face, the waste flakes often show a complete, or a not fully formed bulbar scar. Waste flakes represent the largest part of the remains at gunflint workshops but many elongated blade-like flakes are also present: the latter were discarded due to partial cortex cover, or because they were too thin for the production of usable gunflints (fig. 8).

Some atypical discoidal cores were detected at the Benedetti site (790 meters ASLM, near Ceredo/Sant'Anna d'Alfaedo), from which only thick



Fig. 9 Large gunflint cores from the Cà Palui area with plain platform techno-typology.

flakes could have been detached, probably for the production of fire flints (WOODALL & KIRCHEN, 1999/2000). It would have been possible to modify these flakes into gunspalls, but so far such pieces have not been found within the Veronese region.

The Cà Palui area gunflints

The Cà Palui area occupies a level basin on an Eocene limestone ridge (between 555 and 575 meters AMSL), sloping sharply westward to the Maiolica Veneta outcrop, which is very rich in Cretaceous vitreous flints. The complex geomorphology of this ridge also includes a small occurrence of basalt, with clasts of this material having been spread across the whole basin, along with many nodules of dull grayish-ochreous chert, weighing up to 20 kilos or even more. Sea urchins are the only macro-fossil observed in this Eocene, outcrops of which were exploited by Acheulean and Mousterian groups: remains of workshops from these periods have been found scattered across the entire basin (fully cultivated till the end of 20th century; CHELIDONIO & ZIELO, 2006). Thousands of waste flakes (as well as tens of cores and many handaxes) have been collected from the surface (CHELIDONIO & ZIELO, 1998), whereas on the limestone slopes surrounding the basin many concentrations of gunflint workshops have been recorded (CHELIDONIO, 2013). So far no dateable evidence has been found in connection with these gunflint waste-flakes with the exception of a Venetian copper coin issued at the end of the 17th century. Large gunflint cores may still be found on these grassy slopes: the cores' techno-typology



Fig. 10 Large gunflint core with subpyramidal techno-typology.

varies from single plain platform ones (fig. 9) to subpyramidal ones (fig. 10), both characterized by negatives from the detachment of long blade-like flakes, and both having plain platforms. Dull Eocene chert was the only type of raw material used in these gunflint workshops, whereas varieties of Cretaceous flint were used for gunflints in the Moruri, Trezzolano, Cancellò and Margiuni areas, located on the lower Maiolica slopes. So far, few finished gunflints have been recovered from workshops exploiting Eocene chert. They include a small number of rectangular pieces made from the central part of flake-like blanks with double leading edges, but only one shows the typical French 'D' shape (fig. 11). This kind of techno-typology is the same from all the other gunflint workshops so far identified in the Lessini area. Based on these typical attributes, it is possible to hypothesize that a group of specialized French flintknappers may have been working on Eocene chert nodules, probably during the Napoleonic occupation (1805-1814) of the Verona area.

Another important and well-preserved gunflint workshop is located in the outer part of a cave in the so-called "Vajo da busi", a narrow canyon-like valley cut in the Rosso Ammonitico formation and located in the lower western slopes of Cà Palui. The actual floor is covered by waste flakes and big exhausted cores, probably mainly based on the exploitation of Eocene chert nodules collected from the valley gravels and/or from the slopes above, which were intensely cultivated and meticulously cleared of stones up to the final years of the 20th century. In this cave, the layer of gunflint waste is more than 50 centimeters thick; an unfinished French style musket gunflint (Eocene chert) was collected from the surface. Based on the incredible quantity of these waste flakes and cores at this location, a number of Eocene gunflints must have been produced and exported, since so far not a single gunflint of this kind has been found in Verona nor from any other site in the Veneto region, including surface collected assemblages from more distant locations such as the one from the San Lazzaro museum (Bologna) (fig. 12), or one from Venice's lagoon islands (P. Mel, personal comm.). Other relatively well-preserved gunflint workshops have been identified on the lower slopes of the mid-western Cà Palui ridge, where the Maiolica formation outcrops. From these sites, a limited number of forms have been recovered, such as single plain platform cores from which blade-like flakes were struck. These flakes were subsequently segmented into geometrical pieces by the use of an iron stake and punch; only vitreous flint nodules were used at these sites. Near the villages of Trezzolano and Margiuni concentrations of gunflint waste have been



Fig. 11 A typical 18th century French style D-shaped musket flint made of Cà Palui chert.

found along old cultivated terraces, where stone clearing furnished abundant raw material.

In conclusion, recent surveys sampling the Lessini gunflint workshops using Global Posi-

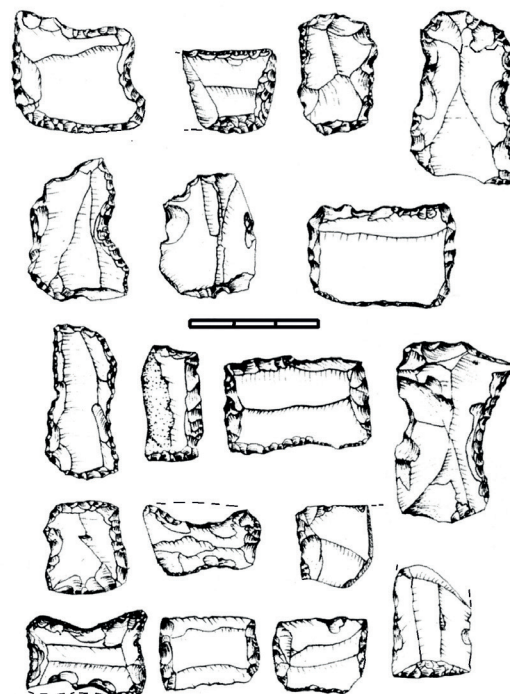


Fig. 12 Sample of Venetian gunflints from San Lazzaro di Savena/Bologna, showing heavy wear traces from the use as fire flints/strike-a-lights.

tioning System (GPS) reveal that in the last 20 years some of these locations have been damaged or destroyed. A large-scale coordinated survey is needed and will be promoted.

Note

⁽¹⁾ Dante Alighieri, "La Divina Commedia - Inferno", Canto XIV, 38-39.

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