

## THE *MERCURIO* GUNFLINTS: A TECHNO-TYOLOGICAL AND CULTURAL ASSESSMENT

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*The discovery of the wreck of the brig Mercurio, which sank in 1812 in the waters of the north Adriatic, is of major significance for the study of Italic Kingdom vessels from the Napoleonic era. The underwater excavations carried out in 2004–11 led to the recovery of many small finds, among which are several gunflints of different size and shape. The Mercurio gunflints were produced mainly from blades using a technique in use in Britain and France, but also in the workshops of the Lessini Hills around Ceredo (Verona province, northern Italy). We suggest that the flint employed for their manufacture probably came from Monte Baldo, in the Trentino, or perhaps from the River Tagliamento, in Friuli. We can exclude the possibility that the specimens recovered from the shipwreck were made from French flint because of the typically north Italian manufacturing technique and the character of the grey Treveti-derived flint. Given the complexity of the period during which the Grado (or Pirano) battle took place, the study of even such small items can contribute to a better interpretation of the dramatic events that characterised the beginning of the nineteenth century in that part of the Mediterranean.*

This paper describes and discusses a group of gunflints recovered during underwater excavations carried out in 2004–11 on the 16-gun brig *Mercurio* (later renamed the *Mercurio*) found in the northern Adriatic. The vessel, built for the French navy in Genoa in 1806, entered the Napoleonic Italic Kingdom fleet, based in Venice, in 1809–10.<sup>1</sup> The ship was sunk on the morning of 22 February 1812 by the British brig *Weasel* (or *Weazel*) in the Grado (also known as the Pirano) battle while it was on a mission to escort the 80-gun vessel *Rivoli* out of the Venetian lagoon.<sup>2</sup> The *Mercurio* was commanded by Lieutenant Palinucchia (or Palincucchia) and the crew consisted of ninety-two men, including five officers.<sup>3</sup> The wreck was discovered accidentally in 2001 at the depth of 16–17m below sea-level, some 7 miles (11km) off the Punta Tagliamento, in the delta of the River Tagliamento, along the present coast of Friuli, south of the city of Lignano Sabbiadoro (fig 1).<sup>4</sup> At the time of its discovery the shipwreck was in a good

1. Beltrame 2010, 55; 2015, 423.

2. Beltrame 2010; Russell and Cohn 2015.

3. Beltrame 2007.

4. Beltrame and Gaddi 2002; Beltrame 2007; 2009; 2014. Its precise geographic location is 45°33'N–13°11'E.

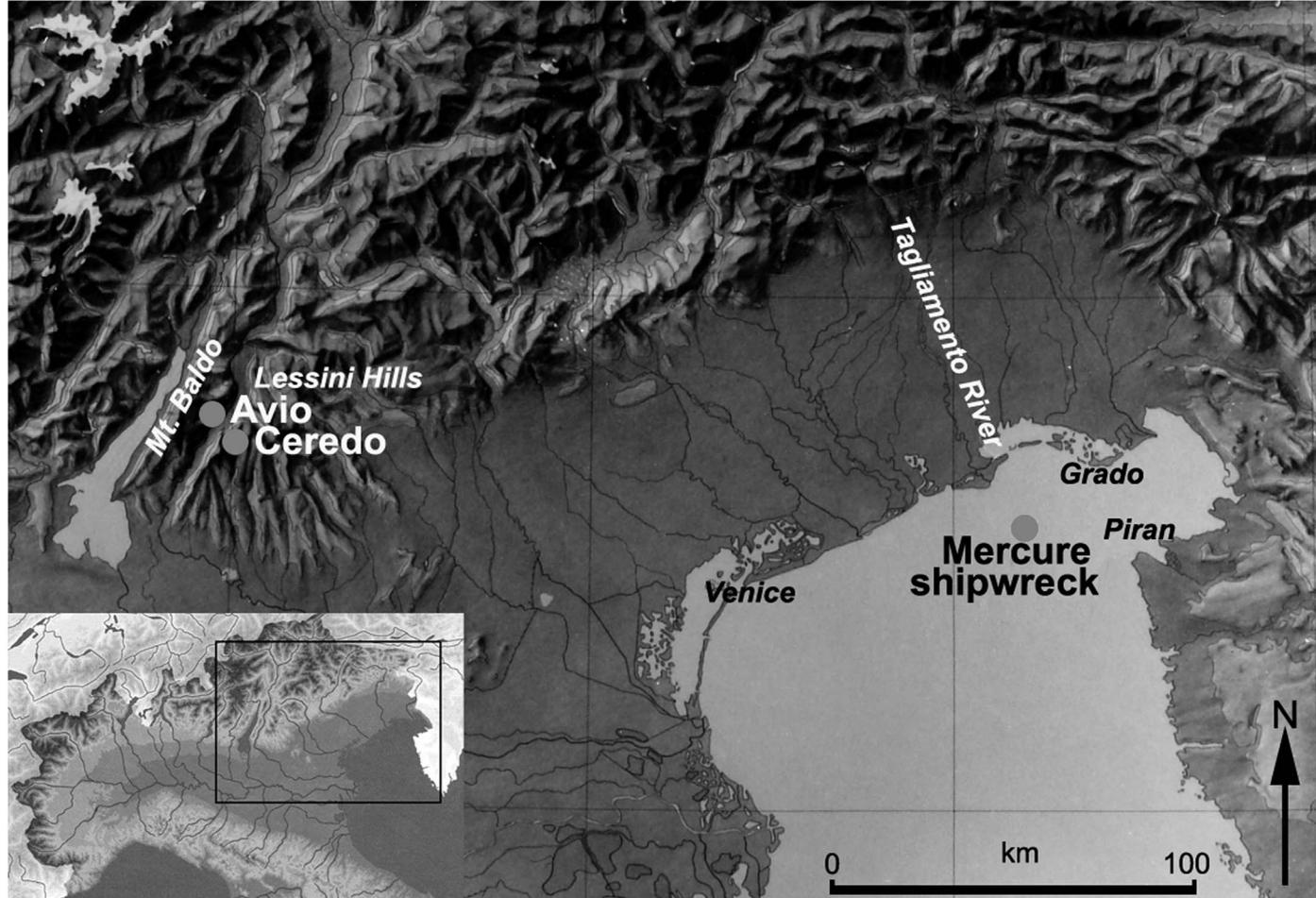


Fig 1. Location of the *Mercurio* shipwreck and of the flint sources and workshops discussed in the text. *Drawing*: E Starnini



Fig 2. The *Mercurio*: the left-hand side of the hull in the prow area. *Photograph:* S Caressa

state of preservation (fig 2), protruding from the sand on the seabed, with only a tumulus of concretions and some iron carronades around it. Although split in two main parts, lying some 70m apart (excavation Zones A and B respectively),<sup>5</sup> the *Mercurio* is so far one of the best-preserved underwater wrecks of this period in the Mediterranean Sea.

As well as the remains of seven crewmen, ranging in age from sixteen to forty-five,<sup>6</sup> some 900 objects were brought to light during excavations carried out by Ca' Foscari University, Venice.<sup>7</sup> These included a large number of firearms: one bronze swivel gun, eight 24-pounder iron carronades, two 8-pounder iron guns, five pistols (*pistolet de bord*) model 1786, made in Tulle,<sup>8</sup> one musket (*mousqueton de hussard*) model 1786, probably made in Brescia,<sup>9</sup> one musket butt plate, three plate locks of small arms, some iron cannon balls and hundreds of lead musket balls, as well as the gunflints that are the subject of this paper. The gunflints come from the bow (Zone A, squares 8 and 9), where the pistols, musket and human remains were found.<sup>10</sup> Although the gunflints could be used for artillery, none of the

5. Beltrame 2010, fig 2.

6. Bertoldi *et al* 2014. Among the human remains are most probably those of the commissioner, an administrative officer some 40 years old, who was identified thanks to specific elements of his uniform among which are metal buttons. The taphonomic and anthropological analyses of the human remains are still in progress.

7. Beltrame 2015.

8. S Donadel, pers comm, 12 Nov 2015; see <<http://www.lapistole.com/1786%20marine.html>> (accessed 12 Apr 2016).

9. S Donadel, pers comm, 12 Nov 2015.

10. Beltrame 2014, 63.

carronades of the An XIII model or the 1786 model guns found aboard the *Mercurio* were equipped with a gunlock.<sup>11</sup> However, the brass fragment (see fig 9, bottom) is clearly a piece of a gunlock produced in Paris, suggesting that there were cannons on board the *Mercurio* that were equipped with this technological innovation.

The study of gunflints from shipwrecks has slowly gained ground during the last fifteen years.<sup>12</sup> Nevertheless papers on this specific topic are still few, despite their importance for the recognition of gunflint production centres, their raw material provenance, the trajectories of military supply and trade routes, and their exploitation and use by crew members of different nationalities. Locating the raw material sources for the manufacture of gunflints, their production methods and typological analysis are all important steps in the study of the weaponry utilised on Italic Kingdom Napoleonic vessels, which depended also on the nationality of the crew members (we know that Dalmatian, Istrian, Venetian, Genoese and French sailors served on the *Mercurio*). Problems that could hamper such studies derive from their deposition, patination and state of preservation in Mediterranean seawaters,<sup>13</sup> as well as the occasional presence of concretions.<sup>14</sup>

The study of gunflints has so far been concerned mainly with British,<sup>15</sup> French,<sup>16</sup> Danish,<sup>17</sup> Dutch,<sup>18</sup> East European,<sup>19</sup> South Balkan<sup>20</sup> and American assemblages,<sup>21</sup> although the provenance of the raw material sources employed for their manufacture is sometimes difficult to assess.<sup>22</sup> By contrast, insufficient attention has been paid to the Lessini Hills (Ceredo) and Monte Baldo (Avio) production centres,<sup>23</sup> the most important suppliers of the imperial army of the Habsburg monarchy.<sup>24</sup> Millions of pieces were produced and exported every year from the workshops located around Ceredo (Verona) and Avio (Trento) that were active mainly during the eighteenth and early nineteenth centuries.<sup>25</sup>

A manuscript written in 1820 by Dr Bourgoïn reports: *Dans le Veronais on traitait des silex de Montebaldo, lequel était grisâtre, d'une pâte assez fine e dure, ressemblant à l'agate; les pierres à fusil ne pouvaient fabriquer qu'au rouet et leur prix était trop élevé pour pouvoir être adoptées dans l'usage général* ('In the Verona region they also work flint from Montebaldo, which is greyish, of very fine and hard texture, similar to agate; the gunflints can be produced only by hammering, and their price is too high for them to be adopted for general use'). Some half a century earlier, General J-J Gassendi had observed that Veronese gunflints were more than twice as large as French specimens and their quality inferior.<sup>26</sup> According to J Emy,

11. Boudriot and Berti 1981, 46; Boudriot 1992, 100–1.

12. Cumming 2002; Bingeman 2004; Ballin 2014a.

13. Ballin 2014a.

14. Ballin 2014b.

15. Whittaker 2001.

16. Schleicher 1927.

17. Ballin 2014c.

18. Witthoft 1966.

19. Ginter 2009; Ballin 2013a.

20. Evans 1887.

21. Austin 2011.

22. Durst 2009.

23. Von Born 1790; Orsi 1886.

24. Woodall *et al* 1997, 17.

25. Chelidonio 1992; 2003, 126.

26. Emy 1978, 114.

author of the seminal volume on gunflint production from Verona province,<sup>27</sup> they were roughly made, and their shape was irregular.<sup>28</sup>

Mitchell was the first to describe British gunflint manufacturing,<sup>29</sup> followed some forty years later by Skertchly.<sup>30</sup> Salmon did the same in France before the end of the century.<sup>31</sup> Blade gunflints were produced in both countries using similar techniques.<sup>32</sup> Although good information was already available for gunflint manufacture from a few other European countries before the 1980s,<sup>33</sup> data on the topic were still very poor for the Lessini Hills gunflint workshops until the publication of the excavations carried out near Ceredo by J N Woodall *et al.*<sup>34</sup> These revealed the importance of the Ceredo production centre, as well as helping to define the different manufacturing stages and the characteristics of the final products; these are somewhat similar to those from Britain, but broader and thinner.<sup>35</sup>

### THE *MERCURIO* GUNFLINTS

The *Mercurio* chipped stone assemblage discussed in this paper consists of eighty-five gunflints (figs 3 to 7; tables 1 and 2). They were all recovered from excavation Zone A, squares 8 and 9 (fig 8). Nine specimens were retrieved from a single concreted block together with a metal fragment of French cannon gunlock (fig 9).<sup>36</sup>

All the gunflints except one are obtained from black/dark-grey/bluish-grey flint, with small whitish spots or lighter grey variegations or stripes (see table 2). The precise flint source exploited for their manufacture is so far undefined. According to our present knowledge, only one *Mercurio* gunflint was knapped from the brown spotted Lessini flint,<sup>37</sup> characteristic of the 'Biancone' and 'Scaglia Variegata' flint formations of the Veronese Lessini Hills and Trentino,<sup>38</sup> whose geological location is well known.<sup>39</sup> The remainder are more like Monte Baldo gunflints in their use of a distinctive type of greyish flint,<sup>40</sup> the outcrops of which might be those that are described by Barbieri *et al.*,<sup>41</sup> consisting of greyish spotted flint formations in the Scaglia Variegata deposits that supply nodules of 'sufficient' quality for knapping.<sup>42</sup> Furthermore, black and dark grey flint is available from the moraines of the

27. *Ibid.*

28. It is important to note that, according to Emy, some black and grey gunflints were also produced in France as well as the more common honey- and amber-coloured gunflints. For example, medium- to low-quality grey flint sources exist in Treveti, near Châtillon, south west of Paris, though it was rarely utilised for the production of gunflints.

29. Mitchell 1837.

30. Skertchly 1879.

31. Salmon 1885.

32. Barnes 1937; White 1975.

33. Emy 1978, 112.

34. Woodall *et al* 1997, 25.

35. *Ibid.*, fig 6.

36. De Vries and Martens 2007, 776–7.

37. Barfield 1994.

38. Barbieri *et al* 2013, fig 2f.

39. Brandl 2013.

40. Emy 1978, 114; see above.

41. Barbieri *et al* 2013, figs 3d and 3f.

42. *Ibid.*

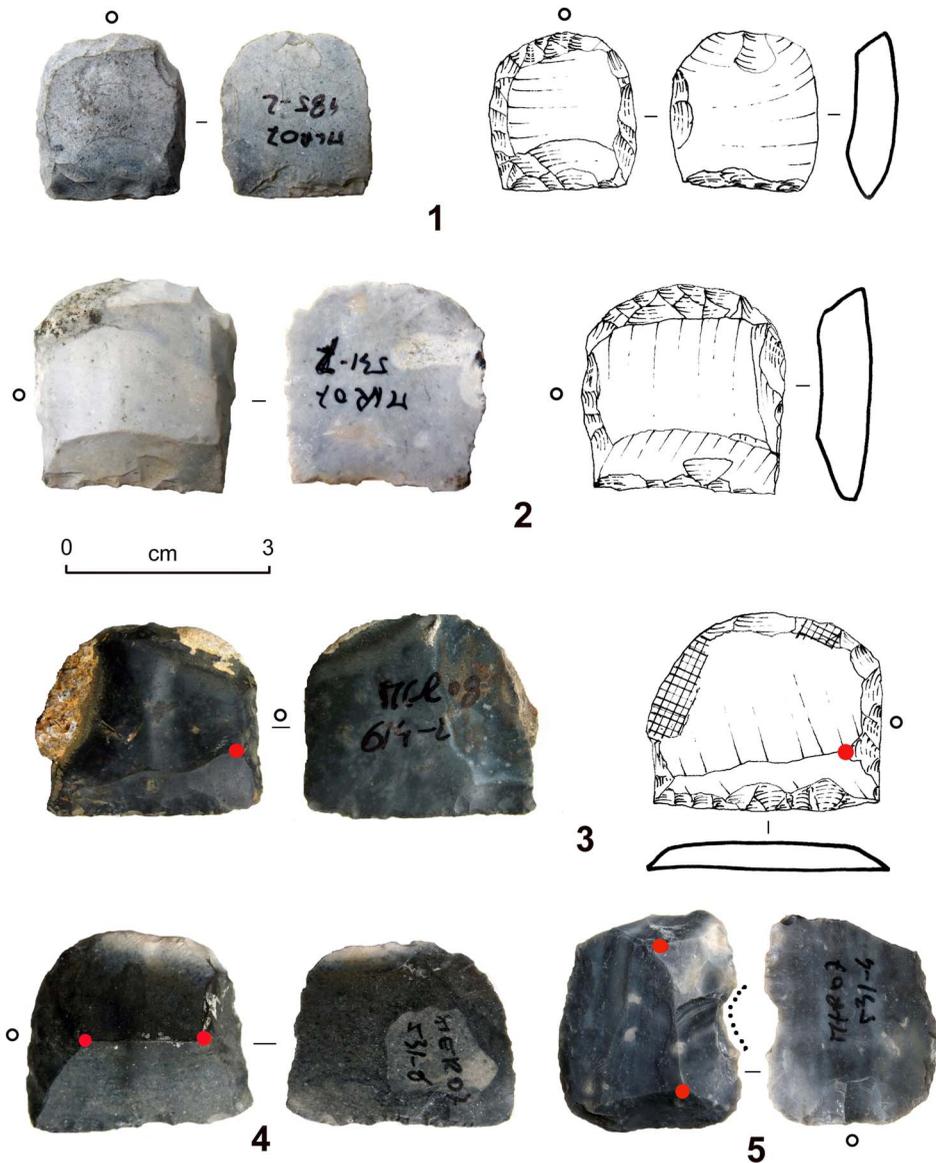


Fig 3. D-shaped gunflints of Class I (nos 1–4) and utilised gunflint of Class 3 (no. 5), with indication of the percussion bulb (black circles) and bevel arrises (red dots). *Drawings:* P Biagi and E Starnini; *photographs:* E Starnini

River Tagliamento and from the Carnic Pre-Alps, in the Friuli region of north-eastern Italy.<sup>43</sup> These were exploited for making chipped stone tools as far back as the beginning of the Holocene.<sup>44</sup>

43. Dal Santo 2004.

44. Ferrari and Pessina 1996.

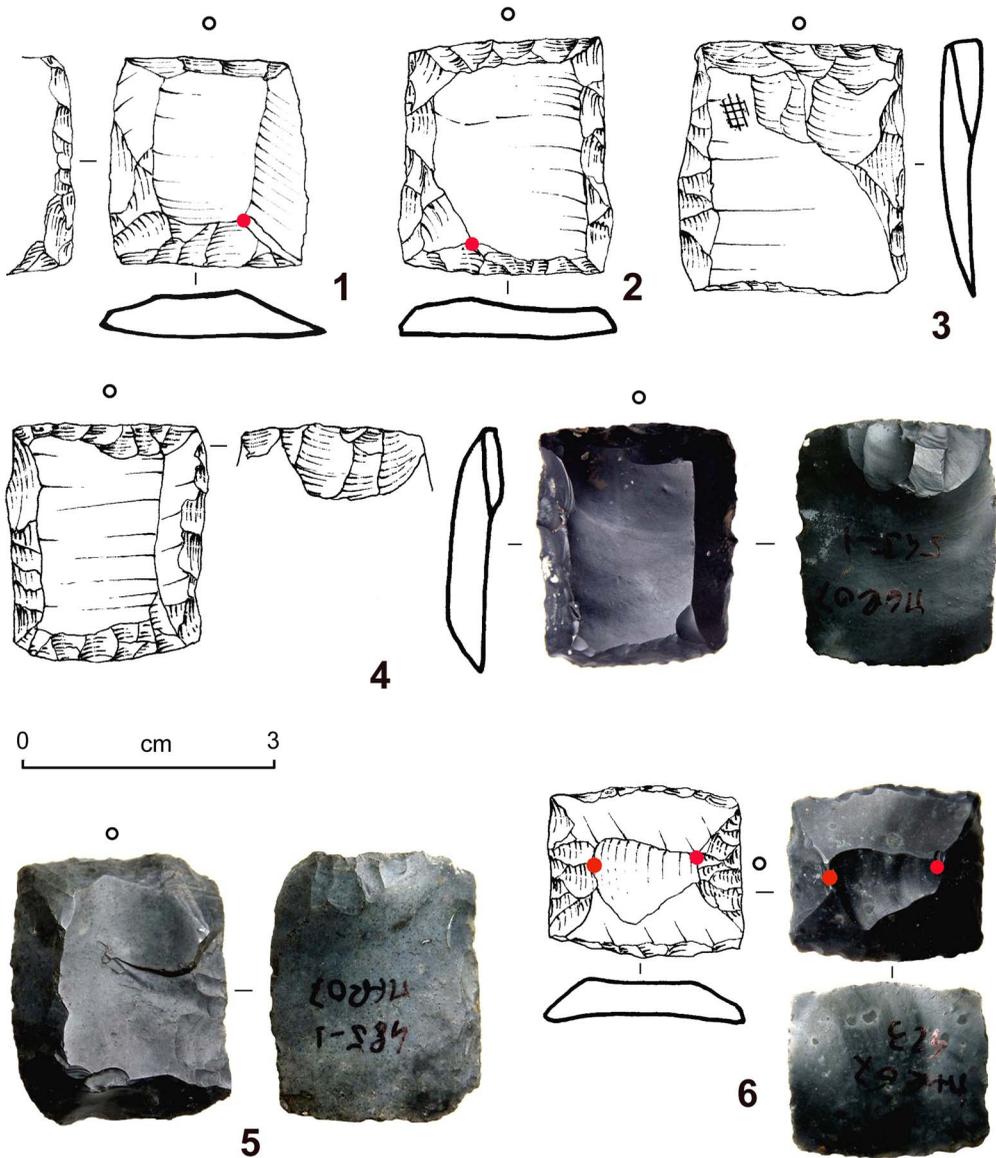


Fig 4. Gunflints of Class 2 (nos 1–5) and Class 3 (no. 6), with indication of the percussion bulb (black circles) and bevel arrises (red dots). *Drawings:* P Biagi and E Starnini; *photographs:* E Starnini

In describing the morphology of the *Mercurio* gunflints (tables 1 and 2) we have followed the typology of Seymour Joly de Lotbiniere<sup>45</sup> who subdivided them into four main classes: 1) D-shaped; 2) squared; 3) squared with two dorsal arrises; and 4) squared with only one arris.<sup>46</sup> The terminology adopted in this paper is that proposed

45. De Lotbiniere 1984.

46. *Ibid.*, 206.

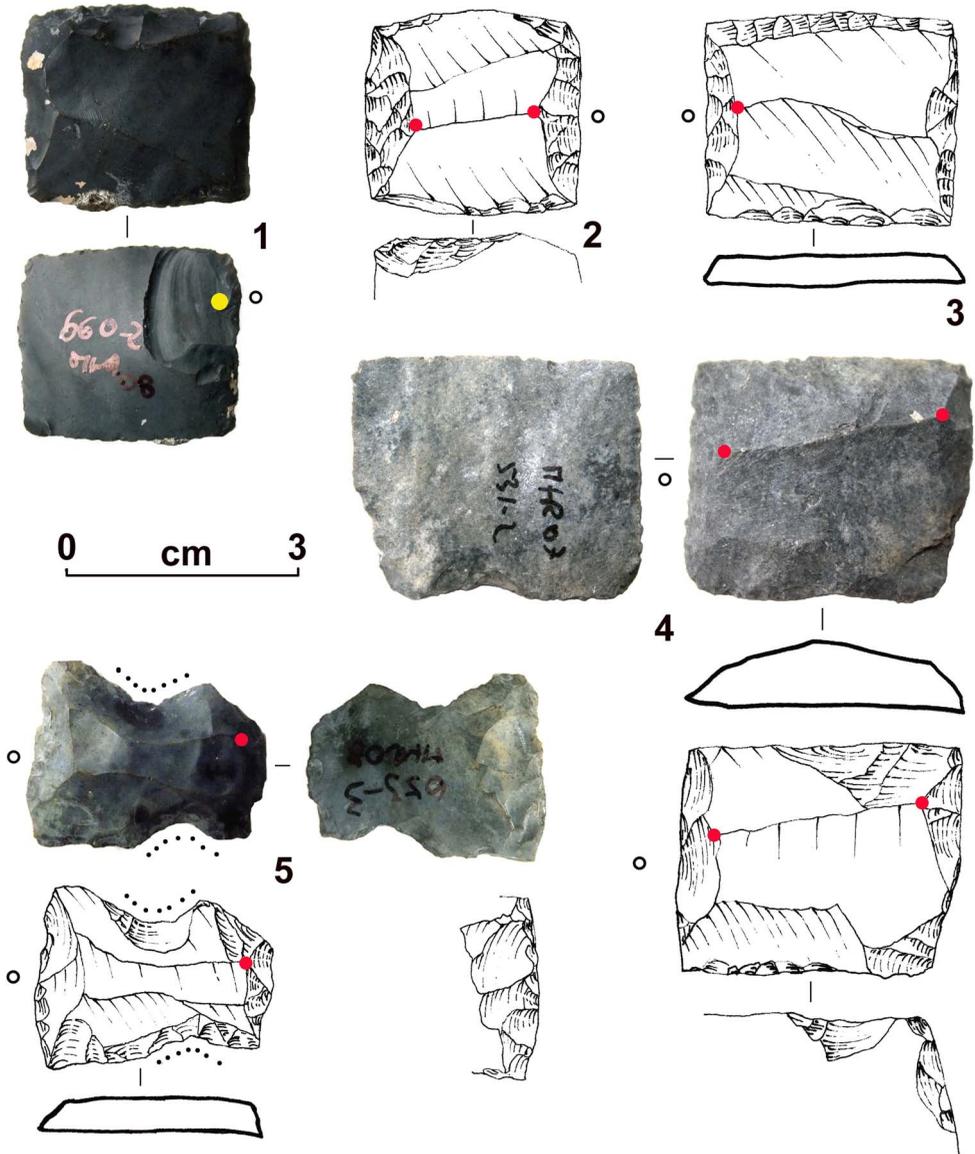


Fig 5. Gunflints of Class 2 (no. 1), Class 3 (nos 2, 4 and 5) and Class 4 (no. 3), with indication of the percussion bulb (black circles), bevel arrises (red dots) and ventral bulbar scar (yellow dot). *Drawings*: P Biagi and E Starnini; *photographs*: E Starnini

by T B Ballin,<sup>47</sup> while the description of the retouching on the leading edge, heel and sides follows that introduced by G Laplace<sup>48</sup> for prehistoric chipped stone tools. Four *Mercurio* pieces have been attributed to Class 1, thirteen to Class 2, seventeen to Class 3 and forty-six

47. Ballin 2012, 117.

48. Laplace 1964.

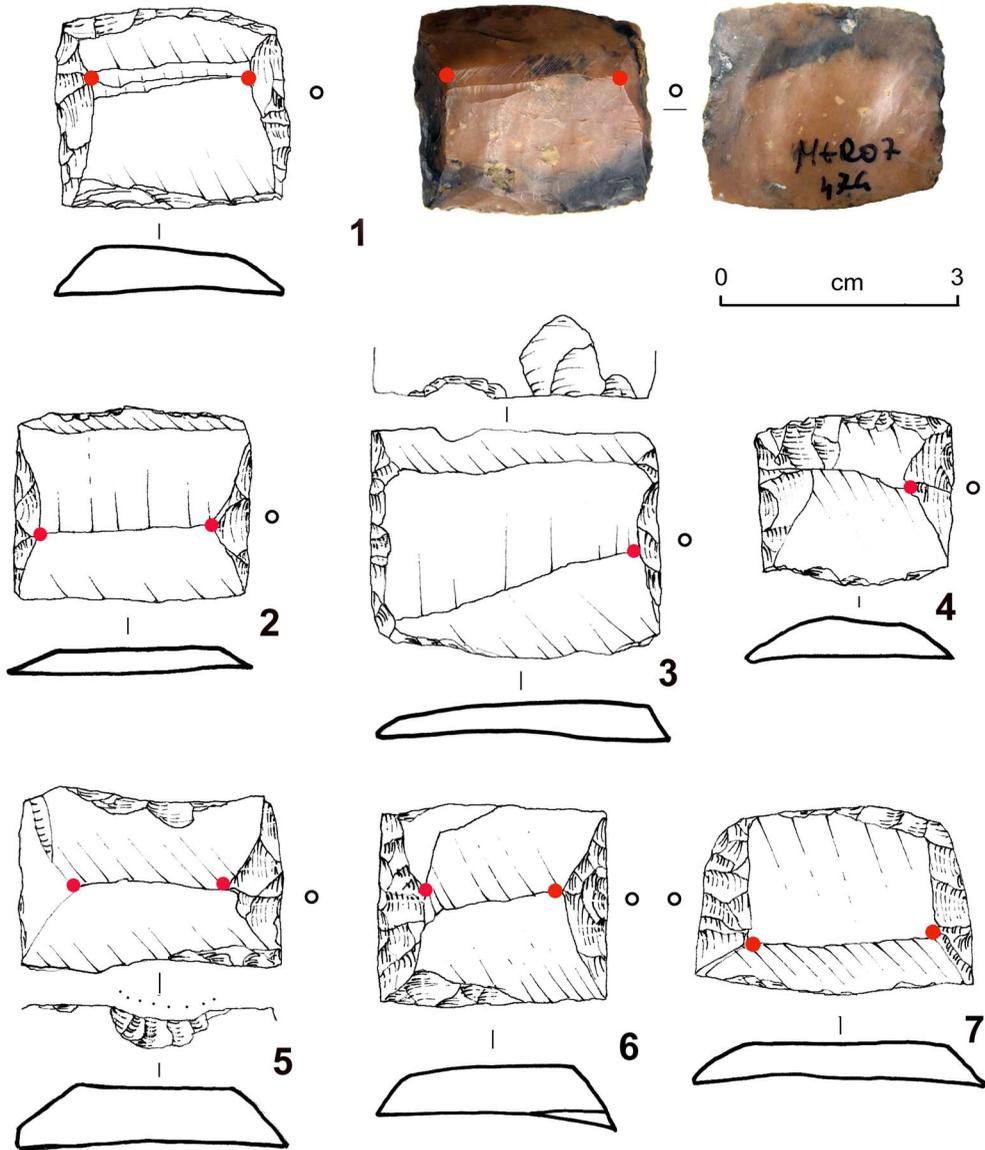


Fig 6. Gunflints of Class 4 (nos 1-7), with indication of the percussion bulb (black circles) and bevel arrises (red dots). *Drawings:* P Biagi and E Starnini; *photographs:* E Starnini

to Class 4. Four have been assigned to Class 3 or 4 because they were found still inserted in their lead sheath, and thus it has been impossible to observe their entire shape and study them in detail.

The typology, number of complete tools and high percentage of medial pieces retrieved from the *Mercurio* suggest that most specimens (85 to 92 per cent) were obtained from blades that were long, wide and thin. The presence of one or two small dorsal scars is typical of a knapping technique involving hard hammering

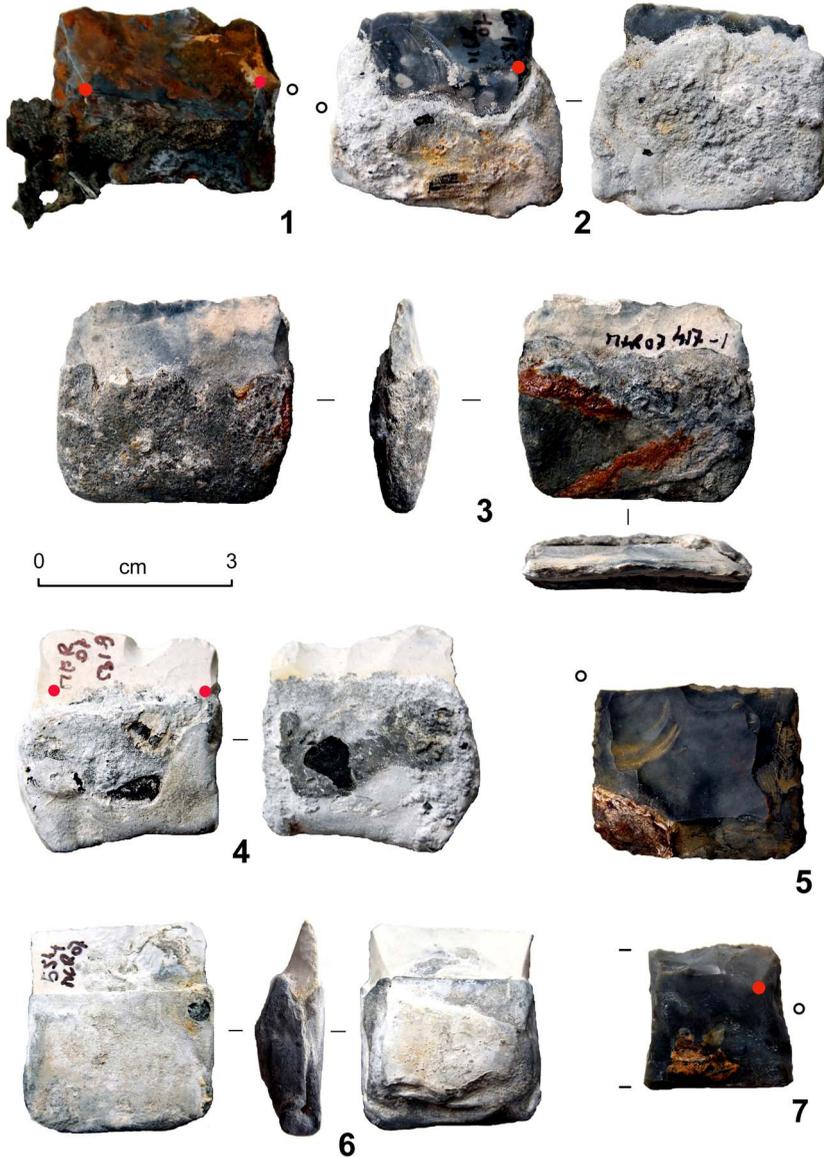


Fig 7. Gunflints of Class 4 (nos 1, 5 and 7) and Class 3 or 4, partly covered by a lead sheath (nos 2–4 and 6), with indication of the percussion bulb (black circles) and bevel arrises (red dots). *Photographs: E Starnini*

when the blade was positioned on a stake (fig 10, nos 1 and 2).<sup>49</sup> The same can be said for the presence of three specimens with wide ventral lenticular bulbar scars (fig 5, no. 1; fig 10, no. 3) consequent on violent hard-hammering detachment with a metal-pointed tool.<sup>50</sup> Only seven to fourteen specimens are obtained from flakes (fig 7, no. 5).

49. Emy 1978, pl ix; Woodall and Chelidonio 2006, 224.

50. Emy 1978, pl iv.

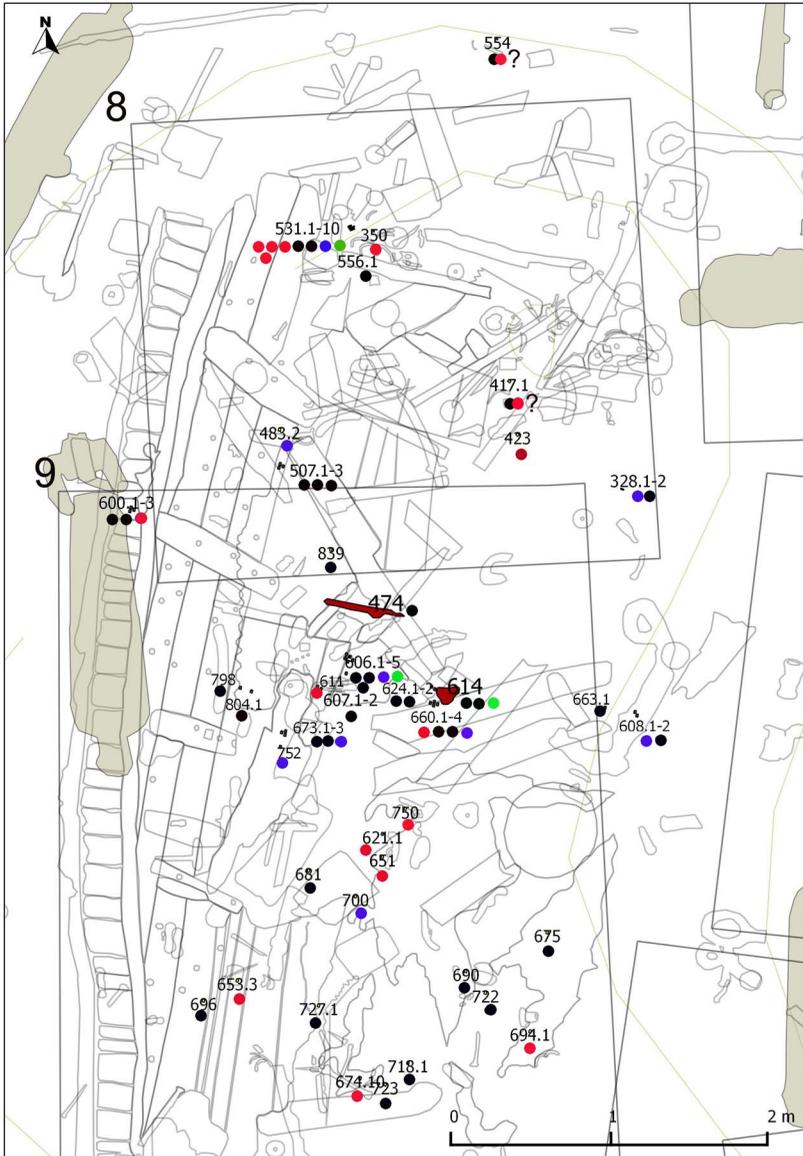


Fig 8. Distribution of the gunflints recovered from excavation Zone A, squares 8 and 9. Class 1: green dot; Class 2: red dot; Class 3: blue dot; Class 4: black dot; Class 3 or 4: black and red dots. *Drawing: S Manfio*

Just a few pieces show an invasive thinning retouch to remove the bulb at the proximal ventral end (fig 4, nos 4 and 5; fig 5, no. 5). Most of the gunflints look new and unused, except for a few specimens with traces of wear (see table 2) or a chipped leading edge (fig 3, nos 1 and 2; fig 5, no. 4). Only two have a notch at the centre of the leading edge (fig 3, no. 5; fig 10, no. 4). Two butterfly-shaped specimens with evident traces of use, in the form of notches along both sides, might have been reutilised as fire flints (fig 5, no. 5).

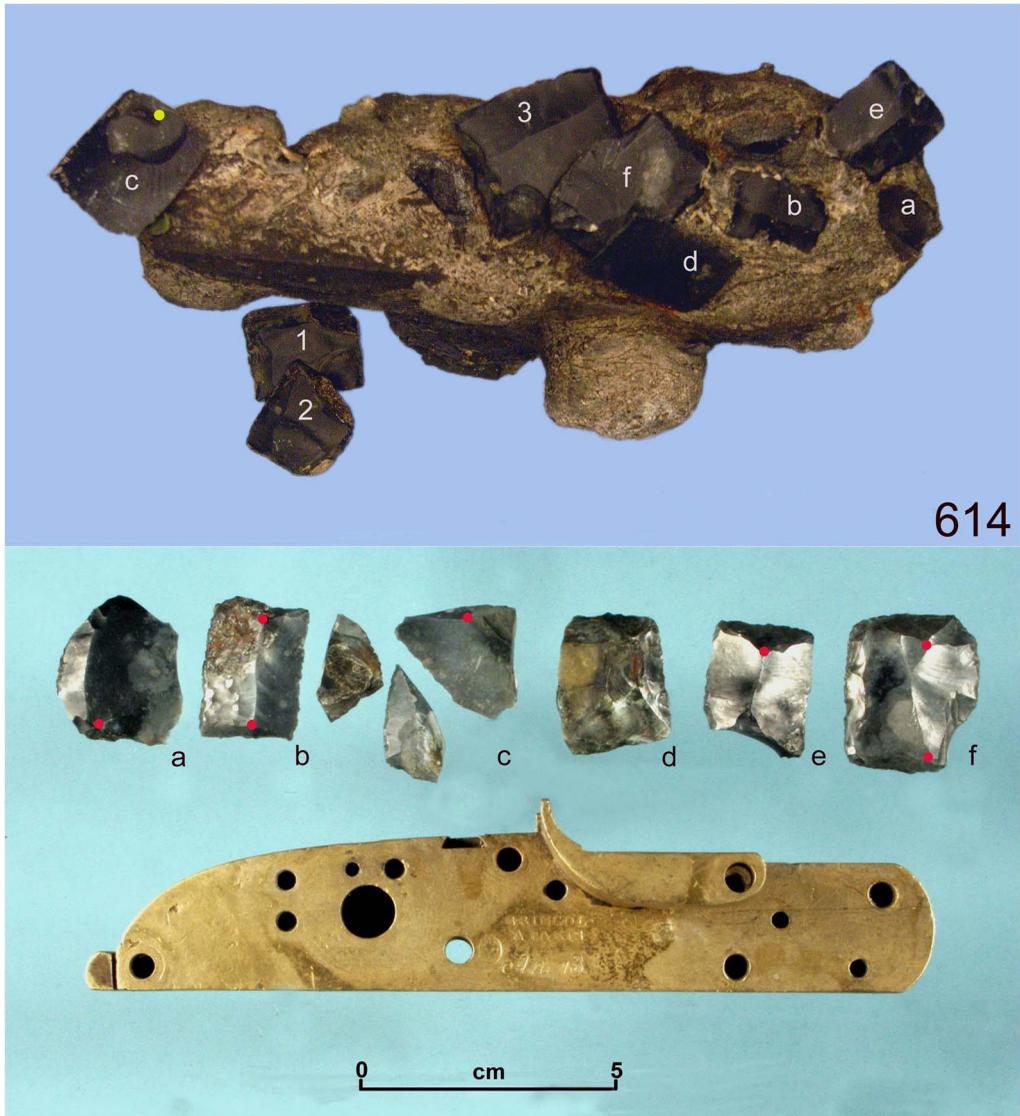


Fig 9. Concreted block containing nine gunflints and a fragment of a gunlock (614) before and after restoration; bevel arrises (red dots) and ventral bulbar scar (yellow dot); numbers as from tables 1 and 2. *Photographs: C Beltrame*

All the gunflints have been measured by orientating the piece according to its original blank axis.<sup>51</sup> The dimensional analysis, exemplified by the length/width and length/thickness diagrams (fig 11), show that the *Mercurio* samples consist not only of different types,

51. This is a form of measuring commonly used for prehistoric chipped stone tools. This means that, in most of the cases considered from this assemblage, the length corresponds to the gunflint's width and the width to the gunflint's length, if a gunflint's length is defined as the axis running from its heal/rear to its leading edge/front.

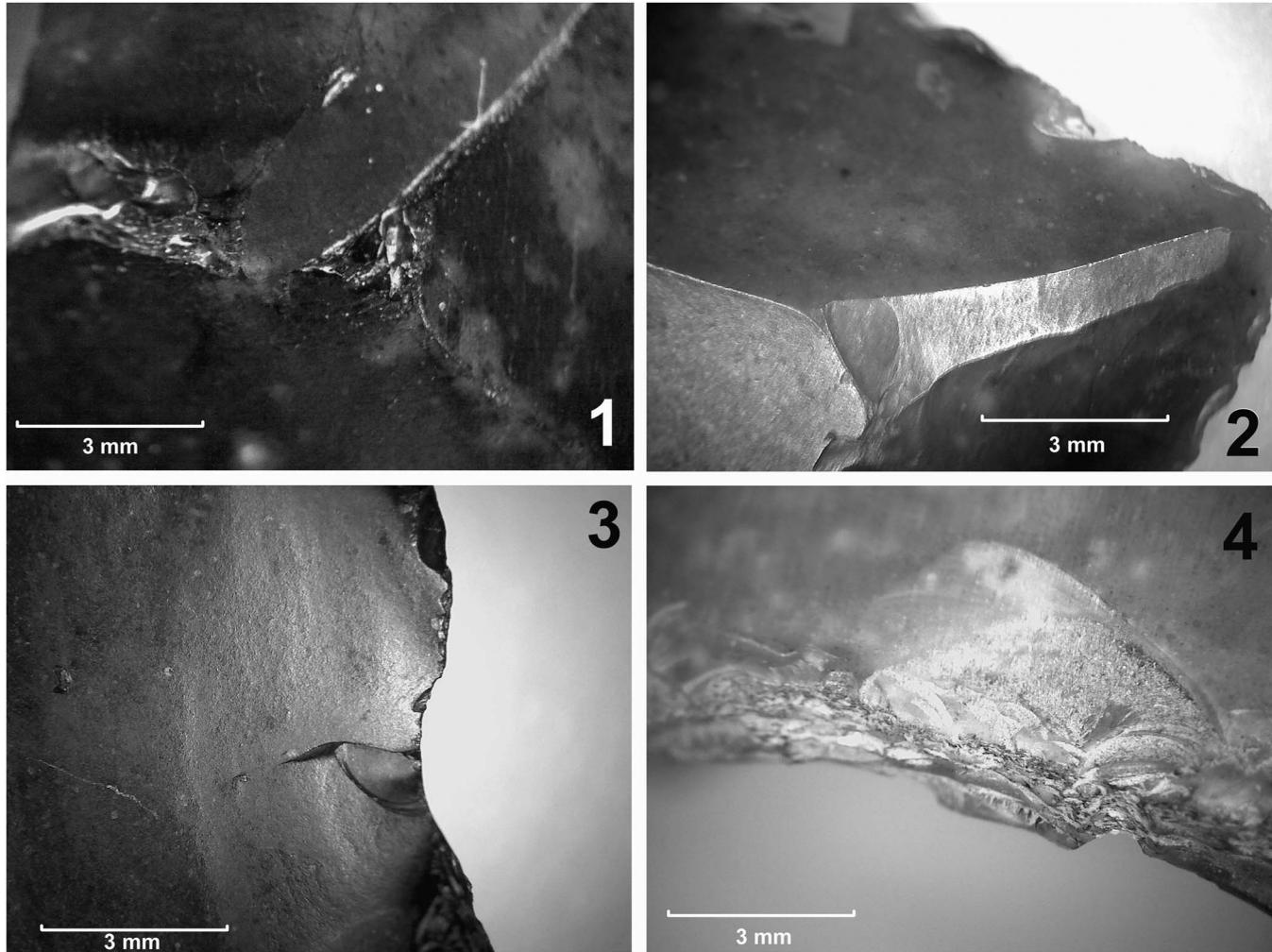


Fig 10. Proximal, right bevel aris of gunflint 609 (no. 1); proximal, left bevel aris of gunflint 663-1 (no. 2); ventral bulbar scar of gunflint 681 (no. 3); and utilisation traces of gunflint 624-1 (no. 4). *Micro-photographs*: E Starnini

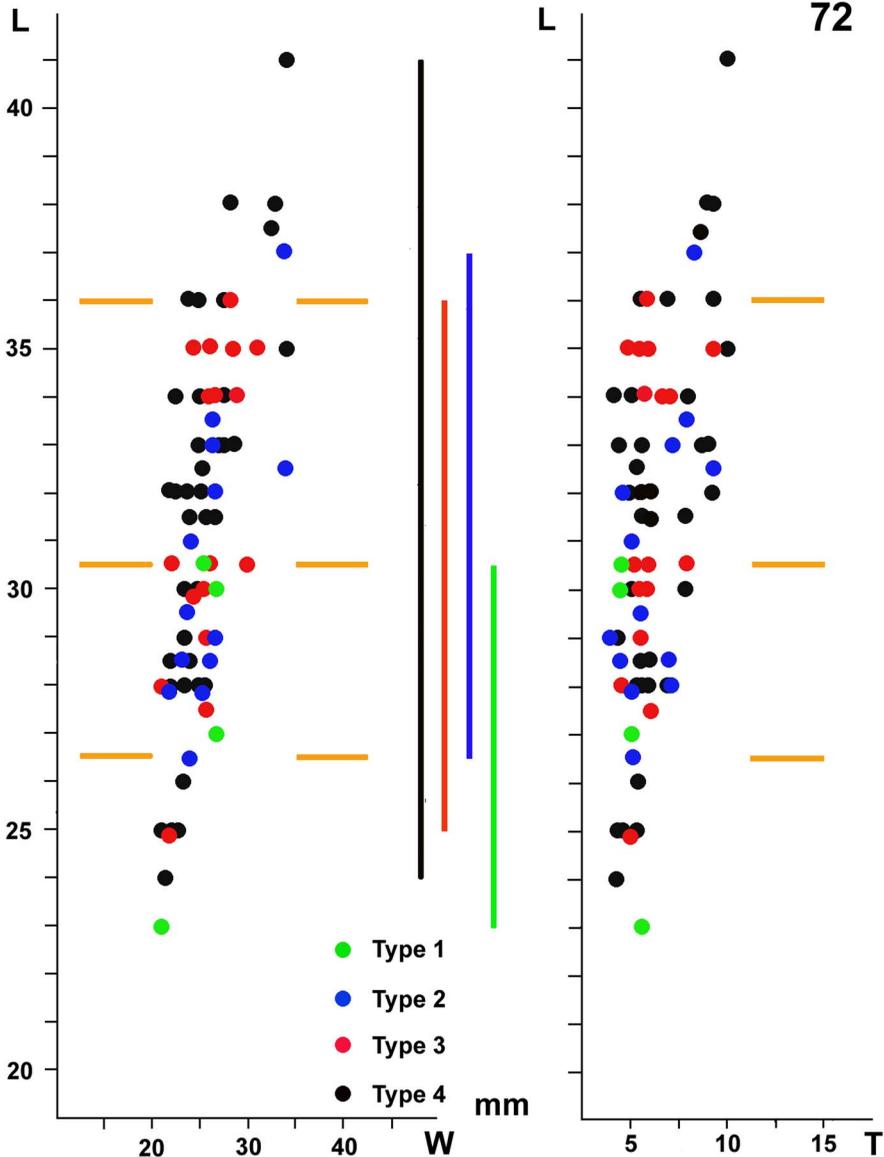


Fig 11. Length/width (left) and length/thickness (right) diagrams of the seventy-two complete gunflints. The colours indicate the four different classes (1 to 4) into which they have been subdivided. The vertical lines represent the maximum and minimum dimensions of the different classes throughout the assemblage.

*Drawing: P Biagi*

but also that their dimensions differ, spanning 23 to 41mm in length, 21 to 34mm in width and 4 to 10mm in thickness. Their average size differs from that of both French and British types.<sup>52</sup> A closer comparison is with rectangular specimens from

52. Ballin 2013b, 8.

Andalucia.<sup>53</sup> The variable size and shape suggest that they were employed in different types of firearm.<sup>54</sup> Fortunately, the lead sheath into which four military gunflints of Class 3 or 4 are inserted has been preserved (fig 7, nos 2–4 and 6).<sup>55</sup> Three of the leaded specimens are covered by a whitish patina that rarely occurs on other samples from the same assemblage (fig 7, nos 3, 4 and 6).

Two of the *Mercurio* gunflints (fig 3, nos 3 and 4) are similar in material and shape to some pieces from Castle Neugebäude, on the outskirts of Vienna, where an impressive cache of gunflints, chronologically attributed to the siege of Vienna by Napoleon in 1805, has been recovered.<sup>56</sup> They have been attributed to the Lessini Hills manufacture area.

## DISCUSSION

The gunflints excavated from the bow (excavation Zone A) of the *Mercurio* represent the only assemblage of this type ever studied from a shipwreck of the Napoleonic-era Italic Kingdom. The scope of the present analysis is to shed some light on a few important topics, among which are: 1) typology; 2) manufacture; 3) raw material provenance and circulation; and 4) the function of the specimens. Our conclusions for each of these points is briefly summarised below.

- 1) The tools have been described according to well-established typologies to enable comparison with other assemblages with similar characteristics in the future. Although not exactly identical, a few specimens recall D-shaped French types (fig 3, nos 1–4).<sup>57</sup> The typological and dimensional characteristics of all the other specimens show that they were undoubtedly produced from north Italian production centres, most probably located around Avio in Monte Baldo (Trentino), for use in military weaponry.
- 2) They have been manufactured according to a technique well known from Britain, France and the Lessini Hills (Verona),<sup>58</sup> in which the gunflints were produced from segments of blade that were long, wide and thin. While the British knappers (from Brandon, for example<sup>59</sup>) were capable of obtaining four to five specimens from each blade,<sup>60</sup> the north Italian knappers produced only one (or two?) pieces per blade using the same knapping technique. The Italian products were made from a lower-quality flint, sometimes of irregular shape.<sup>61</sup> Although most of the *Mercurio* specimens were obtained from the central part of the blade, the bulb of the proximal pieces is always absent, or removed, or thinned by a ventral, flat, invasive retouch (see fig 4, nos 4 and 5). A few pieces show a characteristic lenticular bulbar scar on the ventral surface due to violent hard percussion with a metal hammer (see fig 5, no. 1),

53. Roncal Los Arcos *et al* 1996.

54. See Emy 1978, 170–1; Whittaker 2001, fig 1.

55. Emy 1978, 346.

56. Penz and Trnka 2004, fig 11c.

57. Ballin 2013b, fig 3.

58. Chelidonio 1992; 2013.

59. Lovett 1877.

60. Skertchly 1879, fig 19.

61. See Emy 1978.

and one or two dorsal scars at the edge of the arrises. These latter are typical of the manufacturing technique of the British, French and north Italian knappers.

- 3) The precise location of the flint source is uncertain, though it is undoubtedly from somewhere in north-eastern Italy. Only one specimen is probably made from Lessinian, Scaglia Variegata brown flint (fig 6, no. 1).<sup>62</sup> All the other *Mercurio* gunflints have been obtained from grey and black flint, similar to that employed in the Lessini Hills and Avio workshops, whose provenance is most probably to be found within the Monte Baldo Scaglia Variegata formation or as naturally transported nodules in the Friuli Tagliamento moraines. The flint, although varying in colour and texture within the same geological formation, is easy to recognise because of its vitreous appearance and the presence of many small, lighter or white spots all over its surface. The Avio workshop is the most likely source of the *Mercurio* gunflints, a view supported by historical sources.<sup>63</sup> Gunflint workshops are reported to have been active around Avio until 1819, and the remains of gunflint workshops have been recognised at Pra di Stua.<sup>64</sup> Production here seems to have ceased because of the lower quality of flint supplied by the local outcrops.<sup>65</sup>
- 4) The presence of different types of weapons and of crew members of several different nationalities on board the brig supports the idea that the *Mercurio* gunflints were used to arm a wide variety of firearms, probably produced from different countries, although the arms retrieved from excavation do not bear this out. The gunflint assemblage so far recovered during excavation is small compared to the quantity that was probably needed to supply such vessels during complex war operations, which probably carried several barrels of ammunition.<sup>66</sup> It is difficult to understand why north Italian gunflints made from lower-quality flint were used on a Napoleonic vessel moving across insecure waters, and fighting against a very difficult enemy whose weaponry was undoubtedly superior to that of the *Mercurio*.

#### CONCLUSION

The small chipped stone assemblage of *Mercurio* gunflints contributes to a better understanding of the weaponry used on an early nineteenth-century ship, a topic still undeveloped in present-day archaeology.<sup>67</sup> Furthermore it opens new perspectives on the north Italian, Veronese and Trentino gunflint industry whose products, though mostly intended to supply the Austrian imperial army, was undoubtedly utilised also on Napoleonic vessels of this period. The reason why north Italian gunflints were used on the *Mercurio*, instead of superior-quality, longer-lasting French ‘du Berry’ gunflints that might guarantee better results in case of a battle,<sup>68</sup> is difficult to explain. Further reading and knowledge of the historical sources on gunflint commerce and the provenance of the military supplies of the Italic Kingdom navy, and the political reasons behind them, is greatly needed.

62. Barbieri *et al* 2013.

63. See Emy 1978, 114.

64. G Trnka, pers comm, 18 Dec 2015.

65. Chelidonio 1987, 122.

66. Emy 1978, 226.

67. Ballin 2014b.

68. Emy 1978, 149.

Table 1. Class attribution and retouch characteristics of the *Mercurio* gunflints

Year of excavation	Inventory no.	Class	Leading edge retouch	Heel retouch	Right side retouch	Left side retouch	Demicone from segmentation	Figure
2006	328-1	4	Simple, marginal, direct	Damaged	Bulbar end	Simple, deep, inverse	None	
2006	328-2	2	Simple, marginal, direct	Bulbar end	Simple, deep, direct	Simple, deep, direct	None	Fig 4, no. 3
2006	350	3	Simple, marginal, inverse	Simple, deep, direct, partial	Semi-abrupt, deep, direct	Damaged	Left bevel arris	
2007	417-1	3 or 4?	Small, inverse breaks	Lead sheath	Lead sheath	Lead sheath	Not determinable	Fig 7, no. 3
2007	423	3	Simple, marginal, direct	Simple, marginal, direct	Flat, invasive, direct	Flat, invasive, direct	Right and left bevel arrises	Fig 4, no. 6
2007	474	4	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	Semi-abrupt, deep, direct	Right and left bevel arrises	Fig 6, no. 1
2007	483-2	2	Abrupt, deep, direct	Abrupt, deep, direct	Semi-abrupt, deep, direct	Simple, marginal, direct; inverse thinned	Right bevel arris	
2007	484	3	Unretouched	Unretouched	Simple, deep, direct	Simple, deep, direct	Right bevel arris	
2007	485-1	2	Simple, deep, direct	Thinned bulbar end	Small breaks	Simple, deep, inverse	None	Fig 4, no. 5
2007	485-2	1	Simple, deep, direct; ventral thinning, used?	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	None	
2007	497-1	2	Simple, marginal, direct	Thinned bulbar end	Simple, marginal, direct	Simple, marginal, direct	None	
2007	507-1	4	Small breaks	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right band left bevel arrises	
2007	507-2	4	Unretouched	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 6, no. 2
2007	507-3	4	Unretouched	Damaged	Simple, deep, direct	Simple, deep, direct	Right bevel arris	Fig 6, no. 4
2007	511-1	4 fr	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Half missing	Right bevel arris	Fig 7, no. 7
2007	531-1	4	Simple, marginal, direct	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Right and left bevel arrises	
2007	531-2	3	Unretouched	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 5, no. 4
2007	531-3	2	Simple, marginal, direct	Thinned bulbar end	Simple, marginal, direct	Simple, deep, direct	Left bevel arris	
2007	531-4	3	Simple, marginal, direct	Simple, deep, direct, notched	Bulbar end, thinned	Damaged, utilised?	Right and left bevel arrises	Fig 3, no. 5
2007	531-5	3	Unretouched	Simple, marginal, direct	Damaged	Bulbar end, thinned? Damaged?	None	
2007	531-6	4	Small breaks	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 3, no. 4
2007	531-7	1	Direct, scaled	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	None	Fig 3, no. 2
2007	531-8	3	Simple, deep, inverse	Simple, deep, inverse	Simple, deep, direct and inverse	Simple, deep, direct and inverse	Right and left bevel arrises	
2007	531-9	3 or 4?	Slightly damaged	Lead sheath	Lead sheath	Lead sheath	Left bevel arris	Fig 7, no. 2

Table 1 (cont)

Year of excavation	Inventory no.	Class	Leading edge retouch	Heel retouch	Right side retouch	Left side retouch	Demicone from segmentation	Figure
2007	531-10	3 or 4?	Unretouched	Lead sheath	Lead sheath	Lead sheath	Right and left bevel arrises	Fig 7, no. 4
2007	545-1	2	Simple, deep, direct	Thinned bulbar end	Simple, marginal, direct	Simple, deep, direct	None	Fig 4, no. 4
2007	554	3 or 4?	Simple, marginal, inverse	Lead sheath	Lead sheath	Lead sheath	None	Fig 7, no. 6
2007	556-1	4	Simple, marginal, direct	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 6, no. 6
2008	600-1	4	Simple, deep, direct	Simple, deep, direct	Unretouched	Simple, deep, direct	Right bevel arris	
2008	600-2	2	Simple, marginal, direct	Thinned bulbar end	Simple, deep, direct	Simple, marginal, direct	None	
2008	600-3	4	Inverse, thinned, notched	Inverse, thinned	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 6, no. 5
2008	606-1	4	Unretouched	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Right and left bevel arrises	
2008	606-2	2	Unretouched	Unretouched	Simple, marginal, direct	Simple, marginal, direct	Right bevel arris	
2008	606-3	4	Unretouched	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Left bevel arris	
2008	606-4	4	Simple, marginal, direct; thinned, inverse	Simple, deep, direct	Bulbar end; simple, deep, direct	Convex bevel; simple, marginal, direct	Right and left bevel arrises	
2008	606-5	1	Unretouched	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	5% cortex	
2008	607-1	4	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	
2008	607-2	3?	Unretouched	Missing	Damaged	Simple, deep, direct	Right bevel arris	
2008	608-1	4	Unretouched	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	
2008	608-2	2	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	Left bevel arris	Fig 4, no. 2
2008	609	4	Simple, marginal, direct	Unretouched	Semi-abrupt, deep, direct	Bulbar end; simple, deep, direct	Right and left bevel arrises	Fig 10, no. 1
2008	611	3	Simple, marginal, direct	Simple, deep, direct	Thinned bulbar end	Simple, deep, direct	None	
2008	614-1	4	Simple, marginal, direct; damaged	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	None?	Fig 6, no. 5; fig 9, no. 1
2008	614-2	1 (atypical)	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	Simple, marginal, direct	None	Fig 3, no. 3; fig 9, no. 2
2008	614-3	4	Unretouched	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	None	Fig 9, no. 3

Table 1 (cont)

Year of excavation	Inventory no.	Class	Leading edge retouch	Heel retouch	Right side retouch	Left side retouch	Demicone from segmentation	Figure
2008	614-a	4	Unretouched	Unretouched	Unretouched? Damaged	Simple, marginal, direct? Damaged	Right bevel arris	Fig 9a
2008	614-b	4	Simple, marginal, direct	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Right and left bevel arrises	Fig 9b
2008	614-c	4	Unretouched	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Left bevel arris; ventral, lenticular bulbar scar	Fig 9c
2008	614-d	4	Simple, marginal, direct	Simple, marginal, direct, ventral thinning	Simple, deep, direct, ventral thinning	Missing	None	Fig 9d
2008	614-e	4	Unretouched	Unretouched	Simple, deep, direct	Missing	Right bevel arris	Fig 9e
2008	614-f	4	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 9f
2008	621-1	3	Simple, marginal, direct	Simple, deep, direct	Simple, marginal, direct	Simple, marginal, direct	None	
2008	622	4	Small breaks	Damaged	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Left bevel arris	
2008	624-1	4	Utilised (heavily)	Simple, deep, direct	Bulbar end; semi- abrupt, deep, direct	Semi-abrupt, deep, direct	Right and left bevel arrises	Fig 10, no. 4
2008	624-2	4	Missing	Simple, deep, inverse	Bulbar end	Semi-abrupt, deep, direct, convex	Right bevel arris	
2008	625	4	Unretouched	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	
2008	651	3	Unretouched	Unretouched	Simple, deep, direct	Simple, deep, direct	Left bevel arris	
2008	653-3	3	Utilises, notched	Utilised, notched	Thinned bulbar end	Semi-abrupt, deep, direct, slightly convex	Left bevel arris	Fig 5, no. 5
2008	660-1	3	Inverse, thinned	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 5, no. 2
2008	660-2	2	Simple, marginal, direct	Thinned bulbar end	Simple, deep, direct	Simple, marginal, direct	Ventral, lenticular bulbar scar	Fig 5, no. 1
2008	660-3	4	Simple, marginal, inverse	Simple, marginal, direct	Simple, marginal, direct; and inverse	Simple, marginal, direct and inverse	Left bevel arris	
2008	660-4	4	Unretouched	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	
2008	663-1	4 (atypical)	Unretouched	Simple, marginal, inverse	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	Fig 6, no. 7; fig 10, no. 2
2008	669-1	3	Simple, marginal, direct, partial	Unretouched	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	Right bevel arris	Fig 5, no. 3
2008	669-2	4	Simple, marginal, direct	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	None	Fig 6, no. 3
2008	673-1	4	Simple, marginal, direct	Simple, marginal, direct	Simple, deep, direct	Thinned bulbar end	None	

Table 1 (cont)

Year of excavation	Inventory no.	Class	Leading edge retouch	Heel retouch	Right side retouch	Left side retouch	Demicone from segmentation	Figure
2008	673-2	4	Unretouched	Simple, marginal, inverse	Flat, invasive, direct	Flat, invasive, direct	Right and left bevel arrises	
2008	673-3	2	Simple, marginal, direct	Simple, deep, direct	Simple, marginal, inverse	Simple, marginal, direct	Left bevel arris	Fig 4, no. 1
2008	674-10	3	Unretouched	Simple, deep, direct, partial	Simple, deep, direct	Simple, deep, direct	Left bevel arris	
2008	675	4	Unretouched	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right bevel arris	
2009	681	4	Simple, deep, inverse, partial	Small breaks	Simple, marginal, direct	Bulbar end; semi-abrupt, deep, direct	Right bevel arris; ventral, lenticular bulbar scar	Fig 10, no. 3
2009	690	4	Unretouched	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	Right bevel arris	
2009	694-1	3	Unretouched	Simple, marginal, inverse (use damage?)	Simple, deep, direct	Simple, deep, direct	Right bevel arris	
2009	696	4	Unretouched	Simple, deep, direct	Simple, marginal, inverse	Bulbar end; simple, deep, direct	Right bevel arris; ventral, lenticular bulbar scar	
2009	700	2	Simple, marginal, direct	Simple, deep, direct; thinned bulbar end	Simple, marginal, direct	Simple, marginal, direct	None	
2009	718-1	4	Simple, marginal, direct	Semi-abrupt, marginal, direct	Simple, deep, direct	Simple, deep, direct	Left bevel arris	
2009	722	4	Small breaks	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	Right bevel arris	
2009	723	4	Small breaks	Unretouched	Simple, deep, direct	Missing	Right bevel arris	
2009	727-1	4	Inverse, thinned	Simple, deep, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arrises	
2009	750	3	Unretouched	Simple, marginal, direct	Semi-abrupt, deep, direct	Semi-abrupt, deep, direct	None	
2009	752	2	Simple, marginal, direct	Simple, marginal, direct	Small breaks	Small breaks	None	
2009	758-1	4	Simple, marginal, direct	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	Right and left bevel arris	
2010	798	4	Simple, marginal, direct	Simple, marginal, direct	Simple, deep, direct	Simple, deep, direct	None	
2010	804-1	3	Simple, marginal, direct, partial	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arris	
2011	839	4	Unretouched	Unretouched	Simple, deep, direct	Simple, deep, direct	Right and left bevel arris	Fig 7, no. 1

Table 2. Provenance, material, manufacture and raw material characteristics of the *Mercurio* gunflints

Year of excavation	Inventory no.	Square	Measures (mm)	Condition	Part	Blank	Material	Colour	Munsell code	Shape	Percussion bulb	Arrises	Use wear traces	Notes	Figure
2006	328-1	8	33 × 25 × 9	Broken prox. end right corner	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes	1 central	No	Patinated, incrustations	
2006	328-2	8	31 × 27 × 5	Complete	Proximal	Blade	Flint	Dark bluish grey	5B 4/1	Rectangular	Yes, thinned	1 transversal	No	Incrustations (metal?)	Fig 4, no. 3
2006	350	8	35 × 27 × 6	Broken prox. end right corner	Medial?	Blade	Flint	Black	N 2.5/	Rectangular	No	2 parallel	No	Lighter grey spots	
2007	417-1	8	36 × ? × ?	Complete	Medial	Blade?	Flint	Whitish patina	Unknown	Rectangular	No	1 central	No	White patina (N 8), lead sheath cover	Fig 7, no. 3
2007	423	8	25 × 22 × 5	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	2 irregular	No	None	Fig 4, no. 6
2007	474	8	28 × 25 × 6	Complete	Medial	Blade	Flint	Brown	10YR5/3	Rectangular	No	1 asymmetric	No	Lessinian flint (Scaglia Variiegata); inserted in the cock of a pistol?	Fig 6, no. 1
2007	483-2	8	28 × 26 × 7	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	M	1 transversal	No	None	
2007	484	8	29 × 26 × 6	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	2 irregular	No	Slightly variegated flint	
2007	485-1	8	33.5 × 26.5 × 8	Complete	Proximal	Blade	Flint	Very dark grey	N 3/	Rectangular	Yes, thinned	1 asymmetric	No	None	Fig 4, no. 5
2007	485-2	8	23 × 21 × 6	Complete	Medial?	Flake?	Flint	Unknown	Unknown	D-shaped	No	None	Yes	Burnt	Fig 3, no. 1
2007	497-1	8	37 × 32 × 8.5	Complete	Proximal	Blade	Flint	Very dark grey	N 3/	Rectangular	Yes	2 convergent	No	Ventral, lenticular bulb scar	
2007	507-1	8	24 × 21.5 × 4	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 parallel	No	None	
2007	507-2	8	29 × 24.5 × 4	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 parallel	No	None	Fig 6, no. 2
2007	507-3	8	34 × 25 × 8	Right lateral detachment	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 irregular	No	None	Fig 6, no. 4
2007	511-1	8	(23) × 23 × 5.5	Fragment, half missing	Medial	Blade	Flint	Dark greenish grey	5GY 4/1	Rectangular	No	1 asymmetric	No	Concreted with two pistols	Fig 7, no. 7
2007	531-1	8	28 × 24 × 7	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 parallel	No	None	
2007	531-2	8	35 × 31 × 9	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	2 irregular	No	None	Fig 5, no. 4
2007	531-3	8	33 × 28 × 7	Complete	Proximal	Blade	Flint	Grey	N 5/	Rectangular	Yes, thinned	1 irregular	No	None	
2007	531-4	8	34 × 28 × 7	Broken prox. end right corner	Proximal	Blade	Flint	Dark grey	N 4/	Rectangular	Yes, thinned	2 irregular	Yes	Lighter grey spots	Fig 3, no. 5
2007	531-5	8	34 × 26.5 × 7	Broken prox.-dist. right corners	Proximal	Blade	Flint	Dark grey	N 4/	Rectangular	Yes, thinned?	1 irregular	No	5% cortex	
2007	531-6	8	33 × 29 × 8.5	Complete	Medial	Blade	Flint	Dark greenish grey	5GY 4/1	Trapezoidal	No	1 central	No	None	Fig 3, no. 4
2007	531-7	8	27 × 28.5 × 5	Complete	Medial	Flake	Flint	White patina	Unknown	D-shaped	No	1 irregular	No	White patina (N 8), translucent	Fig 3, no. 2
2007	531-8	8	30.5 × 26 × 8	Complete	Medial	Flake?	Flint	Grey	N 5/	Trapezoidal (oval-shaped)	No	2 irregular	No	Reddish brown spots (5YR5/4)	
2007	531-9	8	29 × ? × ?	Complete	Medial?	Blade?	Flint	Whitish patina	Unknown	Rectangular	No	Unknown	Yes	White patina (N 8), lead sheath cover, incrustations	Fig 7, no. 2
2007	531-10	8	30 × ? × ?	Complete	Medial?	Blade	Flint	Very dark grey	N 3/	Rectangular	No	Unknown	No	Lead sheet cover	Fig 7, no. 4
2007	545-1	8	29.5 × 24 × 5.5	Complete	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes, thinned	2 parallel	No	None	Fig 4, no. 4

Table 2 (cont)

Year of excavation	Inventory no.	Square	Measures (mm)	Condition	Part	Blank	Material	Colour	Munsell code	Shape	Percussion bulb	Arrises	Use wear traces	Notes	Figure
2007	554	8	28 x ? x ?	Complete	Medial	Blade	Flint	Whitish patina	Unknown	Rectangular	No	1 central?	No	White patina (N 8/), lead sheath cover, incrustations	Fig 7, no. 6
2007	556-1	8	28 x 25 x 6	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 central	No	None	Fig 6, no. 6
2008	600-1	9	38 x 33 x 9	Complete	Proximal	Flake?	Flint	Black	N 2.5/	Rectangular	Yes	1 irregular	No	None	
2008	600-2	9	32.5 x 32 x 9	Complete	Proximal	Blade	Flint	Dark greenish grey	5GY 4/1	Squared	Yes, thinned	2 convergent	No	Striped grey	
2008	600-3	9	32 x 22.5 x 6	Complete	Medial	Blade	Flint	Dark greenish grey	5GY 4/1	Rectangular, elongated	No	1 central	Yes	Lighter grey spots	
2008	606-1	9	36 x 25 x 6	Complete	Medial	Blade	Flint	Dark greenish grey	5GY 4/1	Rectangular	No	1 central	No	Striped grey	
2008	606-2	9	32 x 28 x 4.5	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	2 transversal	No	Lighter grey spots	
2008	606-3	9	35 x 32 x 10	Complete	Medial	Flake	Flint	Dark greenish grey	5GY 4/1	Rectangular	No	2 irregular	No	Small lighter spots	
2008	606-4	9	30 x 25 x 8	Complete	Proximal	Blade	Flint	Greenish grey	N 6/	Rectangular (trapezoidal)	Yes, thinned?	1 central	No	None	
2008	606-5	9	30.5 x 26 x 4	Complete	Medial	Blade?	Flint	Greenish grey	N 6/	Trapezoidal, convex ends	No	1 central	No	Lighter grey spots	
2008	607-1	9	32 x 24 x 7	Left upper corner missing	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	2 irregular	No	Lighter grey spots	
2008	607-2	9	30.5 x 22 x 6.5	Left side partly missing	Medial	Blade	Flint	Black	N 2.5/	Rectangular	Yes, thinned	2 irregular	No	None	
2008	608-1	9	25 x 23 x 5.5	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 irregular	No	None	Fig 4, no. 2
2008	608-2	9	28.5 x 26 x 4	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	None	No	Lighter grey spots	
2008	609	9	36 x 27 x 9	Complete	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes	1 oblique	No	None	Fig 10, no. 1
2008	611	9	35.5 x 30 x 5.5	Complete	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes, thinned	1 central	No	None, incrustations	
2008	614-1	9	34 x 27 x 5	Complete (from a flake)	Medial	Flake	Flint	Dark grey	N 4/	Rectangular	No	1 oblique	No	Concreted with a cannon gunlock, metal residues	Fig 7, no. 5; fig 9, no. 1
2008	614-2	9	30 x 26.5 x 4	Complete	Medial	Blade	Flint	Black	N 2.5/	D-shaped	No	1 oblique	No	Concreted with a cannon gunlock, metal residues	Fig 3, no. 3; fig 9, no. 2
2008	614-3	9	31.5 x 28 x 6	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 oblique	No	Concreted with a cannon gunlock, metal residues	Fig 9, no. 3
2008	614-a	9	(29) x (23.5) x 4	Three corners missing	Medial	Flake?	Flint	Black	N 2.5/	Rectangular	No	1 irregular?	No	Concreted with a cannon gunlock, metal residues	Fig 9a
2008	614-b	9	28 x 19 x 5.5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 central	No	Concreted with a cannon gunlock, metal residues	Fig 9b
2008	614-c	9	27 x 27 x 5.5	Complete (3 pieces conjoined)	Medial	Flake	Flint	Dark grey	N 4/	Squared	Ventral scar	1 lateral	No	Concreted with a cannon gunlock, metal residues, three conjoined pieces	Fig 9c

Table 2 (cont)

Year of excavation	Inventory no.	Square	Measures (mm)	Condition	Part	Blank	Material	Colour	Munsell code	Shape	Percussion bulb	Arrises	Use wear traces	Notes	Figure
2008	614-d	9	(21.5) x 27 x 6	Fragment (right half)	Medial?	Flake?	Flint	Dark grey	N 4/	Rectangular	Thinned	2 irregular	Yes?	Concreted with a cannon gunlock, metal residues, patinated, light yellowish brown spots (2.5Y6/3)	Fig 9d
2008	614-e	9	25.5 x 19.5 x 5.5	Distal edge missing	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 central	No	Concreted with a cannon gunlock, metal residues	Fig 9e
2008	614-f	9	30.5 x 25 x 5.5	Left upper corner missing	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	Yes, thinned	1 oblique	No	Concreted with a cannon gunlock, metal residues, patinated	Fig 9f
2008	621-1	9	34 x 29.5 x 6	Complete	Medial	Flake?	Flint	Black	N 2.5/	Rectangular	No	2 oblique	No	None	
2008	622	9	25 x 22.5 x 4.5	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 oblique	No	None	
2008	624-1	9	41 x 34 x 10	Complete, left side reshaped	Proximal	Flake	Flint	Grey	N 5/	Rectangular (butterfly)	Yes	1 transversal	Yes	Butterfly-shaped, reused as a fire flint? Small light brown spots	Fig 10, no. 4
2008	624-2	9	30 x 24 x (8)	Left side missing	Proximal	Flake?	Flint	Unknown	Unknown	Rectangular	Yes	2 convergent	No	Burnt, metal residue	
2008	625	9	31.5 x 27.5 x 6	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	1 central	No	None	
2008	651	9	30 x 27.5 x 5.5	Complete	Medial	Blade	Flint	Grey (burnt?)	N 5/	Rectangular	No	2 parallel	No	Burnt?, concretions	
2008	653-3	9	30 x 24 x 5.5	Complete, sides reshaped	Proximal	Blade	Flint	Dark grey	N 4/	Rectangular (butterfly)	Yes, thinned	2 central	Yes	Butterfly-shaped, reused as a fire flint?	Fig 5, no. 5
2008	660-1	9	27.5 x 25.5 x 6.5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	2 central	No	None	Fig 5, no. 2
2008	660-2	9	28 x 25 x 5	Complete	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes, thinned	1 transversal	No	Ventral, lenticular bulbar scar, metal residue	Fig 5, no. 1
2008	660-3	9	37.5 x 32.5 x 6	Complete	Proximal	Blade	Flint	Black	N 2.5/	Rectangular	Yes, thinned	1 central	No	None	
2008	660-4	9	28 x 22 x 5.5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 central	No	Metal residues	
2008	663-1	9	34 x 23.5 x 3.5	Complete	Proximal	Blade	Flint	Bluish grey	5B 5/1	Rectangular	Yes, thinned	1 lateral	No	Lighter grey spots	Fig 6, no. 7; Fig 10, no. 2
2008	669-1	9	36 x 28 x 5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular (trapezoidal)	No	2 oblique	No	Lighter grey stripes	Fig 5, no. 3
2008	669-2	9	33 x 27 x 4	Complete	Medial	Blade	Flint	Bluish grey	5B 6/1	Rectangular	No	1 oblique	No	Lighter grey stripes	Fig 6, no. 3
2008	673-1	9	33 x 27 x 6	Complete	Proximal	Blade	Flint	Dark grey	N 4/	Rectangular	Yes, thinned	Irregular	No	None	
2008	673-2	9	28.5 x 22 x 6	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	1 central	Yes	None, patinated	
2008	673-3	9	26.5 x 24.5 x 5	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	2 parallel	No	None	Fig 4, no. 1
2008	674-10	9	35 x 29 x 6	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	2 parallel	No	None	
2008	675	9	32 x 23 x 5	Complete	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 oblique	No	None	
2009	681	9	31.5 x 28 x 8	Complete	Proximal	Flake	Flint	Black	N 2.5/	Rectangular	No	1 lateral	No	Ventral, lenticular bulbar scar	Fig 10, no. 3
2009	690	9	36 x 24.5 x 7	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 central	No	None	
2009	694-1	9	28 x 21 x 4.5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 oblique	Yes	None	
2009	696	9	38 x 29 x 9	Complete	Proximal	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 lateral	Yes?	Ventral, lenticular bulbar scar	

Table 2 (cont)

Year of excavation	Inventory no.	Square	Measures (mm)	Condition	Part	Blank	Material	Colour	Munsell code	Shape	Percussion bulb	Arrises	Use wear traces	Notes	Figure
2009	700	9	28.5 x 23.5 x 7	Complete	Proximal	Flake	Flint	Black	N 2.5/	Rectangular	Yes, thinned	2 oblique	No	None	
2009	718-1	9	28.5 x 24 x 6	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	1 irregular	No	Lighter grey spots	
2009	722	9	26 x 23.5 x 6	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 transversal	No	None	
2009	723	9	(15) x 19 x 5.5	Proximal fragment	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 central	No	None	
2009	727-1	9	30 x 23 x 5	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	1 oblique	Yes	Lighter grey spots, metal residues?	
2009	750	9	34 x 28 x 5	Complete	Medial	Blade	Flint	Grey	N 5/	Rectangular	No	2 parallel	No	None	
2009	752	9	29 x 26 x 3	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	2 parallel	No	None	
2009	758-1	9	25 x 22 x 4	Complete	Medial	Blade	Flint	Very dark grey	N 3/	Rectangular	No	1 lateral	No	None	
2010	798	9	32.5 x 25.5 x 5.5	Lower right corner missing	Medial	Blade	Flint	Black	N 2.5/	Rectangular	No	1 oblique	Yes?	Thinnings on the ventral face	
2010	804-1	9	34 x 27 x 5	Complete	Medial	Blade	Flint	Dark grey	N 4/	Rectangular	No	2 parallel	No	White cortex lower left corner	
2011	839	9	32 x 25 x 9	Complete	Medial	Blade	Flint	Unknown	Unknown	Rectangular	No	1 central	No	Yellowish red patina (5YR4/6), metal residue (pistol?)	Fig 7, no. 1

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## BIBLIOGRAPHY

- Austin, R J 2011. 'Gunflints from Fort Brooke: a study of some hypotheses regarding gunflint procurement', *The Florida Anthropologist*, **64** (2), 85–105
- Ballin, T B 2012. "'State of art" of British gunflint research, with special focus on the early gunflint workshop at Dun Eistean, Lewis', *Post-Medieval Archaeol.*, **46** (1), 116–42
- Ballin, T B 2013a. 'Brief overview of gunflint forms from northern, eastern and southern Europe', *Gunflints – Beyond the British and French Empires. Occasional Newsletter from an Informal Working Group*, new ser, **1** (2), 4–12
- Ballin, T B 2013b. 'Characterization of gunflint industries through attribute analysis – a proposal', *Gunflints – Beyond the British and French Empires. Occasional Newsletter from an Informal Working Group*, new ser, **2**, 4–16
- Ballin, T B 2014a. 'Gunflints from Drottningen af Sverige (1745) and Concordia (1786)', *Arms & Armour*, **11** (1), 44–67, <doi: 10.1179/1741612414Z.0000000032> (accessed 12 Apr 2016)
- Ballin, T B 2014b. 'Identification of gunflints from shipwrecks', *Vragmus.dk* (the website of Sea War Museum Jutland), <<http://www.seawarmuseum.dk/cgi-files/mdmgfx/file-1045-469778-1760.pdf>> (accessed 16 Apr 2016)
- Ballin, T B 2014c. 'The investigation of Danish gunflint – methodological aspects', *Gunflints – Beyond the British and French Empires. Occasional Newsletter from an Informal Working Group*, new ser, **2**, 4–10
- Barbieri, S, Avanzini, M and Grimaldi, S 2013. 'La selce nel bacino atesino meridionale: caratterizzazione e diffusione', *Preistoria Alpina*, **47**, 27–37
- Barfield, L H 1994. 'The exploitation of flint in the Monti Lessini, northern Italy', in N Ashton and A David (eds), *Stories in Stone*, Lithic Stud Soc Occas Pap 4, 71–83, Lithic Studies Society, London
- Barnes, A S 1937. 'L'industrie des pierres à fusil par la méthode anglaise et son rapport avec le coup de burin tardenoisien', *Bulletin de la Société préhistorique de France*, **34** (7–8), 328–35
- Beltrame, C 2007. 'Il Mercurio: il relitto del brick del Regno Italico affondato nel 1812 nella battaglia di Grado', in L Fozzati (ed), *Caorle Archeologica. Fra mare, fiumi e terra*, 137–46, Marsilio, Venice
- Beltrame, C 2009. 'The excavation of the brig *Mercurio* of the *Regno Italico* (1812). Why investigate a military vessel from the beginning of the 19th century?', in R Bockius (ed), *Between the Seas. Transfer and Exchange in Nautical Technology. Proceedings of the Eleventh International Symposium on Boat Ship Archaeology*, **11**, 249–57, Römisch-Germanischen Zentralmuseums, Mainz
- Beltrame, C 2010. 'Elementi per un'archeologia dei relitti navali di età moderna. L'indagine di scavo sottomarino sul brick *Mercurio*', in S Medas, M D'Agostino and G Caniato (eds), *Archeologia Storia Etologia Navale. Atti del I convegno nazionale, Cesenatico – Museo della Marineria (4–5 aprile 2008)*, 55–61, Edipuglia, Bari
- Beltrame, C 2014. 'L'épave du brick *Le Mercurio* (1812, Italie)', *Archéothéma*, **32**, 62–5
- Beltrame, C 2015. 'A tool assemblage from the brig *Mercurio* (1812): a caulker's storeroom?', *Int J Nautical Archaeol.*, **44** (2), 423–50

- Beltrame, C and Gaddi, D 2002. 'Report on the first research campaign at the wreck of the Napoleonic brig, *Mercure*, Lignano, Udine', *Int J Nautical Archaeol*, **31** (1), 60–73
- Bertoldi, F, Beltrame, C and Sisalli, C 2014. 'Human skeletal remains from the shipwreck of the brig *Mercurio* (1812)', in C Beltrame (ed), *Archeologia dei relitti postmedievali, Archeologia Postmedievale*, **18**, 145–56, All'Insegna del Giglio, Florence
- Bingeman, J M 2004. 'Gunlocks: their introduction to the Navy', <[http://www.invincible1758.co.uk/gun\\_flints.htm](http://www.invincible1758.co.uk/gun_flints.htm)> (accessed 16 Apr 2016)
- Boudriot, J and Berti, H 1981. *Brick de 24 Le Cygne 1806–1808*, A.N.C.R.E., Paris
- Boudriot, J (with the collaboration of H Berti) 1992. *L'artillerie de mer. Marine française 1650–1850*, A.N.C.R.E., Paris
- Brandl, M 2013. 'Characterisation of Middle European chert sources: a multi-layered approach to analysis', unpublished PhD thesis, University of Vienna
- Chelidonio, G 1987. 'Le pietre del fuoco: metodo, problemi e prospettive di una ricerca interdisciplinare', *Annali del Museo Civico di Rovereto, Sezione Archeologia, Storia e Scienze Naturali*, **3**, 113–32
- Chelidonio, G 1992. 'Sui sentieri delle pietre focaie: officine litiche storiche tra "foléndari" ambulanti e non', in R Maggi, R Nisbet and G Barker (eds), *Atti delle Tavola Rotonda Internazionale Archeologia della Pastorizia nell'Europa Meridionale*, **2**, *Rivista di Studi Liguri*, **57**, 233–51
- Chelidonio, G 2003. 'Le pietre del fuoco: un'archo-storia durata fino a loo anni fa', *Quaderni del Savena*, **6**, 125–36
- Chelidonio, G 2013. 'Recent findings and observations on firestones and gunflints between craftsmanship, expedient strategies and warfare conditions', in F Lugli, A A Stoppiello and S Biagetti (eds), *Ethnoarchaeology: current research and field methods*, BAR Int Ser 2472, 36–41, Archaeopress, Oxford
- Cumming, E 2002. *The Earl of Abergavenny: historical record and wreck excavation*, Mibec Enterprises, Weymouth
- Dal Santo, N 2004. 'Provenienza e utilizzo delle rocce silicee scheggiate del sito Neolitico di Palù di Livenza (Pordenone)', *Atti della Società per la Preistoria e Protostoria della Regione Friuli–Venezia Giulia*, **14**, 103–47
- de Lotbiniere, S 1984. 'Gunflint recognition', *International Journal of Nautical Archaeology and Underwater Exploration*, **13** (3), 206–9, <doi: 10.1111/j.1095-9270.1984.tb01191.x> (accessed 12 Apr 2016)
- de Vries, G and Martens, B J 2007. *The Visser Collection. Arms of the Netherlands in the Collection of H L Visser. Volume 1: Catalogue of Firearms, Swords and Related Objects*, Special Interest Publicaties, Arnhem
- Durst, J J 2009. 'Sourcing gunflints to their country of manufacture', *Historical Archaeol*, **43** (2), 19–30
- Emy, J 1978. *Histoire de la pierre à fusil*, Société d'Exploitation de l'Imprimerie Alleaume, Blois
- Evans, A J 1887. 'On the flint-knappers art in Albania', *J Roy Anthropol Inst Great Britain and Ireland*, **16**, 65–8
- Ferrari, A and Pessina, A 1996. *Sammardenchia e i primi agricoltori del Friuli*, Arti Grafiche Friulane, Tavagnacco
- Ginter, B 2009. 'New production site of gunflints for rifles in the region of Cracow', in I Gatsov (ed), *Saxa loquuntur. In honorem 65th anniversari of Nikolai Sirakov*, 345–59, Avalon, Sofia
- Laplace, G 1964. *Essay de Typologie systématique*, Annali dell'Università di Ferrara, nuova serie, sezione 15, Paleontologia Umana e Paleontologia, **1**, Supplemento 2, Ferrara
- Lovett, E 1877. 'Notices of gun flint manufactory at Brandon, with reference to the bearing of its processes upon the modes of flint-working practised in prehistoric times', *Proc Soc Antiq Scotl*, **21**, 206–12
- Mitchell, J 1837. 'On the manufacture of gunflints', *Edinburgh New Philosophical Journal*, **22**, 36–40
- Orsi, P 1886. 'Fabbriche veronesi di pietre da acciarino', *Bullettino di Paleontologia Italiana*, **12**, 94–5
- Penz, M and Trnka, G 2004. 'Ein ehemaliges Flintensteindepot aus dem Schloss Neugebäude in Wien', *Fundort Wien. Berichte zur Archäologie*, **7**, 234–44
- Roncal Los Arcos, M E, Martinez Fernandez, G and Morgado Rodriguez, A 1996. 'Las piedras de chispa: una producción lítica olvidada en España', *Munibe*, **48**, 105–23
- Russell, J and Cohn, R 2015. *Timeline of the Adriatic Campaign, 1807–1814*, Transmedia Holding, Key Biscayne
- Salmon, P 1885. *La fabrication des pierres à feu en France*, Hennuyer, Paris

- Schleicher, C 1927. 'Une industrie qui disparaît. La taille des silex modernes (pierres à fusil et à briquet)', *Bulletin de la Société préhistorique de France*, **24** (10), 367–9
- Skertchly, S B J 1879. *On the manufacture of gun-flints, the methods of excavating for flint, the age of Palaeolithic man, and the connection between Neolithic art and the gun-flint trade*, Memoirs of the Geological Survey. England and Wales, HMSO, London
- von Born, I E 1790. 'Nachricht von den Flintensteinbrüken bey Avio in Walch Tyrol', in I E von Born and W H von Trebra (eds), *Bergbaukunde Zweyter Band*, 383–9, Verlag Georg Joachim Goeschen, Leipzig
- White, S W 1975. 'On the origin of gunspalls', *Historical Archaeol*, **9**, 65–73
- Whittaker, J C 2001. "'The oldest British industry": continuity and obsolescence in a flintknapper's sample set', *Antiquity*, **72**, 382–90
- Witthoft, J 1966. 'A history of gunflints', *Pennsylvania Archaeologist*, **36** (1–2), 12–49
- Woodall, J N and Chelidonio, G 2006. 'Gunflint workshop traces in the Lessini Mountains (Verona, Italy): flintknappers and smugglers at the end of the Venetian Republic', in G Körlin and G Weisgerber (eds), *Stone Age – Mining Age. Der Anschnitt (Proceedings of the VIII Flint Symposium held in Bochum on 13–17 Sept 1999)*, 19, 213–26, Deutsches Bergbau-Museum, Bochum
- Woodall, J N, Trage, S T and Kirchen, R W 1997. 'Gunflint production in the Monti Lessini, Italy', *Historical Archaeol*, **31**, 15–27