

### **Survey and Analysis of the Monte Arci (Sardinia) Obsidian Sources**

Obsidian was a prized stone tool material in antiquity, and the resulting distribution of obsidian in the archaeological record has led to numerous attempts to reconstruct ancient "trade" patterns and mechanisms, and the social and economic conditions under which this "trade" occurred. Cann and Renfrew (1964), analyzing 112 artifacts and geological specimens by optical emission spectroscopy, were the first to "fingerprint" obsidian sources by means of their trace element composition. Despite being unable to separate all the sources studied, Cann and Renfrew were able to identify 18 discrete source groups in the Mediterranean region (fig. 1). In the western Mediterranean, they successfully differentiated the 4 island sources, while noting that the Sardinian source, Monte Arci (fig. 2), could be subdivided into two groups, which they called 2a and 6a. Of the 4 pieces attributed to the two Sardinian sources, all were unstratified archaeological specimens.

A more complete study of the western Mediterranean sources, using neutron activation, was published by Hallam, Warren and Renfrew in 1976. In their analysis of 63 samples of Sardinian obsidian, they discovered that three subgroups of Monte Arci obsidian existed, which they now called SA, SB, and SC. They also discovered that archaeological examples of Sardinian obsidian were found in Corsica, southern France, and Northern Italy, and they proposed an interaction zone model for the distribution of western Mediterranean obsidians. In this model, the Sardinian and Liparian sources are in competition, while the obsidians from Palmarola and Pantelleria have a much more restricted "market."

These analyses of the Sardinian material in fact only confirmed what had been suspected for quite a long time. Della Marmora had written about the Sonnixeddu source near Uras in 1840, and by the turn of the century others had discussed the existence of two principal types of Sardinian obsidian, translucent and opaque. In the late 1940's, Cornelio Puxeddu undertook a survey of the Monte Arci zone, identifying nearly 300 collection centers, workshops, and stations where obsidian artifacts have been found. Puxeddu located one *in situ* source near Conca Cannas (fig. 3), just west of Sonnixeddu, and also thought that Perdas Urias (near Pau) and Tzipaneas (east of Marrubiu) were probable sources because of the quantities of unworked material found in those regions. Puxeddu's work remains important because many of the sites shown in his maps have been obliterated by recent agrarian and industrial activity.

Some more recent analyses of Sardinian material suggest however that the Monte Arci source system is much more complex than previously thought. Mackey and Warren (1983) have demonstrated that *in situ* geological specimens from two localities, Cucru Is Abis, and Monte Sparau North, both in the Santa Maria Zuarbara area of Marrubiu, are similar to, but not identical with, the group known as SB. Moreover, McDougall et al. (1983), using magnetic methods, found that some geological material from near Perdas Urias fell into a fourth group, which was called SD.

To summarize, several analytical studies have been conducted, using various techniques, analyzing different elements, and in general dealing with relatively small numbers of primarily archaeological material. Only the Conca Cannas source has actually been located *in situ*, characterized by a significant number of analyses, and matched with a group of archaeological

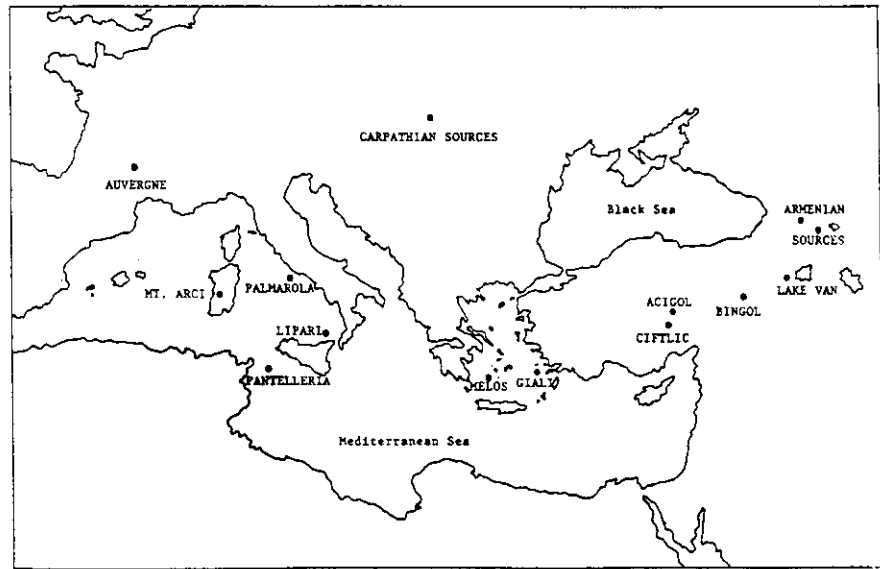


FIGURE 1

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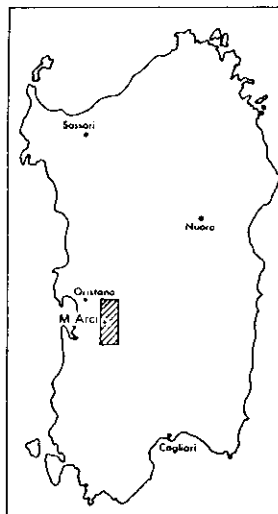


FIGURE 2

specimens. Some *in situ* material has been located in the Santa Maria Zuarbara zone, but neither set of geological samples matches exactly with the archaeological material. Only surface material has been found in the Perdas Urias zone, and two groups may be present there. Along with Sonnixeddu, there might be as many as 5 chemically distinct groups of Monte Arci obsidian.

My own research is intended to clarify the problem of the Monte Arci sources through the collection and analysis of numerous *in situ* geological samples, and then to analyze archaeological collections for the purpose of reconstructing prehistoric trade mechanisms. One cannot emphasize enough the importance of having samples of all the geological sources in one's region of study, and being able to match archaeological artifacts to a specific source, before attempting to reconstruct "trade" patterns. The analysis (by ICP mass spectrometry) of the geological material discussed below, as well as over 500 artifacts from some 35 archaeological sites, is in progress.

The shaded areas of the geological map (fig. 3) are those identified by geologists as acidic lavas in thick flows, and therefore potential sources of obsidian formation. I have collected geological samples from all the sites identified here, although many are of unworkable size or of limited spatial distribution. Obsidian does not occur in all of the shaded areas, and I have located 1 *in situ* source at Pala Sa Murta, in an unshaded zone.

At Conca Cannas, located about 4 kilometers northeast of Uras, and just to the east of the Campidano plain, obsidian occurs abundantly within a perlitic matrix a few hundred meters below the peak, in an area surrounding a modern quarry. Sometimes the perlite is quite hard, with only small specks of obsidian, while at other times much larger pieces will occur amidst flows of red trachyte. In some spots, very little matrix exists among large obsidian blocks which average 10 to 15 centimeters in diameter, and can reach at least 30 centimeters in length. Conca Cannas obsidian is generally quite glassy, black but sometimes quite translucent in thin pieces, with banded clouds of colorant. Occasionally it will contain red streaks. Although small amounts of obsidian occur *in situ* over a wide area near Conca Cannas, nodules of workable size are more restricted in their distribution. I agree with Mackey that Sonnixeddu is actually a collection area, rather than a geological source.

The zone where SB type obsidian occurs is located near the church of Santa Maria Zuarbara but often at much higher elevations. A few kilometers east of the church obsidian may be found *in situ* on the slope of Cuccuru Porcufurau, in blocks up to 30 centimeters in length. 3 to 5 centimeter nodules of obsidian occur at Punta Su Zippiri, at an elevation of 500 meters. And it occurs near Monte Sparau as well in workable-sized blocks.

The Cucru Is Abis source appears to begin at an elevation of 230 meters and flows down to the west, where large blocks may be found in a quarry below the Seddai cliff-face. Material still in the quarry appears to be up to 1 meter in length. Interestingly enough, hardly any obsidian occurs in another quarry less than 1 kilometer to the north. Obsidian from this zone is frequently as glassy as the Conca Cannas material, but may be less translucent and grayer in color. This obsidian also is often broken up by white spots of crystalline material which make the fracture sub-conchoidal. Not all pieces have white spots however, and visual techniques of source identification are not entirely accurate.

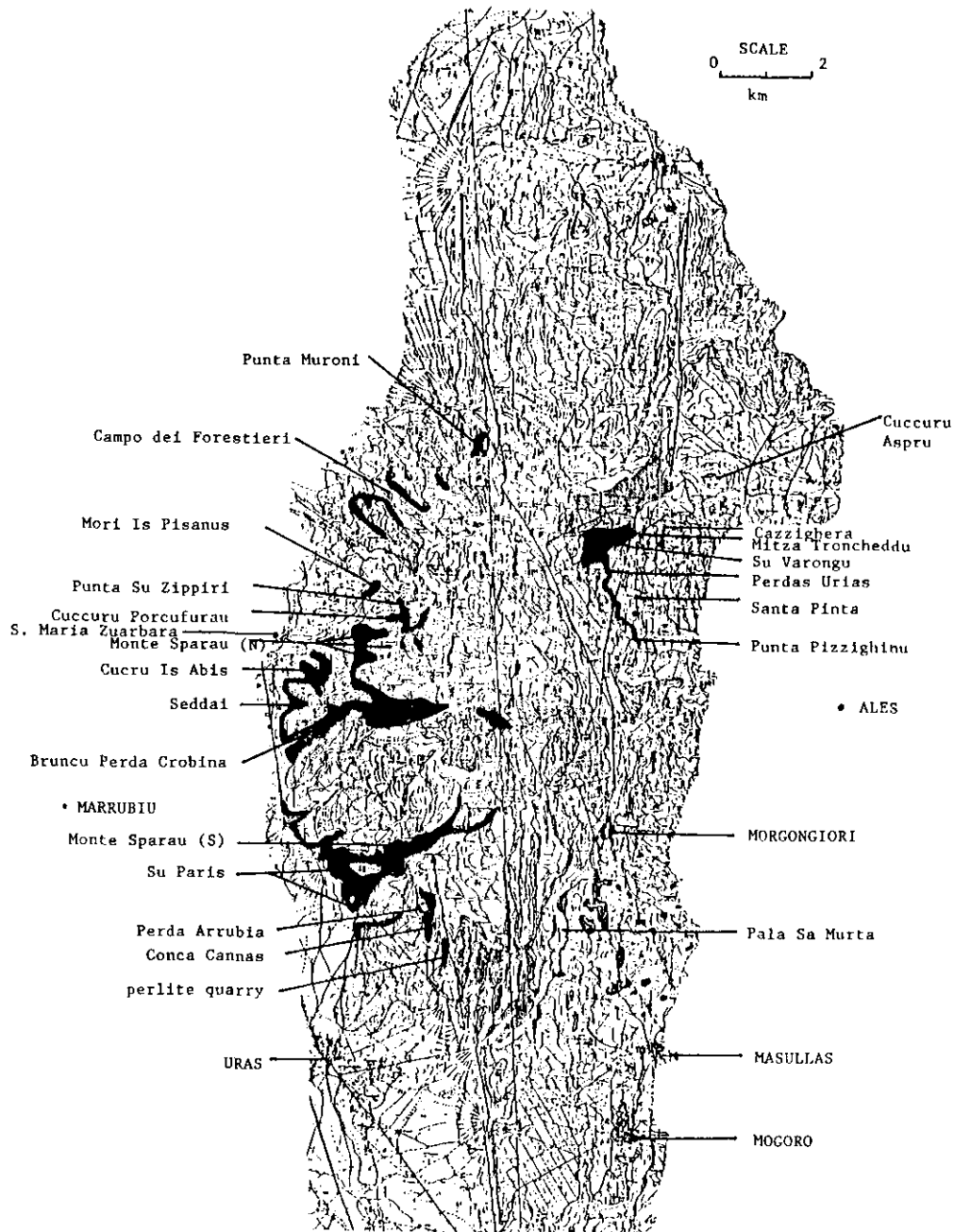


FIGURE 3  
(submitted by author)

Obsidian can also be found elsewhere along the western flanks of Monte Arci. *In situ* obsidian 15 to 17 centimeters in length can be found on the slope of Bruncu Perda Crobina beginning at an elevation under 100 meters in the west, and up to an elevation of perhaps 400 meters to the east. Smaller pieces of obsidian can be found even further south near the peak of Su Paris de Monte Bingias, and near Monte Sparau South where modern quarrying will soon eliminate the confusion caused by the two Monte Sparaus.

On the northeastern side of Monte Arci lies the Perdas Urias source zone, which is actually a chain running north-northwest from Punta Pizzighinu to the plateau of Su Varongu. Abundant material may be found in redeposited contexts, both natural and archaeological. *In situ* material up to 17 centimeters in length may be found in a perlitic matrix at about 600 meters altitude, near Punta Pizzighinu, while natural blocks up to 30 centimeters may be found redeposited near Santa Pinta, just below the actual peak of Perdas Urias, near Mitza Troncheddu to the north, and in the low hills of Cazzighera to the east. Obsidian from this zone tends to exhibit the greatest range of suitability for tool use, perhaps because of its great geological age. Some material is highly devitrified and weathered on its surface, while other pieces are glassy and rival the Conca Cannas material in quality.

In conclusion, obsidian in large workable pieces occurs in a limited area around Conca Cannas, a somewhat wider zone between Pizzighinu and Perdas Urias, and in a number of places along the western flanks of Monte Arci. The task ahead is to characterize the individual geological outcrops, and determine which were exploited in prehistoric times. Once we know where the obsidian is coming from, we may then turn our attention to questions of trade, and the economic and political circumstances under which it transpired.

Robert H. Tykot  
Department of Anthropology  
Harvard University  
Cambridge, MA 02138

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