

# Elusive Glass: The Search for an Obsidian Source on Isla Ángel de la Guarda

Thomas Bowen

## Abstract

In 1994 three pieces of obsidian, purportedly from Isla Ángel de la Guarda, were analyzed by x-ray fluorescence and were found to have a unique chemical signature, suggesting a source of tool-quality obsidian on that island. However, it was unclear just where on the island the specimens had been collected or from what kind of source. Fieldwork conducted on the island up to 2007 failed to locate either a source or a significant quantity of worked material. Since 2009, several sources have been located, and while some contain high quality glass, most consist of a grossly inferior material laden with phenocrysts. Strangely, both high-quality and low-quality materials were quarried and reduced, yet it appears that neither was used very much on the island. While some of the high-quality obsidian ended up on the Baja California peninsula, what became of the poor-quality material remains unknown. Thus, although sources have now been identified, the cultural dynamics of the island's obsidian industry are only beginning to be understood.

## Introduction

Historian of science Thomas Kuhn (1970:136–143) pointed out that textbook and popular histories of scientific disciplines are revisionist histories. They portray scientific progress as linear, each research result building upon the last and leading inexorably to the present state of knowledge. The reality, however, is that scientific progress is more like a maze, full of false starts, wrong turns, and dead ends. These missteps are routinely edited out, as is the sometimes substantial role of luck. The resulting narrative, says Kuhn, is an orderly account, but also wrong.

The search for an obsidian source on Isla Ángel de la Guarda (IAG) (Figures 1 and 2), at least my

participation in it, has had its share of blind alleys and blind luck. After much stumbling around, a basic picture has emerged, even if still rather muddled. With a nod to Kuhn, this narrative is not a sanitized history, but rather a purely personal account of how it came about. No doubt, others who were involved would tell it very differently.

My connection with obsidian on IAG began innocuously enough in August 1978 when a letter arrived from Conrad Bahre. Conrad, a cultural geographer with a longstanding interest in the human history of the Gulf of California, had recently made a brief visit to IAG. At the northwestern tip of the island, he was:

able to spend three or four hours onshore at Puerto Refugio and found some middens (?) just west of the Bay.... There was quite a bit of obsidian, which according to the crew [of the ship] comes from Punta Viboras [near the southeastern tip of the island], though they did not know the exact location of an obsidian source there. At any rate, I have a gut feeling that there must have been people on Angel de la Guarda in the past [Conrad Bahre, personal communication 1978].

At that time, the only Gulf island I was familiar with was Isla Tiburón, so the possibility of Native people inhabiting a large island on the opposite side of the Gulf was intriguing. Obsidian, very rare on Tiburón and the adjacent mainland coast, made IAG seem that

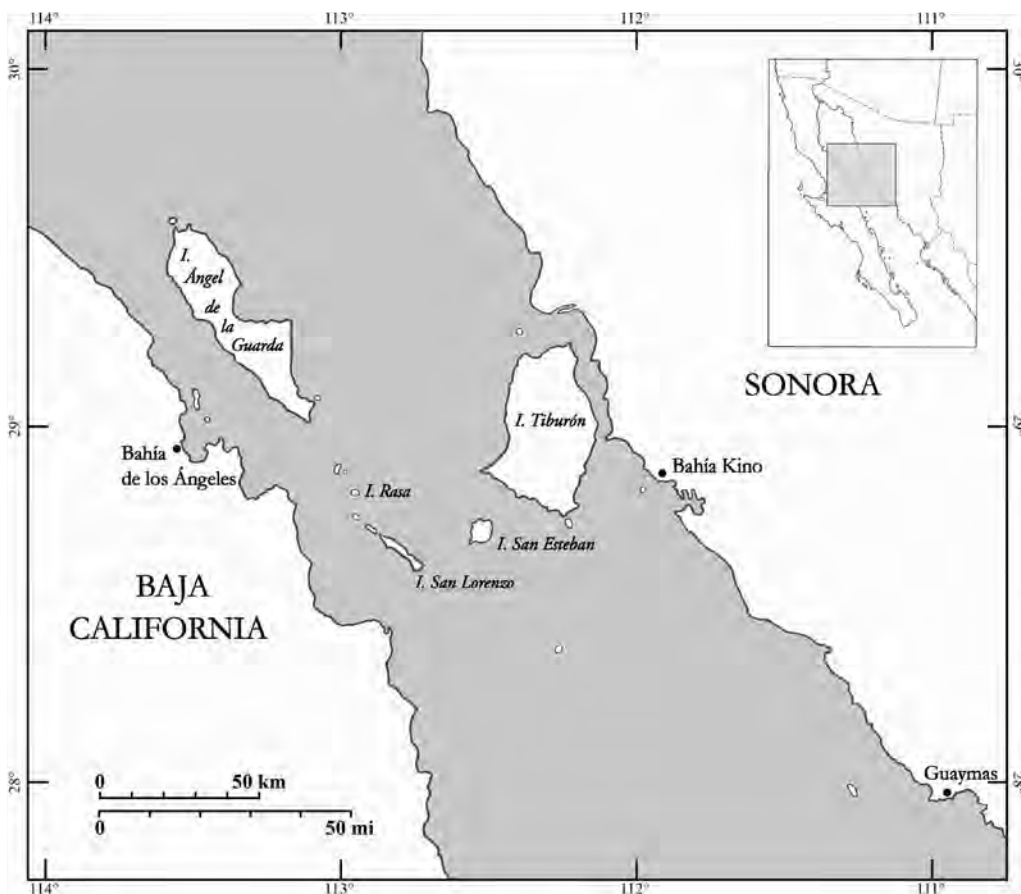


Figure 1. The Midriff region of the Gulf of California. Map by Tracy Davison.

much more exotic. Someday, I thought, it was a place I would like to explore.

### Initial Field Investigations

The first opportunities came in March 1988 and again in March 1989. Four of us spent eight days at Los Machos and recorded 16 sites. These sites revealed a substantial lithic industry based on biface reduction of a local pinkish-brown volcanic rock (rhyolite?). A few sites included modest quantities of quartz and a dark volcanic rock (andesite or dacite?), also available locally. In addition we saw about 35 obsidian flakes, most of them at a single, sprawling campsite. Thus, there was obsidian, but not enough to get excited about.

In May 2004 I made a brief visit to Puerto Refugio and recorded eight sites. I spent three hours at Conrad's midden (now designated PR-1) and found a modest quantity of flakes of several rock types but only three of obsidian. A two-hour search of a similar site a few kilometers away turned up a single obsidian flake. None of the six other sites contained obsidian.

In January 2006 I launched a long-term field project to record sites on IAG. Mindful of Conrad's letter and what he was told about the source of Refugio obsidian, the project began with a field trip to Punta la Víbora. My colleagues and I assumed that if there were a local source, obsidian would dominate the lithic assemblage. Stone artifacts at La Víbora were indeed made of local rocks, but these were chalcedony,



Figure 2. Isla Ángel de la Guarda and the adjacent Baja California peninsula. Map by Tracy Davison.

quartz, quartzite, and andesite. After twelve days, we had found only two obsidian flakes and no source.

By this time I had discovered published references to an obsidian “source” or “quarry” on IAG and to x-ray fluorescence analysis of three samples from this source (Ritter et al. 1994:16, 1995:174; Shackley 1995:Figure 1; Ritter 1998:17–18). This came as a complete surprise because, to my knowledge, no archaeologist had previously worked on IAG. Steven Shackley, who performed the analysis, described the three samples this way (translated from the Spanish):

The three pieces of obsidian collected from the deposit on Isla Ángel de la Guarda consist of a secondary flake 36 mm long, an unreduced nodule approximately 29 mm long, and a core fragment. The three pieces are uniformly black and opaque, and the unreduced nodule shows a plagioclase or sanidine phenocryst. Otherwise the glass is aphyric [Shackley 1994:176].

I asked Eric Ritter (personal communication 2002) about this, and he said that a few people from the

coastal village of Bahía de los Ángeles (BLA) had been to the island, reported an obsidian source there, and brought samples to the Museo de Naturaleza y Cultura in BLA. He intimated that this was the origin of the three specimens Steve Shackley analyzed and added that he himself had not seen the source and was not sure where it was. Steve (personal communication 2002) said that he had no specific information about the source of the specimens either.

There were, however, two reports of a source on the island near Punta Diablo. One was a magazine article by artist and writer John Hilton (1959). It described his 1959 hike up a palm canyon, where his group “noticed fragments of agate, crystal and obsidian in the bed of the wash ... [and where] higher up were bands of obsidian in place” (Hilton 1959:12). Carolina Espinoza, director of the Museo de Naturaleza y Cultura, also recalled hiking there in the 1990s and seeing “tons” of obsidian in the arroyo bed (personal communication 2006).

With this promising information, three of us went to Punta Diablo in January 2007, relocated the canyon, retraced Hilton and Espinoza’s route, and found large quantities of obsidian nodules in the arroyo and a possible outcrop in the cliffs above. However, these nodules were vitrophyric—full of phenocrysts—and they fractured unpredictably, making them seemingly useless as tool stone. Thus, it was no surprise that after 15 days of recording sites in the area, we had found only nine worked pieces of obsidian. All but one were high-quality aphyric material—free of phenocrysts—that must have come from somewhere else. So while there certainly was a source of raw obsidian at Punta Diablo, we had found no real evidence that anybody used it.

References to the “source” on IAG continued to appear (Shackley 2005:Figure 1.1; Ritter 2006a:150, 2006b:172, 174, 176), but additional fieldwork turned up nothing. I was beginning to wonder if there really

was a source of tool-quality obsidian on IAG. In frustration I wrote Steve Shackley:

I have now worked about 45 days on the island at six widely-separated locations, and have seen neither a source of tool-grade obsidian nor any obsidian artifacts [i.e., tools] .... It’s a big island, and there is a lot of it I haven’t explored, but my guess is that the idea of an obsidian source on the island is unfounded rumor [T. Bowen to M. S. Shackley, e-mail letter, 8 February 2007].

Steve replied, “That’s not the first place that this has happened,” and he noted similar situations in the American Southwest. A month later I expressed my doubts at the Society for California Archaeology Annual Meeting (Bowen 2007). Shortly thereafter, I wrote Don Laylander:

I certainly could be wrong, but at this point I can’t believe that there is a source of tool-quality obsidian ... even if we missed finding the source, we would have seen a big spike in the amount of obsidian debitage in that island. My conclusion is that the mysterious collector ... found the three specimens at a site on Angel, which is entirely plausible, but that the term “source” of the samples refers to the site, not a “source” of raw material, and that somehow the message got garbled [T. Bowen to D. Laylander, e-mail letter, 10 April 2007].

But Don did not buy this interpretation, replying that in his view the source was “more than just a rumor.” As it turned out, he was right.

### **The 2009 Expedition to Isla Ángel de la Guarda**

Where one conducts fieldwork on IAG is as often dictated by the sea as by archaeological considerations.

In January 2009 five of us set out from BLA for La Ballenita in two pangas (small open motorboats). As we crossed the infamous Canal de las Ballenas, the wind picked up, the sea turned ugly, and we were forced to run for shore far south of our intended destination. Continuing north was out of the question, so we camped in the lee of a sheltered point, where we would spend the next two weeks. We were not happy about this because we were less than 5 km from the area we had already surveyed in 1988 and 1989, but it turned out to be a great stroke of luck.

That same afternoon we began looking at the area around camp and were astonished to find small nodules of beautiful tool-quality obsidian. They were eroding out of the alluvium that dominates the local landscape, and we found them on the surface, in arroyo banks, in arroyo beds, and even among the beach rocks. Most were too small for reduction, but some nodules were up to 5 cm in length. Later we found one that was 13 cm long.

During the next couple of days, we continued to find scattered nodules almost everywhere. Most were

unworked, but occasionally we found flakes, sometimes in small clusters, just enough to suggest that this material was exploited by Native people. We also found a small camp and finishing site for stone tools (designated MN-4) nestled in a cinder-filled basin (Figure 3). Most of the rather sparse debitage was of two local rocks, a dark gray non-vitreous volcanic rock and a white chalcedony, but we also found five small unfinished or broken projectile points of obsidian (Figures 4 and 5). Incredible though it seemed, it appeared that we had stumbled onto the fabled IAG obsidian source.

Even as we were congratulating ourselves on our discovery, we were becoming uncomfortably aware that a much more complicated story was unfolding. In addition to aphyric obsidian, we had been finding small surface deposits of vitrophyric obsidian with unmistakable signs of workshop activity. Then in a single day, exploring an area we had not covered previously, we encountered some 20 separate surface deposits of obsidian nodules. These were not mere scatters, but dense concentrations (Figures 6 and 7). The obsidian was entirely of low quality, much of it an ugly, scaly-textured material, full of phenocrysts



Figure 3. Site MN-4, small camp and finishing site at Los Machos, looking east-southeast.

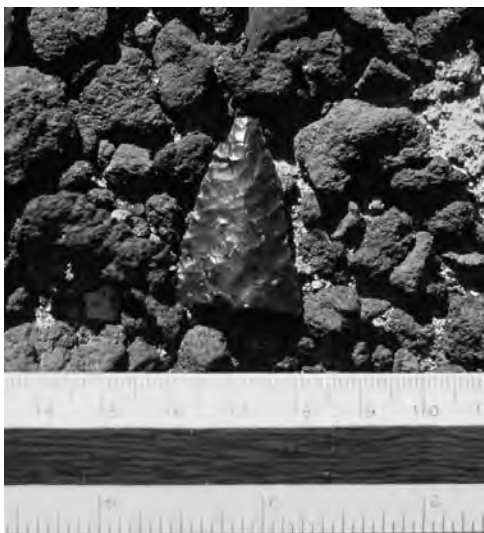


Figure 4. Projectile point of aphyrice obsidian, in situ, site MN-4. Both base and tip are broken. The fragment is 32 mm x 19 mm x 7 mm.

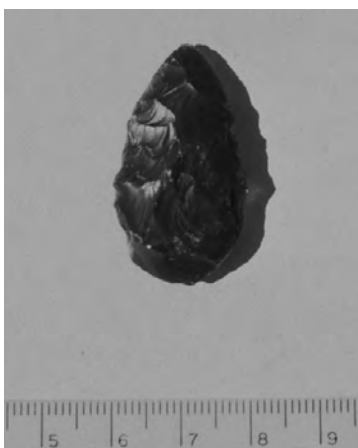


Figure 5. Site MN-4. Biface of aphyrice obsidian with a broken base, 35 mm x 17 mm x 6 mm.

(Figure 8), and yet nearly all these deposits had been intensively worked (Figure 9). In some cases debitage and broken bifaces covered virtually the entire surface. Had we not seen the debitage, we never would have believed that people would try to work this material. Why would anyone resort to such junk if high-quality obsidian was available? Or was it available? Could it be that people turned to the vitrophyric material only after most of the big chunks of high-quality obsidian had already been collected?

Confusing the situation further, we found a major quarry and reduction site of non-vitreous volcanic rock, which we took to be andesite, amid the deposits of vitrophyric obsidian. This site (MN-17) covers an area 350 m x 20 m. It contains an enormous quantity (hundreds of thousands?) of primary flakes, in places lying several flakes deep, along with broken bifaces and battered beach cobble hammers (Figure 10). How this site is related to the obsidian workshops, if at all, is anybody's guess.

Despite these bewildering complications, finding high-quality obsidian on IAG seemed at least to partially resolve the issue of a source. But it still left a nagging historical loose end—how exactly did Shackley wind up with the three specimens he analyzed? In 2010 I asked Carolina Espinoza if she knew anything about it. She vaguely remembered that they were collected in the early 1990s by an individual who might have been on the island as a member of a botanical trip sponsored by the San Diego Wild Animal Park. She thought this person told her that the specimens came from somewhere near Los Machos, at the mouth of an arroyo close to the beach. He brought the pieces to her house, and from there they went to the museum. Eric Ritter was in town at that time, and it was either at her house or the museum where he saw them. She did not remember what became of them after that (personal communication 2010).

I related Carolina's recollections at the 2012 Annual Meeting of the Society for California Archaeology (Bowen 2012), and after the session Eric Ritter told me a somewhat different story. The collector, he said, was a BLA fisherman and guide who often explored the island. This collector gave the specimens to Carolina, Carolina gave them to Eric, and Eric mailed them to Steve. In fact, both Eric's and Carolina's versions may be accurate accounts, but of two separate incidents. As Eric noted, a number of people may have brought obsidian from the island to BLA (personal communications 2012, 2013).

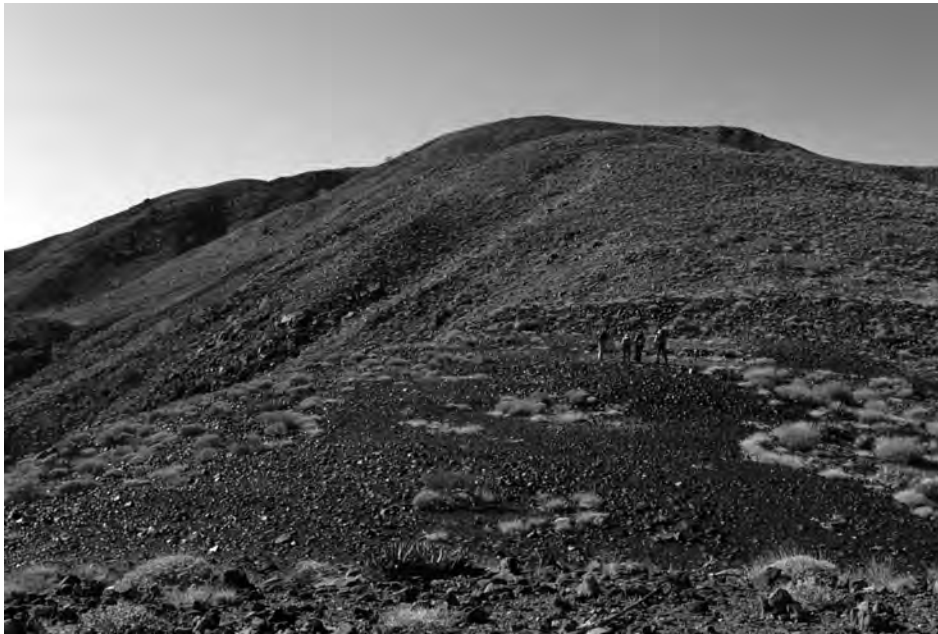


Figure 6. Site MN-8. A classic surface deposit of vitrophyric obsidian at Los Machos, approximately 30 m in diameter. It consists of nodules and flakes overlying a silt substrate. Looking south.



Figure 7. MN-8 site surface.

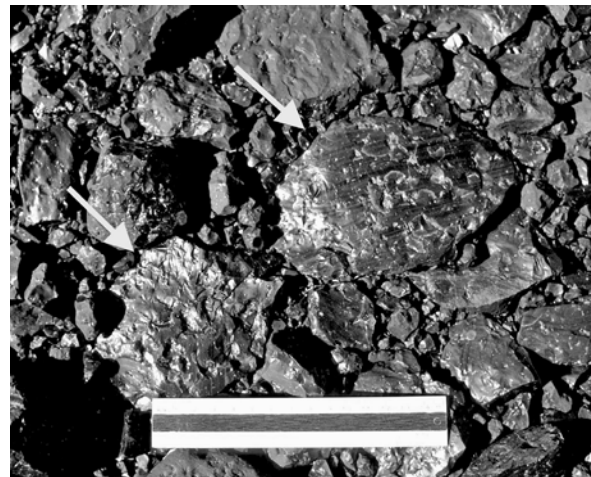


Figure 8. Site MN-8. Two large flakes (above the ruler) showing phenocrysts and the scaly texture of the obsidian



Figure 9. Reassembled broken biface of vitrophyric obsidian at an unnumbered quarry-workshop on Isla Ángel de la Guarda. The left portion is in situ; the right was found 1 m away. The reconstructed artifact is 25.0 cm x 7.3 cm x 2.7 cm. The biface probably broke when a large thinning flake, struck from the buried side, destroyed the right edge.

### Fieldwork Results

Fieldwork on IAG has now totaled more than 100 days in 12 locations. Although we have learned a bit more about the obsidian there, the situation is clearly complicated and will take much more work to untangle. Nevertheless, a few things can be said with modest confidence. First and foremost, obsidian has now been accurately located and formally documented on IAG, and it is no longer necessary to rely on vague reports by casual visitors. Second, sources of aphyric obsidian are scattered but widespread over the northwestern half of the island. Whether tool quality glass occurs in the south at Punta la Víbora, as reported to Conrad Bahre, and as a Mexican geologist once told Eric Ritter (personal communication 2013), appears doubtful. Third, it appears that vitrophyric obsidian is much more abundant than aphyric material. We have seen both deposits and worked vitrophyric material at La Ballenita and Los Machos. The source at Punta Diablo is large, but there is no evidence that it was utilized. Fourth, most vitrophyric obsidian was reduced where it was quarried. There is little evidence to indicate where aphyric obsidian was worked. Scattered clusters of small flakes suggest that some may have

been worked wherever suitable nodules were found. Secondary flakes of high-quality material sometimes occur at camps, but usually in very small numbers. Since they occasionally occur with unfinished or broken bifaces or projectile points, it may be that camps sometimes served as finishing sites.

Finally, while obsidian was certainly quarried on IAG, there is not much evidence that it was used there. If people were not using it on the island, who was using it, and where? It was probably not taken to the islands of the San Lorenzo archipelago, southeast of IAG. Extensive field work in 1984 and 2004–2005 on these islands turned up only a single flake of obsidian, on Isla San Lorenzo. As luck would have it, however, the one island in this group that has not been investigated, Isla Rasa, is where geologists have found a hint of culturally transported obsidian:

On Isla Raza [*sic*] Dick Phillips and later Jim Stroh found exotic hand-size specimens of obsidian and other rocks, some of which had been worked, and which in the opinion of one archaeologist were trading material. We are interested in the source of this material





Figure 10. Site MN-17. A small portion of the andesite quarry-workshop at Los Machos, looking west-southwest. The material in the lower half of the photo consists of primary flakes several flakes deep.

because of its very strange chemistry [Gordon Gastil, personal communication 1983].

Nothing more is known about this intriguing discovery.

There is no reason to think that obsidian moved eastward from IAG or that the Seri people (Comcaac), or their ancestors or predecessors, were involved in obsidian transport. Surveys of Isla San Esteban in the 1980s produced only a few small nodules and flakes (Bowen 2000:368). Fieldwork on Isla Tiburón, mostly in the late 1970s and early 1980s, revealed just 11

flakes. There is almost no obsidian at sites on the Seri coast of Sonora north of Bahía Kino. South of Kino it becomes common only toward Guaymas, where there is a major source (Bowen 1976:83, 114).

The only place IAG obsidian could reasonably have been taken is to the Baja California peninsula, and that clearly happened. Eric Ritter and Steve Shackley have matched the chemical signature of more than 30 obsidian flakes from sites around BLA and Bahía de las Ánimas with that of the three analyzed specimens from IAG, confirming that IAG obsidian was brought

to the peninsula (Ritter et al. 1994:Table 2; Ritter 2006b:172–174). Furthermore, hydration measurements indicate that this took place over a considerable, but as yet unknown, span of time (Ritter 1998:Figure 14, 2006b:172).

What we do not know are the cultural factors surrounding the exploitation of IAG obsidian. Did peninsular craftsmen launch expeditions to IAG to obtain obsidian? Did they exploit large quantities of aphyric obsidian? If so, did they reduce it on the island at locations not yet discovered, or did they take raw material back to the peninsula? One might also wonder about the vitrophyric obsidian at the Los Machos quarry-workshops. Who worked it, and why? Was it also transported to the peninsula, and if so, where is it? If people were willing to work that material, why not the equally poor obsidian at Punta Diablo? Was it too long a trip from the peninsula by Native watercraft? How does the vast quantity of andesite quarried at Los Machos fit in, if at all?

### Final Thoughts

Three years after our purported discovery of obsidian sources at Los Machos, I reread Charles Anderson's (1950) report on the geology of the Midriff Islands, based on the 1940 cruise of the research vessel *E. W. Scripps*. During the expedition's two-day visit to IAG, Anderson, J. Wyatt Durham, and Kenneth O. Emory hiked across the narrow midsection of the island from Bahía el Pulpito to the north end of Los Machos. Anderson wrote of this traverse:

Nearer Humbug Bay [Los Machos] the volcanic gravels contain pebbles of black obsidian and flow-banded felsites in addition to dacite and andesite pebbles. According to Durham and Emory who followed a different traverse across the island, obsidian and banded felsite occur along the summit ridge resting on the massive dacite [Anderson 1950:41].

Hence obsidian was discovered and reported on IAG almost 70 years before we found it. And if one were to be entirely honest, the real discoverers were the Native people who paddled to the island long before Europeans even knew that Isla Ángel de la Guarda, or the Americas, existed.

### Acknowledgments

First of all, I thank Conrad Bahre for introducing me to the archaeological potential of Isla Ángel de la Guarda, Dan Anderson for the opportunity to scope out Puerto Refugio, Carlos Godínez Reyes, Director of the Área de Protección de Flora y Fauna Islas del Golfo de California, Baja California, for permission to conduct field work on the island, and Matt Boxt for the invitation to help honor Mike Mathes. I am grateful to Steve Shackley, Don Laylander, Carolina Espinoza, Doug Bowman, and especially Eric Ritter for help in trying to fit the pieces of the puzzle together. My colleagues in the field, Jon and Carol Avent, Dan Bench, Diane Boyer, Marty Brace, Bill Broyles, Carolina Espinoza, Jonathan and Roseann Hanson, Steve Hayden, Jim Hills, Larry Johnson, Ben Wilder, and Marion Yoder, contributed enormously to sorting out the archaeology and making our trips wonderful experiences. I am grateful to Tracy Davison for producing the maps and to Scott Copeland for preparing the photos. Finally, I thank Marty Brace for her careful editing of the manuscript and for cheerfully putting up with my long absences.

### References Cited

- Anderson, Charles A.  
1950 Geology of Islands and Neighboring Land Areas. In *1940 E. W. Scripps Cruise to the Gulf of California*, Part 1. Geological Society of America Memoir 43:1–53. U.S. Geological Survey, Prescott, Arizona.

- Bowen, Thomas
- 1976 *Seri Prehistory: The Archaeology of the Central Coast of Sonora, Mexico*. Anthropological Papers of the University of Arizona 27, Tucson.
- 2000 *Unknown Island: Seri Indians, Europeans, and San Esteban Island in the Gulf of California*. University of New Mexico Press, Albuquerque.
- 2007 The Midriff Islands in Regional Perspective. Paper presented at the 41st Annual Meeting of the Society for California Archaeology, San Jose.
- 2012 Obsidian Sources on Isla Ángel de la Guarda. Paper presented at the 46th Annual Meeting of the Society for California Archaeology, San Diego.
- Hilton, John
- 1959 Exploring Whispering Canyon on the Guardian Angel Island. *Desert Magazine* 22(12):11–12, 36–37.
- Kuhn, Thomas S.
- 1970 *The Structure of Scientific Revolutions*. 2nd ed. University of Chicago Press, Chicago.
- Ritter, Eric W.
- 1998 Investigations of Prehistoric Behavioral Ecology and Culture Change within the Bahía de los Angeles Region, Baja California. *Pacific Coast Archaeological Society Quarterly* 34(3):9–43.
- 2006a The Vizcaíno Desert. In *The Prehistory of Baja California*, edited by Don Laylander and Jerry D. Moore, pp. 135–152. University Press of Florida, Gainesville, Florida.
- 2006b Bahía de los Ángeles. In *The Prehistory of Baja California*, edited by Don Laylander and Jerry D. Moore, pp. 167–178. University Press of Florida, Gainesville, Florida.
- Ritter, Eric W., John W. Foster, Robert I. Orlins, Louis A. Payen, and Paul D. Bouey
- 1994 Archaeological Insights within a Marine Cornucopia: Baja California's Bahía de las Ánimas. *Pacific Coast Archaeological Society Quarterly* 30(1):1–23.
- 1995 Informative Archaeological Signatures at Bahía de las Ánimas, Baja California. *Estudios Fronterizos* 35–36:151–186.
- Shackley, M. Steven
- 1994 Análisis de Energía Dispersiva en Fluorescencia de Rayos X (EDXRF) de Artefactos de Obsidiana, de Sitios Arqueológicos en Bahía de los Ángeles y Materiales de una Fuente de Obsidiana en Isla Ángel de la Guarda, Baja California. In *Investigaciones de Ecología Social y Cambios entre Culturas Prehistóricas en la Región de Bahía de los Ángeles, Baja California (1993)*, edited by Eric W. Ritter, pp. 172–184. INAH, Mexicali.
- 1995 Sources of Archaeological Obsidian in the Greater American Southwest: An Update and Quantitative Analysis. *American Antiquity* 60(3):531–551.
- 2005 *Obsidian: Geology and Archaeology in the North American Southwest*. University of Arizona Press, Tucson.