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REPORTS

Notes on a Bar of Insect Lac Resin from the Saline Valley, California

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A large piece of resin, identified as being creosote lac insect resin, was found in a small cave in the Saline Valley in 1931. The piece, now in the Eastern California Museum, is described here and provides some additional information regarding the use of such materials in the Great Basin.

In 1931, Clifford Baldwin, in association with the Eastern California Museum (ECM) in Independence, California, conducted a survey of a portion of Saline Valley, recorded several sites, and collected some artifacts from several of them (Baldwin 1931). One of these artifacts, a large piece of red-colored resinous material about the size and shape of a bar of soap, was collected from "Arrow Maker Canyon Cave 6" (Baldwin 1931:12). The piece, along with other material from the site, was donated to the ECM and was catalogued as "Creosote Lac Pitch Gum." During a visit to the ECM in 2003, the author observed the piece on display, put it on a "to do" list, and returned in 2019 to document the artifact, the results of which are reported here.

SETTING

Cave 6 was found near Upper Warm Springs (Fig. 1), located in the Saline Valley of east-central California. Upper Warm Springs is situated in a northeastern trending offshoot of the valley, with the Saline Range on its northwestern flank and the Last Chance Mountains to the southeast. The vegetation of the Saline Valley is dominated by creosote bush (*Larrea tridentata*). Upper Warm Springs itself is within the broad wash, while "Arrow Maker Canyon" lies to its west and northwest.

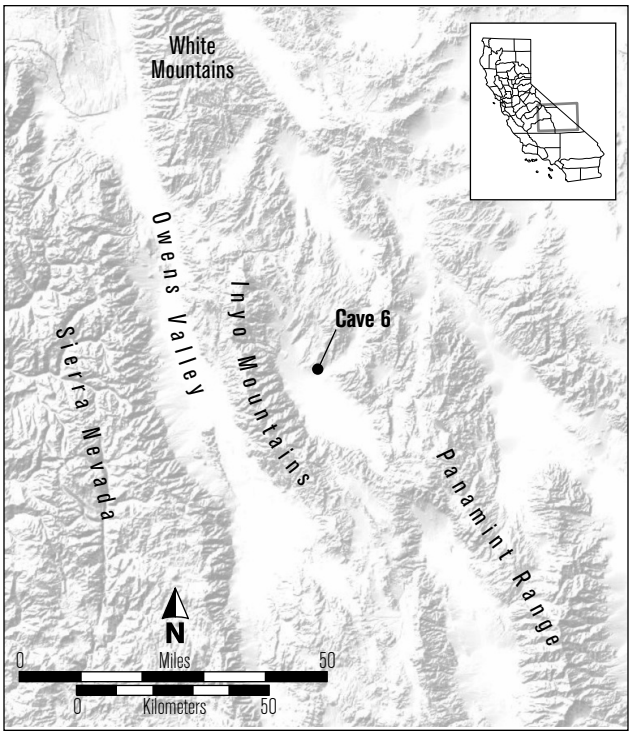

Figure 1. General location of Cave 6 (part of CA-INY-1947) in Saline Valley, eastern California.

CAVE 6

Cave 6 is one of a series of six small caves/rockshelters (numbered 1 through 6) located along the east bank of a small wash in the bottom of Arrow Maker Canyon. The site, now formally recorded within CA-INY-1947, consisted of a small cave about five feet wide, two feet high, and about 10 feet deep that contained a large woodrat nest (Baldwin 1931:12). Within the woodrat nest were a number of artifacts, including "a large piece of pitch to cement water bottles," which is the artifact described here.

Thirty-one other artifacts were collected from the woodrat nest in Cave 6 (Baldwin 1931:12, Plate 100). First, two "rodent hooks" with wooden shafts were found, one with a metal hook and one with a bone hook, and both were "fastened with sinew and cemented with a ball of pitch" (Baldwin 1931:12). Other collected artifacts included two metates, an obsidian scraper, six sherds of corrugated pottery, three awls (one of a cactus spine and two of pointed wood), 10 pieces of cut, notched, and

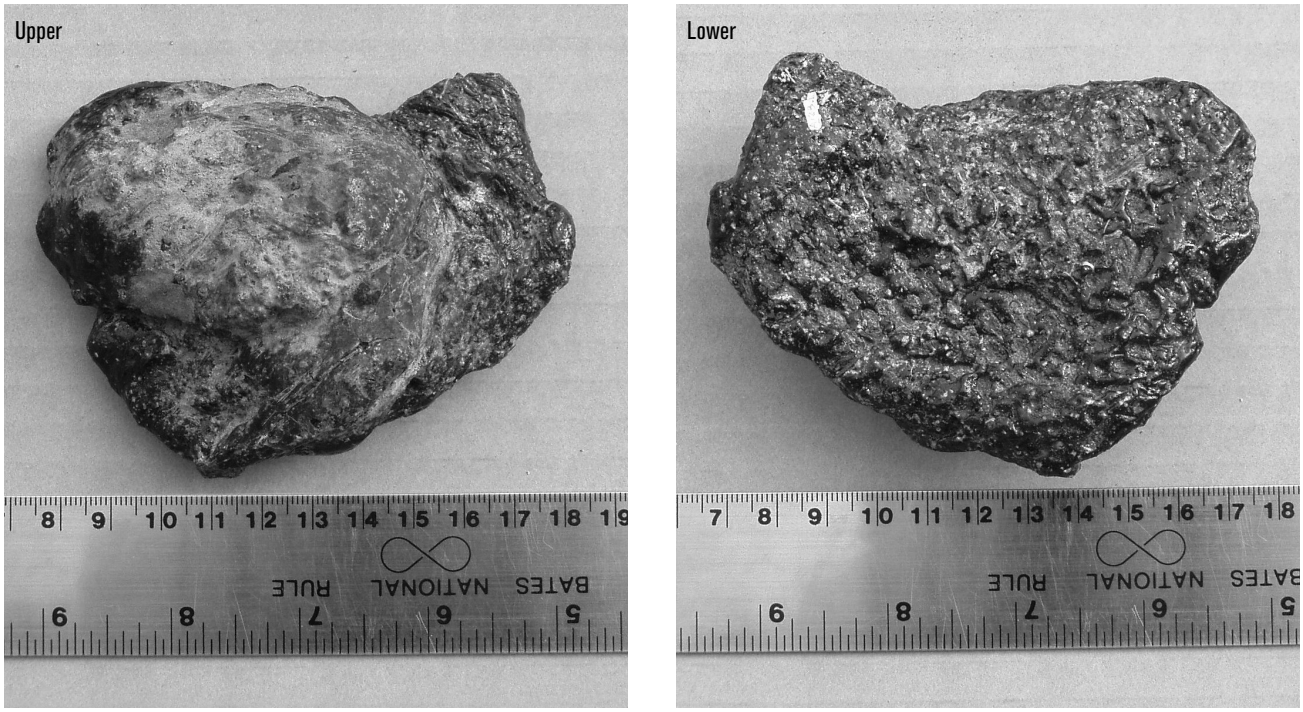

Figure 2. The resin artifact from Cave 6 (CA-INY-1947): left, ventral surface; right, dorsal surface (photos by author).

burned wooden sticks, three notched and pointed wooden pegs, three pieces of burned bone, and a fragment of a pitched water bottle (Baldwin 1931:12).

THE RESIN ARTIFACT

The resin artifact (Cat. No. A123.1; Fig. 2) is irregularly shaped, although it generally resembles a bar of soap. It has a maximum length of 96.4 mm., a maximum width of 87.3 mm., and a maximum thickness of 31.5 mm. The piece weighs 152.1 g. The presence of "flow" marks on its ventral surface (see Fig. 2, right) is of interest, suggesting that it had originally been a viscous liquid (e.g., the consistency of thick molasses) when the artifact was created, which then solidified upon cooling. It is not clear whether the piece had been used.

No sampling of the material was permitted, and it therefore could not be chemically identified; thus, the artifact was visually examined under 10× magnification. The material is a deep red in color, incorporates several small twigs, and was "bubbly" on its dorsal surface (see Fig. 2, right), characteristics which are all consistent with lac resin. Thus, its identification as lac resin is based on my personal experience.

CREOSOTE LAC RESIN AS A MASTIC AND SEALANT

Native peoples of the Great Basin and Southwest utilized several types of resins for a variety of purposes. However, when such materials are observed on ethnographic or prehistoric artifacts, it is commonly assumed that the material involved is "pine pitch" (*Pinus* spp.), and no formal analysis is conducted. However, when formal analyses of such resins have been carried out, many specimens are actually found to involve resin from the creosote lac insect (*Tachardiella larreae*). The distribution of the creosote lac scale insect is coterminous with that of the creosote bush (*Larrea tridentata*), with a range that includes the Mojave and Colorado deserts of California and the Sonoran and Chihuahuan deserts of Arizona, New Mexico, Baja California, and northern Mexico (Euler and Jones 1956; Hunziker et al. 1977:14; Sutton 1990:Fig. 1).

There is only one generation of lac insects per year. The adult female lives on the branches of the creosote, completely encased in a resin cell. The young hatch during February and March, after which the female dies. The young females leave the cells and begin producing and covering themselves with lac. The male larva under-

goes a fairly rapid metamorphosis, emerging as a small red "fly" (Colton 1943:27). The winged adult male then copulates with the still immature females (in effect creating a "sperm bank") and dies within a few days (Colton 1943:27; also see Kondo and Gullan 2011). Once the female reaches maturity, the stored sperm is used to fertilize the eggs.

The female produces large quantities of a reddish-colored lac that eventually encases her (Essig 1958:286). Individuals occur either singly or in groups, are globular in shape, and are about 2 mm. in diameter (Essig 1958: 286). Large numbers of insects can aggregate on individual bushes, and the ensuing colonies can create a considerable concentration of lac. Because females are continually encased in lac, the material is available for collection and use throughout the year.

The resin is present in small clumps on the exterior of creosote branches, and it can be removed by hand by twisting it from the branch. This would produce a mixture of fragmented lac, bark from the branch, live and dead insects, twigs, and leaves. This mixture would have to be "purified" to some degree by the removal of the larger debris, leaving mostly resin generally analogous to coarse sand. This material would then have to be further processed for use.

The amount of resin present on any single creosote bush varies, with some branches being covered with lac while others are not. Given a good concentration, a considerable quantity of the resin can be collected in a short time. In one collecting episode (in 1986), I obtained several ounces in just a few minutes (the specific collection times and recovered quantities were not recorded, and due to a fortunate encounter, no search time was involved). However, my personal observations over the last few decades in the Mojave Desert suggest that there are large tracts of the desert with creosote bushes but without lac insects.

Creosote lac resin was employed for a variety of purposes, including being used as chewing gum, medicine, sealant, and mastic (Castetter and Underhill 1935; Colton 1943; Essig 1931:19–21; Westgate 1943; also see Dittemore et al. 2010). Creosote lac resin has been identified on a number of ethnographic and prehistoric artifacts, primarily from the Great Basin (Fox et al. 1995; Stacey et al. 1998; Sutton 1990; van Balgooy 1983) and the Southwest (Bisulca et al. 2017). Most of the formal identifications of lac resin have been accomplished using Gas Chromatography (GC) (Sutton 1990; Sutton et al. 1987), Gas Chromatography-Mass Spectrometry (GC-MS) (Fox et al. 1995; Stacey et al. 1998), o-toluidine test for complex carbohydrates (Bisulca et al. 2016), and Fourier Transform Infrared Spectroscopy (Bisulca et al. 2017).

CONCLUSION

The artifact described here and identified as lac resin is unique as it is the only known piece of processed but unapplied lac. As such, it shows that raw lac was collected and processed into large pieces of material, undoubtedly making its transport and application easier. It also seems clear that this material was processed using heat to make it pliable for application. The lac could then be used in a variety of technological processes—e.g., to waterproof baskets, or to secure projectile points or barbs.

The apparent use of lac resin to help adhere the small barbs on the two "rodent hooks" found in Cave 6 is also of interest. I examined both of these artifacts at the Museum, and the mastic was visually consistent with lac resin. Although identified by Baldwin (1931:12) as rodent hooks (having been found in a woodrat nest), it is also possible that they are actually chuckwalla hooks (e.g., Wallace 1978; also see Driver 1937:111; Steward 1941:224). Perhaps they served a dual purpose.

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