THE RESTORATION OF THE JEWEL CASKET, YALLINGUP CAVE, W.A.

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Abstract

During the September school holidays 1985, vandals extensively damaged the Jewel Casket, one of the centre-pieces of the Yallingup tourist cave. Some of the broken pieces were stolen. This paper describes the restoration of the remaining pieces.

INTRODUCTION

Yallingup Cave is a well decorated cave situated in the Cape Naturaliste region of the Leeuwin-Naturaliste Ridge, the northern end of the most popular caving and tourist areas of the state.

Now surrounded by National Park, the cave was discovered by Edward Dawson in 1899 while searching for stray horses. The cave was opened for public inspection in 1900 with Mr. Dawson as guide, a position he held for about thirty years. Two troglobitic creatures are known to exist in the lowest reaches of the cave, an isopod and a centipede.

The lower tourist section, known as the Main Chamber, has a high humidity, enhanced CO_2 content and abundant decoration, a fair proportion of which is still active. Two pieces of decoration in this chamber, which help set the cave apart from other topurist caves are a cross-banded shawl (its most famous feature) and the Jewel Casket, a small remnant pool where stalactites, amongst other decoration, became encrusted with crystal decoration, the focus of this paper.

The cave is currently vested in the Busselton Tourist Bureau Inc.

DESCRIPTION

The Jewel Casket is a remnant pool, entrapped by a flowstone covered wall, small columns and stalactites. Most of the decoration is damp, caused either by continued seepage or condensation from the cavern atmosphere. To enable this enclave to be illuminated and viewed by the public, a number of stalactites and columns was removed - thus creating a 'hole' in the wall. This hole is large enough to permit human entry, albeit for small humans.

No barrricades or other protection were installed around the feature which is surprising. given the extensive wire netting attention that other, less attractive decoration received at various times in other parts of the cave.

It could be argued that the Jewel Casket received adequate protection while guided tours were conducted through the cave. Guided tours ceased in the early 1970's, to be replaced by self-guided tours. With the inception of self-guided tours it became traditional for a guide to give a short introductory speech at the beginning of the Main Chamber's trail and then sit at a convenient site some 15m away from the Jewel Casket to await the next tourist/s. During the early 1980's, when asked, SRGWA recommended that a clear plastic screen be placed over the viewing hole. This advice was not acted upon.

DAMAGE

Sometime during the school holidays of September 1985 somebody reached into the Jewel Casket in an attempt to steal one or more pieces. In the process of that act, all free-hanging, calcite-encrusted stalactites were broken, with one major crystal cluster being stolen. Several smaller pieces disappeared, either being stolen or falling into small apertures to the side of the feature, but nevertheless un-recoverable.

Due to the characteristic noise that must have resulted from such action it is fair to assume that several people were involved with the breakage and that the guide must have been distracted by another group of tourists. The damage was not detected until much later.

The broken pieces were left where they fell until a SRGWA trip into the cave one month later. It was then proposed to the Bureau that a repair, using 8-hour Araldite epoxy, be attempted on the largest piece. This proposal was accepted.

FIRST ATTEMPT

The necessary items were purchased from a nearby town and the piece glued to the stump of the stalactite. A stiffening rod was positioned behind te decoration, the free-flowing Araldite kept in place by adhesive tape dams. In an attempt to keep the decoration dry and the cave's humidity at bay while the Araldite was setting, a gas burner was placed to one side of the decoration and left to burn overnight. To keep the decoration in position, a plank was placed beneath it and upward pressure applied with a vehicle jack (Figure 1).

On inspection the following day the repair appeared successful and the support was removed. Unfortunately the bond failed six days later resulting in the decoration breaking into three pieces, which were later recovered and taken to Perth for restoration. Moisture attack is suspected as the principal cause of the bond failure.

PROTECTION

In consultation with Busselton Tourist Bureau it was decided to install a clear plastic screen over the Jewel Casket viewing hole and to effect repairs to the decoration during 1986.

Subsequently a sheet of 12mm acrylic (Perspex) sheet was custom fitted and affixed to the viewing hole using plastic wall plugs, chrome plated brass screws and stainless steel brackets. a 75mm camera port was cut in the centre of the screen to allow unimpeded viewing and enable easy handling of the screen.

Independently the Busselton Tourist Bureau erected a 'temporary' pipe and weldmesh fence, joining with two existing fences on either side of the feature. Although a further and now unnecessary barrier, the fence is unlikely to be removed.

REPAIR

The broken pieces were taken to Perth to enable them to dry out and be pieced back together. Some crystals had broken off the clusters and a mini-jigsaw puzzle ensued working out where they belonged. The small pieces presented no difficulty on Araldite back into place, the tell-tale trace of epoxy being hidden among the shiny crystal surfaces.

Larger pieces did present problems. Although larger surface areas presented a prospect of stronger bonds, it was decided to to further enhance these prospects by drilling random angled 3 - 4.5mm holes into the calcite where possible as well as inserting a notched 3mm stainless steel rod along the decoration's centreline. The notches form a 'key' for the Araldite (Figure 2).

These repairs occupied several months. The method to be employed gluing the large restored stalactite back into place was to have a vertical stainless steel pin in the centre of the sections with thin stainless steel cross-pins passing through it and then glued into place with epoxy. The stainless steel pins would then support the the estimated 3kg weight and not the epoxy joint (Figure 3).

TECHNOLOGY

At this stage, advances in technology came to our assistance. The use of gas burners to defeat the effect of moisture on the Araldite was considered too cumbersome and ineffective. Hot air blowers were an obvious alternative. Domestic hair dryers were considered incapable of delivering the temperature required for long periods of time and industrial blowers, although capable of the required time/temperature duration were judged too cumbersome.

Just at the right moment Bosch released the PHG 520 hot air gun, a lightweight 2 speed gun capable of delivering 520°C and 320°C temperature at 240 and 420 litres per minute respectively. The guns, although light, were rugged and compact. By mounting a board on a small camera tripod the gun could be rested on the board, aimed in the right direction and switched on.

In order that the decoration did not become too hot, a HPM series 797 timer was used in the power circuit. This domestic electro-mechanical device allowed the hot air gun to be operated automatically for 15 minute increments.

From conversations with technicians at the University of Western Australia it was theorised that sodium silicate could provide an alternative to Araldite epoxy. This water soluble chemical reacts with calcite and certainly forms a very strong bond - on dry decoration. It was found that this reaction can take several days unless heat is applied, and reimmersion in water dissolves the medium. More testing will need to be performed to prove this method.

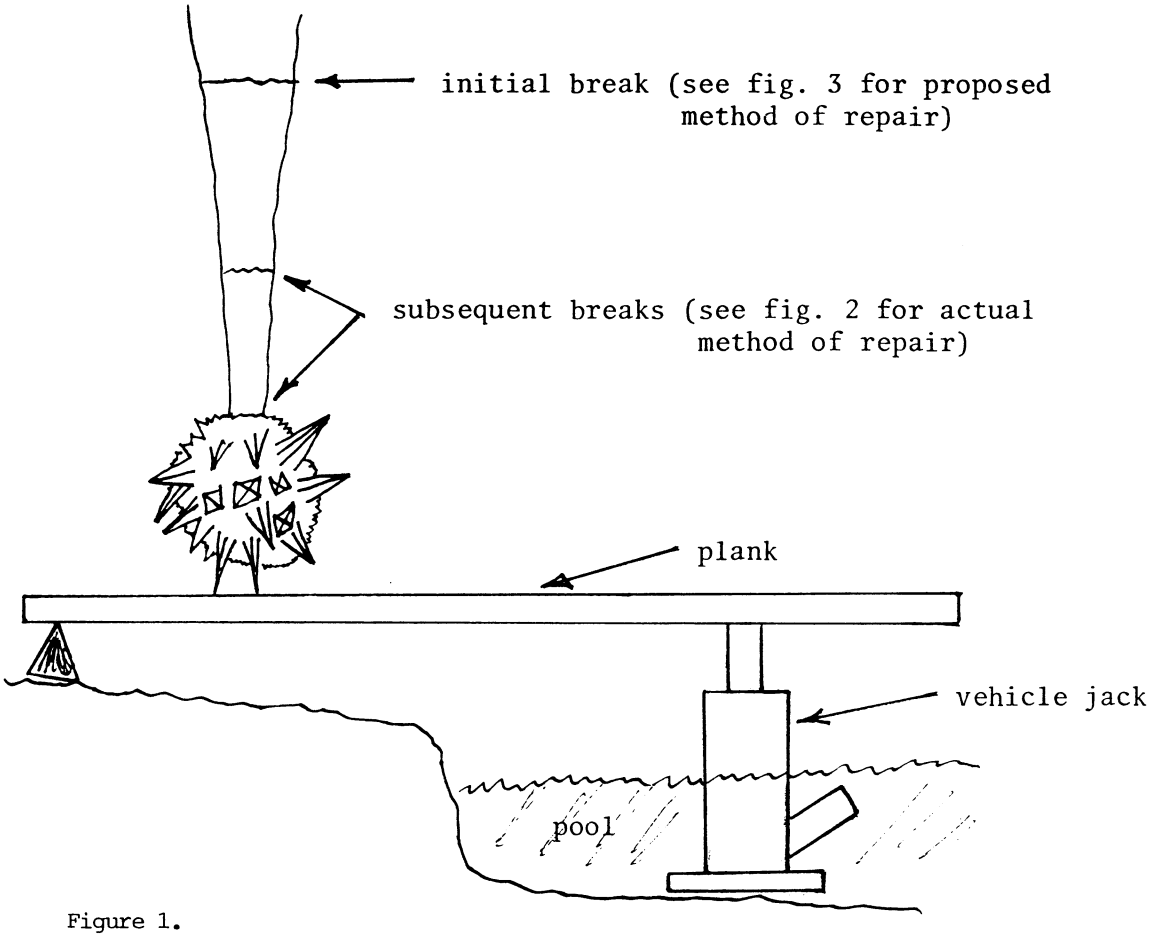

Figure 1.

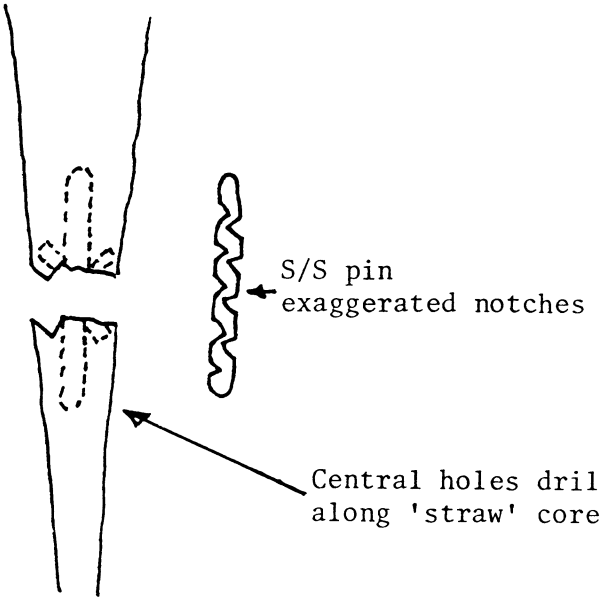

Figure 2.

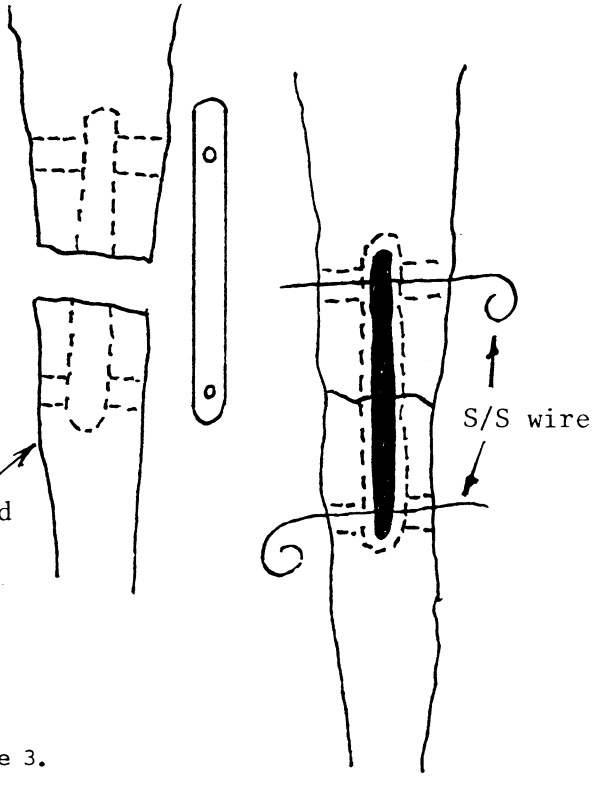

Figure 3.

SECOND ATTEMPT

The smaller crystal cluster was the first to be glued back into place during the second restoration attempt. This cluster was actually two clusters from adjacent stalactites that had joined together. However, during the initial breakage, a section of one stalactite had disappeared and so, rather than rejoin the cluster to its original position and create a strain point on the joint, it was decided in consultation with the attendant guide that centralizing the cluster around one stalactite would not adversely affect the aesthetic appearance of the decoration.

After thoroughly drying the two sections with the hot air gun, the cluster was held in place while the 5 minute Araldite epoxy 'went off'. A section of 3mm acrylic rod was placed underneath the cluster to support the joint. The hot air gun was placed in position and left to run overnight. As epoxy glues take several days to attain full strength, the support rod was left in position for a month, when it was judged that the joint was sound enough to have the support removed.

The reinstallation of the larger stalactite presented problems when the epoxy prematurely 'went off' before the lower portion with the pin installed could be correctly positioned. This necessitated a change in plans as to how it was to be rejoined to the upper section of the stalactite.

The pin was removed, with difficulty, and after the offending epoxy had been removed from the joint, a fresh mix was applied and the joint sucessfully made. A 6mm acrylic rod was placed in position under the cluster and a stiffening rod glued over and behind the joint, held in position with paste Araldite (i.e. Araldite mixed with talc). Holes and wide joints were filled and blended to match the texture of the decoration using paste Araldite. Again the hot air gun was left to run ovrnight by way of the timer.

A decision will be made during 1987 as to whether or not the supporting rod can be safely removed. At this stage it is felt that the rod will become a permanent but unobtrusive part of the decoration. An engraved sign was placed nearby explaining how the damage occurred and the SRGWA was responsible for its restoration.

CONCLUSIONS

This paper has attempted to describe the methods used to restore the broken stalactite clusters of the Yallingup Cave Jewel Casket. The salient points were that:

1. The decoration was close to the floor of the cavity thus allowing easy floor support.
2. Being moist, the decoration precluded the use of water-soluble adhesives.
3. Due to the close proximity of other decoration and restricted access to all sides (of the decoration), mechanical jointing methods could not be employed.
4. The use of internal stainless steel support pins and of random 'key' holes was judged essential for strong bonding.
5. Hot air guns make life easier when working in humid caves or with active decoration, the power being supplied from mains as with commercial caves or generators in the case of wild caves.
6. Sodium silicate appears a viable alternative to Araldite when dealing with dry decoration in low humidity caves.

ACKNOWLEDGEMENTS

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