THE TREPHINED SKULL FROM
THE EARLY BRONZE AGE PERIOD
AT ARAD*

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During the course of the excavations carried out at Arad by Ruth Amiran and co-workers, a tomb cave was accidentally discovered outside the northwestern wall of the Early Bronze Age II city. The cave was small, measuring some 1.6 x 2.5 m in area, with the maximum height ca. 1 m (Ill. 1). A number of secondary burials were found, together with a material assemblage which indicates that the burial cave belonged to the non-urban settlement of Stratum IV at Arad (Amiran et al. 1978; Amiran et al. 1986).

The bones had been placed in two piles. The skulls were found on a roughly semicircular platform, while the long bones were concentrated in the western corner of the cave (Ill. 2). Four of the eight skulls excavated were identified as male, two were
female, one was an infant aged two, and one an adult too badly damaged for sex determination. The cranial bones of one of the males, a young individual aged between 16–18 years, showed scars from an old trephination operation, that had probably been carried out some years before his death.

The evidence of the operation is shown by a large shallow symmetric depression on the top of the skull, with shallow sloping edges. It measures some 4 cm in diameter, and is present on both parietal bones, extending across the sagittal suture and reaching the coronal suture anteriorly (Ill. 3). The depression is surrounded by a distinct, slightly raised margin and the size and form of the lesion suggests that this was a trephination carried out by scraping. That is, the scalp was probably reflected backwards to expose the top of the skull, and the bone removed by scraping with a sharp object to expose the underlying connective tissue — the dura mater — covering the brain (Horsely 1887). The operation apparently healed without infection, since the bony margins of the operated site are normal, with no sclerotic or dead bone. Death was probably unrelated to the operation, and in any event, as the well-healed lesion shows, occurred at least one to two years post-operation.

Whatever the immediate cause of death, the individual operated on was buried in the same manner and in the same cave as the seven non-operated individuals.

Trephination, the removal of part of the skull, is still carried out today throughout the world; sometimes as a prelude to brain surgery, sometimes to remove or replace bone fragments following fractures of the skull. In many non-Western societies it is also carried out for additional reasons, including attempts to relieve severe headaches and/or to facilitate the exit of evil spirits (Lisowski 1967; Ortner & Putscher 1981). It has also been claimed, from early ethnographic reports, that in New Ireland, in the South Seas, trephination was fashionable since it was considered to promote longevity (Crump 1901).

Whatever the reason for trephination, ethno-
graphic findings suggest that the operation is not considered dangerous, and that even with minimal hygiene, does not commonly result in significant post-operative complications through infection (Margetts 1967).

The operation seems to have been carried out throughout the ancient world. Its occurrence in Neolithic European skulls was reported as early as 1887 by Horsely, and numerous cases have been described from Precolumbian South and Central America (Stewart 1958). The highest frequency yet published in any archaeological population is that reported by Allison & Pezzia (1976) — 24 instances in 288 skulls examined at Ica, Peru. Of these, 14 showed evidence of previous trauma or infection to the skull, suggesting that the operation had been carried out for therapeutic reasons. On this basis it seems that approximately one in ten of this sample had undergone trephination. It is perhaps of interest to point out that there was a very high incidence of trauma and disease in this group: 39 appeared to have suffered from blows, fractures or infections of the skull.

Similarly, a recent review of English trephinations from skulls found in archaeological sites, also indicates that a high proportion of them had some form of cranial pathology — such as mastoiditis or dental abscesses — that would have caused both pain and swelling (Parker et al. 1985–1986). This provides further support for the suggestion that trephination was primarily for therapeutic reasons, cranial infection or injury.

In the Near East and specifically the southern Levant and Egypt, trephinations have been considered comparatively rare in all periods, but may have been practiced in very early times. Ferembach (1970) has suggested that partial trephination may have been carried out at the proto-Neolithic settlement of Zawi Chemi Shanidar in Iraq. Here three out of eight skulls showed circumscribed circular depressions of the cranial bones, although none penetrated the skull completely. She suggested that in these cases only the outer table of the bone was operated on.

The case from the epipaleolithic site of Taforalt in North Africa, reported by Dastugue (1962), is more convincing. He described a healed lesion, with perforation, measuring 8.5 × 10.5 mm on the left parietal of an adult male. If we exclude the possible Neolithic trephination reported from Jericho (Kurth & Rohrer-Ertl 1981), the first definite cases in the Southern Levant are those from the Chalcolithic period. The first case published was that from the Chalcolithic strata at Azor (Ferem-
bacher 1984) and now additional trephinations have been reported from two other Chalcolithic sites: Wadi Makkuk (Zias & Pomeranz, submitted for publication) and South Sinai (Hershkovitz 1987).

At Wadi Makkuk the frequency of trephinations was exceptionally high, with eight out of 84 individuals identified showing trephinations. One of the eight trephined skulls had suffered what must have been a very painful case of frontal sinusitis with secondary intracranial infection. In this individual three separate surgical interventions had been carried out, as evidenced by the three distinct areas of trephinations. This situation seems highly untypical. Hershkovitz (1987) has described only one case among the many specimens from Sinai he examined, and no trephinations were found in any of the 15 crania that I studied from ‘Ein Hudera (Bar Yosef et al. 1977) or the 19 skulls from the nawamis in Wadi Solaf, studied by Field (1952).

Similarly, examination of Chalcolithic skeletal remains from other sites in the Levant also indicates that the practice was fairly rare. No instances of trephination have been reported in skeletal remains from Ben Shemen, Nahal Mishmar, Shiqmim, Beer Şafad, H. Hor, Tel Teo, Megiddo or Byblos, and only one from Azor (Smith 1989).

Rather surprisingly, very few cases have been reported from Egypt, and most of these appear to be relatively late. In a recent review of the evidence from Egypt, Shaabab (1982–1984) states that only nine cases have been described in Egyptian skulls. Since many thousands of well-preserved skulls have been recovered from archeological sites in Egypt, this suggests that the practice was indeed rare. Of the nine published cases from Egypt, one, from Tarkhan, is Early Dynastic, one is of unknown provenience, while the rest come from various sites dated from the New Kingdom to the Byzantine period. This small heterogeneous sample included both adults and children (the youngest aged 12) of both sexes. Four of the skulls had other infectious or traumatic lesions present, that were unrelated to the trephination and probably antedating it. It thus seems likely that these trephinations were carried out for therapeutic reasons.

In view of the relatively small number of skulls dating to the Neolithic period from Israel and the surrounding regions that have been examined, it would be premature to try and pinpoint the origin or frequency of trephinations. However, the present data suggest an exceptionally high frequency in the region around Jericho in the Chalcolithic period and also that the operation was obviously known in South Sinai and at Azor. By the time the boy from Arad was operated on, the operation was therefore long established, and indeed, although the patient died young, the well-healed margins of the operation site indicate that death was probably unrelated to the operation.

* I would like to express my appreciation and thanks to Ruth Amiran, for her encouragement and support and for providing such a wonderful and inspiring example as a person and as an archeologist. This study formed part of a larger project that received financial support from the Israel Academy of Science.

NOTES


Zias J. & Pomeranz S. Serial craniectomies for intracranial infection 5.5 millennia ago (submitted for publication).