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FAUNAL REMAINS FROM GUA TUPAK, BAU, SARAWAK**Nicholas Gani, Stephen Chia and Velat Bujeng****INTRODUCTION**

In February and March 2008, archaeological excavations were conducted at Gua Tupak, Bau, Sarawak by a team of researchers from the Centre for Global Archaeological Research, Universiti Sains Malaysia (USM), Penang and the Sarawak Museum Department, Kuching. The excavations, which were conducted at Gua Tupak's main cave area and a nearby rockshelter area, recovered various types of artefacts which consist of predominantly of shell remains and animal bones as well as earthenwares, stonewares and stone artefacts (Gani et al, 2009). Radiocarbon dates obtained from the excavations suggests that the rock shelter area was occupied at around $1,190 \pm 40$ B.P., while the faunal remains and other cultural deposits at the main cave area have been dated between 270 ± 50 B.P and 170 ± 40 B.P. (Gani et al., 2009; Gani, 2010).

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INTRODUCTION

In February and March 2008, archaeological excavations were conducted at Gua Tupak, Bau, Sarawak by a team of researchers from the Centre for Global Archaeological Research, Universiti Sains Malaysia (USM), Penang and the Sarawak Museum Department, Kuching. The excavations, which were conducted at Gua Tupak's main cave area and a nearby rockshelter area, recovered various types of artefacts which consist of predominantly of shell remains and animal bones as well as earthenwares, stonewares and stone artefacts (Gani *et al.*, 2009). Radiocarbon dates obtained from the excavations suggests that the rockshelter area was occupied at around $1,190 \pm 40$ B.P., while the faunal remains and other cultural deposits at the main cave area have been dated between 270 ± 50 B.P and 170 ± 40 B.P. (Gani *et al.*, 2009; Gani, 2010).

Gua Tupak is a cave located in Bau District, approximately 35 kilometres southwest from Kuching city in Sarawak (Fig. 1). Gua Tupak was previously excavated by the Sarawak Museum in 1950 (Wilford, 1964: 74). Although no excavation report was ever published, we know from the Sarawak Museum records that the 1950 excavation recovered earthenwares, stonewares, animal bones and ash (Gani, 2010). A survey conducted in November and December 2007 at eleven caves in the Bau area established Gua Tupak as a potential cave for further archaeological investigation. Subsequently, excavations at Gua Tupak were conducted at two different locations with a total of five trenches

excavated. Three trenches (trenches A, B and C) were excavated at the main cave area, while two (trenches Y and Z) were excavated at a nearby rockshelter area (Fig. 2). All trenches were two metres by one metre in size, and were excavated in spits or arbitrary layers of 10 cm.

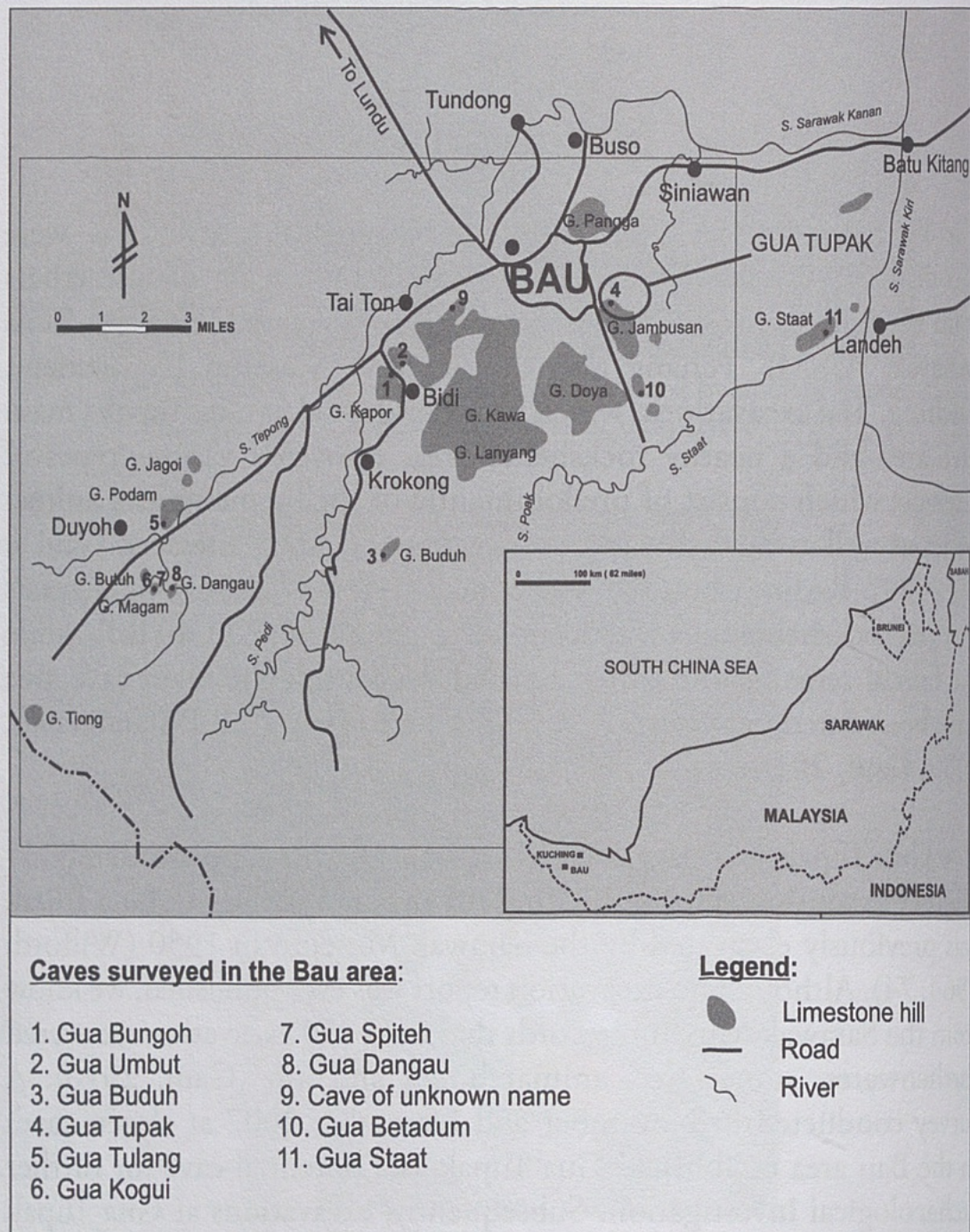


Fig. 1: The location of Gua Tupak (and other caves surveyed) in Bau, Sarawak.

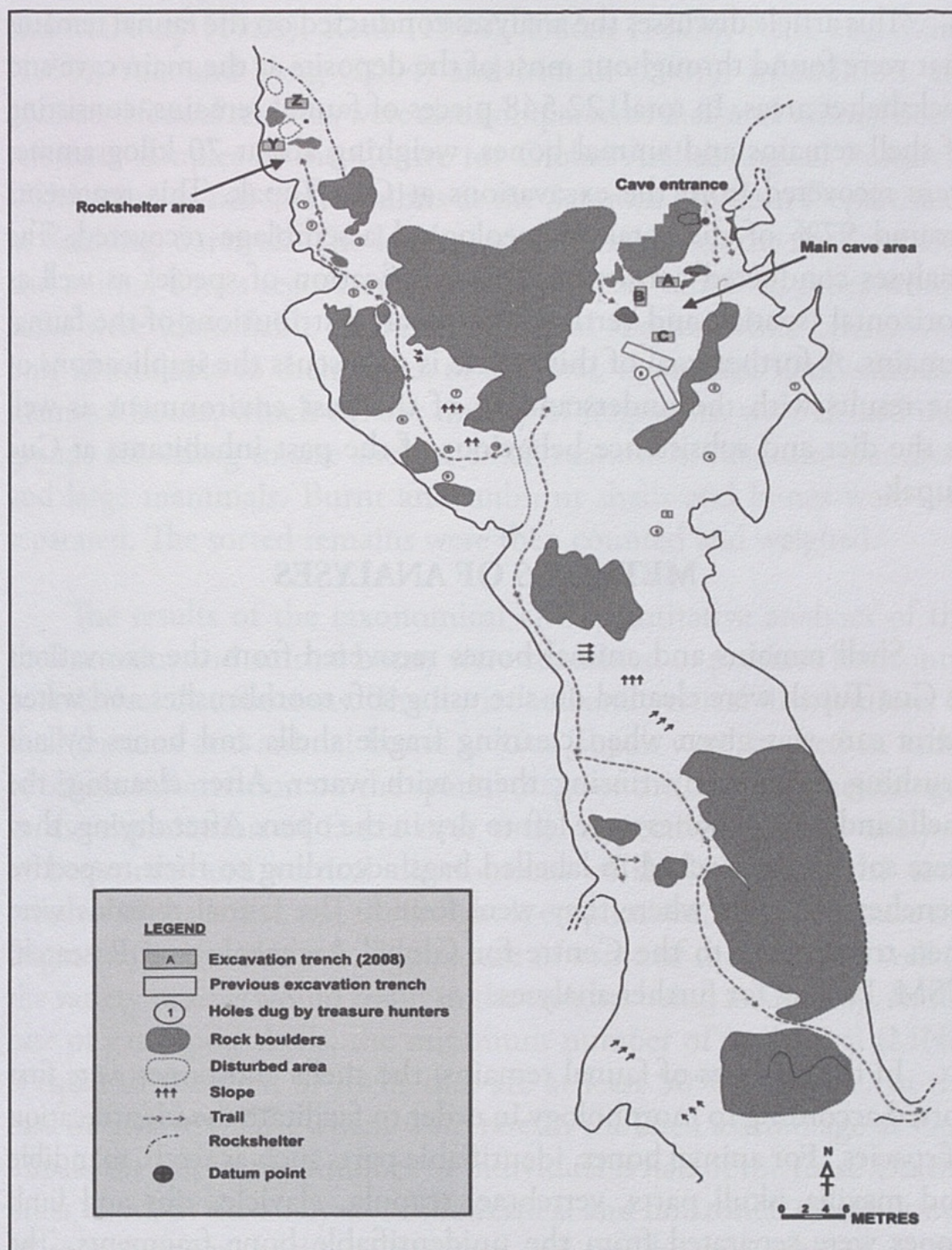


Fig. 2: Map of Gua Tupak and the excavated trenches.

This article discusses the analyses conducted on the faunal remains that were found throughout most of the deposits at the main cave and rockshelter areas. In total, 22,548 pieces of faunal remains, consisting of shell remains and animal bones, weighing about 70 kilogrammes were recovered from the excavations at Gua Tupak. This represents around 97% of the total archaeological assemblage recovered. The analyses conducted consist of the identification of species as well as horizontal (spatial) and vertical (temporal) distributions of the faunal remains. A further goal of this article is to discuss the implications of the results with the understanding of the past environment as well as the diet and subsistence behaviour of the past inhabitants at Gua Tupak.

METHODS OF ANALYSES

Shell remains and animal bones recovered from the excavations at Gua Tupak were cleaned on-site using soft toothbrushes and water. Extra care was given when cleaning fragile shells and bones by not brushing, but merely rinsing them with water. After cleaning, the shells and animal bones were left to dry in the open. After drying, they were sorted and packed in labelled bags according to their respective trenches and spits where they were found. The faunal remains were then transported to the Centre for Global Archaeological Research, USM, Penang for further analyses.

In the analyses of faunal remains, the shells and bones were first sorted according to morphology in order to facilitate the identification of species. For animal bones, identifiable parts such as teeth, mandible and maxilla, skull parts, vertebrae, scapula, clavicle, ribs and limb bones were separated from the unidentifiable bone fragments. The identification of species for shell remains and animal bones was done by using published references such as Maxwell (1921), Cornwall (1956), Berry (1963), Saunders and Manton (1969), Romer (1970), Tweedie (1970, 1978), Medway (1977), Bellwood (1988), Leekagul

and McNeely (1988), Kent (1992), Datan (1993), Reitz and Wing (1999), Yule and Yong (2004) and Matsui (2007). In addition, the excavated faunal remains were also compared to shell and animal bones reference samples at the Centre for Global Archaeological Research, USM, Penang and shell exhibits at the Sarawak Museum Department in Kuching, Sarawak. The level of identification for the shell remains and animal bones recovered from Gua Tupak varies. In other words, some were identifiable to their genus and species, while others were only identifiable to their order, or at worst, their class. Unidentifiable mammal bones, which consist mainly of fragments, were classed into groups according to size such as small mammals, medium mammals and large mammals. Burnt and unburnt shells and bones were also separated. The sorted remains were then counted and weighed.

The results of the taxonomical and quantitative analyses of the shell remains and animal bones were combined to produce horizontal and vertical distributions. The horizontal and vertical distributions of shell remains and animal bones at Gua Tupak were studied in order to obtain information on the spatial usage of the cave and the changes in the exploitation of fauna over time, respectively. In the analyses of horizontal and vertical distributions of shell remains, the total number of shells and not the weight is emphasised. This is because the fragmentary and also calcified nature of some of the shells, as well as the variety in sizes would result in the weights being misleading. In the case of gastropod shells, the minimum number of individual (MNI) is equal to the total of shells that are at least 50% complete. In the case of bivalve shells, which were rare in the shell assemblage at Gua Tupak, the minimum number of individual is half of the total. On the other hand, in the analyses of the vertical and horizontal distributions of animal bones, both the number and weight are included in the distribution tables. This is because the totals do not represent the minimum number of individual (MNI) for they include both whole bones and fragments. In addition, some mandibles were found with the teeth still intact. A mandible fragment, together with the intact