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Honey, Hadza, hunter-gatherers, and human evolution

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ABSTRACT

Honey is the most energy dense food in nature. It is therefore not surprising that, where it exists, honey is an important food for almost all hunter-gatherers. Here we describe and analyze widespread honey collecting among foragers and show that where it is absent, in arctic and subarctic habitats, honey bees are also rare to absent. Second, we focus on one hunter-gatherer society, the Hadza of Tanzania. Hadza men and women both rank honey as their favorite food. Hadza acquire seven types of honey. Hadza women usually acquire honey that is close to the ground while men often climb tall baobab trees to raid the largest bee hives with stinging bees. Honey accounts for a substantial proportion of the kilocalories in the Hadza diet, especially that of Hadza men. Cross-cultural forager data reveal that in most hunter-gatherers, men acquire more honey than women but often, as with the Hadza, women do acquire some. Virtually all warm-climate foragers consume honey. Our closest living relatives, the great apes, take honey when they can. We suggest that honey has been part of the diet of our ancestors dating back to at least the earliest hominins. The earliest hominins, however, would have surely been less capable of acquiring as much honey as more recent, fully modern human hunter-gatherers. We discuss reasons for thinking our early ancestors would have acquired less honey than foragers ethnographically described, yet still significantly more than our great ape relatives.

Introduction

This special issue of the Journal of Human Evolution is dedicated to 'Insectivory' – eating insects. This paper focuses on the consumption of honey as an insect product. While hunting and meat-eating have long received attention in the literature on paleodiets, honey consumption has received much less attention until recently (Wrangham, 2011; Crittenden, 2012). Here, we first discuss the importance of honey for human foragers wherever honey exists. Next, we analyze how much honey is consumed by Hadza hunter-gatherers in Tanzania. We report how much honey is acquired by males versus females and how acquisition varies with age. We also report on the amount of honey acquired from each bee species. We discuss the importance of a chopping tool to access hives inside trees. Finally, we discuss the importance of controlling fire to make torches to stun and incapacitate stinging bees. These factors are used to estimate how important honey was for foragers living before effective chopping tools and the control of fire.

Honey is probably the most energy dense food in nature. Several analyses have concluded that it has roughly 3049–3680 kcal per kg (Skinner, 1991; Ulene, 1995; Murray et al., 2001). There are several different species of bees in Africa that make honey but the one famous for its aggressiveness in defense of the hive is *Apis mellifera*. This kind of honey also usually comes in the greatest quantities. The African honey bee is famous for its serious stings and aggressiveness compared with those hybrid subspecies that European beekeepers have cross-bred. Within a minute or two of being stung, one's hand can swell noticeably and stay feverish for several days.

With straw-like tongues, honeybees suck nectar from flowering plants. The nectar mixes with proteins and enzymes in their stomachs. When they return to the hive they fan their wings, which

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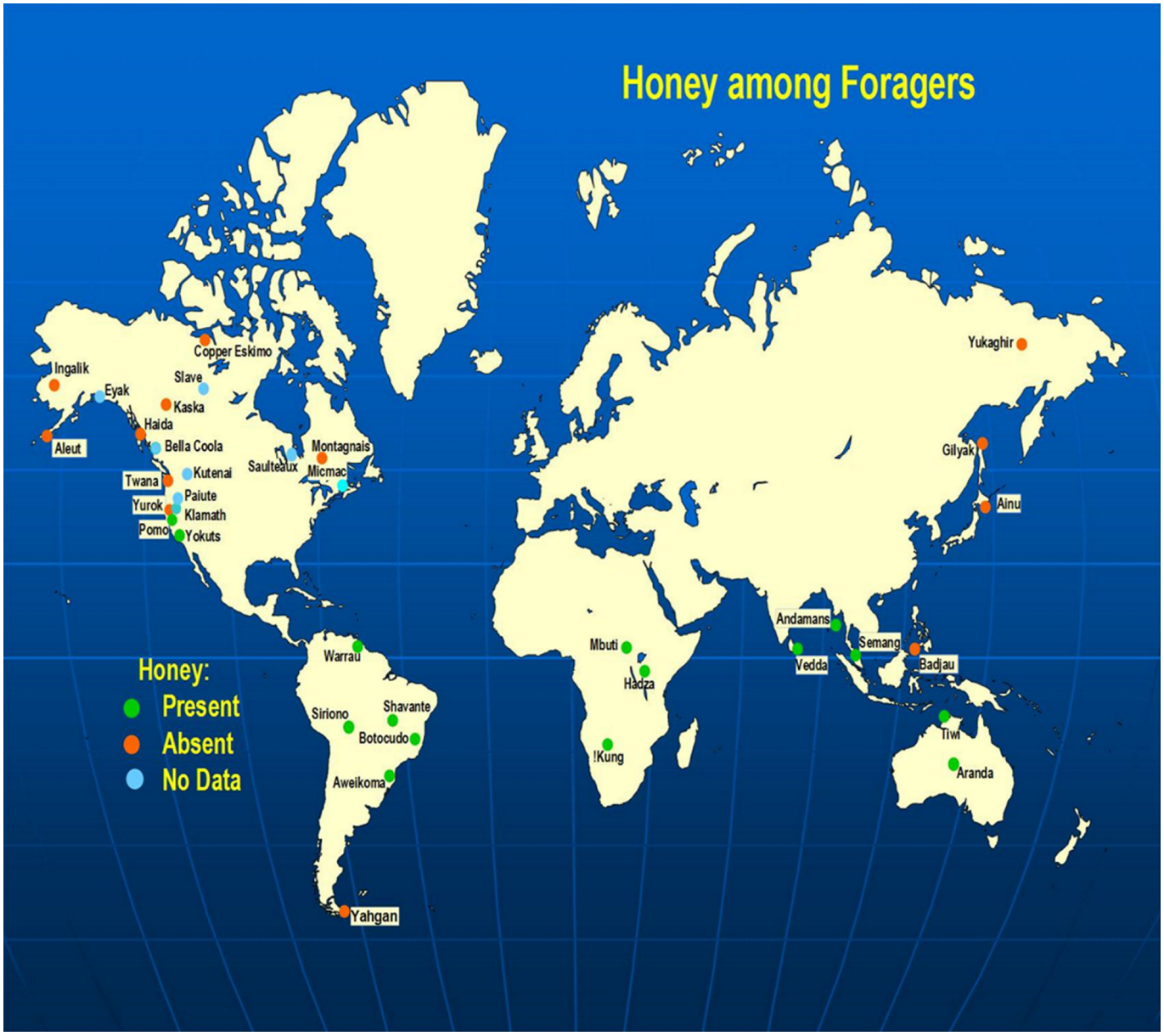

Figure 1. Locations of 36 foraging societies in the Standard Cross Cultural Sample (SCCS).

causes the nectar to evaporate and thicken. Nectar is about 80% water, while honey is only 14–18% water (Winston, 1991). Honey then is nectar that bees have collected, regurgitated, and dehydrated to enhance its nutritional properties for the larvae that feed on it. It is also an important food for humans, other mammals such as black bears (*Ursus americanus*), and the honey badger or ratel (*Mellivora capensis*), as well as birds like honeyguides (*Indicator indicator)* and honeyeaters (Meliphagidae) (Ford and Paton, 1976). In addition, our closest relatives, chimpanzees (*Pan troglodytes*) (Sanz and Morgan, 2009; McLennan, 2011), bonobos (*Pan paniscus*) (Bermejo et al., 1994; McGrew et al., 2007), gorillas (*Gorilla gorilla*) (Kajobe and Roubik, 2006) and orangutans (*Pongo abelii* and *Pongo pygmaeus*) (van Schaik et al., 2003) all eat honey, so it is likely that the last common ancestor (LCA) of the great apes also accessed honey. We use our data on the Hadza to estimate how much honey our ancestors were capable of acquiring before they could control fire and before they had very effective chopping tools.

Cross-cultural description and analysis of foragers

Where honey is available, it is an important food for hunter-gatherers. Almost all warm-climate foragers in the Standard Cross Cultural Sample (SCCS) of traditional societies have honey in their diet (Fig. 1, Table 1). Of the 36 foraging societies in the SCCS by our definition of foragers, there are 29 with data on honey consumption.[1] Fifteen of the 16 warm-climate societies (Effective Temperature $\geq$13 °C) take honey, whereas none of the 13 cold-climate societies (ET $<$ 13 °C) (Table 1) take honey, or at least there is no mention of it. Of the 15 warm-climate societies, only the Badjau of

[1] From variables in the SCCS, we defined as hunter-gatherers/foragers those with no more than 10% dependence on agriculture ($v3 < 4$) or animal husbandry ($v5 < 4$), with trade accounting for no more than 50% and less than any single source ($v1 < 6$), and not horse-mounted foragers (not $v858 = 5$).