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SHORT COMMUNICATION

Chimpanzees in Bwindi-Impenetrable National Park, Uganda, Use Different Tools to Obtain Different Types of Honey

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ABSTRACT. Evidence of tool use for foraging for honey by chimpanzees in Bwindi-Impenetrable National Park, Uganda, is reported. These are the first records of tool use by chimpanzees in this region of the Albertine Rift. Tools of two types were found at sites of bee activity. Chimpanzees apparently use small stick tools to forage for the honey of a stingless bee [*Meliponula bocandei* (Trigonidae)] that nests in tree cavities and also in subterranean holes. They use significantly larger, thicker tools to assist in foraging for honey of African honeybees (*Apis mellifera*).

Key Words: Chimpanzees; Tool use; Honey-foraging; Bees; Tool archaeology.

INTRODUCTION

Tool use by wild chimpanzees has been documented in forests across equatorial Africa (GOODALL, 1970; MCGREW et al., 1979; NISHIDA, 1973; YAMAGIWA et al., 1988; BOESCH & BOESCH, 1983, 1990). As information on the distribution of tool use has accumulated, it has become clear that regions within the geographic range of chimpanzees differ markedly with respect to the types of tools used. The most widespread form of tool use reported is honey-dipping, which occurs in numerous sites and contexts (MCGREW, 1992, p. 166; BREWER & MCGREW, 1990). Honey is a highly nutritious forest food, containing high concentrations of calories in the honey itself (FLETCHER, 1978) plus protein and fat in larvae, adult bees, and pollen that are often eaten with the honey (MCGREW, 1992). Honey-dipping involves the use of a stick inserted into a tree cavity or subterranean nest to extract honey, often accompanied by the use of hands to enlarge the hole or scoop up additional honey and bee products. Whether dipping tools or hands alone are used appears to depend on the population; TUTIN and FERNANDEZ (1985) observed honey dipping by hand in Lopé, Gabon. BOESCH and BOESCH (1990) recorded stick tool-use in honey-dipping in Taï National Park, Ivory Coast, as did NISHIDA and UEHARA (1983) in Mahale National Park, Tanzania, and GOODALL (1986) in Gombe National Park, Tanzania. Recently, WHITEN et al. (1999) presented a systematic analysis of tools and other cultural aspects, including honey-foraging tools, of chimpanzee societies in seven long term study sites across Africa. They distinguished among anecdotal, habitual, and customary use of such tools, and showed that in at least 39 cases, cultural behaviors including tool use show a pattern of customary use, more reasonably attributed to learned traditions than to ecological influences on the pattern.

This study investigated the use of honey foraging tools in a montane wet forest in the Albertine Rift region of east-central Africa. Little is known about the behavior of chimpanzees in montane forest (YAMAGIWA et al., 1996; BASABOSE & YAMAGIWA, 1997). Although gorillas occur and have been studied in the Afro-montane forest of the Virunga volcanoes, chimpanzees do not occur in the Virungas. In Kibale National Park, Uganda, chimpanzees raid the nests of honeybees (*Apis mellifera*) by hand but only occasionally use stick tools (WRANGHAM, pers. comm.). In Kahuzi-Biega National Park, Democratic Republic of Congo, chimpanzees use digging sticks to open subterranean nests of stingless bees (*Meliplebeia tanganyikae*; YAMAGIWA et al., 1988). Little is known about differences in how wild chimpanzees deal with various bee species. Raiding of nests may be done differently for venomous honeybees versus stingless Trigonids. This paper presents evidence of the selection of different tool size for different types of bees and their honey in one chimpanzee population in East-Central Africa.

OBSERVATIONS

We studied the behavioral ecology chimpanzees (*Pan troglodytes schweinfurthii*) as part of a study of the sympatric ecology of chimpanzees and gorillas (*Gorilla g. beringei*) in Bwindi-Impenetrable National Park, Uganda. Bwindi-Impenetrable National Park (331 km², hereafter Bwindi) is one of the largest remaining tracts of East African afro-montane forest still in existence, and has a high level of floral and faunal species endemism (BUTYNSKI, 1984). Field data were collected from January to March 1997, July 1997 to January 1998, and June 1998 to July 1999. Bwindi is located in the southwestern corner of Uganda, adjacent to the Democratic Republic of the Congo. Data collection was carried out from our Camp Kashasha Research Station in the Nkuringo section of the park (S 01°05'183", E 29°38'797"), approximately 14 km southeast of the main ecotourism center at Buhoma. Elevations at this site range from approximately 1,400 to 2,000 m above sea level. The forest at Bwindi is separated from the next nearest forest, the Virunga Volcanoes Conservation Area, by about 25 km at the point of closest proximity. Nkuringo itself is approximately 40 km from the Virunga region. The next nearest chimpanzee population for which tool use is well documented is in Kibale National Park, about 200 km to the north.

Immediately upon beginning a survey and pilot study of a chimpanzee community living in and around Nkuringo valley in July 1997, sticks were found at the foot of trees containing bee nests in trunk cavities. Field marks such as knuckle prints (distinguishable from those of gorillas by local trackers) and feces indicated that chimpanzees had been at the sites in the past several days, and in one case an hour or so earlier. In no instance did we see the tools being used by chimpanzees. All trees located having trunk cavity nests that were in active use ($N = 5$) had from 2–8 tools scattered on the ground near the base of the trunk.

Tools were found to fall into two size categories. Nine tools found at the base of three trees containing nests of the stinging *Apis mellifera* had a mean length of 60 cm (range 25–85 cm), and a mean mid-point diameter of approximately 1.6 cm (Fig. 1). Twelve tools found at the base of three trees containing nests of a stingless bee known locally as *Obuhuru maranga* [*Meliponula bocandei* (Trigonidae)] had a mean length of 27 cm (range 14–70.5 cm) and a mean mid-point diameter of approximately 0.5 cm. This length difference was statistically significant (paired t -test: $df=8$, $t=7.71$, $p<.0001$). The two size classes of tools overlapped by only one tool. All sticks had been cleared of attached leaves and twigs. Four sticks in each size class were missing bark from one end and may have been peeled; one end of each stick was frayed and smelled strongly of honey.



Fig. 1. Tools used for extraction of honey from African honeybee (*Apis mellifera*) nests in Bwindi-Impenetrable National Park, Uganda. Photograph by CRAIG STANFORD.

DISCUSSION

There may be differences in the use of honey foraging tools within Bwindi. No honey-dipping sticks have been found by researchers or park guides in other parts of the park in spite of intensive human use of some areas due to the gorilla tourism project. One of us (C.G.) reported seeing chimpanzee tools previously only in one region of the park where no research has yet been done. The Nkuringo region in which the present study was carried out has not been studied in detail before, and other types of tool use may come to light in time.

The consumption of bee honey plus larvae and adult bees occurs at many chimpanzee study sites, but the occurrence of tool use to facilitate honey consumption varies in the Albertine Rift region. The Kibale National Park population only rarely uses tools to obtain honey, using fingers or hands instead. WRANGHAM (pers. comm.) has suggested that the aggressiveness of the local honeybees at Kibale discourage honey-foraging tools notwithstanding. It is not known how recently Bwindi, now isolated from all other forest tracts, was contiguous with other East African forests. Bwindi gorillas are genetically indistinguishable from those in the nearby Virunga region (GARNER & RYDER, 1996), and the two forest tracts were separated by human cultivation only within the past 500 hundred years (HAMILTON et al., 1986). The genetic affinities of chimpanzee populations in the region are not as well known.

Bwindi chimpanzees appear to select or modify tools of different sizes depending on the bee and honey species for which they are foraging. The link between tool dimensions and the threat posed by the bee species suggests task specificity. Elsewhere, large sticks are used as chisels to enlarge the tree cavity to allow better manual or tool-assisted honey-dipping (BREWER & MCGREW, 1990). The longer and thicker tools at Bwindi were used only on honeybee nest-

holes. Bwindi honeybees may nest in cavities for which longer sticks are more useful than the short sticks used to forage for stingless bee honey. *Apis mellifera* is an aggressive species that stings readily; in addition to the use of the longer sticks as chisels for opening nests or enlarging cavities, their length may enable chimpanzees to avoid some stings while gaining access to the hive. Conversely, long sticks may not be necessary to forage in stingless bee nests. We have never observed tools near stingless bee nests that are situated at or near the forest floor. At least six other species of stingless Trigonid bees occur in the forest at Bwindi, including *Meliponula bocandei* (B. DOMINIC, pers. comm.), nesting in both tree cavities and subterranean burrows. We have no information about chimpanzee predation on other species.

The occurrence of stick tools in Bwindi is noteworthy since other local chimpanzee populations appear to use tools rarely if at all. This cultural variation (sensu WHITEN et al., 1999) is typical of the geographic distribution of chimpanzees. Patterns of tool use or its absence do not, however, follow consistent geographic boundaries and suggest that both innovation and extinction of learned traditions has occurred repeatedly and independently (MCGREW, 1992). Documenting the technologies of as many chimpanzee populations or communities in a region as possible is the only way in which the observed behavioral diversity will be explained.

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