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**Evidence for Leaf Swallowing  
Behavior by Savanna  
Chimpanzees in Senegal- a New  
Site Record**

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Evidence of leaf swallowing, a proposed form of medicinal plant use by savanna chimpanzees was recently recorded at the Fongoli study site in southeastern Senegal. Since April 2001, the Fongoli community of chimpanzees has been studied in an effort to better understand the ecology of chimpanzees in an arid environment. The habitat can be described as a mosaic of woodland and savanna containing areas of bamboo forest and grassland and interspersed with isolated areas of gallery forest (<1% of study area) and larger areas of laterite plateau. Chimpanzees at this site have been estimated to occur at a density of 0.09 individuals per km<sup>2</sup> (1). The site lies approximately 40 km E of the Parc National du Niokolo Koba and 10 km NW of the town of Kedougou, in southeastern Senegal.

Field assistants monitor chimpanzee ranging, diet, and habitat use within an approximately 50km<sup>2</sup> study area. Data are collected on chimpanzee beds as well as observations of chimpanzees. Habituation of this chimpanzee community is in progress, and diet data are based on analyses from fresh fecal samples. Currently 5 individual chimpanzees have been identified, but opportunities for behavioral observations are limited. However, research assistants have been able to remain with chimpanzee parties for up to 9 hours when they are attracted to dry season water sources. The rainy season begins in June-July, while the extensive dry season begins in November-December.

Chimpanzees share their range with baboons (*Papio hamadryas papio*), green monkeys (*Cercopithecus sabeus*), and patas monkeys (*Erythrocebus patas*). People of the Malinke, Bassari, Bedik, and Diahanke groups also share this area with the chimpanzees and do not hunt them. Much of the large mammalian fauna has been eliminated from the area, but ungulates such as warthog and bushbuck remain at low densities.

Since April 2001, over 400 fecal samples have been analyzed to determine the dietary habits of Fongoli chimpanzees. In addition to recording the number of seeds and their plant species within feces, data are also collected on the percent fiber contained per fecal sample and other characteristics, such as the presence of

insect and vertebrate parts and leafy vegetation. Eighteen samples have been identified as indicative of leaf swallowing behavior.

Fecal samples thought to be indicative of leaf swallowing were observed to contain a large amount of undigested and unchewed leaves with some leaf fragments also included. Five samples were collected during the late rainy season that contained these unchewed leaves:

<b>27 September 2002</b>	<b>10 whole leaves</b>
<b>3 October 2002</b>	<b>&gt;10 whole leaves</b>
<b>22 October 2002</b>	<b>&gt;50 whole leaves + 2 large grass leaves</b>
<b>22 October 2002</b>	<b>&gt;10 whole leaves + 1 large grass leaf</b>
<b>22 October 2002</b>	<b>4 whole leaves.</b>

The plant these leaves originated from was found after two weeks of searching and comparing in the field. Samples were then compared under a microscope and they are believed to be identical. This herbaceous plant is from the legume family (Fabaceae). The leaves are between 3-6 cm long and 4-5 mm wide with a slightly rounded base and an apex that is mucronate or tipped with a sharp, abrupt point. The pubescence of the upper and lower surfaces of the leaves is strigose, which means bearing straight, stiff, sharp, appressed hairs.

Several fecal samples also indicated that Fongoli chimpanzees swallow whole large amounts of grass leaves belonging to the species *Andropogon chevalieri* Reznik. During the beginning of the rainy season, on July 22, 2002, a fecal sample was collected that was made up almost entirely of wadded grass leaves. Over two months later, near the end of the rainy season, on Sept. 27, Oct. 25, and on Nov. 14, more samples were found that also contained large amounts of unchewed grass leaves. The grass leaf sections were up to 25 cm long and around 1 cm wide. The leaf surfaces are scabrous (rough) and the leaf margins are fringed with short hairs. Three other samples were collected that contained small amounts of unchewed grass leaves (between 1 and 2 leaves present per sample). Similarly, on June 18 and 19, 2003 two fecal samples were observed to contain >5 entire

grass leaves measuring over 10 cm in length and 4 mm in width that may also belong to the same species.

On 31 December 2002, during the early part of the dry season, 18 entire or mostly entire leaf fragments were found contained in one fecal sample collected within a small strip of gallery forest. Leaves and leaf fragments averaged 56.9 mm in length (range: 40-102 mm) and 19.8 mm in width (range: 13-27 mm) (N=18). A number of smaller leaf fragments were also found in the dung sample. Leaves were folded/wadded when sieved from the fecal sample, but no evidence of chewing or any digestion was evident on the leaves. Leaves were identified as *Ficus asperifolia* after comparison with a series of plants in the study area. Less than 30 m from where the fecal sample was collected, a recent ground bed made from two *F. asperifolia* saplings was recorded. This particular plant is characterized by very coarse leaf surfaces. Six other instances of whole leaf swallowing were observed at Fongoli (between 1 and 2 leaves per sample). These leaves were different than the *F. asperifolia*, legume, and grass leaves. Similarly, the surfaces of some of the leaves were rough.

A study of parasite loads of Fongoli chimpanzees as well as future studies of feeding behavior here will provide a test of the hypothesis that Fongoli chimpanzees use plants medicinally. We hypothesize that Fongoli chimpanzees swallow whole leaves in a manner conducive to their medicinal use as reported for plants such as *Aspilia* and *F. exasperata* in the Kibale Forest, Uganda and at other sites (2). Chimpanzees fold and ingest physically irritating leaves whole, and analyses suggest such behavior helps to eliminate gut parasites (3). Chimpanzee fecal samples had not yet been collected for analyses of parasite load, save for the June 2003 samples. Adult parasites have been observed in at least 3 different fecal samples.

Given the aridity of the study site and the significant differences between the vegetation here and that characterizing other sites where chimpanzees have been assumed to use plants medicinally, this report of possible medicinal plant use has important implications for the universality of this aspect of chimpanzee behavior and ecology and, perhaps, cultural

implications as well.

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