Seed Dispersal by Pygmy Chimpanzees (Pan paniscus):
A Preliminary Report

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ABSTRACT. The role in seed dispersal played by the pygmy chimpanzees (Pan paniscus) inhabiting Wamba, Republic of Zaire, was studied. Germination was tested for seeds of 17 plant species recovered from the feces of pygmy chimpanzees at Wamba. The fecal seeds of 13 species germinated, and in six of the species the germination rate for the fecal seeds was higher than that of control seeds. Although five other species showed a higher germination rate in the control seeds than in the fecal seeds, the remaining two species revealed no difference in germination rate between the fecal and control seeds. There was no great difference in germination velocity between the fecal and control seeds of the same species. For comparison, seeds of four plant species collected from the feces of common chimpanzees (Pan troglodytes) and gibbons (Hylobates lar) in captivity in Okinawa were tested for their germinability. In this test, although the seeds had passed through the digestive tract, their germinability demonstrated little change. Based on the behavioral characteristics of the pygmy chimpanzee at Wamba and observations of the captive primates in Okinawa, it seems that pygmy chimpanzees may play an important role in the seed dispersal of fruit plant species at Wamba.

Key Words: Pan paniscus; Forest ecology; Seed dispersal; Vegetation; Mutualism.

INTRODUCTION

Many field studies have recently been made on seed dispersal by birds, bats, and primates in tropical forests (Howe, 1977, 1980; Howe & Estabrook, 1977; Howe & van de Kerckhove, 1979; Janzen et al., 1976; Estrada & Coates-Estrada, 1984; Takasaki, 1983; Takasaki & Uehara, 1984; Breitwisch, 1983; Janson, 1983). Many plants depend on various frugivorous animals for their seed dispersal (Frankie et al., 1974; Howe, 1977, 1980; Breitwisch, 1983; Janson, 1983). This means that seed dispersal is closely interrelated with mutualism between animals and plants (Temple, 1977; Wheelwright & Orians, 1982). Plant seed dispersal by animals greatly influences the compositional heterogeneity of tropical forests as well as the density and distribution of the plant populations (Janzen, 1969; Howe & van de Kerckhove, 1979; Gauldikas, 1982).

Pygmy chimpanzees (Pan paniscus) inhabiting the forest in the central part of the Zaïre Basin consume a wide variety of foods, most of which are fruits (Kano, 1974, 1983; Kano & Mulavwa, 1984). They travel over a large area searching for various foods. They discharge and disperse many of the fruit seeds with no apparent signs of damage to the seeds caused by chewing or the digestive process. This implies that the pygmy chimpanzee represents an important seed disperser in this area.

It has been reported in recent field studies on howling monkeys (Alouatta palliata; Estrada & Coates-Estrada, 1984) and common chimpanzees (Pan troglodytes; Takasaki, 1983)
that the germination velocity and germination rates of seeds which have passed through the body of a frugivore are higher than those of the seeds of fruits which have fallen directly from their parent trees. There is much argument about the biological effects on germination to which seeds are subjected while they are in the digestive tract (Estrada & Coates-Estrada, 1984; Takasaki, 1983).

The present germination experiments were undertaken to reveal any conspicuous differences in germination rate and germination velocity that may exist between seeds found in the feces of pygmy chimpanzees (Pan paniscus) and seeds collected directly from the fruits. This paper also reports the results of seed germination experiments performed on common chimpanzees (P. troglodytes) and gibbons (Hylobates lar) in captivity. The interrelation between seed dispersal by the pygmy chimpanzee and the surrounding vegetation is discussed.

MATERIALS AND METHODS

The present study was conducted at Wamba village (22°30' E, 0°10' N), about 80 km south of Djolu, Equateur, Republic of Zaire, over the period from November 5, 1984 to February 12, 1985.

The vegetation in the study area can be divided into the following five types: primary forest, swamp forest, aged secondary forest, young secondary forest, and secondary bush (Kano, 1980; Kano & Mulavwa, 1984). Five unit groups of pygmy chimpanzees (E, P, K, B, and S) currently inhabit the area and their home ranges overlap (Kano, 1982, 1984; Kano & Mulavwa, 1984). The fecal seeds used in this study were collected from the feces of 65 individuals of the E group and 80–100 individuals of the B group. The control seeds used were taken from ripe fruits. They were collected in the home ranges of the above two groups. During the study period, the pygmy chimpanzees consumed 43 plant species, in 24 of which they ate the fruits. From these 24 species of fruit plants, 17 were chosen for the germination experiments (Table 1).

The germination tests were conducted in a garden at the camp. Both the control seeds and fecal seeds varied in size. The seeds were placed 5 to 10 cm apart from one another and covered with 10 mm of earth. The garden was watered twice a day (morning and evening). The conditions were observed and recorded every evening.

Similar seed germination tests were also made for captive animals in Japan. Two adult female common chimpanzees and two adult male gibbons, kept at the zoo of Children's Country in Okinawa, were used. Their fecal seeds were tested for germinability for 50 days from July 1 to August 19, 1985. Ten species of fruit, including watermelon, muskmelon, apple, grapes, papaya, litchis, loquat, cherry, orange, and plum (all agricultural species), were tested. One half of each fruit was fed to the subjects and the seeds were collected from their feces. Control seeds were collected from the other half. The seeds of the same species of fruits were used so as to ensure that the difference of germination potential between the seeds and control seeds was as little as possible. The seeds were planted in a flowerpot (60 × 20 × 16 cm) and watered once in the morning and evening. Under these conditions, the germinability was periodically observed and recorded.

In another experiment with captive animals, the time of consuming the fruit, and the time when the seeds were discharged was recorded in order to estimate how long the seeds stay in the digestive tract.