Motion pictures of regurgitation feeding by a lactating harvest mouse to her young.

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Summary of the study on regurgitation in harvest mice

Regurgitation of partially digested food by mother to young had been regarded as a behavior specific to the Canidae among mammals (Malm and Jensen, 1993). But Ishiwaka and Mori (1998) observed regurgitation feeding of young in the harvest mouse (*Micromys minutus*). According to their observation, female harvest mice regurgitate food directly to their young throughout the period of lactation and beyond.

The summary of their study was as follows.

○There were no morphological adaptations of the upper alimentary tract of *M. minutus* for storage of food, such as the cheek pouch of squirrels (Sciurus) and hamsters (Mesocricetus) or the crop sacs of some birds. Thus, food material transferred to young actually comes from the stomach of the mother.

○The amount of time that the lactating female spent in regurgitation behavior in each observation period rose significantly after day 10. The length of longest regurgitation bout in the first 10 days postpartum was generally 40-50 sec but increased dramatically thereafter, lasting nearly 180 sec on day 16.

○The Number of regurgitation bouts within 1 h of the time the female finished eating increased significantly during days 8-16 than during days 1-7.

○Some regurgitation bouts appeared to be initiated by dams, preceded by licking of the mouth of the young or placing its nose against the young's mouth. The number of regurgitations initiated by dams was greatest on days 1-4 and declined thereafter. Other regurgitations appeared to be initiated by the young licking around their mother's mouth (begging behavior). The regurgitation initiated by young first appeared on days 5-8 and became more common thereafter.

○Young harvest mice facilitated regurgitations with begging behavior after 9 days postpartum, and mean duration of regurgitation behavior drastically increased after day 11. Therefore, at least after day 9, partially digested food provided by lactating female *M. minutus* appears to play a role as 'baby food' for the young and supplements milk.

○In *M. minutus*, regurgitation feeding may help reduce energy demand on the female during lactation and thus indirectly compensate for some of the constraints of small body size. It is considered that this type of maternal care may be of particular benefit to species such as *M. minutus* in which males take no part in care of young.

In the above study, the regurgitation behaviour in harvest mouse was confirmed by detailed observations and by the detection of small plastic pieces from the stomach of pups, which had been mixed in the feed of their mother.

We succeeded in taking some motion pictures of regurgitation behaviour that a harvest mouse dam performed toward her pups in their spherical nest 20cm above the ground. You can view a part of the motion pictures in this report.

Photographing the motion pictures of mother-pups

Motion pictures in the nest where a female harvest mouse were rearing five pups (counted at the weaning) were photograghed through an opening.

The attached motion pictures were photograghed at the night of April 11, 2014 (13 days after parturition).

The photograghing devices and conditions

Small monochrome nightscope (MK-323 type, f=3.6mm) , SD card recorder (AD-S20 type, Carrot Systems Inc.). Motion pictures were recorded when the movement of the subject was detected at a rate of 30 frames/second.

The contents of the motion pictures

Two motion pictutes are attached below. Clicking on the picture, Windows Media Players file movie will start soon.

Motion picture 1: The mother entered her nest at 20:22 and started regurgitation feeding to a pup and then another pup demanded regurgitation and switched with him. The duration of regurgitation for the former was about 45 sec and for the latter was about 48 sec.

Motion picture 2: Thereafter the mother and pups got into the state of sleep. About 2 hours and 10 minutes later, pups started to demand regurgitation again and the mother responded to it. The mother went out of the nest at 23:13.

	
Motion picture1. Regurgitation Feeding of Harvest Mouse (1) (14.2MB, 2:05min) *Click here for MP4(8.5MB)	Motion picture2. Regurgitation Feeding of Harvest Mouse (2) (19.0MB, 2:25min) * Click here for MP4(10.9MB)

Literatures

Malm, K. and P. Jensen (1993) Regurgitation as a weaning strategy－a selective review on an old subject in a new light. Applied Animal Behaviour Science, 36: 47-64.

Ishiwaka, R. and T. Mori (1998) Regurgitation feeding of young in harvest mise, *Micromys minutus* (Rodentia: Muridae) . Journal of Mammalogy, 79 (4): 1191-1197.