A FIRST RECORD OF *BEAMYS* FROM TANZANIA WITH OBSERVATIONS ON ITS BREEDING AND HABITS IN CAPTIVITY

C. ANDRESEN HUBBARD*

Malaria Institute, Amani, Tanzania

The genus *Beamys* holds one of the rarest and least known mice in East Africa. The original description of the genus was made by O. Thomas in 1909 from a specimen in alcohol collected by Dr. S. L. Hinde on June 26, 1908, in the Taveta forest at Taveta, Kenya, not far from the base of Mount Kilimanjaro. The elevation is 2,500 feet. Today this forest is a small patch of jungle trees about 0·5 by 4 miles maintained by a strongly flowing spring and surrounded on all sides by miles of dry bush. Although conditions still favour the presence of *Beamys* the writer has so far not taken it there.

Thomas named the mouse *Beamys hindei* after its collector. It was only a short time later that the Smithsonian Expedition, led by Theodore Roosevelt, landed at Mombasa and set up camp on the mainland at Mazeras. Here Heller and his staff took 13 of these mice, the largest number ever taken by one expedition. Apparently in all his trappings Heller took the mouse only at this one spot, 1,000 feet in elevation and 12 miles inland from the Indian Ocean.

In 1914 Dollman described a *Beamys* from Nyasaland which he thought was much larger, in all respects, than *hindei*, although he must have known that *hindei* was described from a sub-adult specimen. Dollman called the southern form *Beamys major*.

At present it is felt that all the *Beamys* so far recorded are *hindei*, *major* being only a subspecies of it, if distinct.

RELATIVES: *Beamys* is generally called the "Long-tailed Pouched Mouse", the pouch being an internal, thin walled, cheek sack used to transport food. The "Short-tailed Pouched Mouse", *Saccostomus*, also has these cheek pouches, is about the same size and colour, but with tail only one-third as long. Another relative is the "Giant Rat", *Cricetomys*, which may be three feet long of which one-half is tail. This large animal looks nothing at all like the others but like a monstrous Norwegian Rat. It does have the cheek pouches and they will easily hold 100 grains of maize.

HABITAT: *Beamys* is a forest mouse living from sea level up to at least 7,000 feet. Most of the writer's specimens have been taken along waterways, four from Amani on Dodwe Creek at 3,000 feet, Eastern Usambara Mountains; nine from Mamba on the Saseni and Chafre Rivers at 6,000 feet, South Pare Mountains; one from Sunga on Sunga Creek at 6,500 feet, Western Usambara Mountains. Their populations cannot be very dense for in three years of nightly trappings (perhaps 5,000 set traps) made in the vicinity of my headquarters at Amani, only four were secured using every imaginable type of food for bait. All *Beamys* recorded

* Present address: 15115 S.W., 74th Avenue, Tigard, Oregon 97223, U.S.A.

here were taken in small screen-backed, wooden box traps baited with quick cooking rolled oats. At the time of writing *Beamys* has been found in Tanzania only in isolated pockets in the mountains of the north-east. These mountains are separated from one another by miles of thorn bush plains. The populations must be at a very low density and it is difficult to see how the mouse has maintained itself.

THE MOUSE: In prime specimens, the mouse is a soft dove grey colour above and pure white below. The fur is soft, fine and thick, but with age turns to a somewhat dirty brownish grey. The head is suggestive of a pig's, the eyes being small and tending to squint. The snout is pointed and the tail is mottled black, grey and white, naked and smooth. The tail may serve, like that of the American Gnome Mouse, *Microdipodops*, as a water storage device. It is fleshy, can easily be depressed between the fingers but does not immediately fill out again. In infant *Beamys* the slightest pressure or injury to the tail causes it to atrophy and drop off. The base of the adult tail has body fur down it for about one-half to three-quarters of an inch. The small, delicate feet are pink and five-toed. Arms and legs are furred white. The ears are medium sized. Mammae 2-2=8.

HABITS: These mice are nocturnal and terrestrial. However, a female with young, under observation, was often out feeding with her young during the day. The mice seem to have difficulty in climbing and easily fall. To some extent they root with their noses, as does a pig. Their home varies. A male mouse will simply force his way into a mass of dry grass, pushing some aside until there is a cavity which constitutes the nest. A grass tunnel generally leads to the cavity. In nature this nest may be under or in a fallen, dry log or in a tree with a hollow base. Female *Beamys* do build nests. One observed, built a cup shaped nest with grass walls an inch thick and deep enough to cover her entire body, the cavity just fitting her body when she was rolled up into a sleeping ball. Another female used the newspaper in the bottom of her cage to fashion a nest for her young. Yet another female fashioned a nest for her young out of litter shavings.

These mice are hoarders and midden heap builders and in this way resemble the Giant Rat. Heller records finding the cheek pouches of some of his Mazeras specimens well filled with seeds. Like the American Kangaroo Rat this mouse buries its caches without apparent plan. *Beamys* has a definite voice. The young are quite noisy and the mother, when disciplining them, croaks in a harsh voice.

DISPOSITION. *Beamys*, in detention, are quiet, sleepy and generally uninteresting. They become quite tame, fat and lazy. When fighting, their method is like that of the American Flying Squirrel, *Glaucomys*, that is, over on their back, defending themselves with the sharp, small claws of all four feet. Occasionally they will bite. If annoyed in their nest, they refuse to retreat, but instead sleepily claw with their four paws.

DIET. In captivity *Beamys* readily ate sliced orange, banana and avocado. Quick cooking rolled oats is eaten with relish and was used as staple food. They refuse ordinary rolled oats, cheese does not interest them, nor are they particularly interested in green foods. Insects

of all kinds are eaten and it seems likely that this mouse, living along water ways, as it may, feeds on all pond life it can secure and devour. Compared to other mice, *Beamys* in captivity drinks very little water.

SIZE: When fully grown a male *Beamys* may reach 9 cm in head and body and up to 15 cm in tail. Females at maturity may be 3·5 cm shorter. In Table 1 the variations in size of the writer's specimens have been tabulated.

TABLE 1

VARIATIONS IN BODY SIZE OF BEAMYS. ALL MEASUREMENTS IN MM

F. No.	*Date*	*Loc.*	*Stream*	*Elev.*	*Sex*	*H.B.*	*Tail*	*H.E.*	*Ear*
T 352	28/ 1/62	Amani	Dodwe	3,000	m	150	150	22	18
T1047	25/ 9/62	Mamba	Saseni	6,000	m	160	120	25	22
T1048	25/ 9/62	Mamba	Saseni	6,000	m	190	130	25	18
T1501	27/11/62	Sunga	Sunga	6,500	f	130	140	28	20
T2271	27/ 3/65	Amani	Dodwe	3,000	f	155	125	25	22
T2670	5/ 7/65	Amani	Dodwe	3,000	f	145	120	24	20
T2792	4/ 8/65	Mamba	Saseni	6,000	f	145	100	20	15
T2806	5/ 8/65	Mamba	Saseni	6,000	m	150	115	20	15
T2807	6/ 8/65	Mamba	Chafre	5,500	f	140	115	21	21
T3115	13/ 1/66	Mamba	Saseni	6,000	f	130	115	20	14
T3122	14/ 1/66	Mamba	Saseni	6,000	f	130	120	20	15
T3131	15/ 1/66	Mamba	Chafre	5,500	f	135	125	21	21
T3132	15/ 1/66	Mamba	Saseni	6,000	m	170	150	22	16
T3272	11/ 3/66	Amani	Dodwe	3,200	f	130	125	20	21

REPRODUCTION

The only reference to breeding in this mouse is made by Lawrence and Loveridge (1953). "On December 1 this mother and her four, well-grown young were brought in by a Chewa native. Size, female, 160·140·22·23 mm; male juv. 111·55·20·13 mm; female juv. 102·52·20·13 mm." These records are from Nchisi mountains, central Nyasaland, and dated 1948.

COURTSHIP: It was noticed during the last two weeks in January that clean patches, down to the floor boards, appeared in the litter of the detention cage of the *Beamys*. Each morning the litter was raked back in place. It was not until January 20 that it was discovered what the cleared spaces meant. They were courtship circles. A young female, T3122, captured one week before, started her courtship dance about 7.30 PM even though the laboratory was brightly

lighted. Neither the light, a flashlight beam or a pounding typewriter disturbed her mating dance. Twisting around and around, flinging litter and debris out of the way, she cleared a circle down to the wooden floor. This seemed done to secure a good foothold for the steps of the dance. After a circle was cleared, she selected one of the three uninterested males, one which had been born and raised in captivity, to be her dancing partner. The little female now danced before him, taking three steps forward, then four steps backwards to bring her rump in contact with the male's nose. Here she would quiver her body as if she were spraying a scent into the male's nose to sexually excite him. This forward and backward dance was repeated time after time with occasional biting in between. Gradually the female led the male into the dancing circle. When within the circle the scent must have been stronger for the male sprang with all four feet upon the female's back and she carried him about the circle. However, when he attempted to mate with her, she would throw him off, he would scamper away and the dance would be repeated. The writer has seen similar courtship behaviour in the American Grasshopper Mouse, *Onychomys*. This courtship was still continuing after two hours. During the next day and evening the small female did not venture out of her nest even to feed. The male, when examined the next day, had been bitten here and there, particularly on his sensitive tail and scrotum.

At a later date a female *Beamys*, seven months of age and raised in captivity, engaged a large male in courtship at 8.20 PM. Sexual penetration occurred every three minutes and after each ten minutes the male became so exhausted that he would hide his head in a corner, in a crevice, or under a stick but the female persisted. She would poke her sharp nose between the male's hind legs, root her way completely under him and boost him out of the cover and the courtship dance would continue. This activity was still continuing after three hours. The energy taken to form this dance was apparently so great that neither mouse was seen out of their nest for two days. Apparently this mating dance did not prove fertile for the young female was again engaged in courtship behaviour 35 days later, which might suggest an oestrous cycle of approximately 30 days.

BIRTH AND DEVELOPMENT

Female No. T2792: On August 11, 1965, seven days after capture she began fashioning herself a nest out of newspaper which lined the bottom of her cage to hold in the litter. The cage was 12 x 12 x 10 inches, the litter dry, crumbled, rotten wood. The mouse abandoned a weaver bird nest in which she had been sleeping and constructed the home for her young under it. The newspaper lining was torn neatly into strips.

During the afternoon of August 13, investigation showed three small, pink, naked and blind mice with short tails. (Measurements given in Table 2.) At three days the grey-back fur and the white belly fur were in evidence. At five days it was noted that the family had been reduced to two. No trace of the missing young was found. It was also noted that these young mice were growing differently from other small mice for they were short and plump where most young mice grow long and slender. On the tenth day, having nourishment from eight sources, the young mice were fat and appeared to have rolls of it under their skin. They were now 5·4 cm in head and body, their growth rate, to this time, being about 2 mm per day for both head and body and for tail. The tail was a delicate pink and very

TABLE 2

GROWTH CHART OF THREE YOUNG *Beamys* BORN AUGUST *13, 1965.* MOTHER (T*2792*) TAKEN AT SASENI RIVER, MAMBA, TANZANIA.

	Total	*H. and B.*	*Tail*	*Hind Foot*	*Ear*
Mother	245	145	100	21	10
35 days	220	140	80	21	10
30 days	190	120	70	20	9
25 days	160	100	60	19	8
21 days	Eyes open				
20 days	130	80	50	18	7
18 days	Out eating food				
15 days	102	62	40	17	6
10 days	84	54	30	14	4
5 days	65	45	20	10	3
Birth	45	35	10	8	2

wrinkled. The young were quite noisy. At fifteen days the young mice were 6·2 cm long. When a flashlight was directed into the doorway of their nest the mother would quickly push strips of newspaper into the entrance. On the 20th day, still blind, the young measured 8 cm, were fighting with one another, eating everything available, but were still nursing. On the 21st day the eyes were open, but it took several days before the young learned to use them. It was about this time that insects were introduced into their diet. Both mother and young relished them. When the young were 30 days old and practically full grown the mother built a new nest in an empty small box and the whole family moved in. The young still slept attached to the mother's teats.

At 40 days the young female was helping her mother to clean the nest, spending the morning gathering up the bits of paper that had become dislodged during the night, inspecting each, then returning it to its proper place. At 50 days the young male appeared to be sexually attracted to his mother and sister. At 60 days the family was separated and

FIGURE 1
Illustrating (top) *Beamys hindei* mother with twins and below, habitat, a rocky montane stream (the Saseni river at 6,000 feet altitude).

placed in a three-compartment maze, each with its own nest box, the mother's being the old family box with all the newspaper insulation in it. In three days the mice had worked the maze and were all sleeping together again. On the fourth night the mother decided a new box was more comfortable and the entire night was spent by the two females moving the shredded newspaper from the old family nest to the new nest box. Not a shred of paper was left in the old box nor was there a shred dropped anywhere in the maze. The entire family slept in the new box.

Female T3122: Thirty days after the courtship described on page 231 at 1 PM on February 22, the faint cry of a new-born *Beamys* was heard. After the courtship the various members of the colony had been separated by closing the trap doors between the compartments of the maze. They had, however, forced the doors open and slept together as if they were gregarious. Thus when the first nest box was opened to find the source of the new-born *Beamys* cry, four adult mice were found with three newly-born, pink young, scattered amongst them and a fourth firmly attached to the young mother. The other adults were removed and the trap door nailed shut. Shortly afterwards the other young had also found the mother's teats. When measuring the young, one cannot take a newly-born *Beamys* by the tail, as with other young mice, for pressure put on the minute tail causes it to atrophy and drop off.

The average measurements of this family of four was: Total 50, H.B. 40, Tail 10, H.F. 6, Ear 2, as compared with that of the earlier family of three: 45, 35, 10, 8, 2. Apparently number at birth has little to do with size at birth. There is little doubt, moreover, from these observations, that the gestation period is about 30 days. In the case of this family too, one of the youngsters disappeared without trace.

On the tenth day after the birth, a large green Hawk Moth was placed, presumably dead, in the nest box for the mother to feed upon. The moth suddenly came to life and fluttered around in the nest. Within seconds the mother removed her three young from the nest into her yard and returned swiftly to attach the intruder. It took several minutes to subdue the moth during which time the young were squealing for their mother while the mother croaked harshly at the moth. After killing the moth the mother rushed out into her yard, gathered up her family and when she could find no more returned to her nest and covered them, trembling all over from the excitement.

On the 14th day after the birth of the young the mother came out into her yard, dug a hole in the litter, defecated and urinated in it, then took the young out one by one and introduced them to the latrine. From the next day on the young used the yard regularly for this purpose. Whenever they were gone too long the mother came out and dragged them home by the hind leg. At 15 days the young were out and eating everything available and for the first time were stuffing food into their cheek pouches. When one returned to the nest with food the other two would fall upon it, steal the morsel, the young squealing and fighting, the mother eventually croaking at the young and putting an end to the scuffle. At this age the young were out every hour of the day either using the latrine or feeding voraciously. At 22 days the eyes opened and at 30 days the mother tried, without success, to desert her family. After 25 days the mother was taken from her young each evening between 7 and 9 p.m. and placed with a male. This was carried out for a week but there was no sign that she was in oestrus.

Female 2792: This female again gave birth to a set of three young when the first set was six months old. The mother repeatedly evicted one of the new-born young from the nest. It finally disappeared and again only two were raised to maturity.

PLAGUE AND PARASITES: This mouse has never been associated with plague. The writer has never found it carrying fleas, the fur being too fine and too thick for fleas to travel through with ease.

On two occasions the writer removed the parasitic earwig *Hemimerus vosseleri* Rehn and Rehn from this mouse even though this earwig is supposed to be host positive for *Cricetomys*. *Beamys* has its own *Hemimerus* which the writer has removed from it on the Saseni River. This earwig is *H. morrisi* Hanney 1963, described from *Beamys* taken in Nyasaland.

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REFERENCE

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