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CONTENTS

CAPYBARA-the world's largest rodent as human food

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Most of us would recoil in disgust at the thought of eating rodent flesh, such is our aversion for rats and mice and possibly other rodents that we know of. The rodent group consists of over 5000 species of which rats and mice comprise only a small, though important, fraction. The other rodent species such as porcupines, squirrels, gerbils and dormouse are well setablished dietary delicacies in different parts of the world. Even in India, wild rodents are relished by some tribal people. The muskrat —*Ondulria zibethica*—is reported to be proving a delicacy in certain restaurants in Belgium and Holland. In West Africa, the grass cutter or cane rat, *Thryonomys swinderianus*, constitute an important component of the food of a majority of the population. The best example of a rodent that has gained wide acceptance as human food is *Cavia procellus* of the Andes. In Peru alone, there are more than 20 million domestic *C. procellus*. These rodents normally weigh upto 4-5 kg and are an attractive source of animal protein for the local people.

The largest living rodent species in the world—the capybara, *Hydrochoerus hydrochaeris*—is also a native of South America. This rodent belongs to an ancient South American group that once included such species as the *Eumegamys*—a rodent nearly as large as a rhinoceros.

The adult capybara is about 2 feet high at shoulder, 3-4 feet long and weighs about 50-65 kg. It is common throughout South America from Panama down to Argentina. It is a water-looing creature and inhabits the banks of rivers, ponds, etc. Its main food is the grass growing near the water bodies. The capybara has a chubby, tailless, brown, furry body with short, partly webbed feet. These animals live in family groups of 12-24 individuals.

Although widely distributed in South America, it is in Venezuela only that capybara meat seems to be in great demand. Opinions differ with regard to the taste of the flesh and renges from "delicious" to "horrible" depending on the fat content of the ultimate preparation (the less fat, the better).

Venezuelans have a long tradition of eating capybara meat since the eighteenth century. The animals are killed in their home ranges and the

carcasses are salted and hung in the air for drying. By the mid-twentieth century, the demand for capybara meat became so much that the wild populations were serverly decimated. The Govt. of Venezuela had to impose a total restriction on its killing during 1962-67. At about the same time, the Govt, initiated some studies on the biology and management techniques of this species. The breeding potential of the capybara is pretty high, each adult female producing a litter of 4 at 8 month intervals. Looking to its body size and fecundity, the capybara's potential for meat production can be easily imagined. In view of its population build-up in recent times, the Govt. of Venezuela permits the killing of adult male and non-pregnant female capybara, although the conventional method of clubbing these timid animals to death is rather cruel.

The results of various research projects on capybara farming in Venezuela indicate that these rodents can be profitably reared along with cattle in large, fenced paddocks having 1-2 water bodies. The foraging materials for the capybara and cattle being ordinarily different, they do not compete with each other for resource utilization and thus ensure optimum conversion of the available phytomass into animal protein. Under Venezuelan ranching conditions, a stocking rate of 6 capybara/ha is considered optimum, which results in the production of 72 kg of capybara meat/ha. Roughly, 2000 tonnes of fresh capybara meat reach the Venezuelan markets each year.

Evidences from Brazil suggest that a three tier farming system involving capybara, cattle and fish may be quite profitable. Capybara devour the vegetation on the banks of the water bodies the nutrient status of which gets enriched through their droppings. As a result, the algal population flourish and provide ample feed for the fish. Thus, it may be possible to manage cattle, capybara and fish all together in an integrated natural partnership.

Note: Most of the information contained in this article has been adapted from *A Feast in the Wild*, by Russell Kyle, Kudu Publications, Oxford, 1987.

Occurrence of *Golunda ellioti (Gray)* in Chamundi Hill area in Mysore

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The Mysore plateau is a rolling surface of gentle slopes and eccassional monad rocks. The Chamundi hill is composed of granites belonging to the Archaean age. The hill is 1038 m high and is situated between 76°39' 40" and 76°41' 0" E and longitudes 12°15' 30" N and 12°17' 20" N latitude. The maximum annual amount of rainfall is 100 cms. The soil typs is sandy loam with pockets of silty soil. The highest temperature recorded was 36.5°C during March to May and the lowest was about 16.4°C during December. The relative humidity ranges from 27% to 85%.

The Indian bush rats (*Golunda ellioti*) were collected from the Chamundi hill and the sundounding scrub jungle. Their distinctive features like short, rounded heads, rounded ears and a rather hairy tail with yellowish brown coat above, finely sparkled with black were recorded.

Materials examined: 2 Males and 3 Females. The favourite habitates of these rats were areas having the common shruby plants like *Randia, Erythroxylon, Kirganelia carissa, Toddalia ziziphus* and succlents like *Luphosbia, Datura, Polygala, Barleria, Oputia, Sopubia* and *Tridax*.

One Pregnant female with two young ones were collected in November from their nest in between grasses like *Cynopogon, Aristida, Digikalis, Cynodon, Panicum* and *Tragus*. Females were also collected from the cool crevices of rocks wherein short herbacious plants along with ferns like *Selaginella, Adiantum* and *Actinopteres* were common.

Nibbled roots, grassy stems and seeds were collected near the nests and habitations.

A specimen of *Bandicota bengalensis* with abnormal development of right lower incisor

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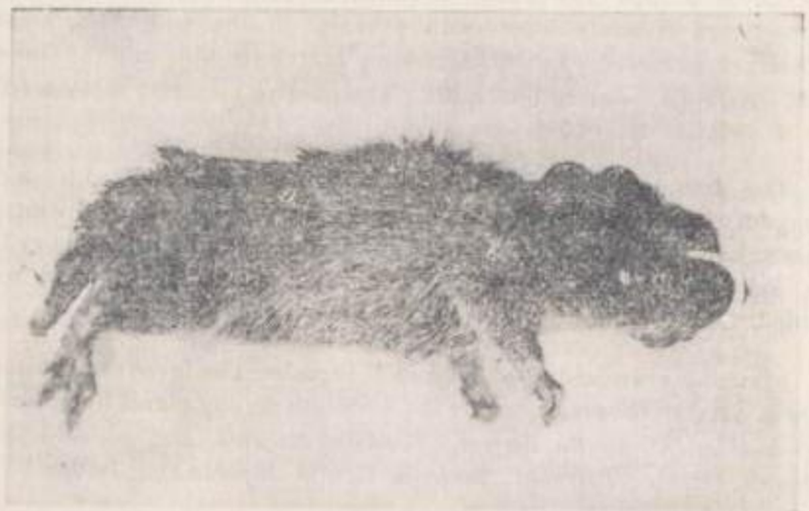
At the Haffkine Institute, Bombay about 600,000 rats are examined every year as a part of plague surveillance programme. These rats are collected from different wards of Greater Bombay and transported to the Institute for examination. All rats are identified and sexed before they are subjected to examination for plague.



On 9.3.1992, we encountered a specimen of rat (*Bandicota bengalensis*) showing abnormal development of the right lower incisor (Figs. 1). The incisor was developed in a curved manner and was found to touch the right eye. The rat in question did not reveal any other abnormal features except for this development of the incisor. A brief description of the rat is presented below:

Locality : 'P' Ward, Gorezaon
Sex : Female, *Weight*: 175 g

Size: Total length (HB Length): 14.50 cm; Body: 10.3 cm, Head : triangular, 4.2 cm (broken); Ear: 1.2 cm; Eyes: 2 cms from snout and 1 cm from ear; Tail: 2.5 cms (broken).

Teeth : Incisor teeth markedly developed; Yellowish in colour, n in a row.

Upper incisor: Right : 2 cms; left: 0.5 cm
Lower incisor: Right: 5.8 cms; left : 1.5 cms
Mammary gland : 8 pairs
Hind claws 3 cms

It is for the first time are have come across a specimen of *B. bengal nsis* revealing this abnormal development of incior teeth in the course o our 30 year study. The authors wish to thank Dr. N.K. Sutar, Office in-Charge for permission to publish this observation.

Rodent invasion to forest trees in U.P.

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Heavy and notable rodent damage to *Babool* (*Acacia nilotica*) ha been reported during 1991-92 to the extent of 20 to 30 per cent destructio of plants in Baharaich, Sahjahanpur, Moradabad, Agra and Kanpur fores divisions of Uttar Pradesh. Rodents inflicted damage to the plants of 1- years of age by cutting them from the base. The *babool* plants raised on fl ash area near Panki Power Station in Kanpur were found to be damage by *Bandicota bengalenses* and *Tatera indica*. The peculiar feature of roden damage was that they attacked only the babool plants although som other plants were also raised in that area. This indicates that babool trees provides comparatively more attractive and nutritive sap to the rodents or some as yet unknown factor may be operating in this respect

Observation son the behaviour of the short tailed mole rat, *Nesokia indica G.*

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Various workers have described the habits and beheviour of *Nesokia indica*. While carrying out field studies on this rodent at the Indian Agricultural Research Institute, New Delhi, some additional informations on its behaviour were collected, and the same are presented below:

*Floriculture Division, C.S.I.R. Complex, Palampur—176 061

a) Abandonment of burrow openings :

It was observed that the burrow openings which were not used by the rat for a number of days usually had spider webs spun across them. Generally, the rat never used such openings any more.

b) Suspiciousness :

Nesokia indica hesitated initially to come out of their burrows. They kept on peeping out of the exit hole for about 30-50 times and ultimately came out only when they felt that it was safe to do so.

On the slightest disturbance the rat immediately ran into the burrow which was nearest to it and not necessarily to the burrow from which it had originally emerged.

c) Effect of bait size on acceptability :

The rodents easily accepted smaller baits weighing about 2.5 g each whereas, baits of the same material weighing 5 and 10 g were accepted rather poorly.

d) Time taken by the rat to pick the bait :

Within 25 seconds to 65 seconds the rat picked up the bait and re-entered the hole. The same rat again came out after a brief spell of 3-5 minutes and picked up another bait from the same site.

e) Droppings and paw marks :

Droppings were always found in large numbers in front of the burrows. The colour of the droppings varied from dirty white to light brown. They were cylindrical in shape, with rounded ends. They did not emit any smell. These rodents left clearcut paw marks in the runways.

f) Observations on host plants :

These rodents were found to feed often on the leaves and roots of lawn grass and vegetable crops like brinjal and tomatoes.

g) Burrowing sites :

The short-tailed mole rats have been observed to make their burrows only in the localities, where the moisture content of the soil is above 7 per cent. These rats were observed in the banks of perennial drains. The burrows were confined upto heights ranging from 35-100 cms. The maximum number of burrows were concentrated at heights of 45-50 cms.

In the irrigated fields the rats made burrows at heights of 4-27 cms but the maximum number of burrows were observed at heights ranging from 9-21 cms. In unirrigated areas, burrows were also noticed in the fields when the soil was moist. As soon as the soil became dry, these rats migrated from these fields.

h) Period of activity :

The short-tailed mole rat, *Nesokia indica* G. was observed to be active soon after the dusk, between 6.00 PM-7.30 PM and early in the morning from 6.00 AM to 7.30 AM.

i) Seasonal variation in soil plugs :

General observations were also made on the seasonal plugging behaviour by the moles. It was found that during winter (minimum temperature 2°-5°C) and also during the rains, the openings were plugged very tightly upto lengths of 16-60 cms.

Reactions of groups of norway and black rats to Quintox

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Ready to use Quintox bait was tested on fourgroups of rats in the rodent house in area of 5 m^2. There were two troughs in the pen Quintox bait was placed in one of these (Trough A), and the control bait was always put in the other one (Trough B.)

Daily weighing of the troughs showed significant (P > 95%) decrease in consumption of Quintox in comparision to the control food, and consumption of Quintox on the third day had fallen to zero in all the four groups.

Reactions of norway and black rats were identical. The mean doses of the active compound (Cholecalciferol) for each group were close too, viz. 16.9 to 19.3 mg/kg. 70% of norway rats and 50% of black rats died as a result of these experiments.

The feeding behaviour of the rats has been observed (during 40 hours for each group). It was seen that at the beginning of the experiment animals readily accepted quintox bait and avoided it.

Table 1. Consumption of bait in groups of rate.

Sr. No.	Species	Trough	Consumption p/ animal p/ day (g) 3 days before expt.	1st day of experiment	2nd day	3rd day	3 day after expt	Morta-lity (%)	Day to death
1	*Rattus norvegicas*	A	9.3	3.8+	3.6+	0.0+	3.1	100	5-10
		B	5.3	9.0	8.2	5.2	0.2		
2	*Rattus Norvegicus*	A	10.3	7.2+	0.2+	0.0+	0.4	40	4-5
		B	3.3	9.0	8.2	2.2	0.7		
3	*Rattus rattus*	A	4.6	2.4+	0.8+	0.0+	2.4	60	3-6
		B	2.3	4.8	8.0	2.3	1.6		
4	*Rattus rattus*	A	12.1	3.2+	0.0+	0.0+	2.9	40	3
		B	1.5	7.2	7.0	4.0	2.0		

+ Quintox is in the trough

Table 2. Frequency of visit of troughs by rats (per animal per hour of observation.

Sr. No.	Trough	3 days before experiment	EXPERIMENT 1st day	2nd day	3rd day	3 days after experiment
1	A	0.63	1.31+	0.23+	0.03+	0.0
	B	0.66	0.74	0.67	0.23	0.0
2	A	0.55	2.0+	0.23+	0.07+	2.07
	B	0.36	0.89	1.27	0.23	0.7
3	A	0.31	0.47+	0.37+	0.0+	0.11
	B	0.21	0.23	0.66	0.13	0.11
4	A	0.45	1.67+	0.0+	0.0+	0.61
	B	0.13	0.67	1.27	0.25	0.5

+ Quintox is in the trough

Thus, it was shown that in both norway and black rats the avoidance of Quintox bait is based on the aversion principle (reaction of secondary avoidance of the toxic food). In spite of the fact that the death of the animals occurred 3 to 10 days after the start of the experiments, the phenomenon of avoidance of the basic compound was exhibited almost during the first 24 hours of the experiment.

Rodent infestation in Sunflower

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The sunflower crop is now gaining an importance to meet the fast growing need for crude and refined edible oils in the country. The area under this crop is increasing every year. With a view to note the degree of rodent pest infestation in this crop, an area of 16 acres sown with sunflower at the New Dairy Farm of this University at Kalyanpur, Kanpur was surveyed from the germination to the maturity stage of the crop.

It was observed that this crop is damaged by rodents as well as by parrots and other birds. Four species of field rodents were found to infest the sunflower crop. The predominant species was *Tatera indica*, followed *Millardia meltada*, *Mus booduga* and *Bandicota bengalensis*, in that order. On an average, 8.75 burrows per acre were recorded. Flower damage ranged from 7 to 11 percent. Rodent damage starts from the stage of flowering and continues till harvest. On seed formation, the flowers bend down due to the weight and some of the flowers touch the ground. Rodents easily damage these flowers and collect the seeds in their burrows. The stem of sunflower is thick and strong, allowing some species of rodents to climb up on it and eat the flower or cut it and bring it to their burrows. *B. bengalensis* cuts down the plant as a whole and damages the flowers. On digging the burrows of this species, sunflowers are found in a rotten stage. The Indian gerbil, *T. indica* visit the field from outside and inflict damage to the flowers. *M. meltada* and *M. booduga* generarlly damage and eat the flowers outside their burrows. The seed coat were found outside their burrow openings. *B. bengalensis* hoarded sunflower seeds ranging from 200 g to 1 kg in their burrows.

Looking to the importance of the crop and the damage caused by the rodents, rodent pest management practices need to be employed to protect the sunflower crop.

Evaluation of Quintox bait efficacy against House mice

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The efficacy of ready-to-use granulated Quintox bait (Welcome Foundation Ltd.), containing 0.075% of cholecalciferol (vitamin D_3) was evaluated against house mice (*Mus musculus*) of laboratory and wild lines (mice trapped in the city).

Laboratory experiments were conducted under individual cage conditions with and without the presence of alternative food. The bait was weighed daily. The results have been given in Tables 1 and 2.

Table 1: Quintox Bait efficacy against mice in absence of alternative food

Group of mice	Consumed amount of Quintox (g)	Days to death	%Morrality
White males (n=20)	2. 8±0. 15	4-7	100
White females (n=20)	3. 08±0. 15	3-7	100
Wild (males and females) (n=19)	2. 08±0. 2	3-5	100

Table 2: Quintox bait efficacy against mice in presence of alternative food

Group of mice	Intake of Quintox mean for group (g)	mean for dead animals	Days to death	Mortality (%)
White males (n=20)	2.4 1±0.3	2. 9±0.6	7-12	21
White females (n=20)	2.1±0.2	2. 2±0.2	3-19	90
Grey males and females (n=14)	1 .2±0.3	1.8*	19	7

* 1 mouse died

The duration of the experiment on determining the preferable bait was 14 days. Then mice were given the standard laboratory diet and were observed till the 21st day from the beginning of the experiment.

The data given in the Tables show that Quintox is not a prefel bait for mice (either white or wild). The analysis of the data on consun tion rates revealed the presence of the typical reaction of avoidi Quintox, more over some of animals had developed such a reaction fr the first day of the exposure.

Besides the laboratory experiments we carried out field trials i cities covering a total territory of 2000 sq. meters. The bait was distribut every 3-6 meters in premises of different types. The efficacy was determin by the consumption of non-poisoned baits before and after undertaki measures for rodent extermination. The efficacy of control measu against mice was 70-80% on food areas and 90% on non-food areas.

So, field trials of the Quintox bait gave satisfactory results.

Laboratory evaluation of Brodifacoum-A second generation anticoagulant against *Mus musculus* (Albino)

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Adult albino mice (*M. musculus*) of both sexes, weighing 40-45 gn were offered brodifacoum (supplied by ICI) at 0. 001, 0. 0025 and 0. 005% carried in a standard bait. For each concentration, 4 mice of each sex we used and the baits were left in cages for 24 hours only. The baits we tested by giving the mice 'Free' and 'No choice' of alternate food. The te animals were observed for symptoms and mortality for a period of tw weeks after poisoning bait feeding during which period they were fed with stock diet and water *ad libitum*. The results presented in Table 1, indicate that brodifacoum at 0. 001, 0. 0025 and 0. 005% (with or without choice resulted in 100% mortality of test mice (male and female) between 2-1 days after feeding. The symptoms of poisoning like heamorrhage in eye mouth, neck and paws, etc. were more intense in males as compared t females. The other symptoms noticed were sluggishness, and heav breathing apart from bleeding.

Table 1: Results of feeding baodifacoum baits (1 day) to *M. musculus* (albino)

Rodenticide Conc. (%)	Sex	Av. body weight (gms)	Test conditions	Av. Poison bait intake/plain bait (gms)	Days to death	mortality (%)
0.0025	M	40.5	No choice	1.0	4-7	100.0
	M	43.0	Free choice	1.0/4.5	6-9	100 0
	F	43.2	No choice	1.25	6-9	100.0
	F	42.2	Free choice	1.0/3.0	2-9	100.0
0.001	M	44.2	No choice	1.5	5-7	100.0
	M	44.0	Free choice	1.5/3.0	4-7	100.0
	F	40 4	No choice	1 0	4-9	100.0
	F	40.0	Free choice	1 0/3.0	4-8	100.0
0.005	M	44 2	No choice	1.25	:-7	100.0
	M	42.7	Free choice	0 75/3.75	3-9	100.0
	F	45.5	No choice	1.0	6-8	100.0
	F	40.0	Free choice	0.75/3.75	3-6	100.0

The results obtained pointed out that 'Brodifacoum' as a single dose toxicant is highly effective against *M. musculus* (a difficult species to be controlled) even at a concentration of 0.001% (although the recommended concentration is 0.005%) whether or not they had free access to alternate food.

Evaluation of formafog for controlling rodent pests in crop fields

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A study was conducted on the fumigation of rodent burrows in field of wheat, chilly, carrot, onion and the brinjal. Fumigation was done randomly in these plots and in all 25 active rodent burrows were fumigated with the help of auto-generator machine 'RODENFOG' supplied by Shri Subiak, Madras. Formaldehyde solution (5ml/litre) mixed in diesel was used for the production of poison gas. Each rodent burrow system was treated for a minute and all the openings were closed with wet sand prior to release of poison gas inside the burrow system. Later on, the treated burrows were excavated after 10 to 30 minutes of the over of operation

The dead rodents were collected and preserved for the anatomy. 'e composition of rodent species was observed in wheat, the desert ger, *Meriones hurrianae* was the only species, whereas, in other crops i.e. chi, onion, brinjal, *Rattus meltada pallidior*, *Tatera indica* and in carrot, *Tan indica*, *Rattus meltada pallidior* were found to be the major rodent pe. The rodent population was constituted 66.7, 23.3 and 10 per cent of ad, sub-adult and juveniles respectively (Table 1) and it was also fou out 2.4 rodents per burrow system. Female rodents were found to: higher in number as compared to males (67.5% females and 32.5% mal Not a single rodent was reported live and all rodents were collected de

It was further observed that the death was occurred due to pulmonary arrest. The cornia of eye ball became wrinkled, hard and lense turned white.

Table 1. Showing the effect of formafog on rodent species associated in diffeac crops.

Crop	Species associated	No. of burrows treated	Composition of species (%)	Mortality (%)
A. CEREAL Wheat	*Meriones hurrianae*	10	100	100
B. VEGETABLES (Chilly, carrot, onion & brinjal)	*Rattus meltada* and *Tatera indica*	15	75.2 25.8	100
Maturity stage		Adult	Sub-adult	Junials
		66.7	23.3	10

NOTES & NEWS

Dr. B.D. Rana, Principal Scientist, CAZRI, Jodhpur has taken over the charge of Project Co-ordinator, AICRP on Rodent Control w.e.f. 1st June, 1992 on superannuation of Dr. P.K. Ghosh from his ICAR, Service on 31st May, 1992.

Contributions for inclusion in the Newsletter may please be forwarded along with 1-2 good black and white photographs to :

Project Coordinator,
AICRP on Rodent Control,
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