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Rat kings in Estonia

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Abstract. The expression ‘rat king’ is applied to a group of rats whose tails are tied together. The causes of this rare phenomenon remain uncertain. The article describes Estonian finds of rat kings. This additional information is used for the evaluation of hypotheses concerning the mechanism of rat king formation. Estonian finds support the hypothesis that the rat king’s knot is created after the rats’ tails are glued or frozen together. Analysis of the worldwide geography of the finds of rat kings demonstrates that with one exception (Java), they occur in regions where two factors coincide: cold winters and the presence of the black rat, *Rattus rattus*.

Key words: *Rattus rattus*, rat king, Rattenkönig.

INTRODUCTION

The strange expression ‘rat king’ is traditionally applied to a rare phenomenon – a group of rats whose tails are tied together. The causes of the formation of rat kings remain uncertain. Moreover, even the existence of naturally created rat kings has been questioned. According to Hart (1982) and Internet data (http://en.wikipedia.org/wiki/Rat_king), before the year 2005 only 58 reliable rat kings have been registered, 6 of which were preserved in collections. The number of animals in the rat kings varied from 3 to 32. Most finds were made in Germany, others in France, Poland, the Netherlands, Belgium, and Indonesia (Java). All rat kings studied consisted of the black rat, *Rattus rattus* L., except for one find from Java, which consisted of the field rat *R. argentiventer* (= *R. rattus brevicaudatus*). A few ‘kings’ were also observed in the case of mice and squirrels (*Apodemus*

sylvaticus, *Mus musculus*, *Sciurus carolinensis*?, *S. vulgaris*) (Kunstyr, 1977; Hart, 1982; Kotenkova et al., 1989).

The recent discovery of the rat king at Saru (Estonia) in January 2005, as well as other hitherto undescribed Estonian finds provide new factual data that may help solve the mystery of rat king formation. These new data are presented and analysed below.

ESTONIAN RAT KING FINDS

On 16 January 2005 farmer Rein Kõiv discovered a huddle of squeaking rats on the sandy floor of his shed in Saru village, Mõniste parish, Võru county, Estonia. The animals were unable to escape, and the farmer's son killed them with a stick. After that a cluster of 16 rats were excavated from the frozen sand. Their tails were tangled in a knot that contained frozen sand. At the time of discovery only about 9 of the rats were alive. Obviously the animals tried to dig themselves out of the narrow tunnel, and the first rats buried the last ones under the sand. The crater in the sandy floor could still be seen even two months later.

The farmer knew nothing about rat kings. Nevertheless, the find seemed curious and he put the rats on a pile of planks where neighbours and chance visitors could observe them. It was only about two months later that Mr. Evar Saar, a relative of the farmer's wife and a local reporter, ran across the animals and asked zoologists for comments. After that an avalanche of reports followed in Estonian journals and newspapers, and on the radio and television (see Miljutin, 2005 for the most complete account).

On 10 March the rat king of Saru was transported to the Natural History (Zoological) Museum at the University of Tartu, where it was preserved in alcohol and is exhibited to visitors. It consists of 13 adult black rats (*Rattus rattus* Linnaeus, 1758): 7 males and 6 females (Fig. 1). One specimen of the original 16 was thrown away by the finder and two were taken away by some predator, probably a polecat. Of these two, only one tail remains in the knot.

Due to long-lasting exposure to open air, some rats have suffered various injuries, and their appendages were somewhat dried out. Namely, in two rats the brains have been eaten, and in another rat the hind legs have been gnawed. Since the tails of the rats dried up, the knot became so loose that during examination in the museum, some specimens dropped out. Nevertheless, the heavily compressed parts of the tails testified that the knot had once been very tight.

The rat king of Saru was not the first find in Estonia. I have been told of two more finds (Table 1). Unfortunately, nothing has remained of them except obscure memories. The rat king of Tartu was seen at the beginning of the 20th century by the father of zoologist Sven Veldre. The rat king of Rõika was observed by many inhabitants of that village. When asked in 1986, however, no one was able to remember the exact year of the find. They said that it was an extremely cold winter 'about 15 years ago'. This rat king was found inside the wooden wall of a cowshed. It consisted of 18 live rats that were killed and hung outside for people to see.



Fig. 1. Rat king of Saru in the exposition of the Natural History Museum, University of Tartu.

Table 1. Rat kings in Estonia

Year	Locality	Species	Number of rats	Season	Source
1915–1920	Tartu	?	3	?	S. Veldre, pers. comm.
1971 (?)	Rõika, Viljandi county	<i>R. rattus</i> (?)	18	Winter	K. Pedja and others, pers. comm.
2005	Saru, Võru county	<i>R. rattus</i>	16 (13 preserved)	Winter	Preserved at the University of Tartu

DISCUSSION AND CONCLUSIONS

Among numerous explanations of the mechanism of rat king formation referred to by Hart (1982), the following hypotheses seem to be the most reasonable: (1) rat kings are artificially manufactured, (2) the knot is created due to chance movements of the tails, and (3) the knot is created after the tails are glued or frozen together.

In the case of the Estonian rat kings there is no reason to suspect falsification. At the moment of finding the finders had never heard of rat kings, and received no profit for their finds. Moreover, it is impossible to tie the tails of living rats without using anaesthesia, which can hardly be done in farm conditions. In the case of the Saru find, the finder had made no attempt to tie the rat tails more tightly after they dried.

According to the second hypothesis, a rat king is created when rats are frightened and nervously grasp each other with their tails. The Estonian finds do not support this hypothesis, because in two cases for which appropriate information is available, the kings were created in a shelter (in a burrow and inside a wall), where rats should feel quite safe. In addition, the observations of rats' behaviour do not support this hypothesis. I have kept wild black rats in captivity for about 8 years. Over this period hundreds of animals were disturbed by people every day during the cleaning of cages, feeding, catching or observing the animals, but an entangling of tails has never been observed.

According to the third hypothesis, for the formation of a rat king, rats should first huddle together as they usually do when sleeping in the nest chamber, especially when it is cold. If their tails become glued or frozen together, animals try to free themselves by moving in different directions. These chaotic movements may result in their tails becoming entangled in a tight knot. Even after removal of the initial cause (sticky substance or ice), they are no longer able to escape from the knot. The sticky substance may be blood, food items, nesting material, etc.

The Estonian finds support the last hypothesis. In two cases for which relevant information is available, the kings were created in the shelter, not outside (animals tried to get out, not in). In both cases the weather was frosty. Indeed, the rat king of Saru was found after a sudden drop in the air temperature from above to below zero. The gluing–freezing hypothesis is also causally supported by the worldwide geography of rat king finds: rat kings are very rare in regions with warm climates, where the freezing of tails is completely ruled out. Apart from the king of Java, all finds were made in Central and Eastern Europe. Why there? It seems that rat kings occur in regions where two factors coincide: cold winters and the presence of the black rat. Indeed, the black rat is more common in Southern Europe, but there are mild winters there. Winters are severe in Northern Europe and Canada, but there are no black rats or they are very rare. There are large numbers of brown rats, *R. norvegicus*, in Northern Europe and North America, but they do not create rat kings. This is obviously due to their relatively shorter, thicker, and less flexible tails than in *R. rattus*.

The Estonian finds demonstrate that the phenomenon of rat kings, though rare, is not as rare as it was thought to be. Of three finds, only one was reported by the media, and in this case it only took place because the finder had a journalist among his relatives. Moreover, obviously only a small part of the rat kings created are discovered by people. For example, the rat kings of Rõika and Saru would never have escaped from their shelters and been seen by people if the walls or floors had been built of stone or some other equally solid material. Moreover,

even rat kings described in local languages or/and local editions may be overlooked by scientists from other countries. For example, the Lithuanian rat king described by Jeziorskas (1961) in Russian in the proceedings of an ornithological conference remain unknown to Hart (1982).

On the basis of the data presented above, the following conclusions may be drawn.

1. Estonian finds support the hypothesis that the rat king's knot is created after the rat tails are glued or frozen together – at least two kings out of three were found in very cold winters.
2. Analysis of the worldwide geography of rat kings' finds demonstrates that with one exception (Java) they occur in the regions where two factors coincide: cold winters and the presence of the black rat.
3. Estonian finds suggest that the occurrence of rat kings may be more frequent than presumed. Not all rat kings that arise are found by people, and not all finds are reflected in the press, much less in scientific papers.

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Rotikuningad Eestis

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Rotikuningaks nimetatakse sabapidi kokku põimunud rotipundart. Selle haruldase nähtuse põhjused ei ole veel päris selged. Artiklis on kirjeldatud rotikuningate leide Eestis. Saadud uusi andmeid on kasutatud rotikuninga tekkemehhanismi olemasolevate hüpoteeside hindamiseks. Eesti leiud toetavad oletust, et rotisabade sõlmumise eelduseks on nende kokkukülmumine või -kleepumine. Rotikuningate leidude geograafilise analüüsi näitab (välja arvatud üks erand – Jaava leid), et rotikuningad esinevad nendes piirkondades, kus langevad kokku kaks tegurit: külmad talved ja koduroti (*Rattus rattus*) olemasolu.