

# Look who behave like true insect hunters: voles and mice

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Insect hunters that enjoy specific hunting behaviour patterns:

**Onychomys** (*O. torridus*, *O. leucogaster*, *O. arenicola*)  
(Landry, 1970)

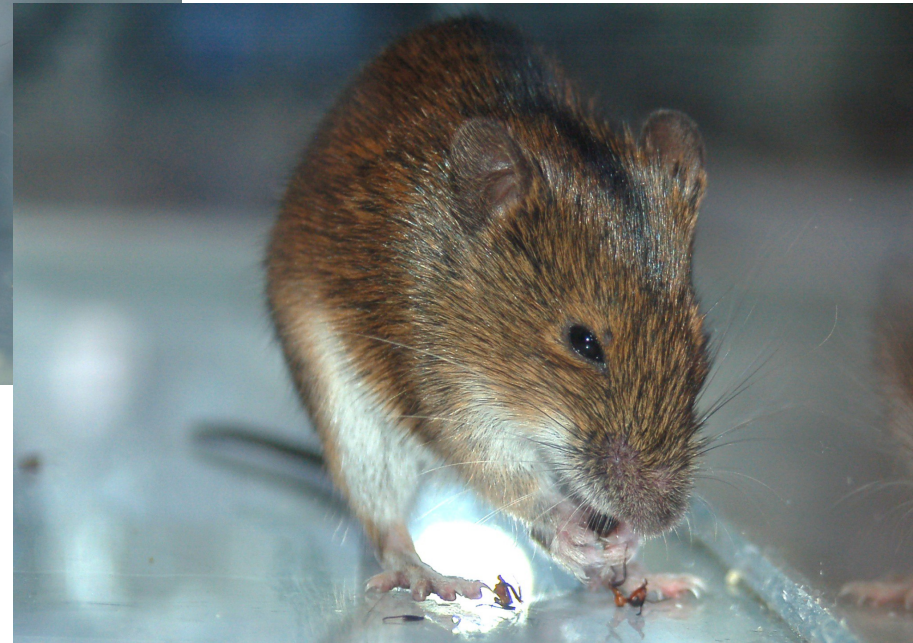
**Peromyscus** (*P. californicus*, *P. maniculatus*, *P. leucopus*)  
(Langley, 1994)

**Meriones unguiculatus**, **Acomys cahirinus** (Tinberlake & Washburne, 1989),

**Rattus norvegicus** (Landry, 1970; Comoli et al, 2005)

**Mesocricetus auratus** (Langley, 1987).

# Striped field mice interact with ants as predators and mass prey



(Panteleeva, Reznikova, Vygonyailova, 2013. **Frontiers in Psychology**)

- Who else possess specific hunting behaviour? Granivorous? Herbivorous?
- Do hunting behavioural patterns differ in different species?

# Objects



**Rats** *Rattus norvegicus*  
(generalist)

n=81, 16 h of observation



**Striped field mice** *Apodemus agrarius*  
(granivorous)

n=26, 24 h of observation



**Narrow-headed voles** *Lasiopodomys gregalis* (herbivorous)

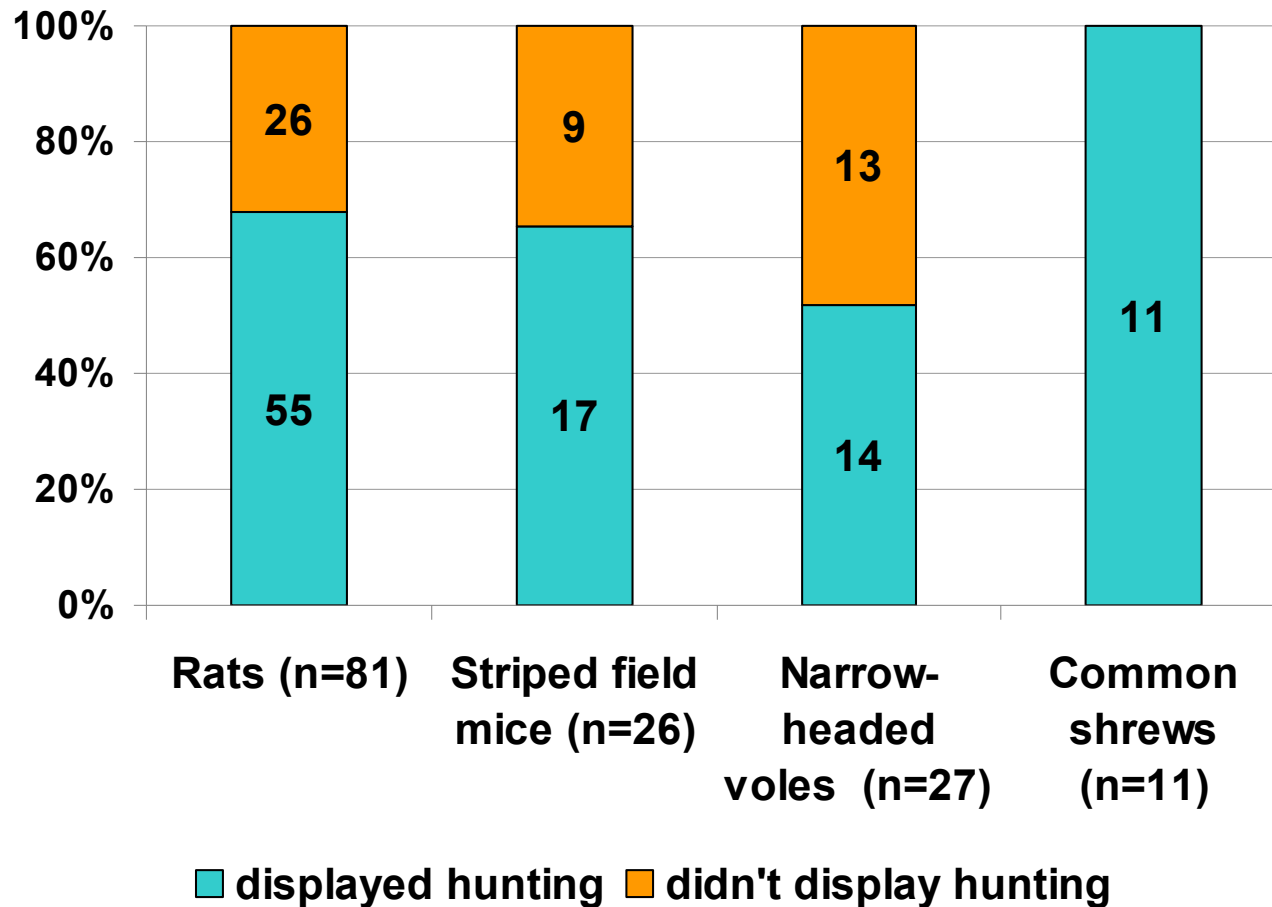
n=27, 27 h of observation



**Common shrews**  
*Sorex araneus* (insectivorous)

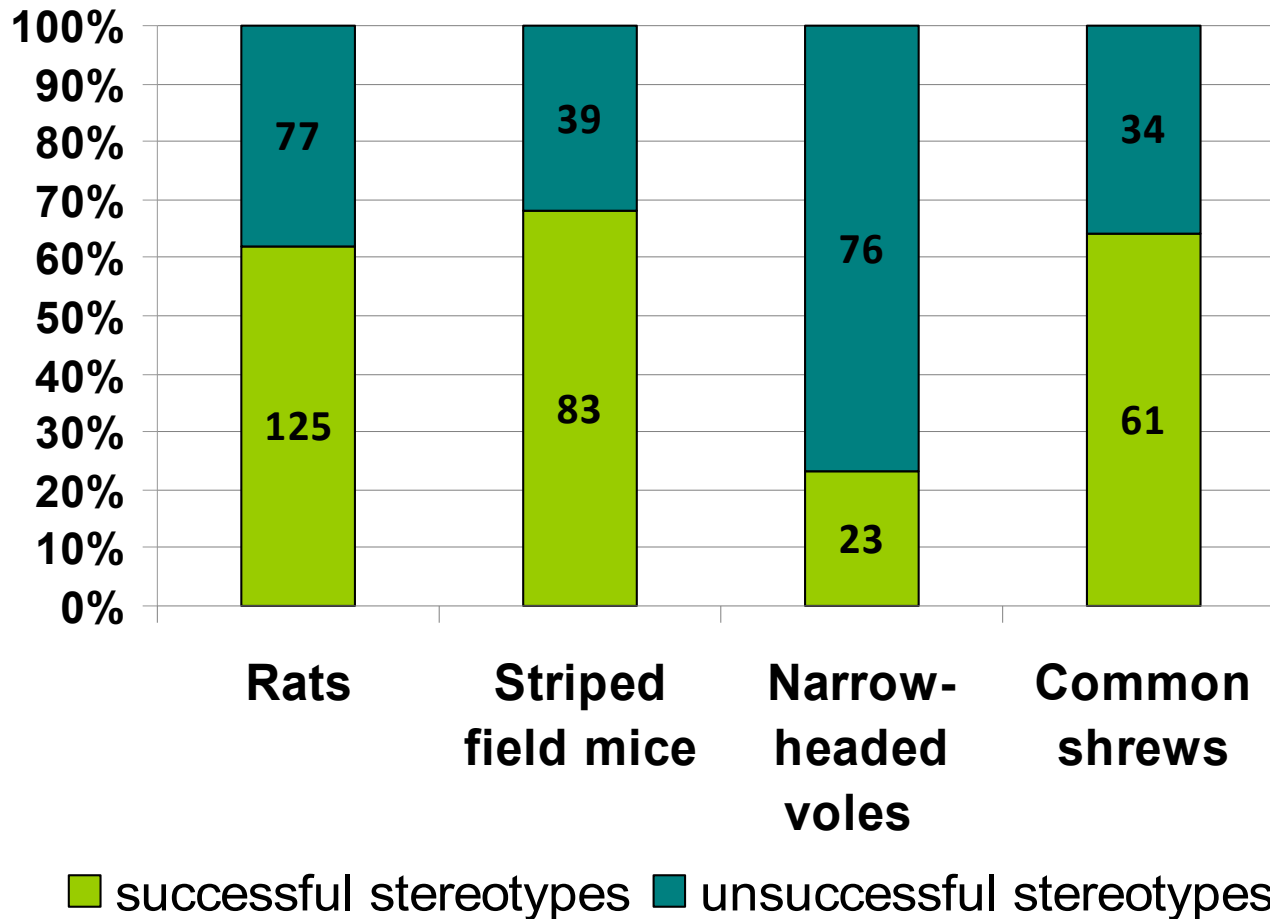
n=11, 6 h of observation

# The proportion of animals that displayed hunting





# Successful and unsuccessful hunting stereotypes



Voles differ significantly ( $p < 0,01$  in all cases,  $\chi^2$ ) from all other species by their minimal numbers of successful attacks.

# Behavioural elements of hunting stereotypes

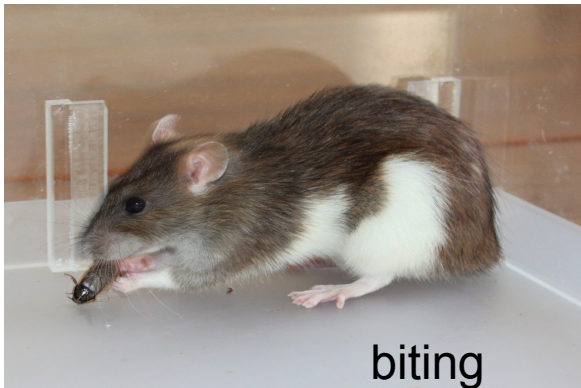
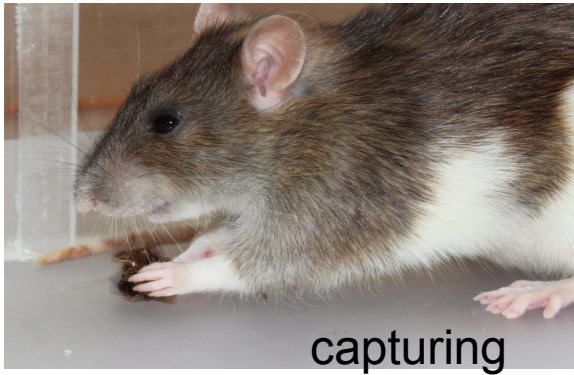
## Key elements:

**Q** - running

**S** - walking

**W** - biting

**E** - capturing the prey by forepaws



## "Auxiliary" elements:

**R** - handling

**H** - nibbling insects' legs

**G** - carrying the prey in teeth

**D** - sniffing

**N** - pinning the prey down to the ground by one paw

**M** - the same, by two paws; "M" and "N" were observed in shrews only

**D** - sniffing

## "Noise" elements:

**C** - freezing

**V** - turning a body to 90

**B** - U-turn

**F** - turning a head

**Y** - rearing against the wall

**I** - free-standing rearing

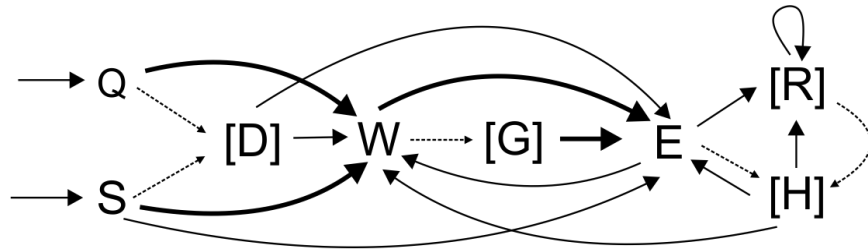
**U** - backwards movement

**X** - self-grooming

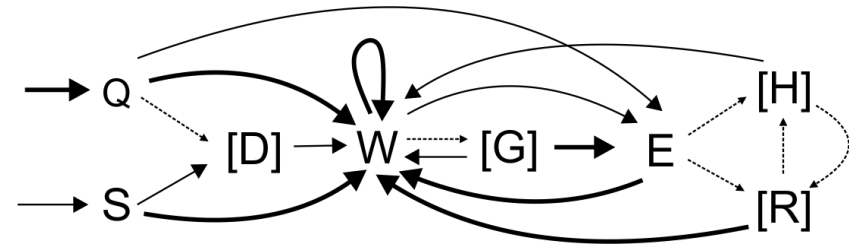
**J** - jump; was observed only in shrews and mice but not in rats



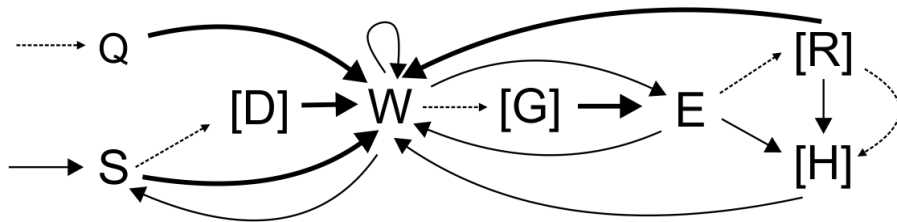
# Schemes of the successful hunting stereotypes revealed by Markov chain analysis



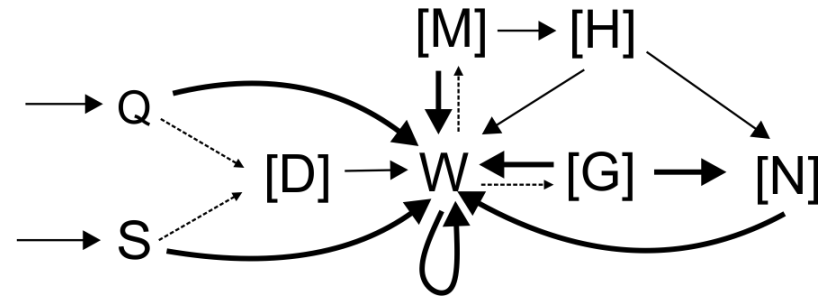
**Rats**



**Striped field mice**



**Narrow-headed voles**



**Common shrews**

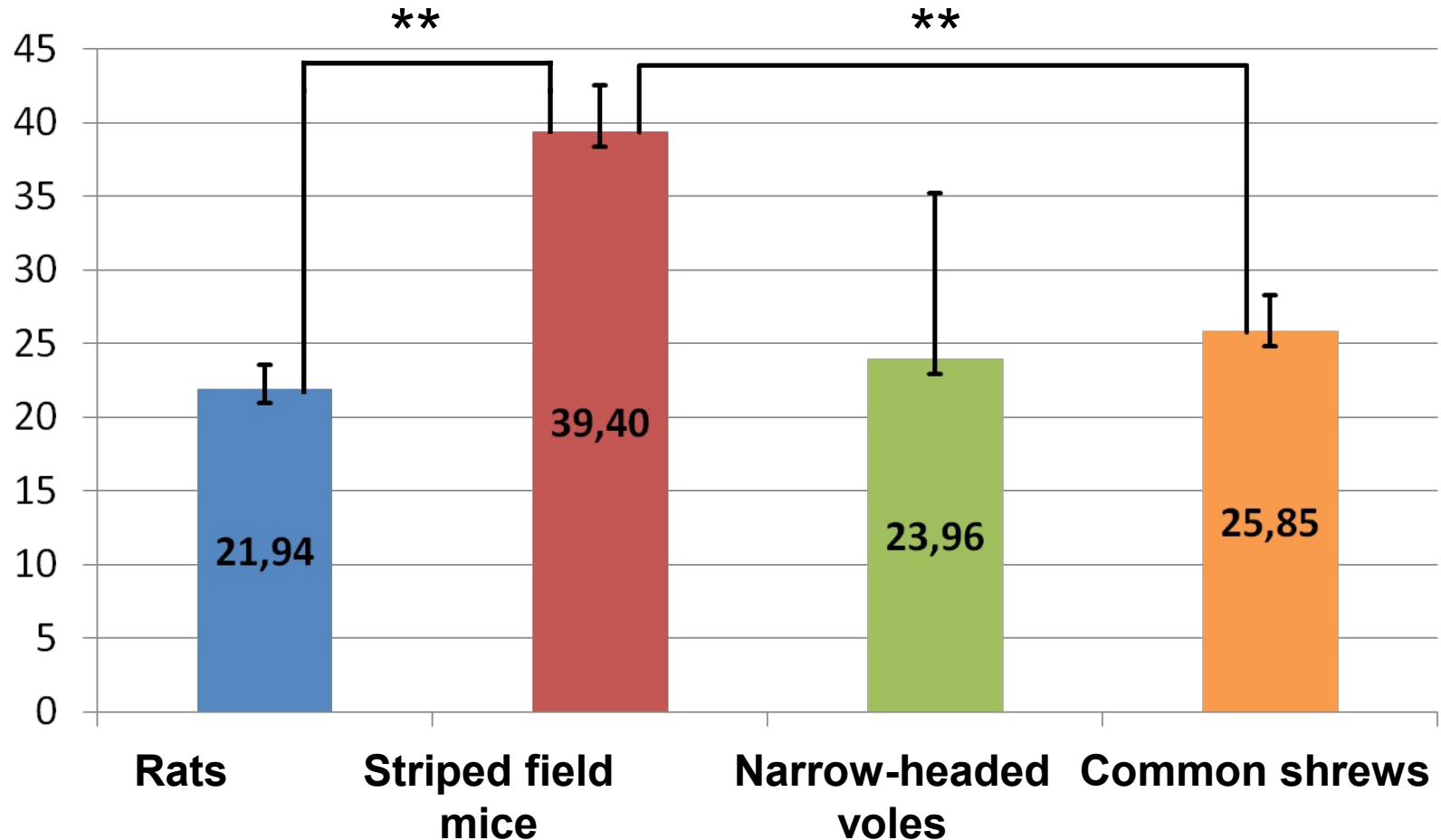
**Transitional probabilities among  
behavioural elements:**

[D], [G], [R], [H], [M], [N] - "auxiliary" elements

.....  $p < 0,2$     $\longrightarrow$   $0,2 \leq p < 0,5$     $\longrightarrow$   $p \geq 0,5$

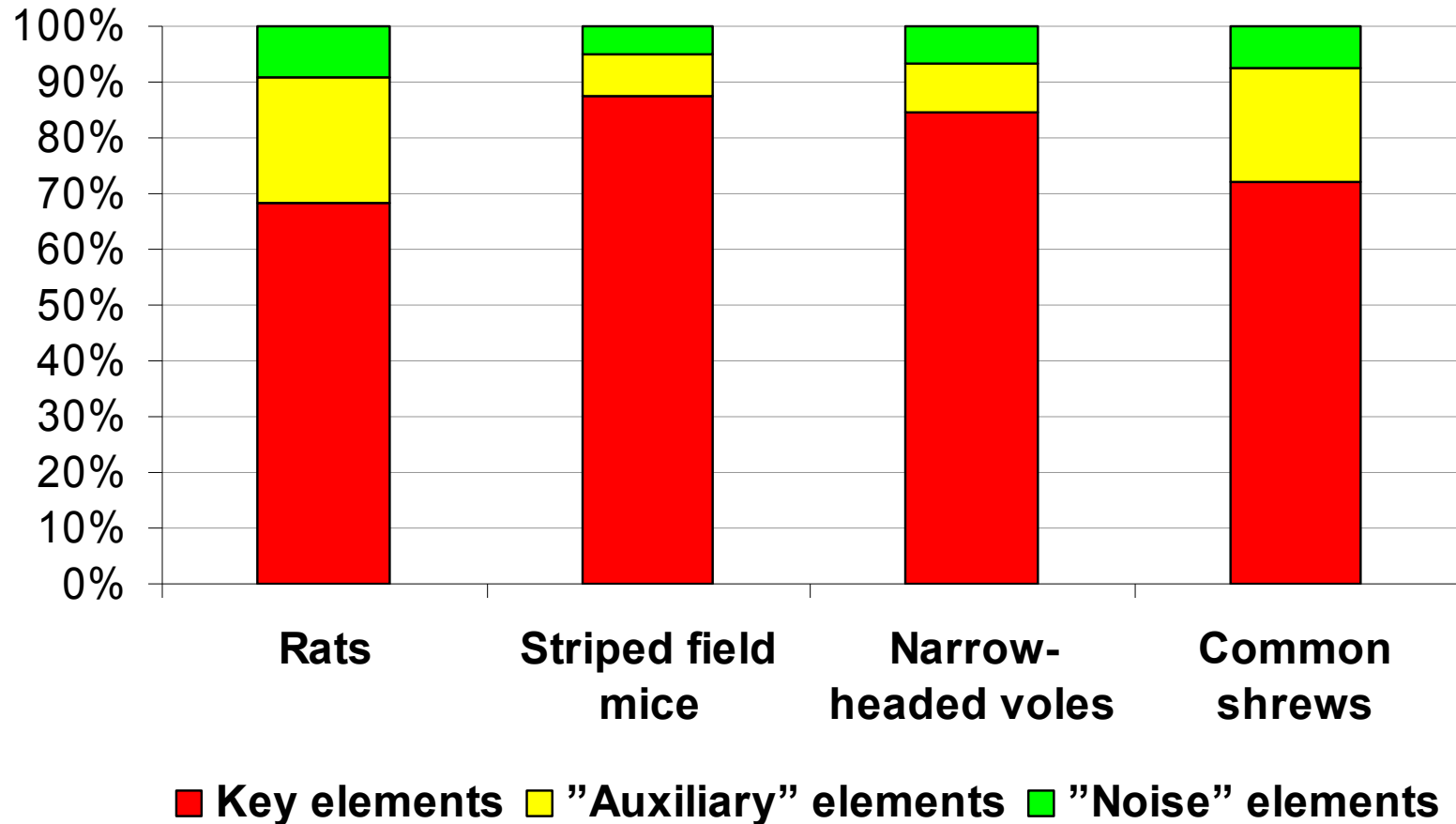
Examples: qweewefeqwerweqwewwwewebwerrh, qwerrh

# The average length of the hunting stereotype in letters (elements)



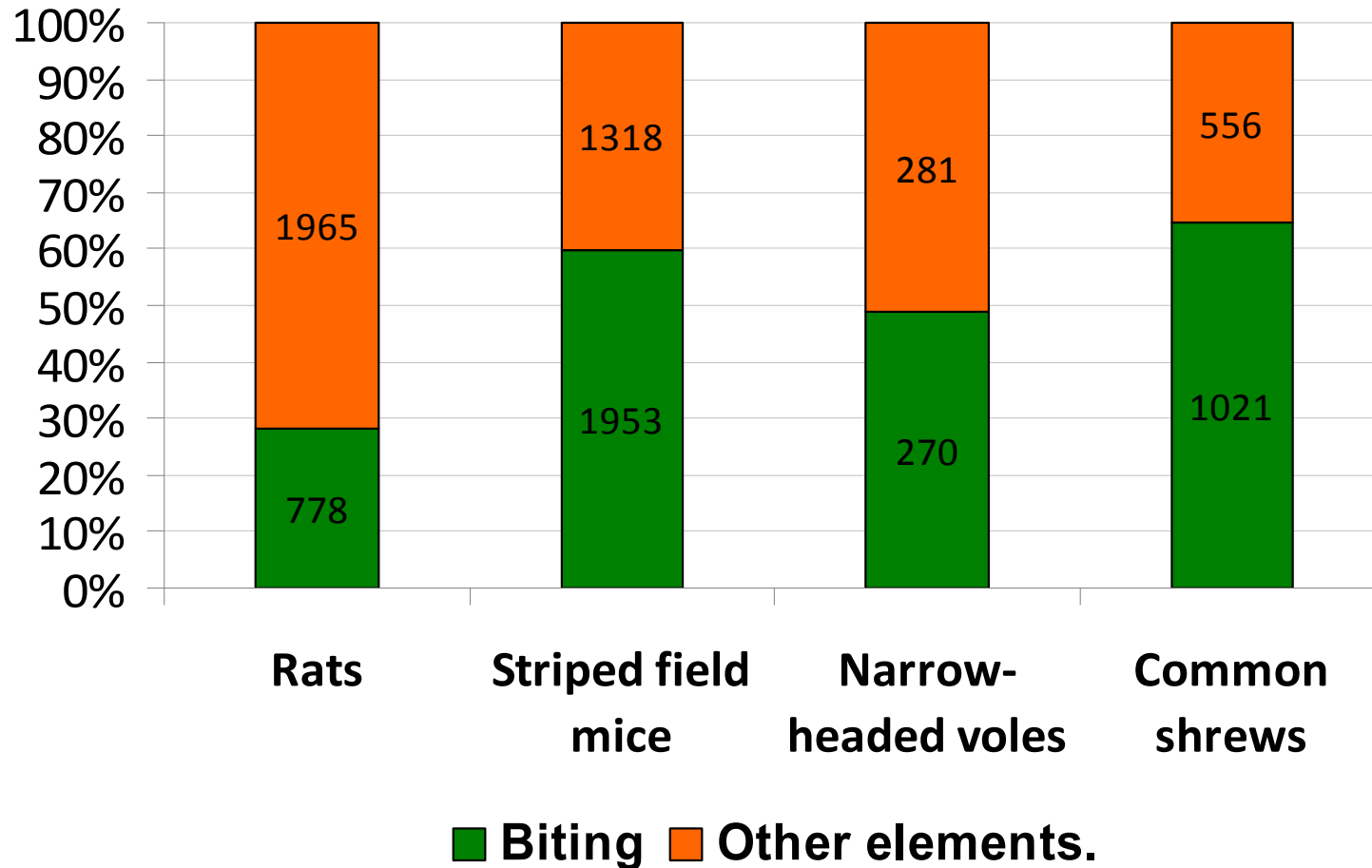
Student criterion, \*\*  $p < 0,01$

# The proportion of key, "auxiliary" and "noise" elements in the hunting stereotypes



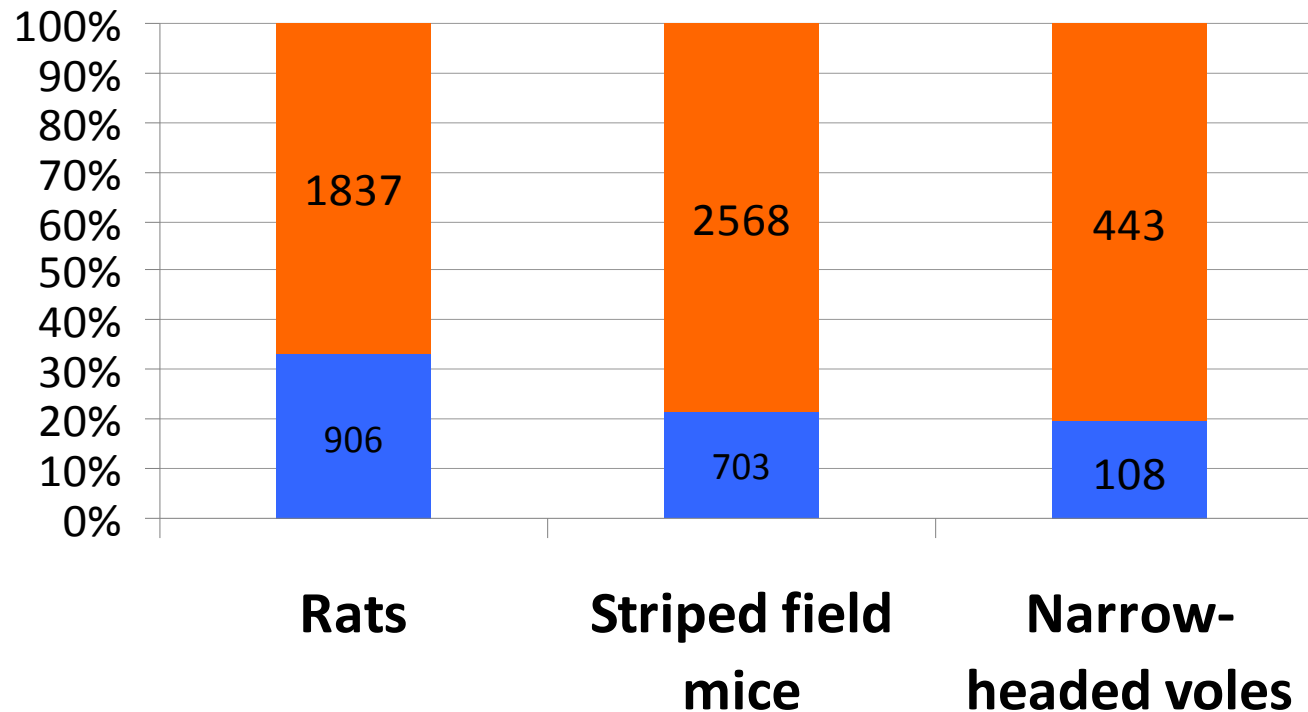
**RATS:** The less proportion of key elements in their hunting stereotypes in comparison with other animals ( $\chi^2$ ,  $p < 0,01$ ).

## The proportion of the element "biting" in the hunting stereotypes



**RATS:** The less proportion of the element «biting» in their hunting stereotypes in comparison with other animals ( $\chi^2$ ,  $p < 0,01$ ).

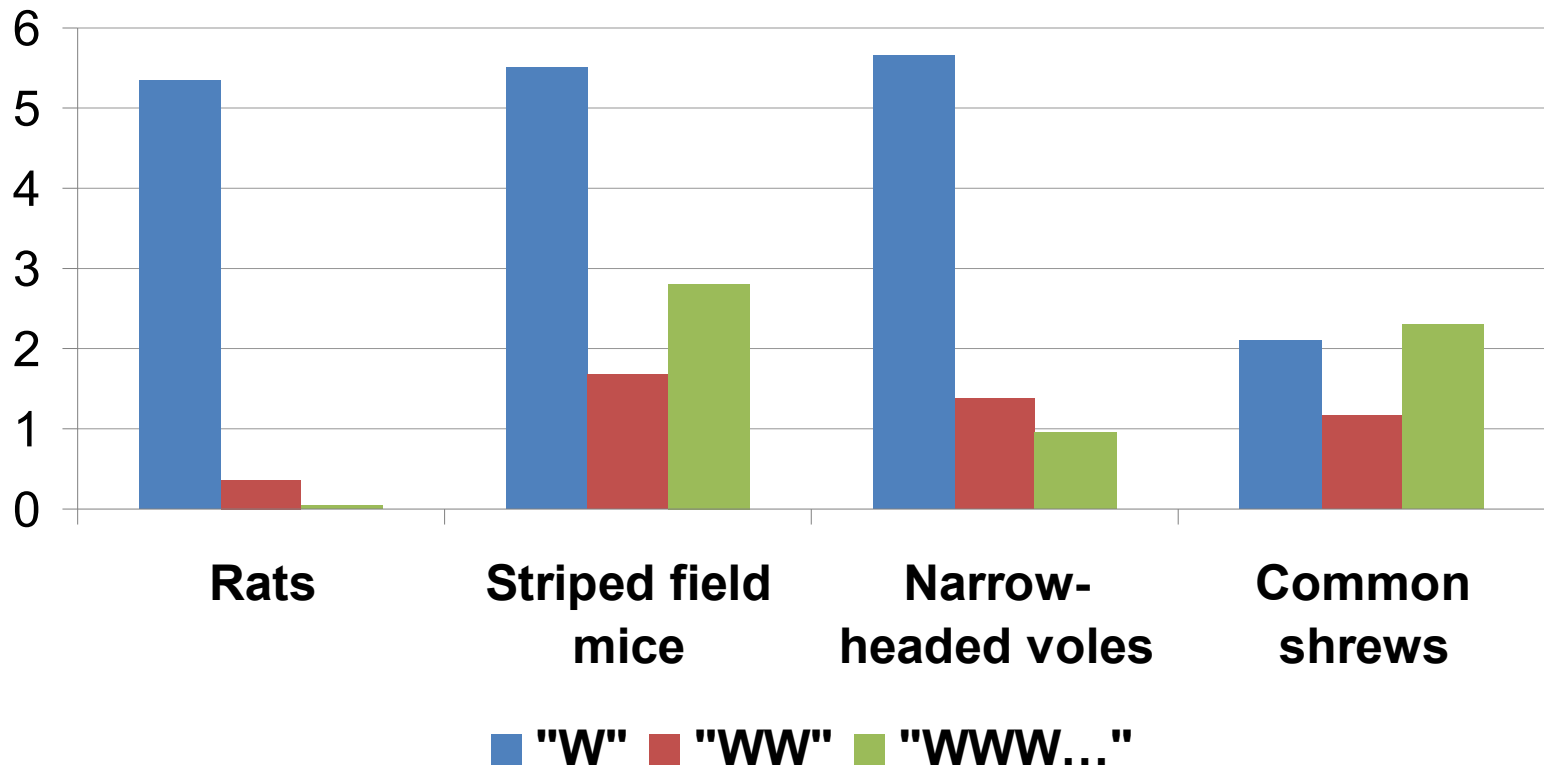
# The proportion of the element "capturing the prey by the forepaws" in the hunting stereotypes



■ capturing the prey by forepaws ■ other elements

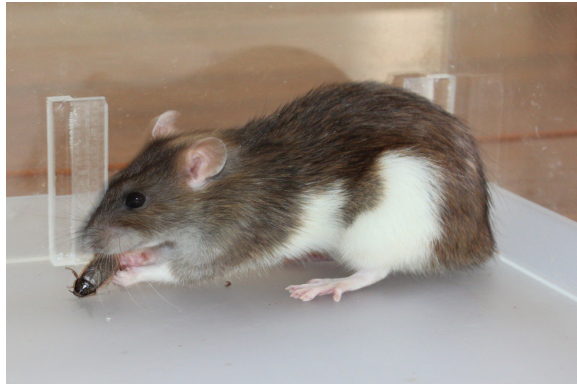
**RATS:** The larger proportion of the element «capturing» in their hunting stereotypes in comparison with other animals ( $\chi^2$ ,  $p < 0,01$ ).

The average number of "W" (bite), "WW" (double bites) and "WWW..." (multiple bites) in the complete hunting stereotypes





# Intervals between the seizure with the mouth (W) and contact with the forepaws (E) (indicator of the degree of specialization)



**Rats: 0,15 s**



**Striped field mice: 0,068 s**



**Narrow-headed voles: 0,065 s**



**Deer mice:  
0,04-0,06 s**



**Grasshopper mice 0,02-0,05 s  
(specialized insect predator) (Langley, 1994)**

# Conclusion

We revealed unexpected hunters among granivorous and herbivorous rodents which can clarify evolution of their behaviour. Rats, striped field mice and narrow-headed voles possess the hunting stereotypes that comparable with the hunting stereotype in insectivorous animals (common shrew). There is a difference in hunting stereotypes of these species. Striped field mice and narrow-headed voles are more adept in capturing insects than rats.

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