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PRESS-RELEASE

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**WHEN THE BRAIN SHRINKS IN WINTER:
SHREWS AS A MODEL FOR ORGAN REGENERATION**

When winter comes, the tiny shrew's brain shrinks by more than a fifth. This loss will be compensated for in spring - but not entirely. Dr Dina Dechmann of the Max Planck Institute for Ornithology Migration and Immunoecology in Radolfzell, Germany, reported today (July 9) at the FENS Forum of Neuroscience, that not all areas of the brain are equally affected by shrinkage. Brain loss also varies between the sexes. The loss of brain mass affects the cognitive abilities of the animals: they perform less well in a spatial test.

Animals that have to survive in the cold season have developed various strategies to cope with the rigors of nature. Some adapt their behaviour, others change their metabolism and some even change their anatomy. "The hibernation strategy of the shrews is certainly an extreme adaptation," says Dr. Dechmann. "Her brain mass decreases by more than 20 percent in the cold season and grows back again by up to 16 percent in spring."

In general, loss of brain volume was more pronounced in the female animals than in the males. As spring growth was comparable for both sexes, the brains of the female animals remained smaller than those of the male shrews.

The scientists also analysed changes in the volume in different brain regions. In the hypothalamus (the control centre for functions such as hunger and thirst), the thalamus, (the gateway to consciousness) and the hippocampus (involved in memory formation and orientation) the brain mass regenerated in spring. In the neocortex, a part of the cerebral cortex, and in the striatum, which plays a role in motor function, regeneration did not occur. "However, these differences cannot be explained by the different energy requirements of the areas," said Dr. Dechmann.

The research group also analysed changes in the morphology of nerve cells. In general, the size of cell bodies and dendrites decreased, especially in certain regions of the brain. "These morphological changes cannot explain the total loss of brain mass," emphasises Dr. Dechmann. She is convinced that "forest shrews are an interesting model for identifying mechanisms that can be used to reverse degenerative processes in the brain and other organs".

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Symposium S17: Evolutionary and ethological perspectives to understand neural circuits and behaviour

Abstract The shrinking of the shrew - reversible changes of individual brain and skull size in an alternative wintering strategy

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NOTES TO EDITORS

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The 11th FENS Forum of Neuroscience, the largest basic neuroscience meeting in Europe, organised by FENS and hosted by the German Neuroscience Society will attract more than 7,000 international delegates. The Federation of European Neuroscience Societies (FENS) was founded in 1998. With 43 neuroscience member societies across 33 European countries, FENS as an organisation represents 24,000 European neuroscientists with a mission to advance European neuroscience education and research. <https://forum2018.fens.org/>

Further Reading

Profound seasonal changes in brain size and architecture in the common shrew (2018)

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