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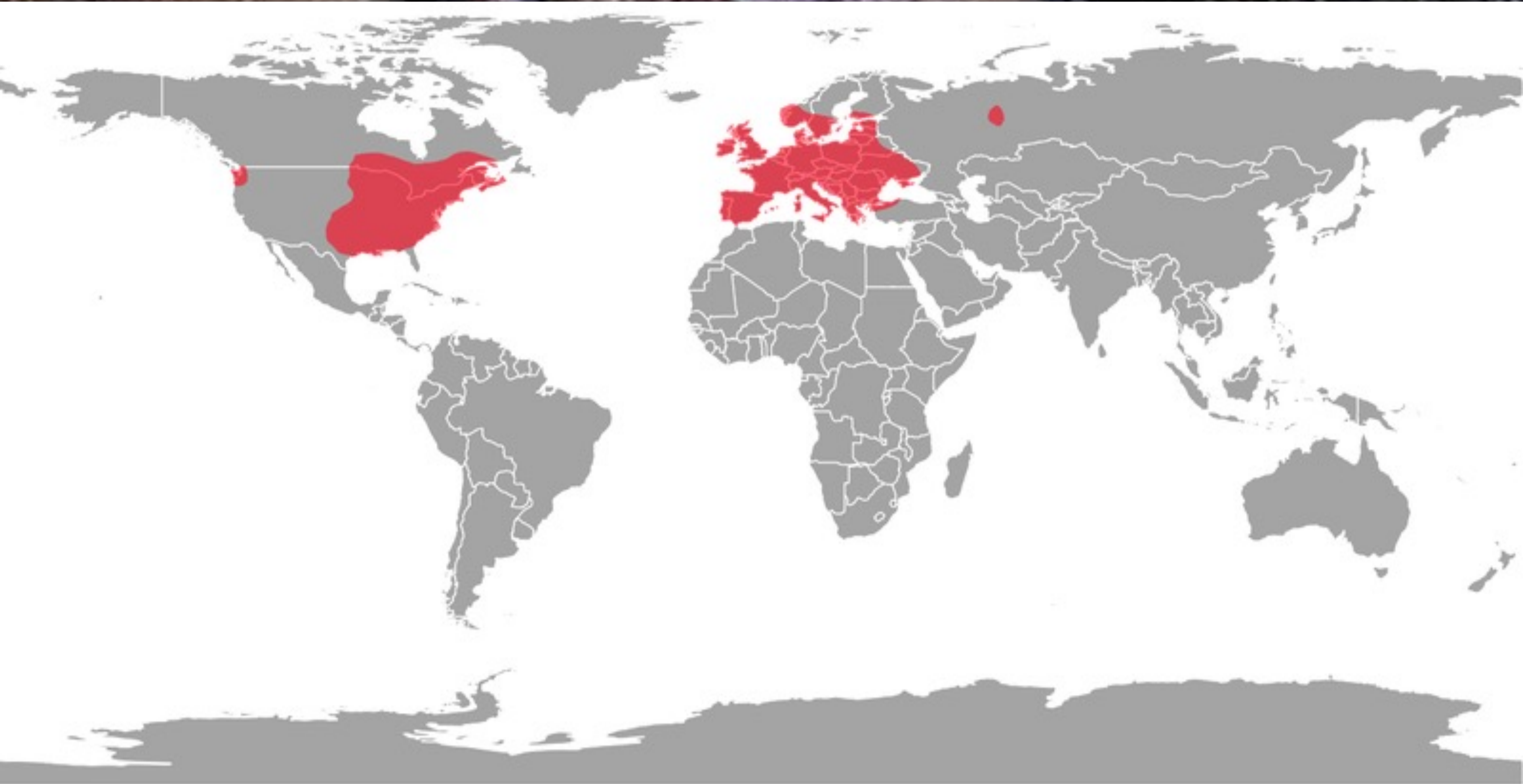
WHAT IS WNS AND WHERE DID IT COME FROM?

The fungus *Pseudogymnoascus destructans* that causes WNS has been present in Eurasia for thousands of years. It has only been recently observed in North America within the last 16 years.

WHY IS WNS A CONSERVATION PROBLEM?

Bats in North America suffer high mortality compared to bats in Eurasia. It’s growth temperature of 5°C-19°C overlaps with most bats’ hibernating temperatures of 2°C-10°C

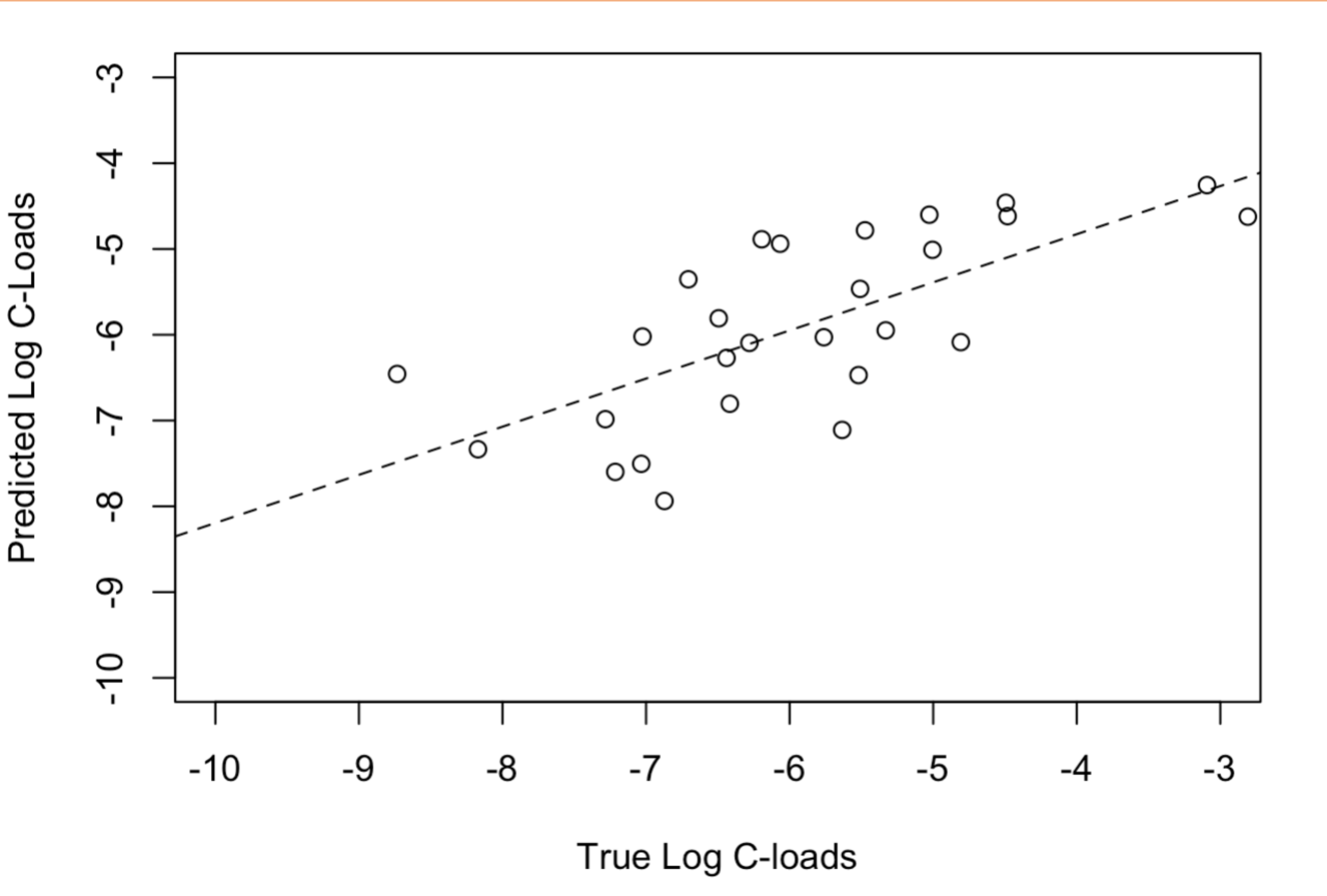
Phylogeny showing bat species exposed to WNS (Eurasia & East US in red) and unexposed/unreported (Mid to West US in black)



ARE RELATED SPECIES PREDISPOSED TO TOLERATE OR SUCCUMB TO FUNGAL INFECTIONS?

| Model | R ² | Adj. R ² | LOOCV mse |
|--|----------------|---------------------|--------------|
| Fungal loads ~ Body mass | 0.1 | 0.069 | 1.011 |
| Fungal loads ~ Hibernating temperature | 0.06 | 0.021 | 0.981 |
| Fungal loads ~ Body mass + Hibernating temperature | 0.15 | 0.077 | 0.949 |
| Fungal loads ~ Body mass + Forearm length + Hibernating temperature | 0.36 | 0.273 | 0.906 |
| Fungal loads ~ Body mass + cluster size + Hibernating temperature | 0.17 | 0.065 | 1.196 |
| Fungal loads ~ Body mass + Forearm length+ Cluster size + Touching + Hibernating temperature | 0.39 | 0.245 | 1.531 |
| Phylogeny only model | | | 1.026 |
| Non Phylogenetic model | 0.35 | 0.197 | 1.875 |

CROSS VALIDATION MODEL




Take away points:
Model predicted values were similar to the true values. Phylogeny improves prediction!


The model was then used to predict the susceptibility and tolerance levels to be expected in bat species in the Western USA not infected with the fungus.

Reference
1. Hoyt, J. R., Kilpatrick, A. M., & Langwig, K. E. (2021). Ecology and impacts of white-nose syndrome on bats. *Nat Rev Microbiol*, 19(3), 196–210. <https://doi.org/10.1038/s41579-020-00493-5>
2. Langwig, K. E., Frick, W. F., Bried, J. T., Hicks, A. C., Kunz, T. H., & Marm Kilpatrick, A. (2012). Sociality, density-dependence and microclimates determine the persistence of populations suffering from a novel fungal disease, white-nose syndrome. *Ecol lett*, 15(9), 1050–1057. <https://doi.org/10.1111/j.1461-0248.2012.01829.x>


Model Variables for the Data available for 27 species



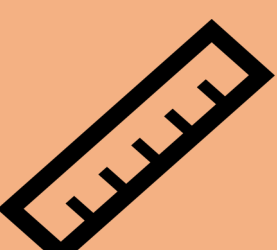
Fungal loads




Hibernating Temperature



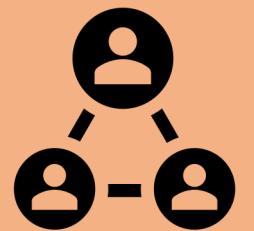
Body mass



Forearm length



Cluster size



Touching

