

Motivation

The red panda's radial sesamoid (false thumb) was believed to be for holding bamboo.

A carnivorous, arboreal ancestor suggests climbing may be the primary reason.

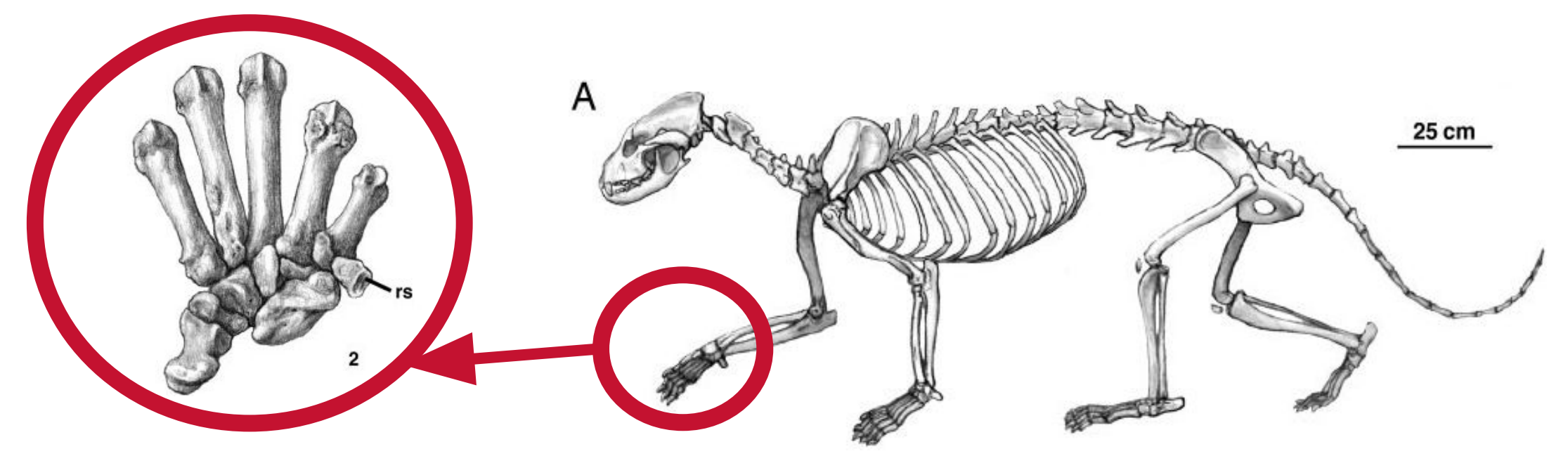


Fig. 1. Fossil Ancestor with False Thumbs [1].

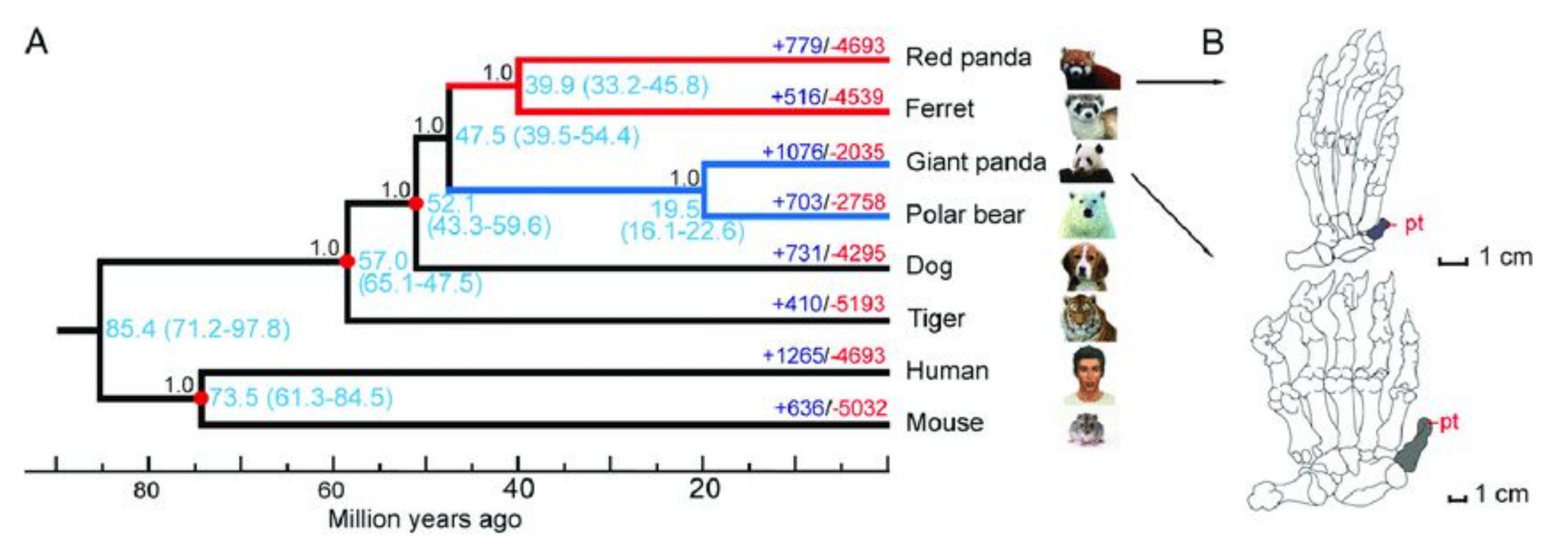


Fig. 2. Independent Evolution of the Red Panda Thumb [2].

Methods

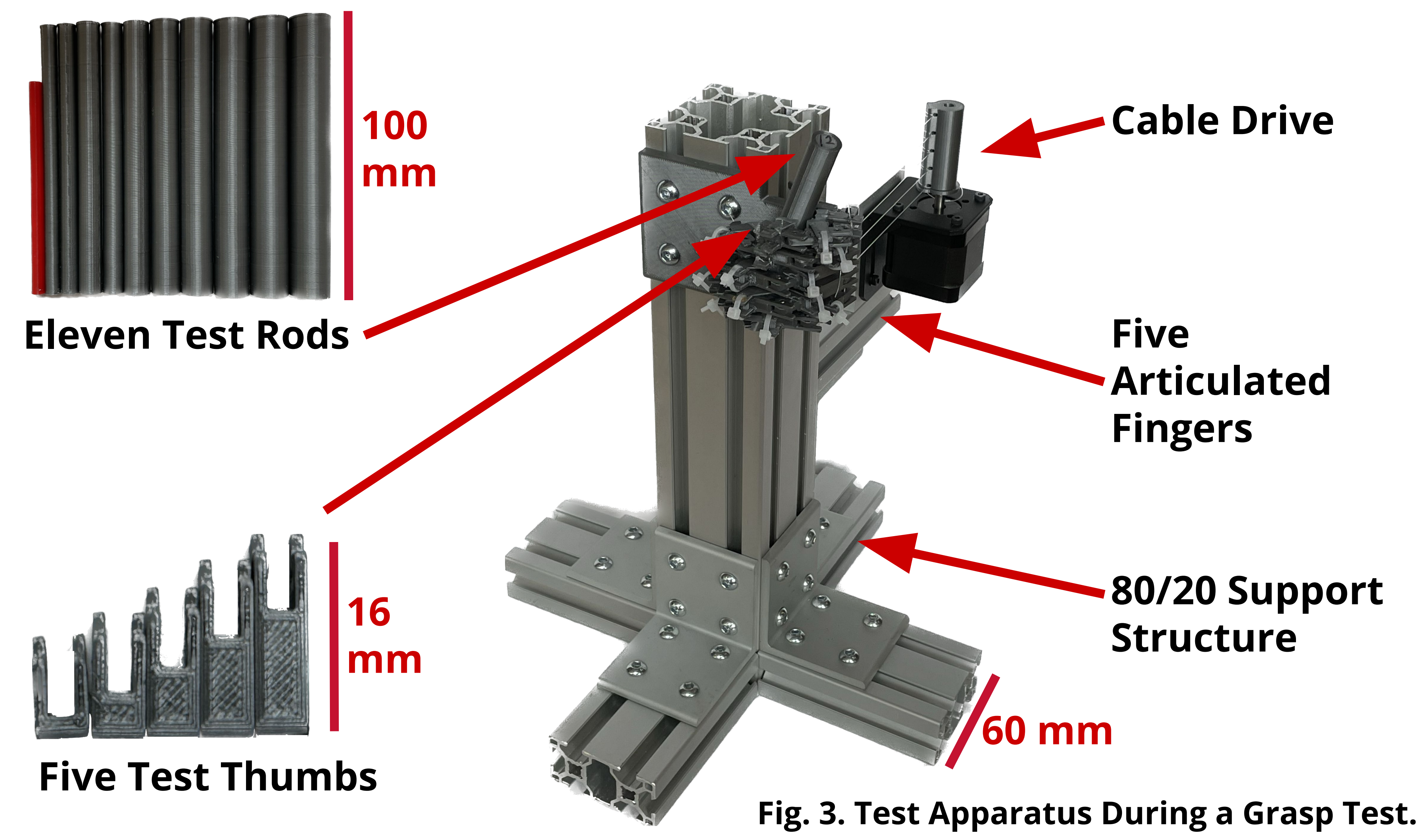


Fig. 3. Test Apparatus During a Grasp Test.

Results

Table 1. Grasp Test Results for Three Trials of Each Thumb/Rod Combination

Thumb Length (mm)	Rod Diameter (mm)										
	5	6	7	8	9	10	11	12	13	14	15
0	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held
5.5 Actual Thumb	Not Held	Not Held	Not Held	Held with bad thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact
7	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact
10	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with bad thumb contact	Held with bad thumb contact
13	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with bad thumb contact	Held with bad thumb contact
16	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with good thumb contact	Held with bad thumb contact	Held with bad thumb contact

Optimal Thumb

Legend for Grasp Test Results:

- Held with good thumb contact
- Held loosely with thumb contact
- Held with bad thumb contact
- Held without thumb contact
- Not Held

Conclusions

- Red panda thumb near the optimal size
- Larger diameter rods were favored
 - Supports the theory of the thumb as an adaptation primary to climbing and secondary to food manipulation

Acknowledgements

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References:

[1] M. J. Salesa, M. Antón, S. Peigné, and J. Morales, "Evidence of a false thumb in a fossil carnivore clarifies the evolution of Pandas," *Proceedings of the National Academy of Sciences*, vol. 103, no. 2, pp. 379–382, 2005.

[2] Y. Hu, Q. Wu, S. Ma, T. Ma, L. Shan, X. Wang, Y. Nie, Z. Ning, L. Yan, Y. Xiu, and F. Wei, "Comparative genomics reveals convergent evolution between the bamboo-eating giant and Red Pandas," *Proceedings of the National Academy of Sciences*, vol. 114, no. 5, pp. 1081–1086, 2017.