

# Adhesion of Patterned Surfaces: When do players become a team?

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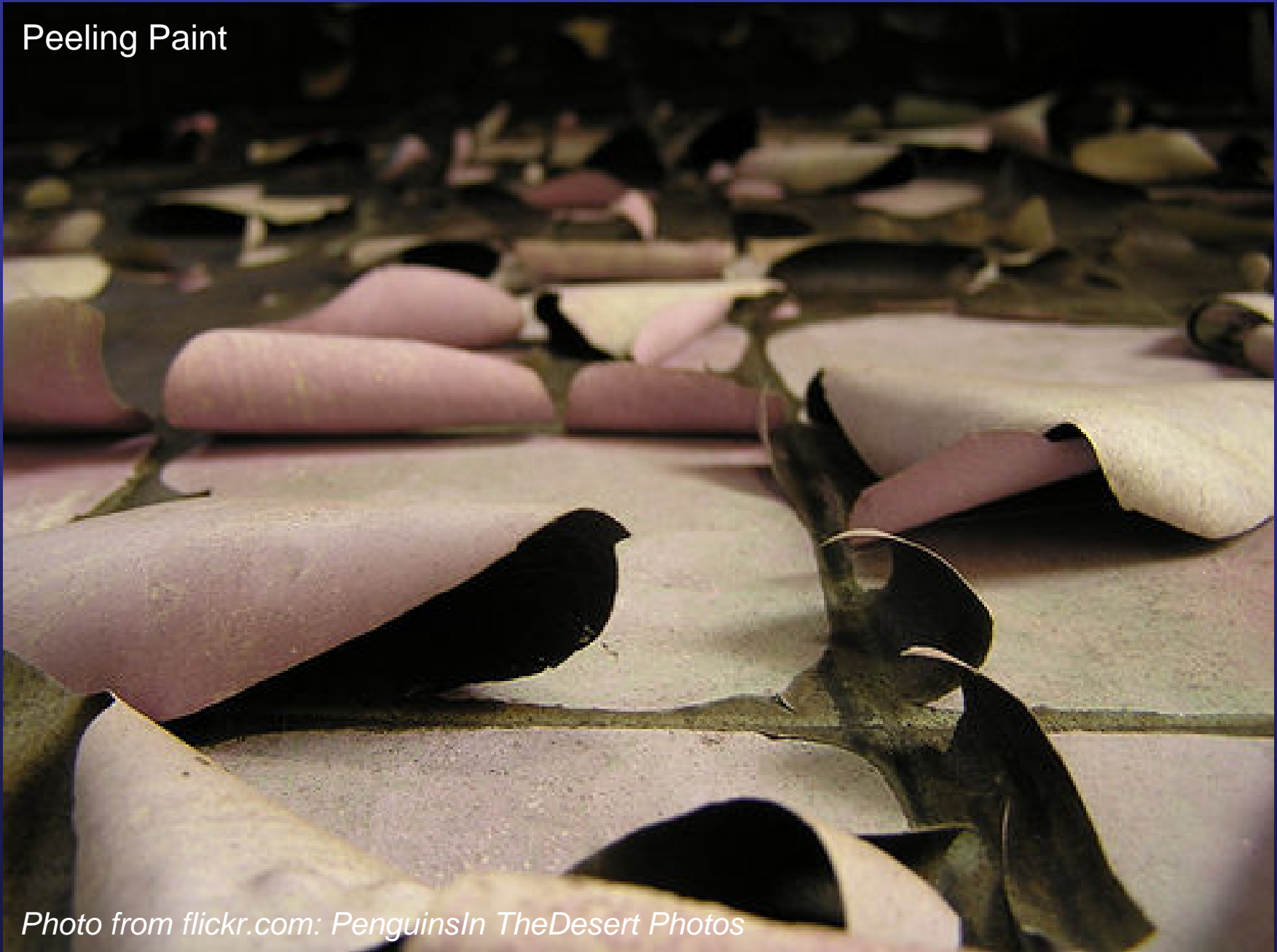


USA

LAKE  
PLACID  
1980

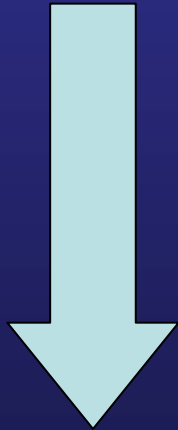


## Peeling Paint

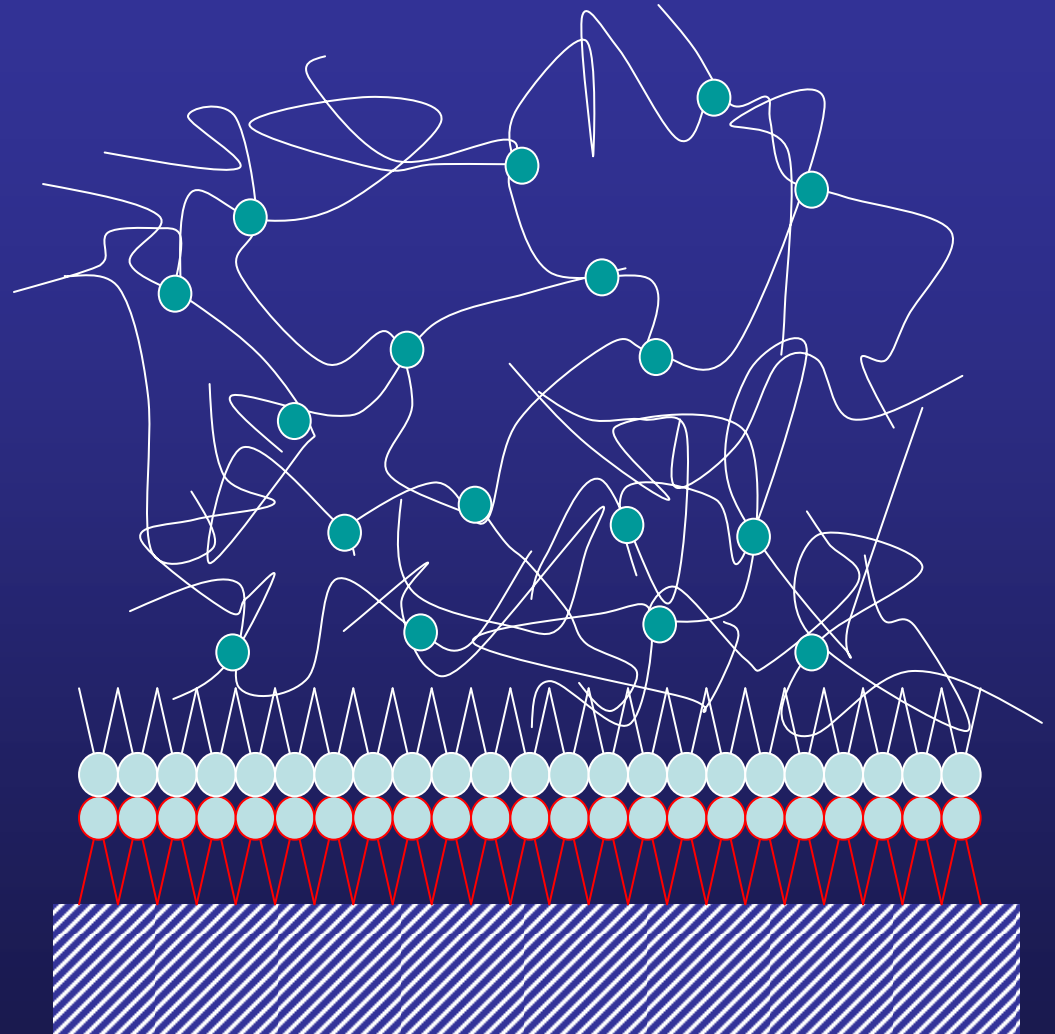


*Photo from flickr.com: PenguinsIn TheDesert Photos*

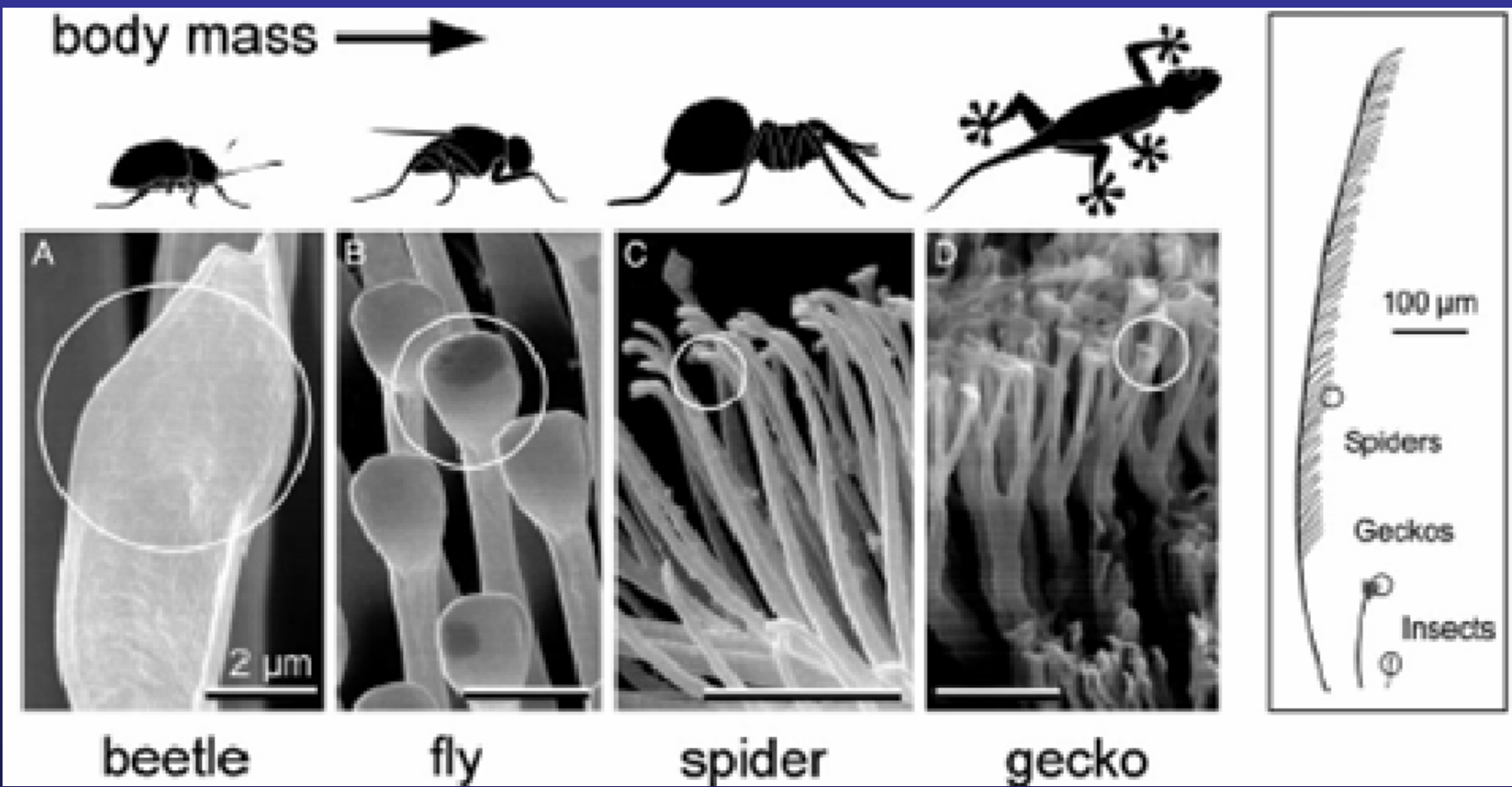
- Intermolecular forces
- Near-interface network
- Free chain motion
- Surface roughness



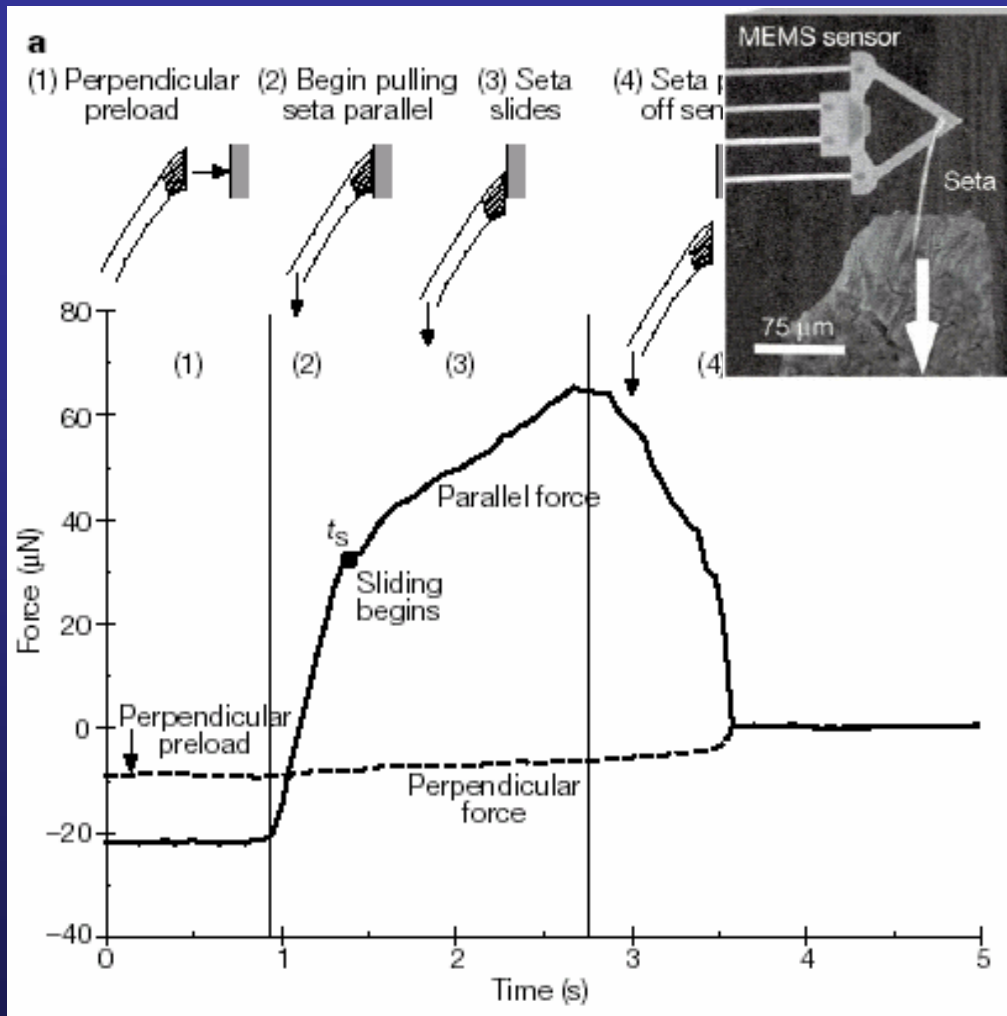
ADHESION



Combining these “ingredients”  
in a systematic manner to  
achieve a predictable result is  
challenging.

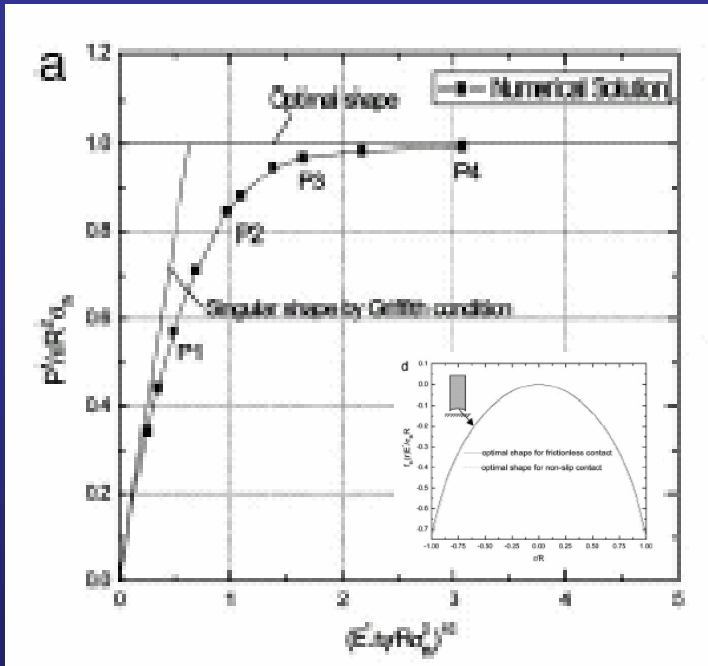


Arzt, E., et al. PNAS, 100 (19) 2003.



K. Autumn *et al*, *Nature*, **405**, 6787, 2000.

- Insects and many vertebrate animals have unique control of adhesion.
- Several mechanisms, or strategies, have been developed.
- One theme is the combination of **material and geometry**.
- Autumn *et al* demonstrated that gecko adhesion is solely linked to the combination of **van der Waals interactions and geometry**.



H.J. Gao *et al*, PNAS, **101**, 21, 2004.

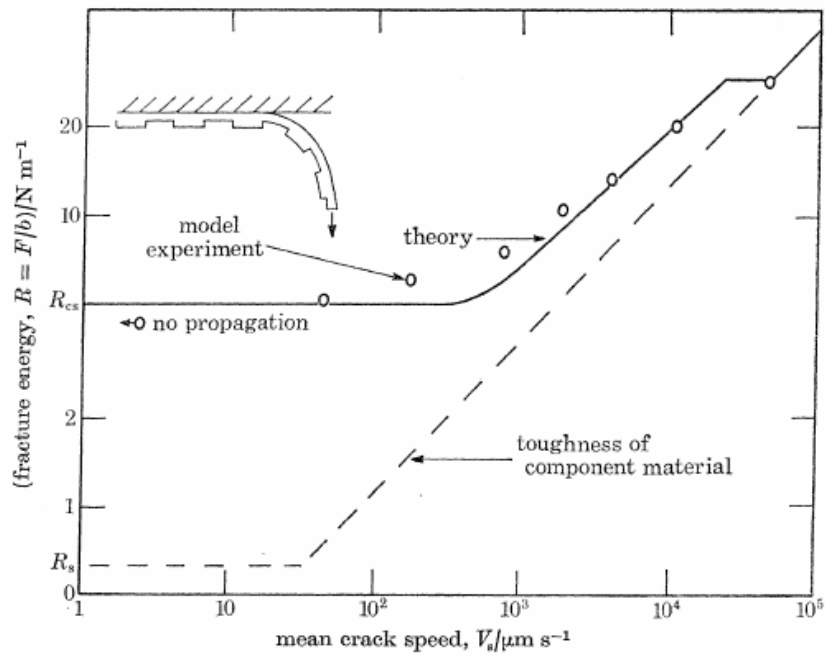


FIGURE 10. Theory and experiment of composite toughness.

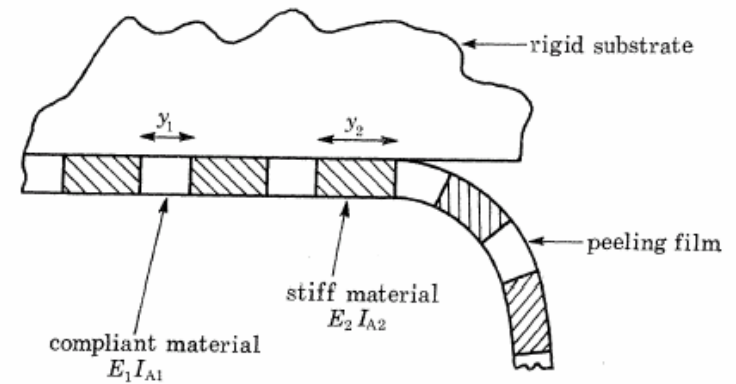


FIGURE 11. Design of composite to resist peel cracks.