

Supporting information for:

How a beetle catches fog

F. K. Chan, A. Shahrokhian, J. Feng, M. Gazzola & H. King

*Corresponding author email:

mgazzola@illinois.edu

hking@uakron.edu

This PDF file includes:

- Captions for Movies S1
- Supplementary Figs. S1 to S

Videos. Movie S1- Close contact visualization of the flow past smooth cylinder. Droplets glide on the surface at very close distances, entering back to the free stream.

Data availability. The data presented in this work is available upon request.

Code availability. Code for the analysis described in data analysis section and other analyses presented in this paper are available upon request.

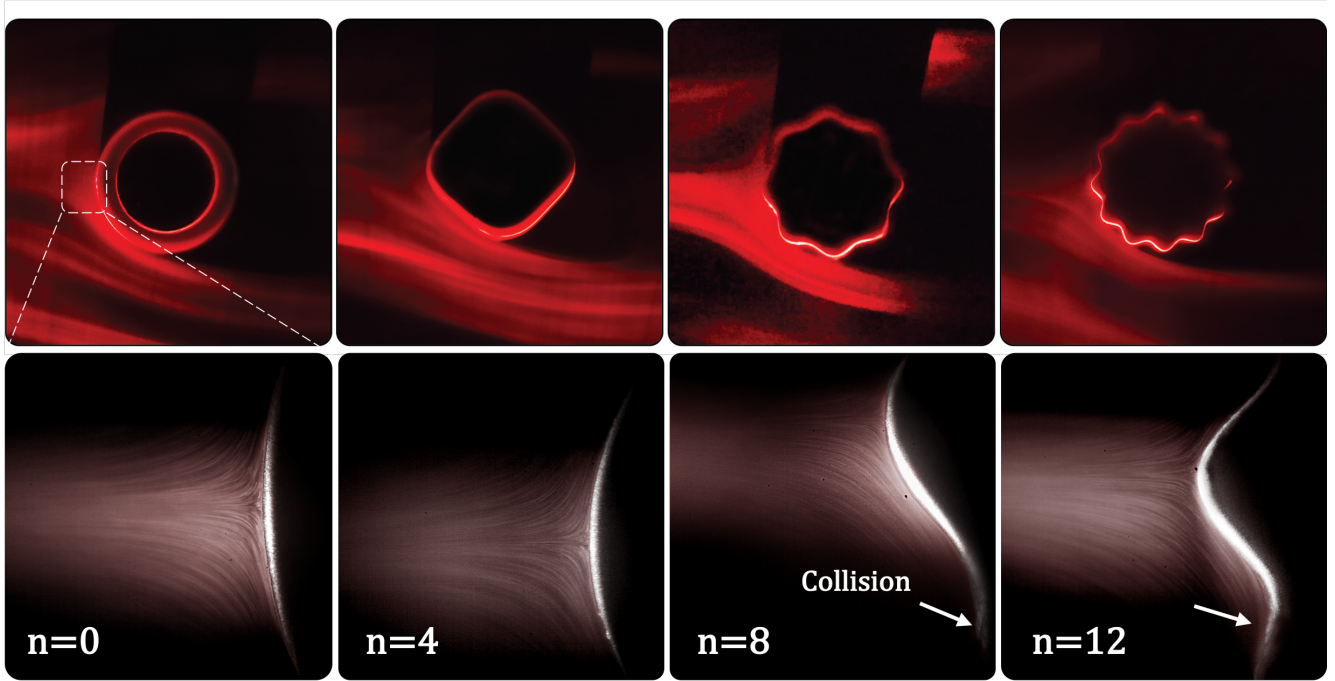


Fig.S 1: Top: Laser-illuminated flow around experimental targets; Bottom: Droplet pathlines near stagnation point, increasing the number of waves (n) from left to right. Collision of the droplets are observed in $n=8$ and 12 in early times.

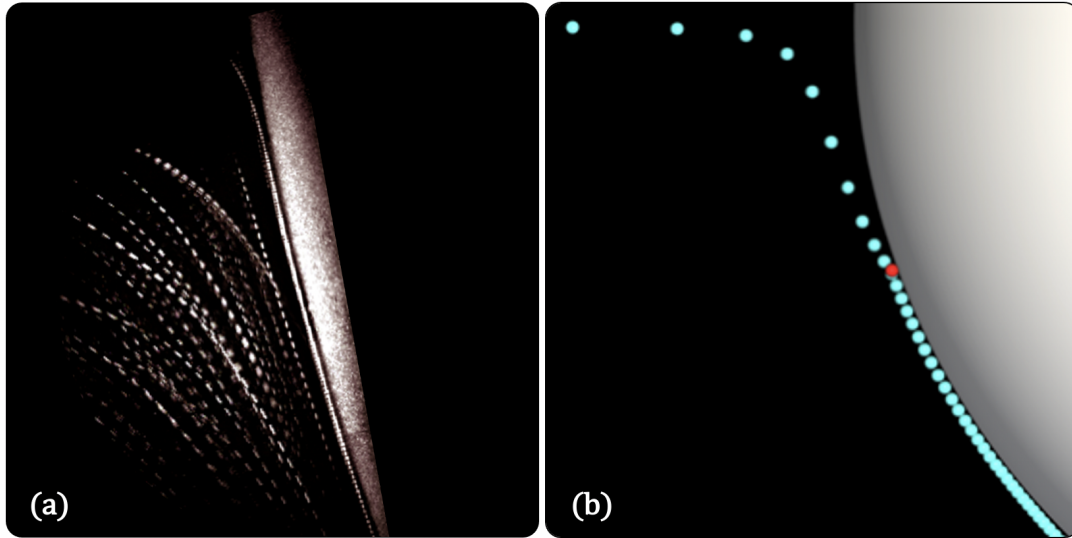


Fig.S 2: a) Droplet trajectories shows gliding behavior of droplets at very close distances to the surface, before reentering the free stream. Shown at intervals of $1ms$. b) Illustration of a single droplet approaching a surface with and without lubrication interaction. Collision happens at the red dot when lubrication interaction is neglected. When lubrication is 'on', the droplet adopts a trajectory of hugging the surface without touching.

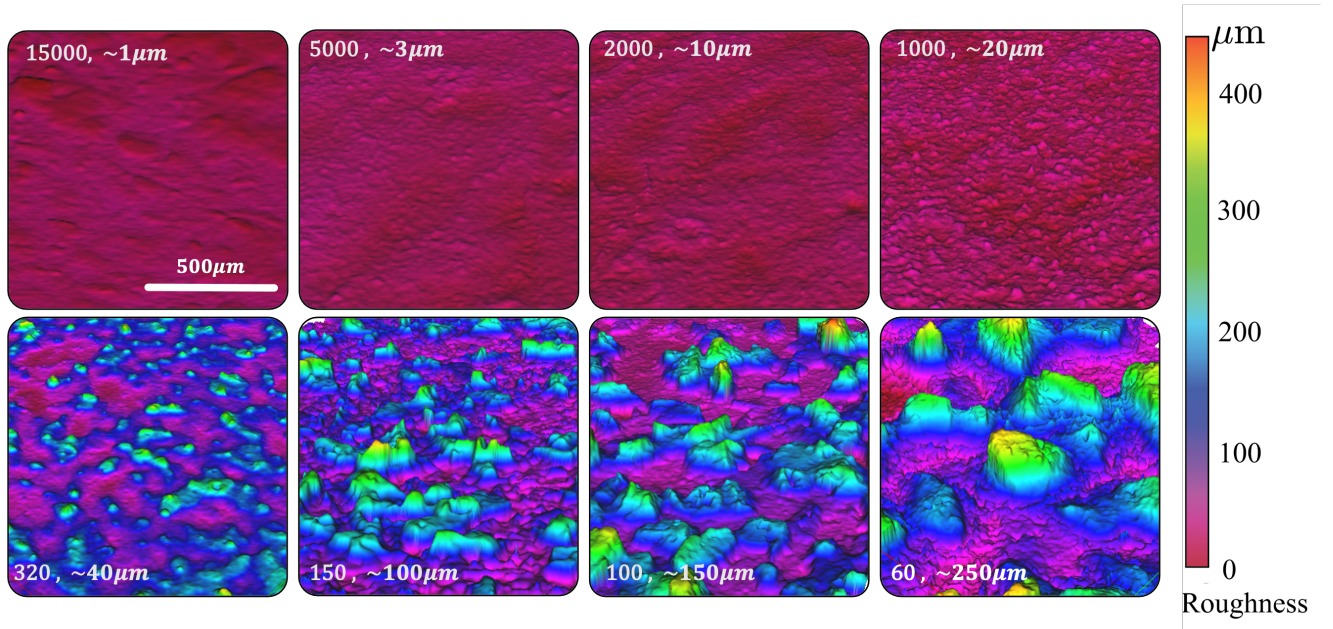


Fig.S 3: Top left: Minimum, bottom right: maximum roughness on the cylindrical targets, measured by optical profilometry. Averaged equivalent particle diameter for each grit (15000 to 60) are considered as the roughness of the surface (1 to $250\mu m$).

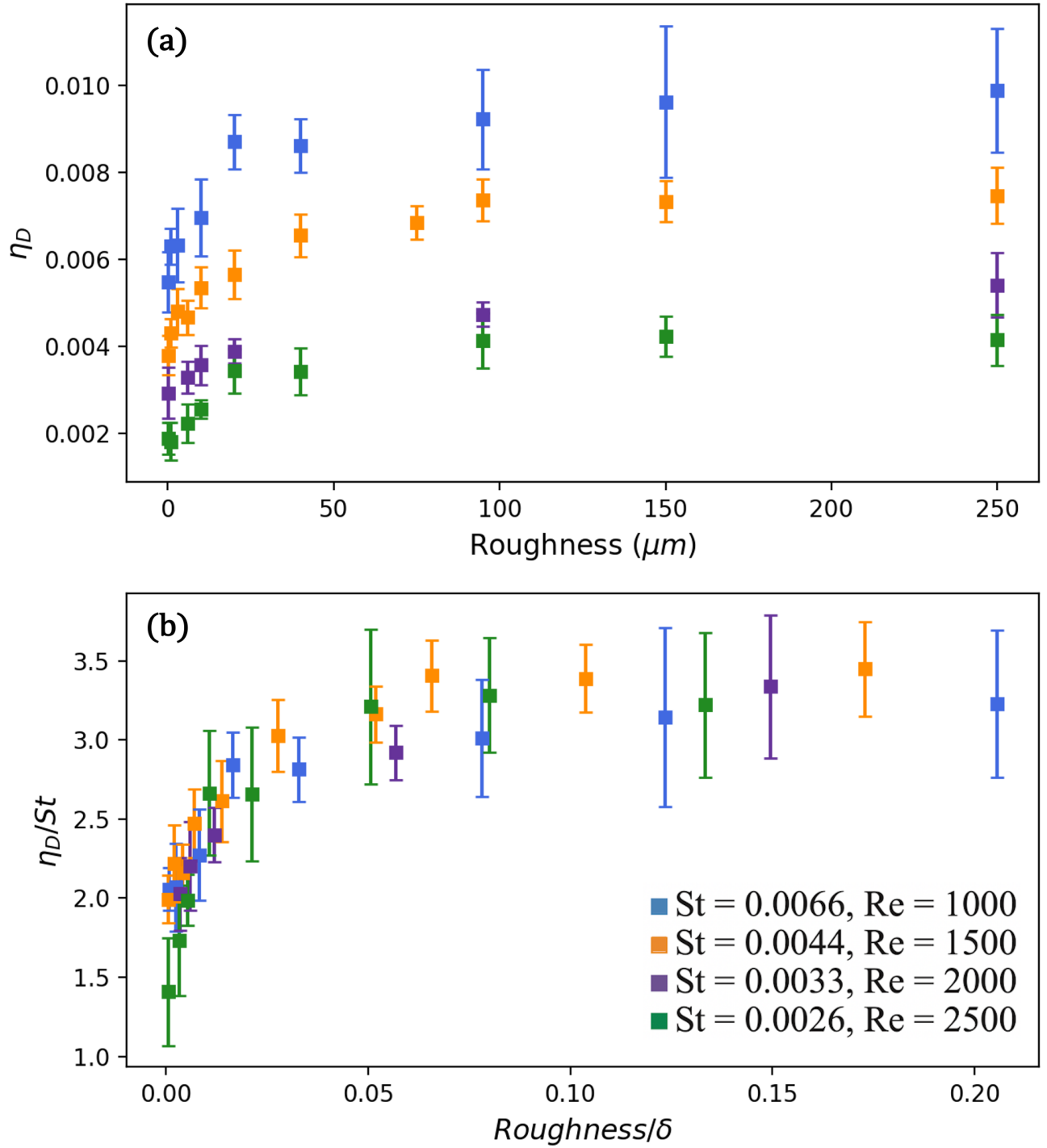


Fig.S 4: a) Deposition efficiency of roughened cylinders. St and Re numbers are altered by varying cylinder diameter. b) Data collapses, when deposition efficiency is scaled by St and roughness by laminar boundary layer thickness, δ .

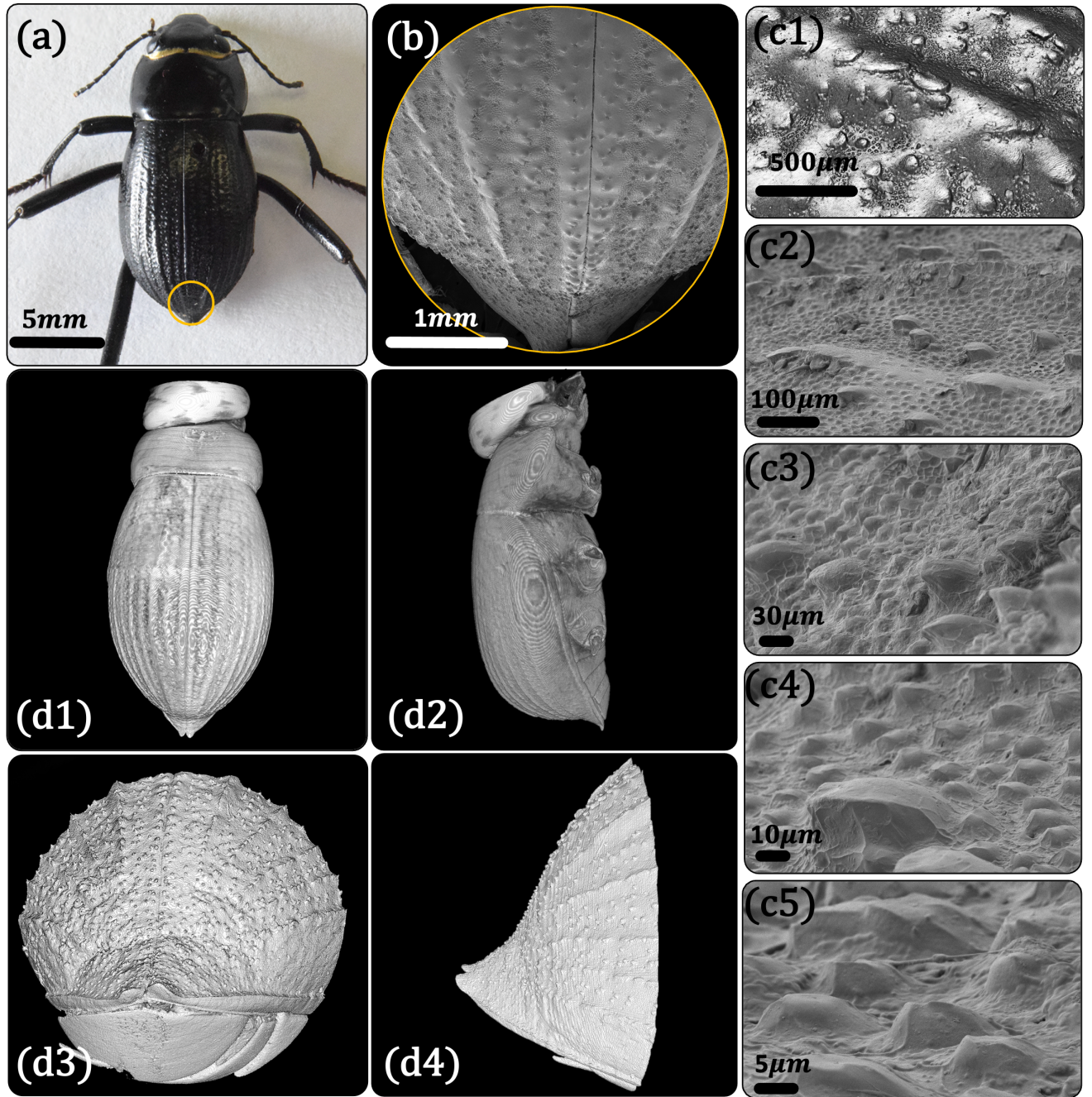


Fig.S 5: Shape and roughness of a) *Onymacris unguicularis* is characterized by b,c2-5) scanning electron microscopy, c1) optical profiler, and d1-4) micro CT scanner. Larger scale images (a,b,c1,d1-4) show parallel ridges of $\sim 200\mu m$ wide and $\sim 100\mu m$ high. Close up SEM pictures exhibit two distinct scales of bumps, $\sim 50\mu m$ and $\sim 10\mu m$.

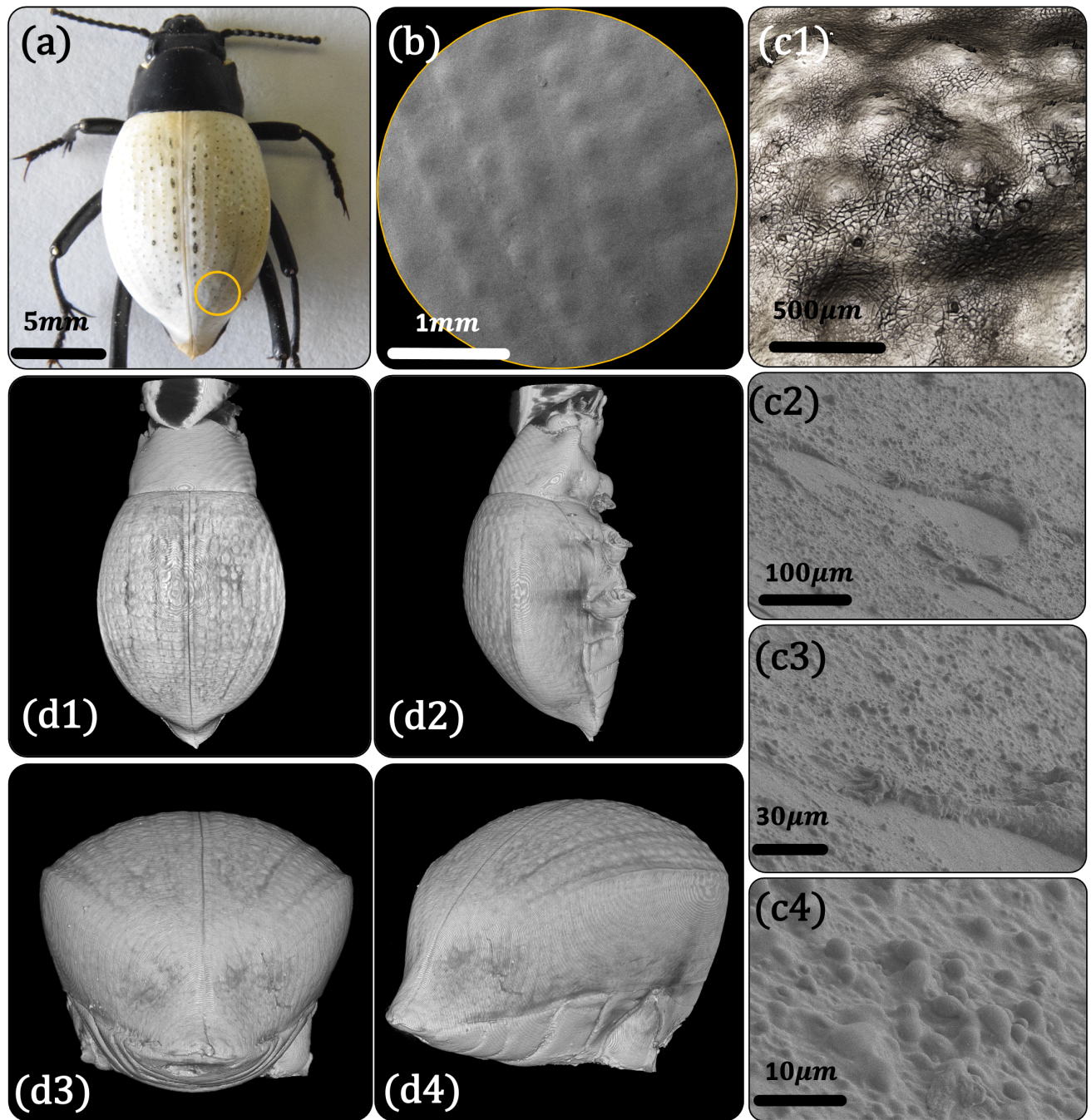


Fig.S 6: Shape and roughness of a) *Onymacris bicolor* is characterized by b,c2-4) scanning electron microscopy, c1) optical profiler, and d1-4) micro CT scanner. Larger scale images (a,b,c1,d1-4) show shallow bumps of $\sim 300\mu m$ diameter and $\sim 80\mu m$ high. Close up SEM pictures smaller bumps, approximately $1\mu m$.