

Mud crab's mottled, deep blue exoskeleton: surface morphology and internal microstructure

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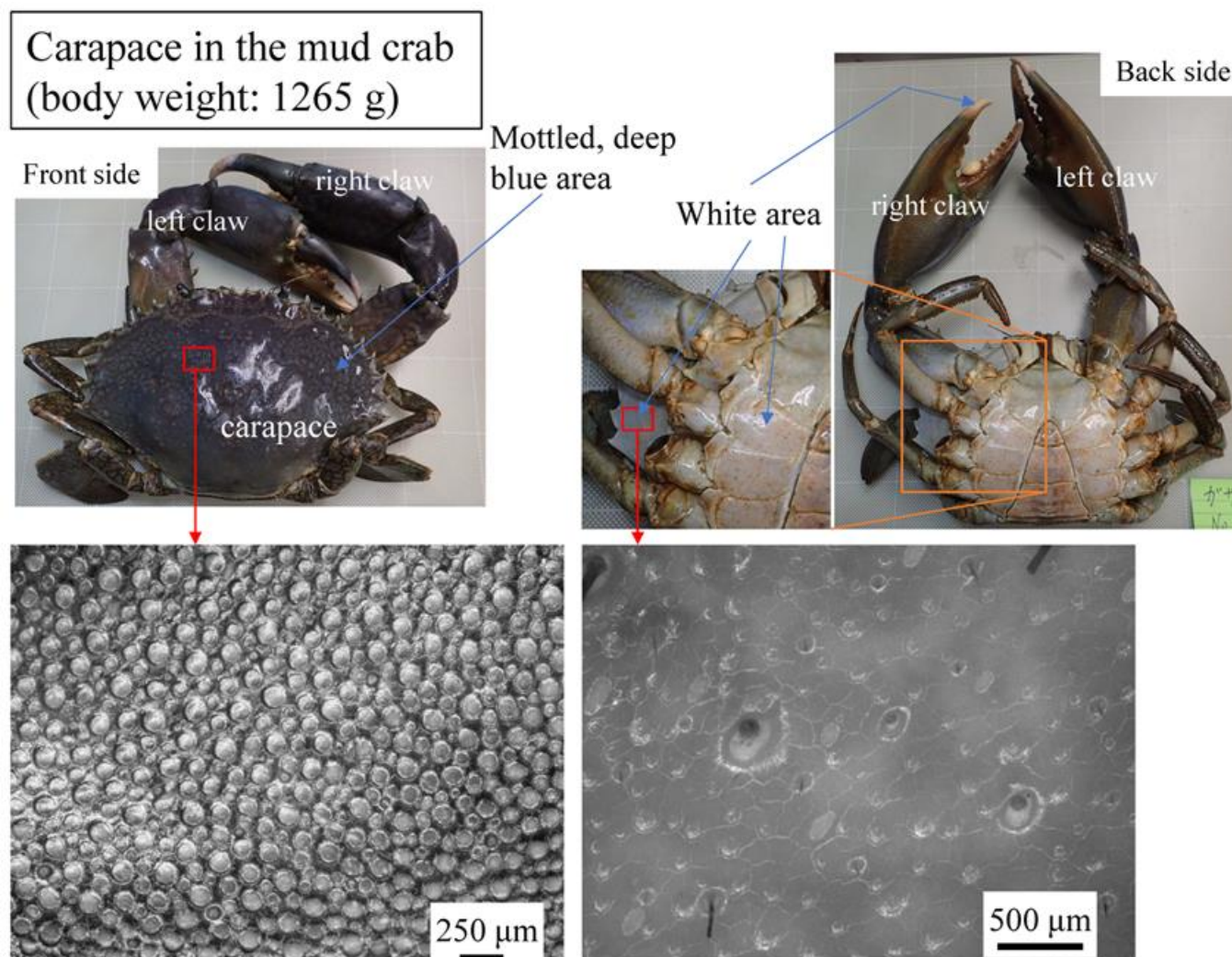
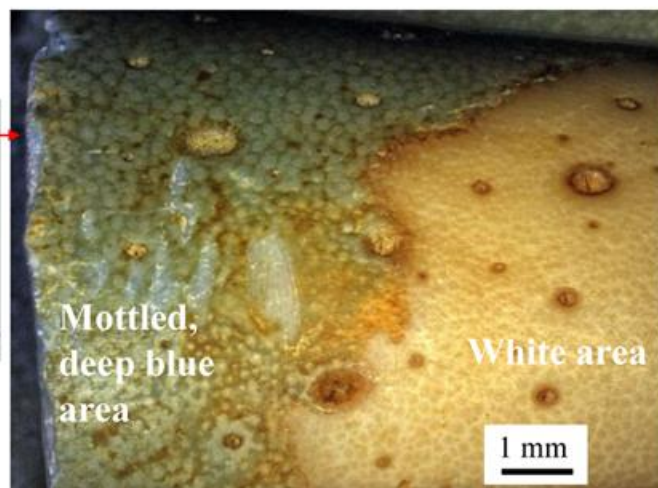


Figure S1. Digital micrographs of the carapace surface of the mud crab observed through a digital microscope (VHX-900, Keyence Corporation, Osaka, Japan). Many bulges several hundred microns in diameter are observed only on the surface of the mottled, deep blue area. These bulges were also confirmed on the claw surfaces of the mud crab shown in Fig. 3. No bulge is visible on the white exoskeleton surface on the back side of the carapace.

Fixed finger of left claw in the mud crab
(body weight: 1578 g)



Right claw in the mud crab
(body weight: 2138 g)

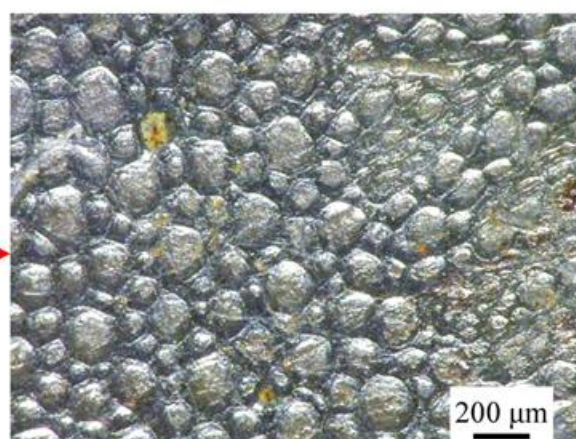
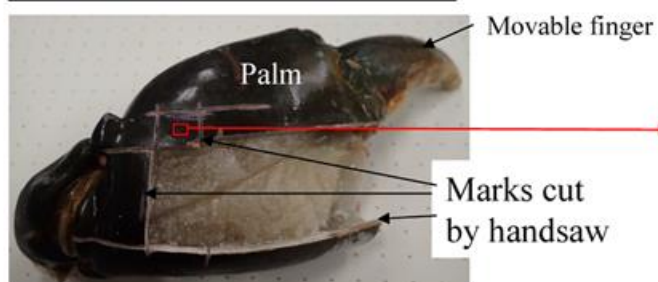


Figure S2. Digital micrographs of the claw surface of other two mud crabs observed through a digital microscope (VHX-900, Keyence Corporation, Osaka, Japan). Many bulges several hundred microns in diameter are observed only on the surface of the mottled, deep blue area. These bulges were also confirmed on the surfaces claw and carapace of the mud crab (body weight 1265 g), as shown in Figs. 3 and S1.

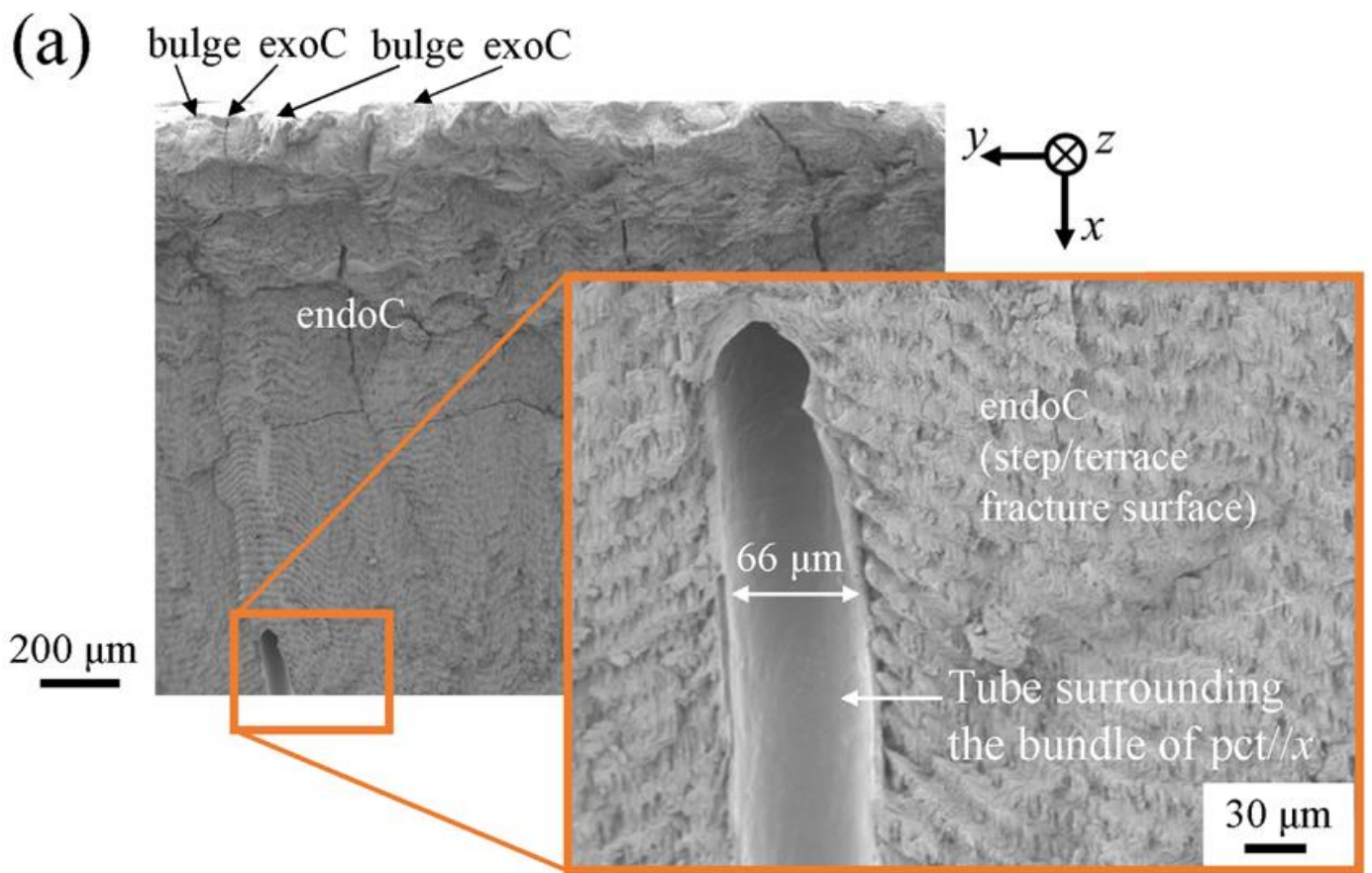


Figure S3. Scanning electron microscope images of the fracture surface in the mottled, deep blue exoskeleton.

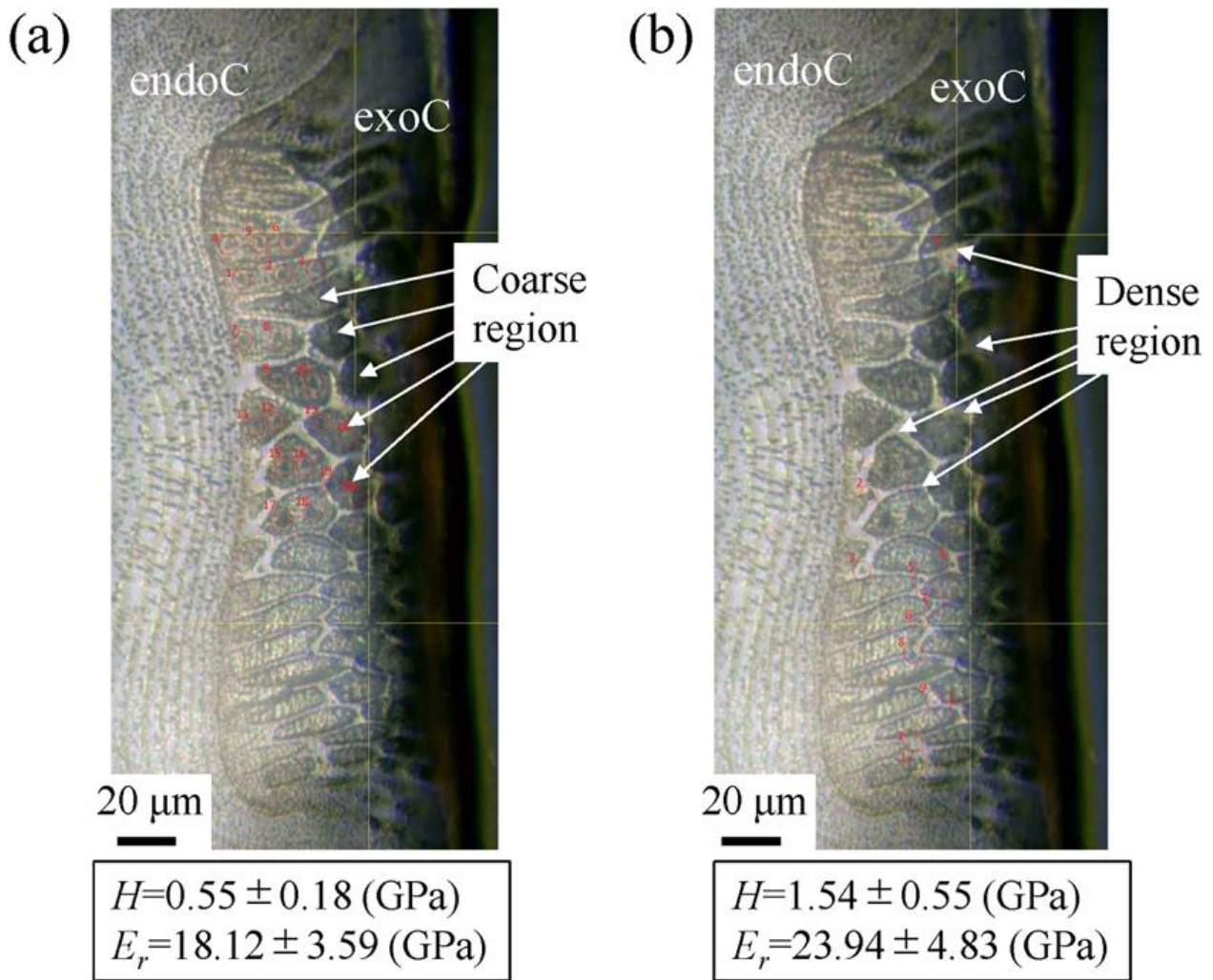


Figure S4. Hardness, H , and elastic modulus, E_r , at (a) coarse regions corresponding to the columnar structure and (b) dense regions between columnar structures obtained by nanoindentation tests (maximum force = 5 mN, loading time = 5 s). The tests were conducted 15 times for the coarse region and 10 times for the dense region. The properties are the average values, including their standard deviation. Red circles in figures show indentations after tests. Some data, in which the indentations were not accurately embedded in each region, have been removed.