Underwater walking is challenging in part because maintaining contact with the benthos is compromised by buoyancy. Thus, one crucial aspect of crab morphology is animal density, which counteracts buoyancy. The opportunity to conduct research at the University of Oregon’s Oregon Institute of Marine Biology (OIMB) provided access to a rich biodiversity of underwater locomotors. In particular we studied four species of crab: *Cancer magister*, *Cancer productus*, *Cancer antennarius*, and *Hemigrapsus nudus*. We measured the density of a size range of each of these species. Finding an accurate way to measure underwater weights posed an interesting and challenging obstacle, and the literature provided few suggestions. However, after much experimentation, we designed a system that provided measurements with greater accuracy and precision than had been accomplished in our laboratory before.

What we found was fairly intuitive but elegant. We found that the crabs with the narrowest carapaces had the highest densities and existed within two species of *Cancer* crabs: *C. magister* and *C. productus*. However, there existed weak or no correlation between carapace width and density among the *C. antennarius* and *H. nudus*. Overall, *C. magister* and *C. productus* were least dense; *C. antennarius* and *H. nudus* were most dense.

However, the ecology of these four species might serve to rationalize the existence of the observed trends or lack thereof. In the case of *C. magister* and *C. productus*, we observed these species to be primarily subtidal. Thus, perhaps to resist being swept away with the currents, the higher density of young individuals may help them to stay in contact with the benthos. After gaining a sizable weight post a series of molts a crab has girth in lieu of density, which serves to keep it grounded.

Alternatively, in the case of *C. antennarius* and *H. nudus*, we observed these two species of crabs to predominate along the rocky intertidal. Perhaps compensatory density does not exist among intertidal species as it provides less advantage to smaller crabs. Rather, the fact that the two intertidal species have considerably higher densities overall might suggest that density continues to play a pivotal role in persistence regardless of absolute size. It stands to reason that continuous wave action along the rocky intertidal makes density imperative in staying put and resisting dislodgement from the substrate.

We spent the duration of the summer filming gait cycles of individual crabs. Come this fall, we will use these videos to track the movement of the center of mass and two points on the leg (merus-carpus joint and dactyl) to characterize different gait cycles and determine differences in and among these four species of crab.

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