Habitat-based dactyl morphology of three native Oregon crabs

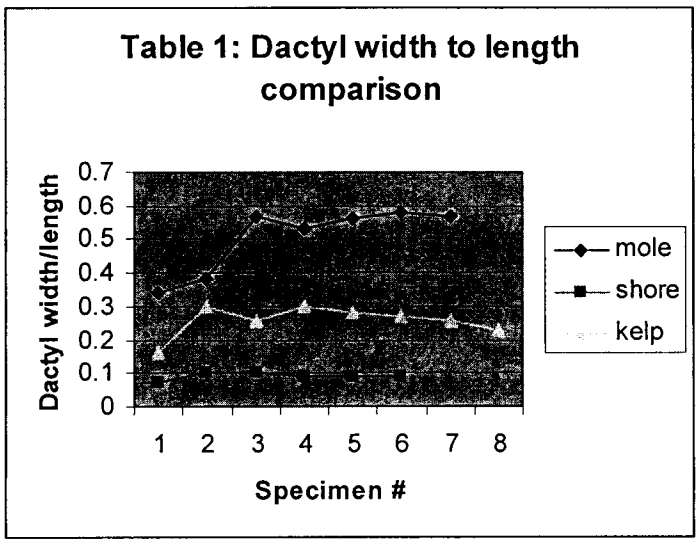
By Matt Hodges

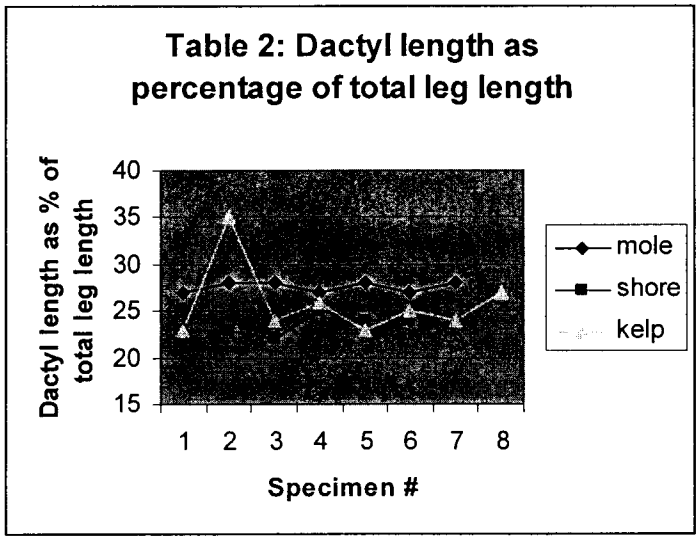
The shoreline of any ocean provides numerous niches for many differently adapted forms of life, and the Oregon coast is no different. From high to low rocky intertidal zones, rife with wave action, boulder crevices, and ever-changing water levels, to mudflats and sandy beaches, perfect for life forms which burrow down and wait for their prey, the coast of Oregon runs the full gamut of diverse biomes. One class of animals, the decapod crustaceans, have made full use of this diversity in Oregon, and have become adapted to better fill their chosen lifestyle. In this paper I will discuss four different crab species of Oregon, and describe the specialized end leg joints, the dactyls, which have made each species better adapted to living in their particular niche. I hypothesize, and will attempt to show through measurements and comparisons of shape, that these three different species of crabs, *Pachygrapsus crassipes*, *Pugettia producta*, and *Emerita analoga* have all become better adapted to their lifestyle through changes in dactyl form and function.

The lined shore crab, *Pachygrapsus crassipes*, inhabits the mid- to high intertidal zones, and has become adept at moving quickly out of harm's way by developing a sideways run which, combined with the crab's ability to climb near-vertical rock walls, allows the crab to find and inhabit small crevices in the boulder- and crevice-heavy substrate quickly. This run is so effective, in fact, that *P. crassipes* can be very difficult to catch before it disappears under a rock, out of the reach of the researcher. To this end, we might expect a change in the size and form of *P. crassipes*'s dactyl, perhaps lengthening

across the widest point of the dactyl (see Figure I a.-c.) Finally, sketches were made, and all (live) crabs released to their place of collection. Data was tabulated for dactyl length as a percentage of total leg length, as well as the ratio of dactyl length to width.

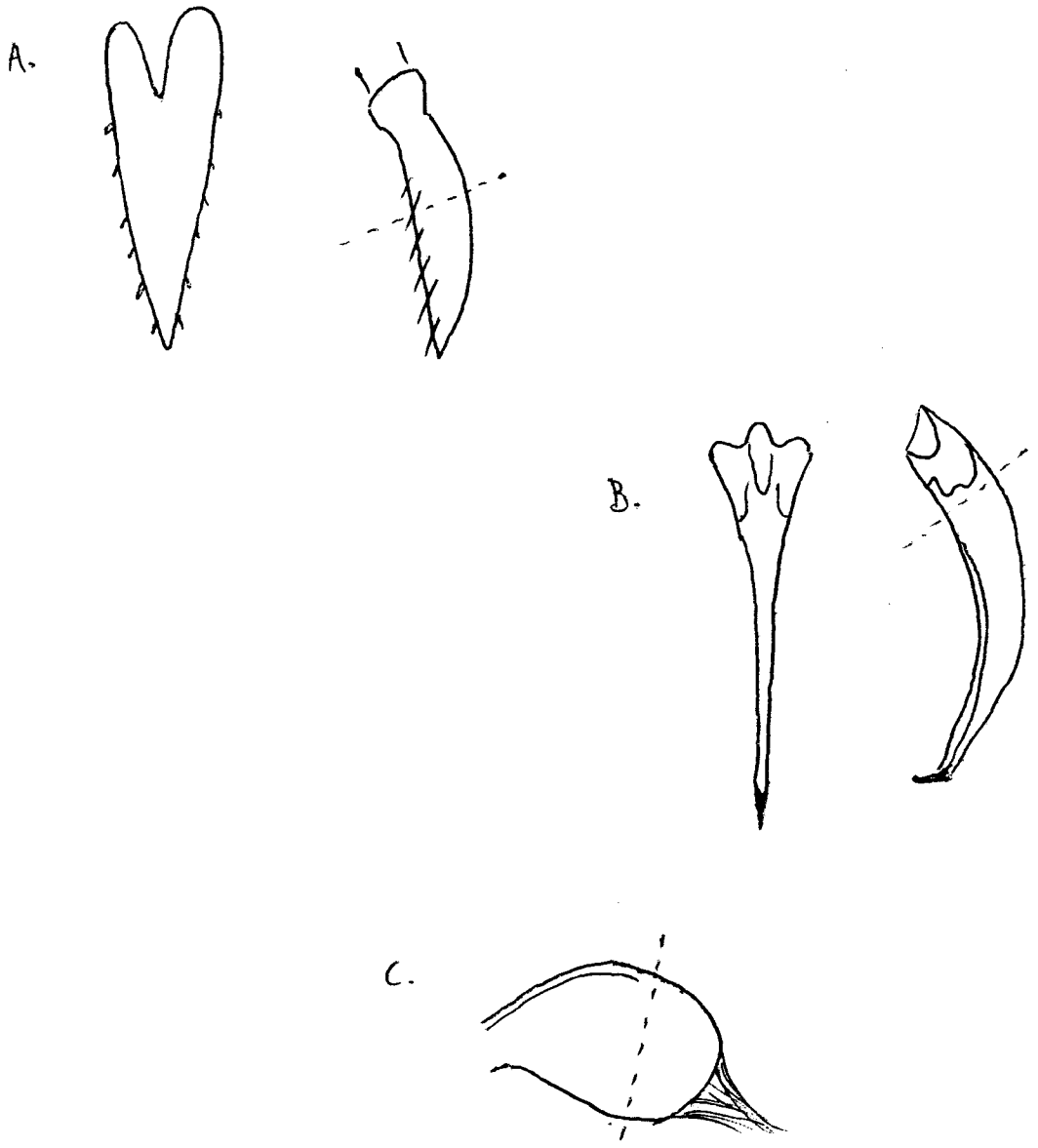
Data





(2003) demonstrated that the ability of an animal to grip the substrate is an important factor in determining its fitness. Although this work did not focus entirely on crabs specifically, it made clear that dealing with substrate, wave action, and exposure are all elements of successful living in intertidal zones. The presence of this paper and the lack of other comparable work, however, highlights just how little research has been done determining the adaptiveness of different crab dactyls. Further research should be done to describe the multifold shapes and orientations seen in different crabs of diverse habitats, including the four examined by this paper as well as those crabs which live by swimming and climbing. Further measurements can be taken with relative ease to compare dactyl length and width between species and habitats, as well as descriptions of shape which will help elucidate this link between dactyl specialization and habitat choice among crabs.

Figure I: Dactyl shape comparitive drawings



A: Front and side views of Pachygrapsus crassipes dactyl (11.5 x mag.), (9.7 x mag)

B: Front and side views of Pugettia producta dactyl (5.5 x mag.), (5 x mag.)

C: Side view of Emerita analoga dactyl (5 x mag.)

Note: Dotted line indicates line of width measurement.