

Settling Behavior and Substrate Preferences of Red King Crab (*Paralithodes camtschaticus*) Glaucothoe

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Background

In nature, young-of-the-year red king crabs are found almost exclusively on live substrates, such as hydroids, bryozoa, sea stars, mussel and worm colonies. They are rarely seen on open substrates such as sand or mud.

Is this distribution the result of (1) indiscriminate settlement, followed by higher survival (or lower predation) in those environments, or (2) selective settlement on preferred substrates? Does the settling stage (glaucothoe) exhibit any particular substrate preference?

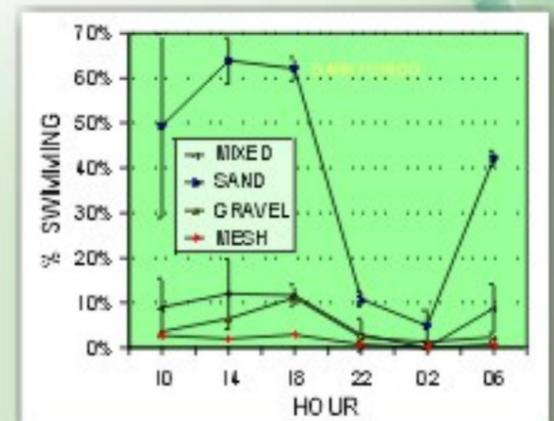
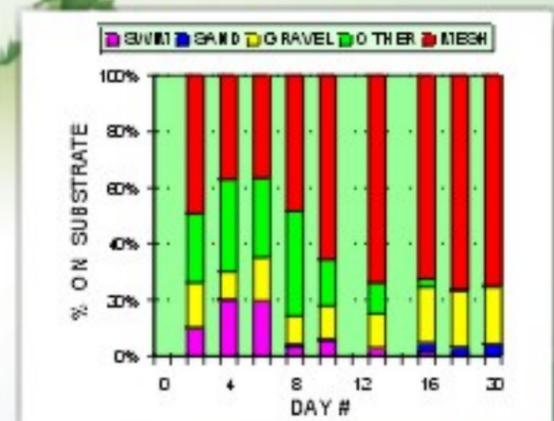
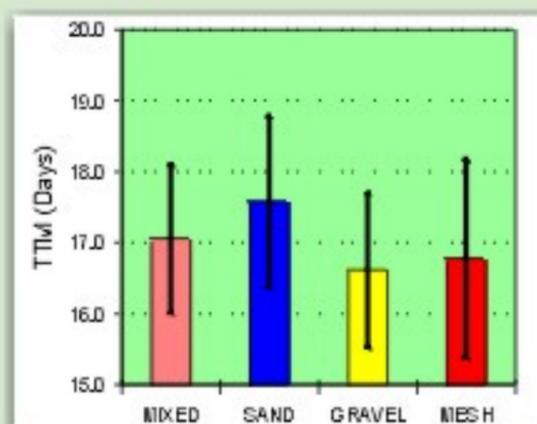
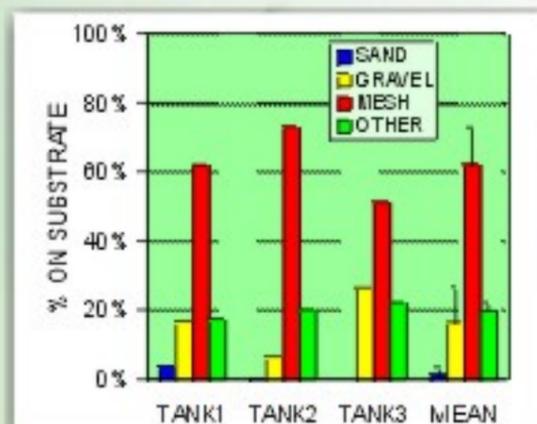
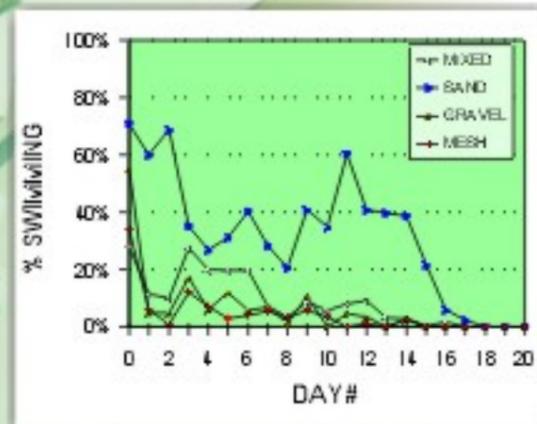


Young-of-the-year red king crab on seastar (above), and among bryozoans (below)



Experimental Design

- This experiment was designed to test the hypothesis that red king crab glaucothoe would settle in equal numbers on three different substrates
- Six 10-liter tanks were used
- 3 tanks contained three (mixed) substrates (S=Sand, G=Gravel, or M=synthetic fiber mesh) in separate trays
- 3 Tanks with a single substrate (S, G, or M)
- 100, 1 day old, Glaucothoe placed into each tank
- Swimming behavior was observed daily
- Number on substrates counted every 2-3 days
- Diurnal observations were made at 4 hr intervals during days 11-12
- Research was conducted at the Nemuro Marine Laboratory, Hokkaido, Japan



5 (Lower Right) Glaucothoe in the sand-only tank showed marked diurnal swimming behavior (just like zoeae do). Those on preferred substrates exhibited very little diurnal swimming.

Results

- 1 (Upper Left) Glaucothoe on Gravel, Mesh, and Mixed substrates settled rapidly, whereas a large proportion of those in the Sand-only tank continued swimming until metamorphosis.
- 2 (Upper Right) Glaucothoe preferred mesh over gravel or sand. The proportion of glaucothoe settling on mesh was 45% on day 2, increasing to 75% by day 20.
- 3 (Left) In tanks with all three substrates, 62% of glaucothoe were observed on mesh, 17% on gravel, 1% on sand, and 20% on other substrates (tank bottom, walls, or airstones).
- 4 (Lower Left) Time-to-metamorphosis (TTM) was significantly one day longer for glaucothoe in the sand-only tank than for those in tanks with preferred substrates, or mixed substrates. Would biochemical cues change this?

Conclusions

Red king crab glaucothoe:

- Exhibit selective settlement on complex 3-dimensional substrates with interstitial space
- Avoid open sand substrates
- Settle more rapidly on preferred substrates
- Have significantly shorter Time-to-metamorphosis (TTM) on preferred substrates
- Continue daytime swimming in the absence of preferred substrates, probably in search of better ones
- How would live substrates affect settling and TTM?
- Preferred biological substrates are sparse on the continental shelf and should be protected



Designed by Thomas Conroy and Wendy Carlson, AFSC Graphics Unit