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Assessing threat of introduction of the parthenogenetic marbled crayfish Marmorkrebs into North American waters

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Introduction

Background

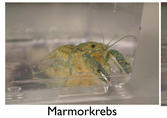
- Marmorkrebs (MK) are only parthenogenetic decapod crustacean[1]; they appear to belong to the genus *Procambarus*.[2]
- First recorded in mid 1990s, their origin is unknown.
- Introductions into the wild have been discovered in Madagascar, Italy, Germany, and The Netherlands.
- These introductions give them the potential to have serious interactions with indigenous populations of crayfish.

Locations where MK been introduced into the wild.

This Study

To assess their potential impact on local ecology in these locations we tested interspecific interactions between Marmorkrebs and intraspecific interactions. Between Marmorkrebs and *Procambarus clarkii* (CK), a well known American species of crayfish that may be more aggressive than MK.[3]

We also conducted an online survey of pet owners to understand the distribution of MK by hobbyists in North



Marmorkrebs (MK)

Procambarus clarkii (CK)

Methods

Animals were isolated for 3 weeks to let them to forget past social interactions.

Testing was performed with size matched pairs in a 4"×6" stand alone plastic tank.

Let's rumble! Fight initiation

Stereotypical fighting behavior occurred at the beginning and end of a fight. Engagements began with the meral spread threat display, lifting of the chelae and body along with antennal flicking.

Things get nasty: Escalation

Continued fights would then escalate to light grappling using chelae to push or touch opponent.

Intense fighting

Light grappling was often followed by a more intense engagement. This included grabbing and holding with attempts to turn over or manipulate the opponent's body. None of the crayfish in this experiment were harmed during this portion, although ripping off limbs, particularly chelae, of an opponent does occur in crayfish fights.

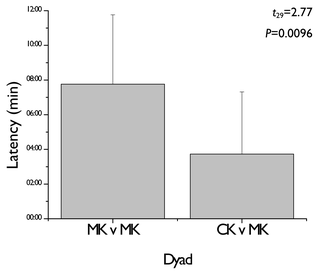
Run away! Resolution and dominance

Intense fighting often concluded with one opponent tail flipping away from the other, the crayfish who tail flipped away was marked as the subordinate opponent for that encounter. At the moment of tail flip away, the test was concluded.

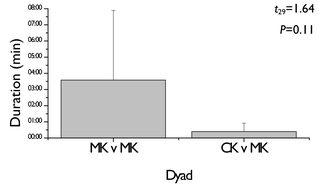
Results

P. clarkii initiate most fights, but Marmorkrebs and _P. clarkii_ win equal numbers of fights.

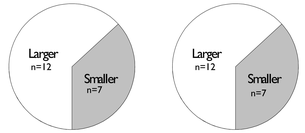
Fights between Marmorkrebs are slower to start than fights between different species.



Interspecific fights are not significantly shorter than fights between Marmorkrebs.

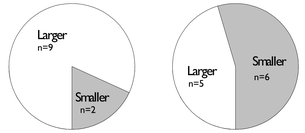


Fights were staged between size-matched animals; the small size differences had minimal effects on the initiation and outcomes of the fights.



MK versus MK Size that Initiated

MK versus MK Size that Won

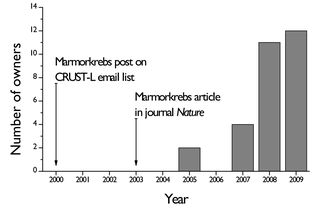


CK versus MK Size that Initiated

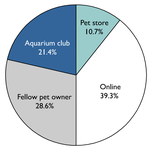
CK versus MK

Marmorkrebs are pets across N. America, and could be introduced in many regions.

Ownership of Marmorkrebs as pets in North America is expanding rapidly.



Marmorkrebs are distributed through several channels; they are actively promoted online.



Take Home Messages

- Marmorkrebs, though subjectively assessed as less aggressive, will compete with other crayfish species, which increases the risk of being an invasive species.
- Release of Marmorkrebs into North American water seems highly probable, given the wide distribution of MK in the North American pet trade.

Acknowledgements

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Marmorkrebs.org