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Organisms employ varying strategies to procure resources and defend themselves from competitors and potential predators. Decorating behavior, or attaching biotic and abiotic materials to the body, by majid crabs can potentially assist in this regard and may be influenced by factors such as algal substrate composition and social interactions among the crabs. To determine these potential functions and factors we created a baseline catalog of behaviors (ethogram) exhibited by the decorating crab *Microphrys bicornutus*. Decorating by this crab involved a complex set of behaviors that begins when a crab approaches an algal substrate, removes, then manipulates pieces resulting in the attachment of algae to specialized hooked setae on the exoskeleton of its body. In general, once decorated,

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po.eriorl .o.he remaining por.ion of.he carapace and leg [15,16]. Decora.ing beha.ior b majid crab ma er. e e eral f nc.ion incl ding pro.ec.ion [17-20], food o rce [21,22] and in.encing in.ra peci, c in.erac.ion [23,24], and ma be in.enced b fac.or .ch a algal.b.ra.e compo.ion [25] and ocial in.erac.ion among .he crab . *Microphrys bicornutus* i a majid crab ideal for .d ing f nc.ional a pec. of decora.ing a i. i omni oro (90% of die. i compo ed of. ege.a.ion) and a medi.m-hea decora.or.ha.a..ache algae.o i. e o kele.on [26,27]. e objec.i e of.hi .d /i h.hi crab pecie /ere.he follo/ing:

1) Crea.e e.hogram of beha.ior e hibi.ed b crab /hen pre en.ed /i h po.en.ial algal o rce .
2) De.ermine if in.erac.ion /i h con peci, c /ill modif beha.ior a ocia.ed /i h decora.ing.
3) De.ermine if di.eren. algal pecie a.ec. crab decora.ing beha.ior.

*Microphrys bicornutus* pecimen /ere collec.ed from algal a emblage fo.nd in hallo/-/a.er bank o. Ta ernier Ke and

Long Ke in. he Florida Ke a dep. h ranging from 0.5-3.0 m. Algal a emblage / ere compo ed of e eral pecie , incl ding (*Halimeda* p., *Laurencia* p., *Acanthophora* p., and *Dictyota* p.). Algal a emblage of. ario i e / ere collec ed ing norkeling eq ipmen and. ran por ed back. o hore- ing a oa ing de ice. ha pre en ed. he e cape of crab d ring. ran por. . Once back on land, . he algal a emblage / ere or ed, and crab / ere remo ed and placed in a cooler / i h na- ral ea/ a er and a por able air - ppl . Algae fo nd in a emblage / ere or ed and placed epara el from. he crab in a cooler / i h na- ral ea/ a er and a por able air - ppl . Crab and algae / ere. hen. ran por ed. o. he labora or a Florida A lan ic Uni er i . ree ho r g er collec ion (. ime of. ran por. be / een. he collec ion i e and FAU), crab and algae / ere epara el . ran ferred. o 37.9 L aq aria (/ i h , l ra ion and air - ppl ) con aining ea/ a er (35 p- alini ), and main ained a 27 , C / i h a 12L: 12D pho operiod. Crab / ere con in o l - pplied / i h algae before and g er. rial . o em la e. heir na- ral habi a. Indi id al crab / ere- ed onl once for. rial . Algal a emblage - b. ra e for e perimen al. rial / ere prepared b combining piece of algae ( 1 5 cm). o a lead / eigh. Clear mono lamen / a - ed. o. ie one end of. he algal ma . o. he lead / eigh , em la ing algae a. ached. o rock.

A ba eline e hogram of decora ing and a ocia ed beha ioral ac di pla ed b *M. bicornutus* crab / a , r . e . abli hed. Speci call , crab / ere . ripped of. heir decora ion ma erial ( ing forcep ), / eighed (g er blo. ing dr ), and indi id all placed in a rec ang lar aq ari m (15.5 21.5 30 cm) con aining an algal a emblage compo ed of *Halimeda* p., *Dictyota* p., *Acanthophora* p., and *Laurencia* p. A er a 30 min acclima ion period, beha ioral ac and. heir d ra ion e hibi ed b each crab / ere ob er ed for 1 h d ring da. ime period (i.e., / hen . he labora or ligh / ere on). e minim m d ra ion of each beha ior recorded in all. rial / a 1 ec mea- red ing a . op/ a ch.

Speci c beha ioral ca egorie ob er ed and doc men ed for. hi - d / ere de ned a follo/ :

• Crab. ear a piece of alga / i h. he chelae and bring i. o . he ma illae / here. he alga i . hen che/ ed and all or por ion of. he ample are con- med.

• Crab. ake ma erial from. he - b. ra e, ing i chelae, and a. ache . he ma erial. o hooked e ae on. he e o kele on.

• Crab remain . ill.

• Crab pick a. he algae- ing i chelae b . doe no . ear, con- me, or- e. he algae for decora ion.

• Crab mo e on. he - b. ra e- ing i pereopod .

A er 1h, crab / ere re/ eighed. o q an if . he amo n of algae added. o. he e o kele on- ing. he follo/ ing eq a ion:

Weigh of algae added. o e o kele on = Final / eigh of. he crab - Ini ial / eigh of. he crab

Addi ionall , algae added. o. he e o kele on / ere remo ed, or ed b pecie , and / eighed.

Kr kal-Walli One Wa ANOVA on Rank and a Mann Whi ne Rank S m Te . / ere- ed. o anal e. he da a. Da a / ere al o collec ed and anal ed imilarl for. he follo/ ing. rial de cribed belo/ .

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A erage freq encie of each beha ior are mmari ed in . Paired crab pen a igni, can amo n of ime mo ionle hen compared o all ac i e beha ior (P<0.001; Mann Whi ne Rank S m Te ). ere a no igni, can di erence in he amo n of ime (i.e., d ra ion) paired crab in e ed in each of he indi id al ac i e (i.e., e cl ding mo ionle ) beha ior (P=0.232; Kr kal-Walli One Wa ANOVA) ). Time pen on ac i e er di pla aggre i e beha ior among con peci, c ere al o ai icall imilar (P=0.845; Mann Whi ne Rank S m Te ) ).

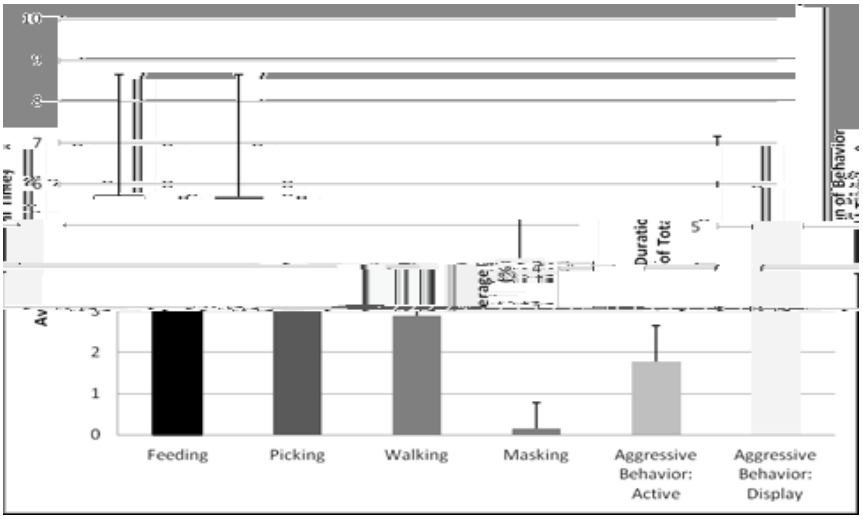
ere a al o no igni, can di erence in he amo n of ime crab in e ed in feeding, ma king, and picking hen paired i h a con peci, c er i ola ed crab (P 0.050; Paired e ) . Crab i h con peci, c did, ho e er, ho a igni, can decrea e in he amo n of ime pen alking compared o i ola ed crab (P=0.048; Paired e ) . Paired crab and i ola ed crab ai icall pen he ame amo n of ime mo ionle (P=0.519; Paired e ). Finall , ai icall , ime pen on ac i e er di pla aggre i e beha ior among con peci, c ere imilar (P=0.845; Mann Whi ne Rank S m Te ).

e 5 non-aggre ion, beha ioral ac doc men ed in he pre io ec ion ere al o ob er ed here for indi id al crab gi en acce o ingle- pecie algal mo nd con r c ed of one each of he follo ing fo r algal pecie : *Acanthophora* p., *Dictyota* p., *Halimeda* p., and *Laurencia* p. A erage freq encie (i.e., n mber of ime occ rred) of each beha ior are mmari ed in ) for crab i h each of he fo r algae. ere ere no igni, can change in he freq encie of picking, ma king, alking, and remaining mo ionle b he crab i h he ingle- pecie algal mo nd (P 0.050; Kr kal-Walli One Wa Anal i of Variance). Ho e er, crab did feed a a igni, can l lo er freq enc hen i h *Halimeda* p. e cl i el compared o he o her 3 pecie . (P < 0.05; Mann Whi ne Rank S m Te ).

Crab pen a igni, can amo n of ime mo ionle i h all ingle- pecie algal mo nd (P 0.050; e /Mann Whi ne Rank S m Te ). When comparing all ac i e beha ior e hibi ed i hin a ingle- pecie algal mo nd, here a no igni, can di erence in he amo n of ime crab in e ed in each of he beha ioral ac for *Acanthophora* p., *Dictyota* p., and *Laurencia* p. (P 0.050; Kr kal-Walli One Wa Anal i of Variance) . A ai icall igni, can di erence a de ec ed i h *Halimeda sp.* (P=0.001; Kr kal-Walli One Wa Anal i of Variance). Speci, call , crab in e ed le ime in feeding, ma king, and picking. han in alking (P 0.050; Mann Whi ne Rank S m e ) .

Crab al o ho ed a igni, can decrea e in ac i i (and concomi an increa e in inac i i ) i h he ingle pecie algal mo nd compo ed of *Halimeda* p. hen compared o a con rol (i.e., 4 pecie mi ed algal mo nd ed in pre io rial i h indi id al crab ) (from 66% o 94%; P=0.006; Mann Whi ne Rank S m e ) . Crab did no ho a igni, can di erence in he amo n of each indi id al algal pecie ed for decora ion (P 0.050; Friedman Repea ed Mea re Anal i of Variance on Rank ) .

Animal ha decora e ha e been looked a primaril from he andpoin of ing hi ra eg for camo age, i h he pical a mp ion of defen e again preda or , e c. Ho e er, die foc ing on he e ec of ocial in erac ion and pecie of decora ing ma erial on he peci, c beha ior in ol ed in decora ing are rare. S ch foc on he e po en ial e ec i e peciall impor an gi en ha he decora ing ma erial ma addi ionall er e a a igni, can o rce of food for he animal i i e peciall r e for crab in he




Histograms represent the average durations of behavioral acts (4 observed in previous trials, excluding motionless, and 2 additional behaviors of

Histograms represent average durations of behavioral acts by crabs during 1 h observation periods with an algal mound constructed with one of the following four algal species: *Acanthophora* sp., *Dictyota* sp., *Halimeda* sp., and *Laurencia* sp. Thus, behaviors were observed for crabs in 4 different trials (n=10 crabs per algal species). Error bars represent the standard error. Motionless activity, which occurred typically over 70% of the time, was not included in the fgures. The only signifcant differences (indicated by different letters above the histograms) in behaviors by crabs occurred with *Halimeda* sp. where feeding, masking, and

In general, majid and man decapod are more ac i e noc rnall .
Camo age among dec

26. Getty T, Hazlett BA (1978) Decoration behavior in Microphrys bicornutus (Latreille, 1825) (Decapoda, Brachyura). Crustaceana 34: 105-108.

27. Kilar JA, Lou RM (1986) The subtleties of camoufage and dietary preference