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DISTRIBUTIONAL PATTERNS AND SPECIES DENSITY OF A FIDDLER CRAB COMNNUNITY *(UCA ANNULIPES AND U. VOCANS)* AT TELOK ASSAM, BAKO NATIONAL PARK, SARAWAK

P.S. Lee and S. S.L. Lim

ABSTRACT

Distributional patterns and species density of a community of fiddler crabs, *Uca annulipes* and *U. vocans* in four mangroove microhabitats at Telok Assam, Bako National Park, Sarawak were studied in November 1998. The four microhabitats were: areas dominated by large pneumatophores (LP), areas dominated by small pneumatophores (SP), areas of almost bare, extremely muddy substratum (VM) and areas of bare, sandy-muddy substratum (SM). A total of 45 quadrats (0.5mx 0.5m)were randomly placed in the four microhabitats for crab density determination. Number of pneumatophores at the four microhabitats differed significantly (One way ANOVA, $p<0.05$), with SP>LP>VM≈SM (Tukey's test). Pneumatophore diameters were also significantly different at the three habitats where theywere present (One way ANOVA, $p<0.05$) with LP>SP≈VM (Tukey's test).

Distributional Patterns and Species Density of a Fiddler Crab Community (*Uca annulipes* and *U. vocans*) at Telok Assam, Bako National Park, Sarawak

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Distributional patterns and species density of a community of fiddler crabs, *Uca annulipes* and *U. vocans* in four mangrove microhabitats at Telok Assam, Bako National Park, Sarawak were studied in November 1998. The four microhabitats were: areas dominated by large pneumatophores (LP), areas dominated by small pneumatophores (SP), areas of almost bare, extremely muddy substratum (VM) and areas of bare, sandy-muddy substratum (SM). A total of 45 quadrats (0.5m x 0.5m) were randomly placed in the four microhabitats for crab density determination. Number of pneumatophores at the four microhabitats differed significantly (One way ANOVA, $p<0.05$), with SP>LP>VM≈SM (Tukey's test). Pneumatophore diameters were also significantly different at the three habitats where they were present (One way ANOVA, $p<0.05$) with LP>SP≈VM (Tukey's test).

There was a preponderance of males to females (4♂:1♀)in the *U. annulipes* population in contrast to a 1♂:1♀ ratio observed for the *U. vocans* population. Densities of two species of crabs in the community were significantly different (One way ANOVA, $p<0.05$; 18.0 ± 10.7 m^{-2} [*U. annulipes*] cf. 7.5 ± 3.0 m^{-2} [*U. vocans*]). Significantly more *U. annulipes* were found in SM than in LP (One way ANOVA, $p<0.05$) and Tukey's test showed that LP<VM<SP<SM. Within the species, more males were also found in VM and SM than LP. There was no significant difference in the densities of females in the four microhabitats. *Uca vocans*, regardless of sex, was evenly distributed in all four habitats with a mean overall density of about 7-8 crabs m^{-2}.

Larger mean burrow diameters (implying larger crabs) were observed for *U. vocans* at LP, VM and SM when compared to *U. annulipes*. Generally, for both species, significantly larger males were observed in SM and VM habitats. We hypothesize that this could be due to the larger requirement for space in which to burrow for the large males.

Key words: *Uca annulipes*, *Uca vocans*, fiddler crab distribution, sex ratio, density, Bako National Park, Sarawak

INTRODUCTION

Fiddler crabs of the genus *Uca* (Brachyuran, Ocypodidae) are found in nearly all tropical, subtropical and temperate region of the world (Crane, 1975). Habitats in which these crabs live include salt marshes, mangroves, mudflats and sandy beaches (Wolfrath, 1993). Numerous studies have been made on fiddler crabs in the temperate parts of the world, e.g., north-eastern USA, Portugal and southern Africa.

To-date, many factors affecting fiddler crab ecology have been studied. These include factors that affect their distribution (*U. pugilator, U. minax, U. pugnax*: Teal, 1958), burrowing behaviour (*U. tangeri*: Wolfrath, 1992; *U. pugnax*: Bertness and Miller, 1984) and foraging strategies (*U. pugnax*: Weissburg, 1993; *U. pugilator*: Robertson and Newell, 1982; *U. panacea*: Caravello and Cameron, 1987). Some of the factors that affect the distribution of *Uca* crabs are: local and regional temperature (Miller, 1965), sediment type (Ono, 1962; Murai *et al.*, 1982), root mat density (Ringold, 1979; Bertness and Miller, 1984) and availability of food (Genoni, 1991).

In particular, studies on distribution and abundance have shown that substratum characteristics and interspecific interactions play important roles in determining observed patterns of distribution and abundance (Aspey, 1971, 1978; Bertness, 1985; Bertness and Miller, 1984; Ringold, 1979). However in the tropical regions, very little work has been done on *Uca* population distribution except that of Chakraborty and Choudhury (1985, 1992) in India and that of Macintosh (1984) in the mangroves of Selangor, West Malaysia.

The objectives of this study were to investigate the distribution and density of two species of fiddler crabs, *Uca annulipes* and *U. vocans* in four mangrove microhabitats at Telok Assam, Bako National Park, Sarawak, East Malaysia.

MATERIALS AND METHODS

This study was conducted in November 1998 at Bako National Park, Sarawak. The study site was located in the mangrove area at Telok Assam in the park (Fig. 1). Two species of *Uca* (i.e., *U. annulipes* and *U. vocans*) were found in abundance on both sides of an inlet where seawater inundates the mangrove beyond. Four microhabitats were studied: (1) areas dominated by large pneumatophores, (2) areas dominated by small pneumatophores, (3) areas of almost bare, extremely muddy substratum and (4) areas of bare, sandy-muddy substratum (Fig. 1). The terms "large pneumatophores" (LP), "small pneumatophores" (SP), "very muddy" (VM) and "sandy-muddy" (SM) will be used to represent microhabitat type (1), (2), (3) and (4) respectively. The LP microhabitat was dominated by *Sonneratia* sp. while the SP microhabitat was dominated by the *Avicennia* sp. mangrove vegetation. Nine, nine, 12 and 15 quarter m^2 quadrats were established randomly in the above habitats respectively.

The positions of burrows that were occupied by *Uca annulipes* and *U. vocans* were mapped onto grid paper for each quadrat. The species and sex of each crab in the quadrat were noted. No crabs were disturbed, handled or collected during the study. Hence, there were no crab carapace size data available. Crab sizes could only be inferred through the indirect method of burrow diameter measurements.

Burrow diameters were measured to the nearest 0.1 mm. Diameters of 10 randomly-selected pneumatophores in the quadrat (whenever present, depending on microhabitat type) were measured with a pair of vernier callipers (Mitutoyo). If there were less than 10 pneumatophores within the quadrat, the diameters of all pneumatophores present were measured.