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Some Brachyuran Megalopa[1]

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INTRODUCTION

This paper is occasioned by Sadayoshi Miyake's published description of a crustacean under the name of *Xenocarcinus esakii* (9)[2] and purported to be a new species of the family Majidae. The holotype from Kusaie, Caroline Islands, is strikingly similar to a crustacean taken at various localities about the Hawaiian Islands and in the central Pacific area, sometimes in considerable numbers. I have long considered the Hawaiian organism to be a megalops of some brachyuran crab, probably a common one, the advanced larval stage of which has not yet been recognized.

This apparent resemblance of *Xenocarcinus esakii* Miyake to the Hawaiian form (fig. 1, a-d), believed to be a megalops, has led to a more complete examination of brachyuran larvae in the collections of Bishop Museum. Among the collections are large numbers of zoeae but comparatively few megalopa. Of the latter, however, four distinct forms of a peculiar type are recognized and are made the subject of this paper. Since they cannot be referred with certainty to any known crabs, they are here designated as megalops *alpha, beta, gamma,* and *delta.* It is the *alpha* form which apparently is identical with *Xenocarcinus esakii* Miyake, and the one frequently seen about Hawaii.

Descriptions of these four megalops are given in some detail, with the hope that collectors may procure living specimens of the curious forms and make it possible, in some laboratory or aquarium where circulating sea water is available, to carry their development through into the adult stage. To definitely refer these peculiar larvae to specific brachyuran crabs would be a scientific achievement of considerable interest.

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[2] Numbers in parentheses refer to the Literature Cited, p. 246.

If the crustacean form described by Miyake were an adult crab, it would seem to be somewhat remote from the genus *Xenocarcinus* as specified by White (15), Miers (8), Alcock (1), and others. However, its identity with material at hand believed to consist of crab megalopa, cannot be doubted. The description and accompanying figures by Miyake could well have been based upon any one of more than 100 Hawaiian specimens.

A critical examination of the Hawaiian megalopa here considered place them within the *"Monolepis"* group. The term *Monolepis* was suggested by Say (13) as a genus to accommodate *M. inermis* and *M. spinitarsus,* believed by him to be adult crabs and described from the shores of Maryland and South Carolina, respectively. The simple character of the lamellae on each side of the terminal segment of the abdomen of these forms gave rise to the generic term *Monolepis.* Although Say was in doubt as to the exact position of his suggested genus in the crustacean scale, he recognized its close relationship to the Brachyura.

Dana (3), following the belief of Say that these organisms were adult crustaceans, accepted *Monolepis* as a valid genus, reported *M. inermis* Say and described a new species, *M. orientalis,* taken from the Sooloo [Sulu] Sea. The latter form is close to, if not identical with, specimens in Bishop Museum from Hawaiian and Philippine Island localities. I have designated this organism as megalops *beta.*

Not until 1873 was the authenticity of the genus *Monolepis* questioned. Observations by Smith (14) on the shores of Long Island established beyond a reasonable doubt that *Monolepis inermis* was a stage in the development of *Ocypode arenaria* Milne Edwards (= *Ocypode arenarius* Say = *Ocypode albicans* Bosc). This conclusion was based not only upon anatomical features but upon the seasonal appearance of the larvae, followed a month later by adult crabs.

More recent investigators have generally accepted the views of Smith, regarding monolepoid forms as megalopa of brachyuran crabs, but usually hesitating to refer them to definite species for want of precise information. Kemp (7) describes and figures the megalops of *Ocypode macrocera* Milne Edwards which resembles, in some degree, a monolepoid form. Kemp regards the larva as remarkable because of the deep cavities at the postero-lateral angles of the carapace into which the last pair of walking legs can be folded.

In a number of articles, Mary J. Rathbun (10, 11, 12) described larval stages of brachyuran crabs which bore considerable likeness to monolepoid forms. In 1918, Miss Rathbun referred to *Monolepis inermis* as a developing phase of the sand crab, *Ocypode albicans* Bosc. And in 1923, she described and figured megalopa of several known brachyuran crabs from the west coast of Mexico as well as those of some doubtful species. In certain of these, monolepoid features are observed. Again in 1924, among crabs from the Galapagos Islands, Miss Rathbun described a megalops so closely allied to *Monolepis inermis* that it was referred by her to the sand crab, *Ocypode gaudichaudii* Milne Edwards and Lucas, as this species was the only representative of the genus in the locality. More recently, Boone (2) also recognized this megalops and definitely assigned it to the Galapagan species of *Ocypode*.

In a bibliography of larval stages of decapod crustaceans Gurney (5) has compiled a comprehensive list of references to crab megalopa, including monolepoid forms.

GENERAL FEATURES OF MONOLEPOID MEGALOPA

These curious larval forms possess a convex, well-rounded carapace with high sides and the front more or less turned down. The chelipeds and walking legs are capable of being held closely against the carapace resting in impressed areas and grooves. As a result of this close contact of appendages with the carapace, the rotundity of the body presents an environmental adaptation. Some megalopa are doubtless pelagic during the greater part of their existence, whereas others live at greater depths. Most of them, however, have been taken on sandy shores after having been washed ashore, where they may be rolled about like tiny balls without appreciable injury.

No reference is made either by Say (13) or Dana (3) to the sex of the specimens of *Monolepis* examined by them. Miyake (9), however, states that the holotype of *Xenocarcinus esakii* is a female. This conclusion is probably based upon the general appearance of the pleopods. It is well known, however, that the sexual characters of decapod crustaceans remain undifferentiated throughout the larval stage. If the sex of the monolepoid megalopa in Bishop Museum were judged by features of adult crabs, they might well be considered to be females, as their abdominal appendages are quite female-like. Each individual possesses four pairs of strikingly similar biramous pleopods, regard-