EGG-LAYING IN THE WESTERN NORTH AMERICAN CRAYFISH,

PACIFASTACUS TROWBRIDGII (STIMPSON)
(DECAPODA, ASTACIDAE)

BY

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INTRODUCTION

Literature concerning the spawning behaviour of North American crayfishes is limited to two papers by Andrews (1904, 1906) pertaining to Orconectes limosus (Rafinesque) (as Cambarus affinis (Say)). The secretive habits and acute sensitivity of mated females preparing to spawn may account for the paucity of information. Most mated females held in aquaria will not spawn but resorb the eggs, often dying in the process. The present paper is based on observations of two female Pacifastacus trowbridgii which successfully completed this intricate task in aquaria. The conclusions of Riegel (1959), based on gonopod morphology of stock introduced into California from Oregon, that P. trowbridgii is but a variant of P. leniusculus (Dana) is not accepted by the author.

PRE-SPAWNING BEHAVIOUR

The time between copulation and egg-laying was characterized by long bouts of grooming. Although general cleaning of the body and appendages occurred, the chief concern lay with cleaning both dorsal and ventral surfaces of the abdomen with the fourth, fifth, and sixth pairs of pereiopods. Grooming of the dorsal surface was concentrated on the last abdominal segment comprising the tail fan. As spawning time drew near, grooming became more intense, of longer duration, and involved primarily the ventral surfaces of the abdomen and its appendages, the pleopods (pl. 1 fig. 1). As a result of this grooming, the fringes of setae along the pleuron and tail fan edges assumed a clean and brushy appearance (pl. 2 fig. 3). Grooming bouts were interspersed with bouts of burrowing, which involved the picking up and carrying of gravel between the second and third pairs of chelipeds and between the third maxillipeds. Gravel was also pushed ahead of the female crayfish by use of the large chelae. Burrowing attempts were of no avail in the aquaria due to the instability of the gravel substrate. When spawning was imminent, excavating behaviour became more random, particular sites of such activity, e.g., corners of the aquaria, being abandoned. At this time, a pronounced

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rise in aggression occurred when another mated female was present in the aquarium as evidenced by vigorous driving and chasing by the female soon to spawn. The latter female would not tolerate other females in her vicinity; movements of females nearly two feet away elicited aggression.

SPAWNING BEHAVIOUR

Spawning was categorized sequentially as follows: (1) vigorous abdominal contractions, (2) assumption of spawning posture, (3) extrusion of the eggs, (4) rest period, (5) resumption of upright stance, and (6) turning. It was initiated when the grooming posture ended with a sudden, extreme and sustained abdominal contraction whereby the posterior tip of the telson surpassed the oviduct openings on the coxopodite segments of the second pair of walking legs (pl. 1 fig. 2). This posture was terminated by a slow straightening out of the tail until it became slightly convex although the tail fan was kept in a semi-folded state (pl. 2 fig. 3). In one female, a series of seven such contractions took place during a thirty minute period. The final contraction was held for nearly ten minutes and appeared to be the strongest of the series. The example depicted by pl. 2 fig. 3 was an early contraction and was followed by stronger ones unfortunately not photographed.

The final abdominal contraction was then partially relaxed and the female made several movements describing a circle, then assumed spawning position as illustrated by pl. 2 fig. 4 through pl. 3 fig. 6. The stance shown in pl. 3 fig. 5 was held for some ten minutes; then the right main cheliped was thrown backward, causing her to assume the full spawning position. This position is reminiscent of the overhead defence posture with its straight and rigidly-held chelipeds and open claws. The desired body angle was maintained by this first pair of chelipeds aided by the walking legs. The abdomen remained tightly folded until the full spawning posture was attained, then relaxed slightly, and with the tail fan constituted a basket-like receptacle for the extruded eggs. Spawning proceeded with no noticeable body movements other than an occasional waving of a walking leg.

The initially transparent glair (mucous secretion) which originates from the abdominal cement glands can be seen trailing off the telson setae, and the recently laid eggs are discernible between the outer lateral face of the right uropod exopodite and the fringe of pleura setae (pl. 3 fig. 6). A stream of eggs can be clearly seen leaving the left oviduct in pl. 4 figs. 7 and pl. 5 fig. 9. Two other major points of interest in the latter two figures warrant mention. The glair has become slightly opaque, a softened spermatophore which has been carried posteriorly is shown in pl. 4 fig. 7, and the eggs in the pouch have imbibed water and are of near-normal size and shape. The eggs are quite formless as they issue from the oviducts and resemble a black, liquid stream. The growing opacity of the glair is more evident in pl. 4 fig. 8 taken some minutes later, the eggs are well-packed in the pouch and the glair in front of them is quite thin in comparison with that adjacent to the base of the legs, and the lateral posterior edge of the cephalothorax, and anterior to the tip of the telson.