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NOCTURNAL MOORING AND PARKING BEHAVIOR OF THREE MONACANTHIDS (FILEFISHES) AT AN OFFSHORE PRODUCTION PLATFORM IN THE NORTHWESTERN GULF OF MEXICO.—This biological note documents a unique nocturnal behavior demonstrated by three species of monacanthids (filefishes) on an offshore production platform in the northwestern Gulf of Mexico. It also contrasts the observed lack of such behavior among monacanthids on natural reefs in the region.

Mobil's High Island A389-A platform stands 1.5 km east of the East Flower Garden Bank (27°54'26"N, 093°34'43"W). The platform was installed in Oct. 1981 and began production in Sept. 1988. The platform rests in 125 m water and reaches a height of 23 m above sea level. Underwater, the platform structure functions as an artificial reef, supporting fauna and flora characterized as originating from the Caribbean (Dokken et al., 1995; Rooker et al., 1997). Three distinct depth zones are identified related to the biofouling community on the structure (Adams, 1995; Dokken et al., 1995). Sponges, molluscs, algae, and hydroids dominate the biofouling community (Adams, 1995; Dokken et al., 1995), whereas coral colonies are few and small. Rooker et al. (1997) characterize the fish assemblage associated with the platform, reporting carangids and scombrids as the dominant ichthyofauna. Reef-associated fishes comprise mainly labrids, pomacentrids, and serranids (Rooker et al., 1997). Fish surveys conducted on self-contained underwater breathing apparatus (SCUBA) from 1991 through 1996 regularly chronicled three species of monacanthids at the platform (Childs, unpubl. data); they were scrawled filefish (*Aluterus scriptus*), orangespotted filefish (*Cantherhines pullus*), and white-spotted filefish (*C. macrocerus*). Surveys were typically conducted to 60 m in depth, with some as deep as 80 m. Night dives were rarely conducted below 31 m in depth and never below 40 m.

The nearby East Flower Garden Bank, locat-

ed 198 km south of Sabine Pass on the Texas-Louisiana border, encompasses an area of 67 km² and is pear shaped. A coral reef cap reaches to within 20 m of the surface, with surrounding water depths of between 100 and 120 m. Together with the West Flower Garden Bank, located 12 km to the west, these banks support the northernmost tropical coral reef communities on the North American continental shelf (Rezack et al., 1985). The Flower Garden Banks were designated a National Marine Sanctuary in Jan. 1992 (National Oceanic and Atmospheric Administration, 1991), and a third bank, Stetson Bank (located 55 km northwest of the West Flower Garden Bank), was added in Oct. 1996.

In May 1994, while conducting night dives at the Mobil platform, a solitary *A. scriptus*, estimated at 92 cm in total length, was observed grasping a piece of sponge (*Calyspongia vaginalis*) in its mouth. The "mooring" sponge was attached at 24-m depth on the down-current side of a platform leg. Thus, the fish was effectively moored to the platform structure and was afforded an opportunity to rest in an area where currents were reduced. The fish maintained its position easily while grasping the sponge, only releasing its grasp after I disturbed it by approaching it closely or by aiming the dive light I was using. The fish moved less than 1 m from the sponge before I turned off my light and withdrew. Later in the dive I returned to the location and observed the fish moored to the same sponge. Mooring behavior is defined here as that behavior during which a fish orally affixes to an attached structure in order to maintain its position.

Subsequent night dives at the platform in ensuing years have yielded similar opportunistic observations of *A. scriptus* moored to the Mobil platform (Fig. 1). Observers detected 11 of 12 individuals displaying similar behavior as they were moored to sites on the down-current side of the platform structure during one week-long excursion on the platform (Stanton et al., 1998). Night dives conducted during other excursions resulted in nocturnal observations of *A. scriptus* moored to sessile organisms attached to the platform structure. However, the frequency of these observations was not documented, except periodically on videotapes while divers were filming the behavior. Most *A. scriptus* observed at night were either moored or maintained a position close to the platform structure by balistiform locomotion. It is likely that some *A. scriptus* were disturbed when divers closely approached prior to the diver's awareness of the fish; these fish proba-

Fig. 1. *Aluterus scriptus* nocturnally moored on crossmember of offshore production platform. Photograph by Jeff Childs.

bly released from their moorings. Mooring behavior appears to be characteristic of *A. scriptus* on the offshore platform.

While searching for additional *A. scriptus* mooring sites on the platform, both *C. macrocerus* and *C. pullus* exhibited similar yet slightly modified behavior. These species were observed mooring to the platform, although the moorings they were orally affixed to were not necessarily demospongid sponges. Tunicates, cirripedians, and even rope or fishing line were used as moorings by individual fish. Also, these species were never observed moored in the open, as was *A. scriptus*, but were rather found in crevices created by sessile invertebrates (poriferans, ascidiaceans, cirripedians, and cnidarians) occupying joints on the platform structure. Such sites provided the fishes with considerable protection from currents, large nocturnal predators, and were effective nocturnal resting sites.

Behavior in which fishes are resting on a substrate is here considered "parking behavior." Whereas *A. scriptus* exhibits nocturnal mooring behavior, *C. macrocerus* and *C. pullus* demonstrate nocturnal mooring and parking behavior.

Monacanthids exhibiting nocturnal mooring and/or parking behavior at the platform were all observed between 10 and 30 m in depth. Nocturnally parked filefishes were absent in water shallower than 10 m at the platform, possibly because of a lack of structural joints between 0 and 10 m in water depth. However, this does not adequately explain the absence of *A. scriptus* within this depth range. It is more plausible that this region of the platform is strongly affected by surface wave and surge dynamics, thereby exposing nocturnally parked fishes to disturbing and undesirable natural forces that inhibit rest.

The maximum depth at which nocturnal parking or mooring occurs was not determined. Fish surveys conducted during daylight hours reveal all three monacanthid species occurred to depths of at least 62 m. Night dives were not typically conducted below 31 m, and when they were, *A. scriptus* was not observed below 30 m. Therefore, it is unknown whether *A. scriptus* occurs at deeper depths on the platform at night.

Some *A. scriptus* were found moored on platform legs that were vertically oriented; however, horizontal crossmembers were also used as mooring sites. Crossmembers occur at 10, 23, and 37 m as part of the top 40 m of the underwater structure. Crossmembers are found deeper and may be used by *A. scriptus*. Wheth-

er individual *A. scriptus* select mooring sites on horizontal crossmembers over those on platform legs was not evident from my observations.

Cantherhines macrocerus was also observed maintaining position in the water adjacent to either horizontal or vertical supports using balistiform locomotion. However, *C. macrocerus* and *C. pullus* were found to moor and park only at crossmember joints. It remains to be determined whether such protected nocturnal resting sites provide an ecological advantage for individual *C. macrocerus* or *C. pullus*.

Mooring behavior was only observed on the down-current side of the structure. Current direction and velocity varied dynamically at the platform and were largely unpredictable and unstable. Currents at the platform often varied in depth, as they did from one end of the structure to the other. For example, currents adjacent to the north end of the platform were often moving in significantly different directions than were those at the south end adjacent to the structure. Horizontal current flow appeared more stable the farther away one moved from the structure. Current velocities varied from 0 to at least an estimated 7.2 km/hr. Thus, mooring behavior is likely to afford dorsoventrally compressed fish like *A. scriptus* with the ability to rest in protected areas without expending considerable energy to maintain position.

Nocturnal resting for reef-associated fishes is well known, yet specifics such as sleeping site selection are poorly documented. Several species of scarids (Winn, 1955; Winn and Bardach, 1959, 1960) and labrids (Hobson, 1965) are known to produce mucous envelopes while resting in protected areas, which is thought to reduce predation by nocturnal predators. Hobson (1965) documents some sleeping sites selected by coastal fishes observed off Baja California, Mexico. He describes general diurnal-nocturnal resting sites for several species within the following observed groups: serranids, pomacentrids, labrids, scarids, chaetodontids, acanthurids, blenniids, balistids, holocentrids, lutjanids, apogonids, pomadasysids, carangids, and sciaenids. Unless disturbed, most diurnal reef fishes are relatively dormant on dark nights but may remain active at night, given adequate moonlight (Hobson, 1965). A study of fish fauna associated with two offshore platforms showed reef-associated ichthyofauna resting near pilings, in protected areas below crossmembers, or between pilings and nearby objects (Hastings et al., 1976). Whereas *C. pullus* was identified at one of these platforms,

Hastings et al., (1976) did not report nocturnal parking behavior for *C. pullus* or other species observed during the study.

Reef-associated fishes select sleeping sites that offer shelter of sorts. Sites described by Hobson (1965) typically consist of crevices or areas affording either partial or complete shelter. Some fishes rest among rocks or depressions in loose substrate, such as sand (Hobson, 1965; Hastings et al., 1976). Dubin and Baker (1982) found princess parrotfish (*Scarus taeniopterus*) selecting nocturnal refuge near reef slopes or in dense coral colonies. Their study revealed two cover-seeking behaviors that demonstrate a preference of resting sites. Robertson and Sheldon (1979) investigated competition for sleeping sites among the bluehead wrasse (*Thalassoma bifasciatum*) and damselfishes (*Eupomacentrus dorsopunicans* and *E. planifrons*). They concluded that damselfish defend food and egg masses from wrasse but not the sleeping sites that were superabundant in the study area.

Monacanthids reported in this note are commonly observed at the Flower Garden Banks and Stetson Bank (Childs, unpubl. data). Filefish resting sites were investigated while conducting night dives at each of these locations, with the intention of observing similar parking behavior. Filefish were rarely observed at night on these natural reefs; one *C. macrocerus* was found sheltered in a crevice between a coral colony and a sponge at the East Flower Garden Bank. At Stetson Bank, a solitary *A. scriptus* was observed maintaining position immediately down-current of a hard clay-siltstone outcropping. The fish was parallel with the rock face and was not moored, as is characteristic of filefish occurring at the offshore platform. The individual was likely benefiting from the shelter produced by the rock instead of expending more energy by exposing itself to the current and the potential risk of predation.

Complex coral colonies at the Flower Garden Banks afford an abundance of nocturnal resting sites, where filefishes may moor or park; however, the network of coral colonies constrains observations of individuals likely sheltered within. Filefish are likely to employ parking behavior to facilitate nocturnal resting on offshore platforms where sleeping sites are limited, particularly for larger reef fish, such as *A. scriptus*. Mooring or parking down-current of the platform structure offers protection and stability that are otherwise not available to larger fish. Furthermore, fishes with a dorsoventrally compressed body type,

like that of many monacanthids, may experience difficulty in finding suitable resting sites in which to settle. Nocturnal mooring and parking behavior is a unique solution to the apparent lack of resting sites on offshore platforms.

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