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Spawning Observations of the Scleractinian Coral *Colpophylia natans* in the Northwest Gulf of Mexico

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SHORT PAPERS AND NOTES

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SPAWNING OBSERVATIONS OF THE SCLERACTINIAN CORAL *COLPOPHYLIA NATANS* IN THE NORTHWEST GULF OF MEXICO.—On the night of 29 Aug. 1994, the ninth evening after the 21 Aug. 1994 full moon (0147 hr), I observed the boulder brain coral, *Colpophylia natans* (Houttuyn) in the process of releasing its gamete bundles (between 2045 and 2105 hr CDT) at the East Flower Garden Bank in the northwest Gulf of Mexico. This observation, thought to be the first for this species, was published in the Gulf of Mexico Foundation technical report by Gittings et al. (1994). A more detailed report with additional observations and in situ images is presented here. The East Flower Garden Bank (Buoy 4) is located at 27°52.49′N, 93°49.07′W, and observations were obtained from a depth of 22 m. I made additional observations in 1995 and 1998. On 19 Aug. 1995, *C. natans* gamete bundles were observed on the surface between 2115 and 2220 hr CDT, the ninth evening after the Aug. 10 full moon (1316 hr). In 1998, spawning was observed on two separate nights, 16 and 17 Aug. 1998, the ninth and tenth evenings after the Aug. 7 full moon (2110 hr). On the ninth evening, spawning was observed between 2100 and 2127 hr. On the tenth evening, spawning of two *C. natans* heads was observed between 2055 and 2120.

Colpophylia natans gamete bundles are considerably larger than those of the symmetrical brain coral *Diploria strigosa,* a common species at the Flower Gardens that was regularly observed spawning on the previous two evenings (i.e., the seventh and eight evenings after the full moon). As reported by Gittings et al. (1992), *D. strigosa* gamete bundles measure approximately 2.5 mm; *C. natans* gametes are twice as large. By using objects of known dimensions while underwater and during observations of bundles on the surface, I determined that *C. natans* bundles averaged 6 mm in diameter (more or less pea size), with some irregular-shaped individuals reaching 10–12 mm in their longest dimension. Their color included variations of a pale pink with hints of pale orange—very similar to *D. strigosa.*

The pattern and timing of gamete bundle release for *C. natans* were also considerably different than those of other synchronous spawners. Figure 1 illustrates a variety of gamete-release stages, ranging from a stage in which only a small portion of a gamete bundle is visible through a slightly opened mouth to a stage in which a fully released gamete bundle is distorted in shape because of the restrictions of the mouth. Near the center of the image, a large gamete bundle is nearly fully extruded, illustrating the extreme dilation of the polyp mouth that is necessary for release. During 1994 observations (including video records) a large proportion of gamete bundles were restrained by an apparent restriction of the mouth opening, in many cases causing substantial deformation of the bundles and, often, rupturing of the bundle sheath and subsequent dispersal of individual eggs and sperm (not visible). In some cases, gamete bundles were trapped in polyp mouths by trailing strands of the sheath for as long as 1 min after the bulk of the bundle had been extruded.

Gamete release observed during both years was very slow, in contrast with that of synchronous spawners such as *D. strigosa* and *Montastrea franksi* (Gittings et al., 1992), which release large numbers of gametes in pulses over a short period of time (20–25 sec). *Colpophylia natans* gamete bundles were often released only one or two at a time over a large area of coral head, as depicted in Fig. 1. It was estimated that a single, relatively large coral head, measuring about 0.75 m in diameter, would take at least 30 min to release all of its gamete bundles. Observations of continuous slow bundle releases were made for 25 min on a single head, where a significant proportion of the gamete release had already occurred prior to the beginning of observations. Although the release was slow, it was relatively continuous.

After release, *C. natans* gamete bundles were positively buoyant and rose slowly toward the surface. Buoyancy varied somewhat between individual bundles. Through the use of video records, it was estimated that gamete bundles would reach the surface (through 22 m of water) in approximately 3–4 min. Figure 2 was obtained by photographing the gamete bundles from underneath while they were floating on the sea surface. Individual eggs can be seen streaming away from the disintegrating egg bundles. Fertilization typically takes place soon after this breakup and is followed by embryogenesis. Currents were very slight when the image was taken on the night of 19 Aug. 1995, at 2150 hr. The first *C. natans* spawning was not

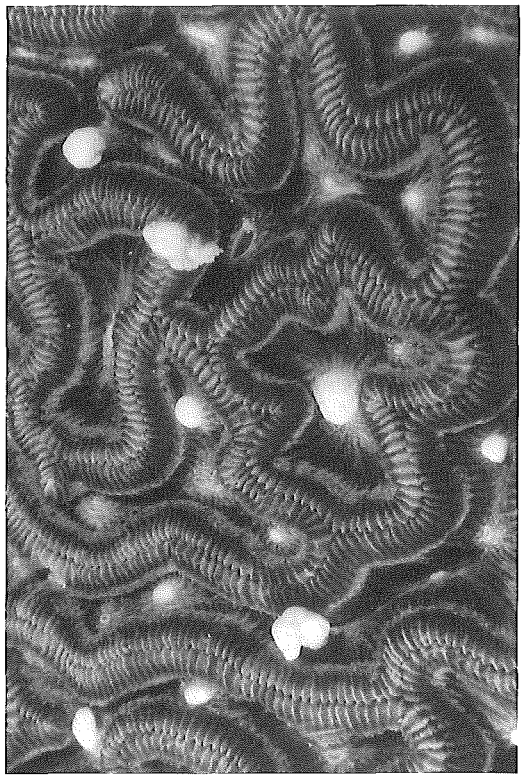

Fig. 1. *Colpophylia natans* releasing gamete bundles, 2100 hr CDT; 16 Aug. 1998.

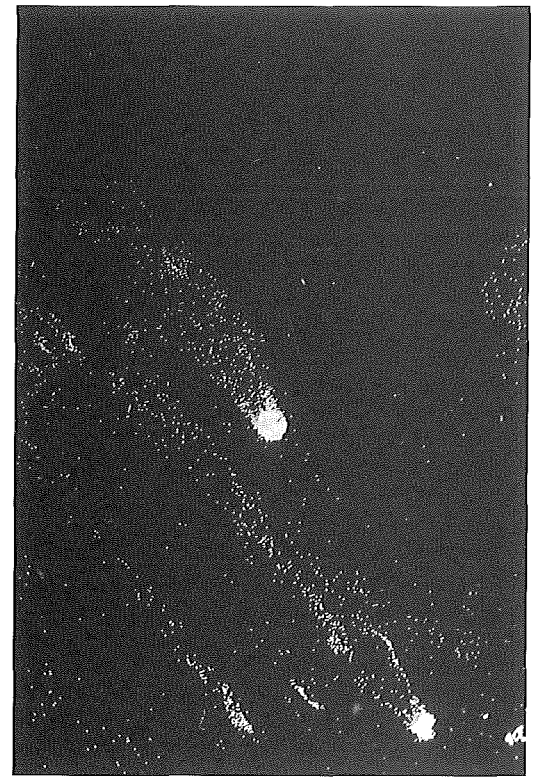

Fig. 2. *Colpophylia natans* gamete bundles on sea surface (view from below). Individual eggs breaking away from bundle in calm conditions after estimated 10–25 min on surface.

observed by other divers on the bottom until 2116 hr, meaning the gamete bundles in Fig. 2 were in the process of breaking apart after no more than about 30 min on the surface.

The distinct temporal separation of *C. natans* spawning times (by at least 1 d) from the other species involved in mass spawning at the Flower Garden Banks would provide complete isolation from gametes of other species, resulting in maximization of fertilization. The multiple nights of synchronous spawning, as observed in 1998 (ninth and tenth evenings), would tend to reduce the risk of a single spawning event when some environmental incident, such as a heavy rain, could negate the entire reproductive effort of the species for the entire year, as reported by Harrison et al. (1984).

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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, located 198 km south of Sabine Pass on the Texas–Louisiana border, encompasses an area of 67 km^2 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 (Rezak 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 (*Callyspongia 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-