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Notes

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NOTES:

CONCEALMENT BEHAVIOR OF THE SPANISH LOBSTER, *Scyllarides nodifer* (STIMPSON), WITH OBSERVATIONS ON ITS DIEL ACTIVITY.[1]

Because a camoulflaged or cryptically colored animal would lose a protective advantage if it cast a shadow, structural adaptations to conceal shadows, or the "Peter Pan effect," are a recognized and common adjunct to disruptive patterns observed in animals. Several species of terrestrial insects with flattened appendages and flanged body surfaces illustrate this structural adaptation (Portmann, 1959). I believe that the flattened antennal appendages and flanged latero-carapacial surfaces of the Spanish lobster, *Scyllarides nodifer,* are similarly employed and not used for burrowing as the local name "bulldozer lobster" would imply. The reef habitat of scyllarid lobsters (Lyons, 1970) provides few unconsolidated sediments in which to burrow, a defensive behavior of many marine and estuarine decapods. Concealment could be afforded, however, by the structural modifications mentioned above, enabling these lobsters to hide on the surface of the reef.

On March 30, 1971, at about 1200 hrs., I observed a 20 cm TL Spanish lobster clinging to the surface of a limestone ledge about 10 km off the coast of Panama City, Florida. The water depth at this natural reef, locally called the "Warsaw Hole," was 25 m, and the bottom temperature was 16° C. Horizontal visibility was approximately 9 m. I was impressed by the ability of this species to conceal itself on the face of this outcrop and photographed the lobster before disturbing it (Figure 1). The lobster was not only cryptically colored, but its body outline blended into the hard substrate. I placed the lobster on the sand bottom directly below the ledge where it was first observed and I took another photograph (Figure 2). It did not attempt to burrow, as penaeid shrimp do when released on the bottom during daylight hours (Fuss and Ogren, 1966), but remained quiescent for the duration of the observation. The distinct shadow it cast caused it to be most conspicuous.

[1] Contribution number 78-09 PC, Southwest Fisheries Center, Panama City Laboratory.

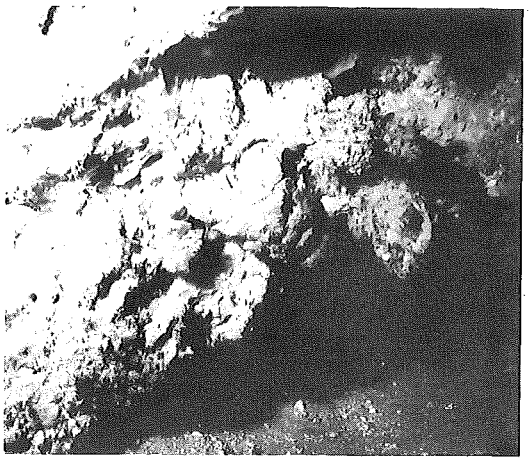

Figure 1. — A Spanish lobster, *Scyllarides nodifer,* clinging to the surface of a limestone ledge. Note how the antennal articles reduce shadows and enhance the camouflage effect.

Figure 2. — The same lobster after it was removed from its hiding place and placed on the bottom directly below the ledge.

I have observed this species for several years (1970-75) while diving on artificial reefs located near the general area of the "Warsaw Hole." I have seen them inside discarded tire casings clinging to the underside of the horizontal supports of a U.S. Navy offshore platform (Stage II), and on the legs of a nearby U. S. Navy underwater habitat (Sealab I). The lobsters were inactive during the daytime suggesting they forage for food at night. They are frequently captured by shrimp trawls fishing at night off Dog Island, Florida, at depths of 18 m, further suggesting that they leave their reef habitat at night. The trawlable bottom consisted of coarse sand and shell sediments, but live bottom habitat and limestone outcrops, which the lobsters use as diurnal retreats, are found in this general area.

Few data were found concerning predation on this species, but Lyons (1970) gave some evidence that large reef dwelling fishes (sharks and groupers) eat them. It seems probable that the vulnerability of the lobster to these active predators would be much greater were it not for their camouflage and cryptic habits.

This species was observed to be most numerous in the fall and early winter (September-December), but they were not seen during the winter months (January-February). In the northeastern Gulf of Mexico the Spanish lobster probably moves offshore in response to low water temperature.

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NOTES ON THE OCCURRENCE OF THE SILVER ANCHOVY, *Engraulis eurystole,* IN THE NORTHERN GULF OF MEXICO. —

On 9 November 1970, several tightly-packed fish schools or pods (as defined by Breder, 1959) were observed moving into Choctawhatchee Bay at East Pass, Okaloosa County, Florida, apparently being carried into the bay by the flood tide. One dip with a small net from one of the pods yielded 574 *Engraulis eurystole,* 9 *Anchoa lyolepis,* and 3 *Sardinella anchovia.* At the time of this observation (10:30 CST), the current in the pass was stronger than usual and the Gulf was quite rough because of a rather strong south wind (about 10-15 knots). The water temperature was 22° C.

Engraulis eurystole had not previously been collected at East Pass during a detailed study of the fish fauna at the jetties there beginning in June, 1968, and continuing through 1970 (Hastings, 1972). One larval engraulid which is apparently this species was collected near the west jetty at East Pass on 26 December 1970. Its anal fin ray count (16) is too low for any of the species of *Anchoa* occurring in the Gulf of Mexico, but does correspond to counts of *Engraulis* collected in November. Other anchovies were seen when the single larva was collected, so other *Engraulis* may have been present. The species is apparently an open water fish, in view of its scarcity in

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coastal fish surveys throughout its range, and the large schools observed in November may have been carried into the pass by the unusual water conditions. The anchovies were being preyed upon by other fishes (possibly *Caranx crysos* and *Lagodon rhomboides*), which may have stimulated the formation of pods (Daly, 1970), although such behavior is also reported for fishes moving through unfamiliar areas (McLean and Herrnkind, 1971). However, the dark, compact schools at the water surface were clearly visible over the light, sandy bottom and attracted large numbers of gulls and terns which preyed upon the anchovies from above.

A size frequency distribution of 554 of the *Engraulis* collected in November is shown in Figure 1. The size range of these specimens is rather narrow (31-60 mm SL; mean size = 39.4 mm with standard deviation of 3.9). Of the 554 specimens measured, 525 (or 94.8%) ranged from 31 to 46 mm SL and an additional 24 specimens (or 4.3%) ranged up to 51 mm SL. Such a size distribution is to be expected in schooling species (Breder, 1951, 1959), and even the *Sardinella* and *Anchoa* were mostly within the same size range. Only one *Sardinella* and two *Anchoa* were smaller than 31 mm SL.

Initially, the *Engraulis* could not be identified but seemed to be intermediate between *Anchoviella perfasciata* and *Anchoviella eurystole* as described by Hildebrand (1963). This was interesting since Hildebrand had reached the same conclusion regarding specimens collected near Pensacola, Florida, about 70 km west of East Pass. The specimens did fit the redefinition of the genus *Engraulis* as recognized by Whitehead (1964, 1973; also see Berry, 1964). Thus, specimens were sent to Whitehead (of the British Museum) who identified them as *E. eurystole*. Most likely many records of *Anchoviella perfasciata* from the Gulf of Mexico will prove to be *Engraulis*

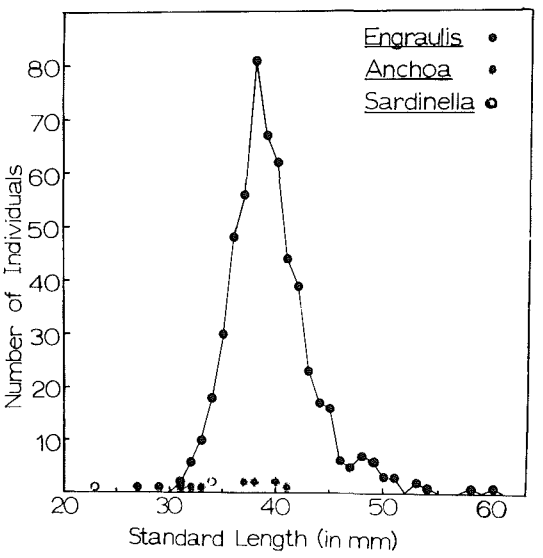

Figure 1. — Size frequency distribution of *Engraulis eurystole*, *Anchoa lyolepis*, and *Sardinella anchovia* collected in a single pod-like school on 9 November 1970 at East Pass, Florida.

eurystole. I have seen one juvenile collected in October, 1974, in the surf at Santa Rosa Island near Pensacola, Florida, and two adults collected at the water surface over the Florida Middle Ground (24°30'N, 84°20'W) in July, 1969, which are *E. eurystole*. Whitehead (1973) reported specimens of *E. eurystole* collected in the Gulf of Mexico off Florida and Mississippi (U.S.N.M. 159720 and 129646). Moe *et al.* (1966) and Powell *et al.* (1972) listed two specimens as *A. eurystole* at R/V *Oregon* stations 1489 (off Veracruz, Mexico) and 1647 (at a depth of 12.6 m off Pensacola Bay in January, 1957). In addition, specimens collected at *Oregon* station 1824 (dipnetted at the surface over a depth of 1665 m off Pensacola Bay) were listed by Bullis and Thompson (1965) as *A. perfasciata,* but have subsequently been reidentified as *E. eurystole* (University of Miami Marine Laboratory Collection 4853 — personal observation). Tagatz and Wilkins (1973) reported collecting several anchovies which they identified as

Anchoviella perfasciata in the Pensacola estuary, but these might also be *E. eurystole*. Although *Engraulis eurystole* may be common and widely distributed in the Gulf of Mexico, it is not often collected apparently because of its preference for offshore open-water habitats, and may be misidentified at times because of its similarity to *Anchoviella perfasciata*. Much additional study is needed on these anchovies to ascertain their distributions in the Gulf of Mexico, and to clarify their relationship to other species of *Engraulis* and *Anchoviella*.

ACKNOWLEDGMENTS

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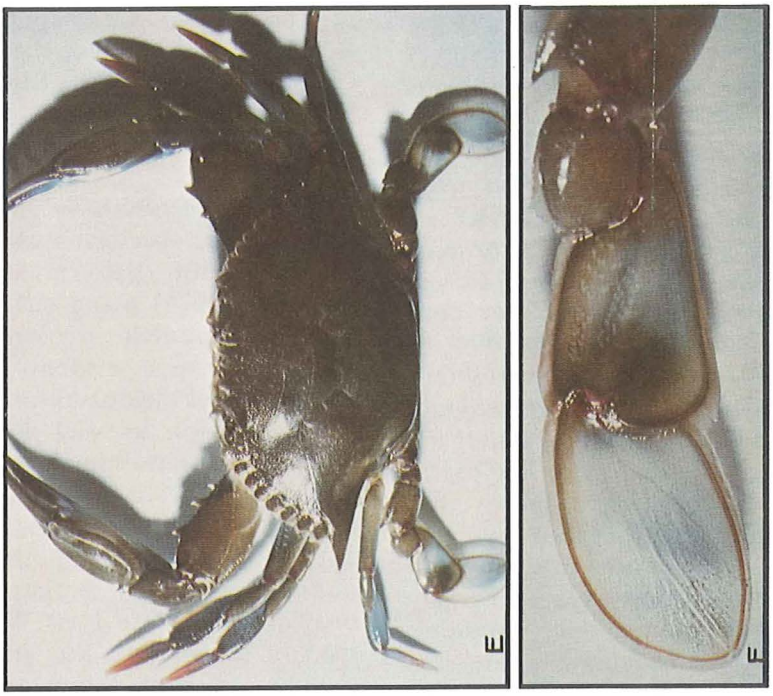
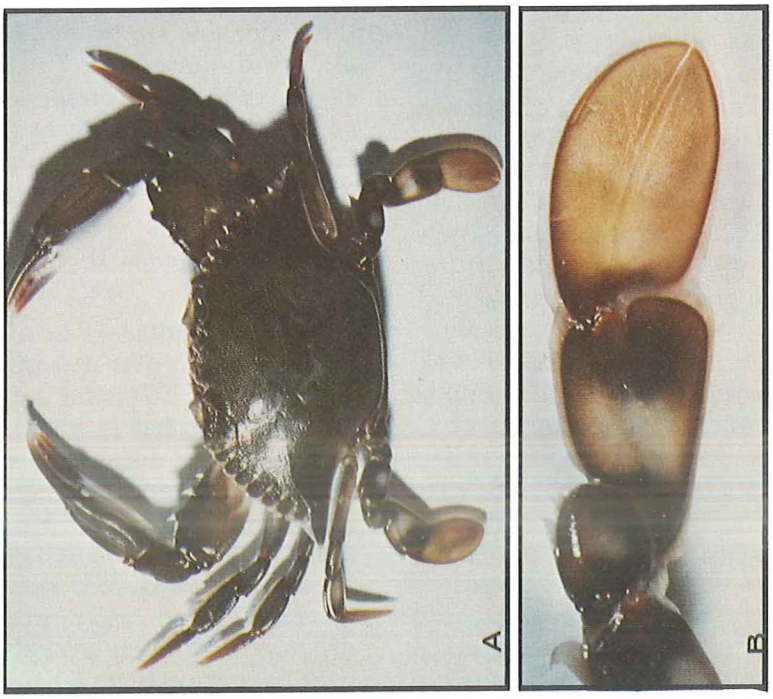
STUDIES ON DECAPOD CRUSTACEA FROM THE INDIAN RIVER REGION OF FLORIDA. VII. A FIELD CHARACTER FOR RAPID IDENTIFICATION OF THE SWIMMING CRABS *Callinectes ornatus* ORDWAY, 1863 AND *C. similis* WILLIAMS, 1966 (BRACHYURA: PORTUNIDAE) — The portunid crabs *Callinectes ornatus* and *C. similis* are two very closely related species; *C. similis* was confused with *C. ornatus* for a number of years until separated by Williams (1966). Both species are common on seagrass beds in the Indian River lagoon along the central eastern Florida coast. Ecological studies in this area have shown that juveniles of both species are also seasonally abundant on lagoonal seagrass beds. Adult male crabs are easily separated to species on gonopod morphology, whereas females are less easily distinguished on gonopore configuration (Williams, 1974). However, because of great similarity in morphological features juveniles of the two species have been relatively difficult to identify as to species. Field data obtained from large numbers of live juvenile specimens, and smaller numbers of adults, in both species show that a distinct difference in color patterns between the two species occurs, especially in cheliped color, and color and pattern of the propodus and dactylus of the modified fifth pereiopod (swimming leg). These color patterns are sufficiently distinctive to form a valuable field character allowing easy identification of live juvenile and adult specimens of *C. ornatus* and *C. similis*. They may also be used to separate recently preserved (up to six months in some cases) material of these two species. I provide color notes and photographs of these patterns to enable other investigators working with live or recently collected and preserved material to quickly distinguish between *C. ornatus* and *C. similis*. Specimens used in this study are deposited in the Reference Collection of the Indian River Coastal Zone Study, Link Port, Ft. Pierce, Florida.

COLOR PATTERNS

***Callinectes ornatus* —** Many of the Indian River specimens varied from the general color pattern described by Williams (1974) being either lighter or darker greenish brown, although similarities were evident primarily in overall hue of the dorsal carapace, and in cheliped color, as well as in hue and pattern on the walking legs. This species is uniformly olive brown or green, with distinct ivory white tips on all the anterolateral carapace spines. The overall impression usually is that of an olive brown crab (Plate 1 A). Ventrally, the meri of the walking legs and the sternal regions are ivory white and the distal segments of the pereiopods are varying shades of greenish-brown (Plate 1 C). Viewed frontally, the chelipeds are ivory white, flushed dorsally with olive green; the finger tips are brown or tan (Plate 1 D). Most noticeable, however, are the dactyls of the fifth pereiopods which are a uniform golden brown or light tan, and the propodus which appears distinctly banded with translucent yellow proximally, and a dark bluish-green distally (Plate 1 A, B).

***Callinectes similis* —** The overall color of this species has been described accurately by Williams (1974) and the Indian River specimens agreed in most respects. The dull orange or orange-red spot on either side of the carapace posteriorly was not always present, or if present was not always distinct. Viewed dorsally, the overall impression one gets is that of an olive drab crab, more greenish than *C. ornatus,* and often irregularly speckled with light gray (Plate 1 E). The iridescent





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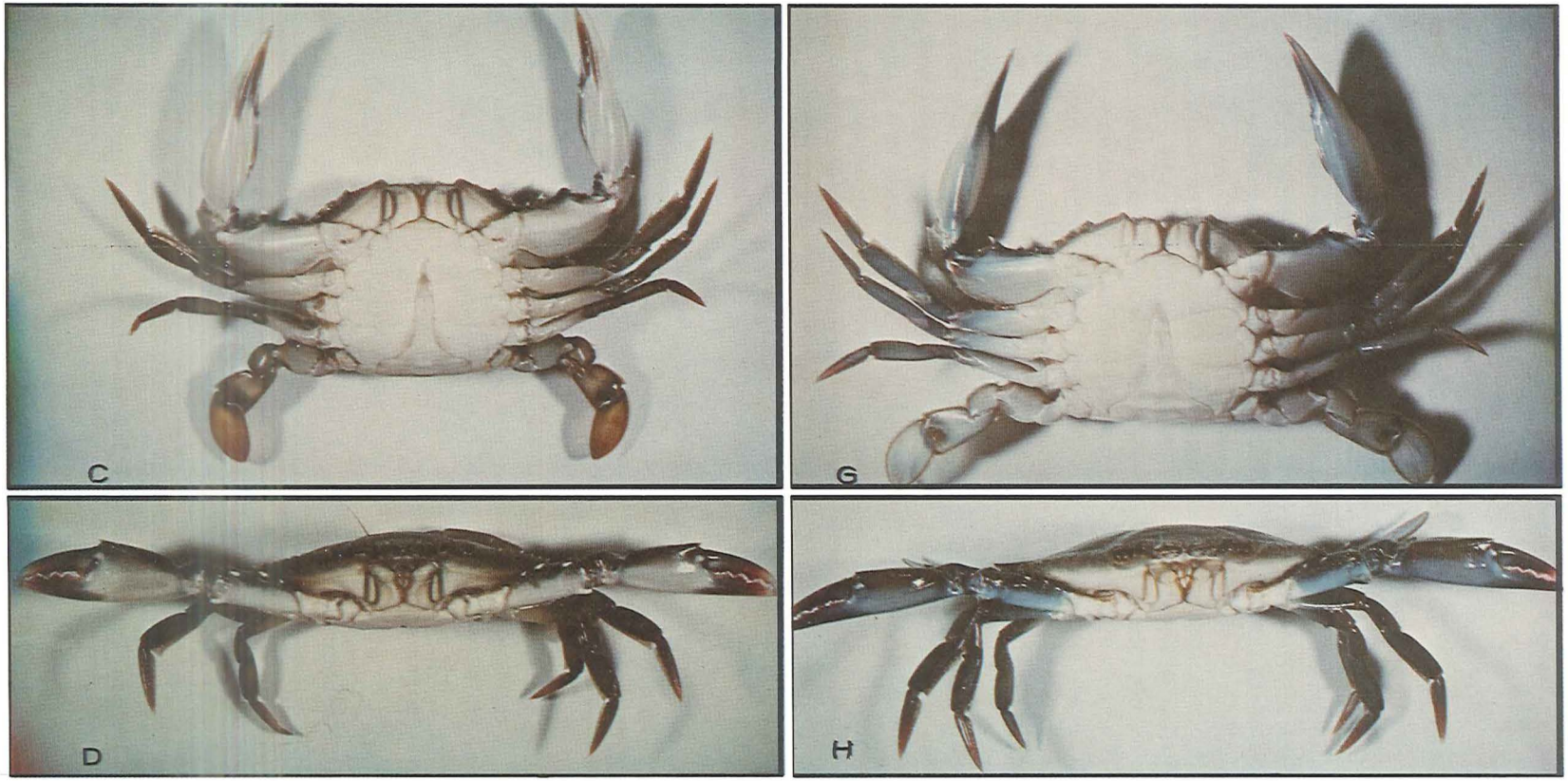

Plate 1 A-D. — *Callinectes ornatus* Ordway, 1863. Male, 58 mm cw, Indian River, St. Lucie Co., Ft. Pierce, Florida. SIFP 89:2920. A, Dorsal view; B, Right pereiopod 5, dorsal view; C, Ventral view; D, Frontal view.

Plate 1 E-H. — *Callinectes similis* Williams, 1966. Male, 59 mm cw, Indian River, St. Lucie Co., Ft. Pierce, Florida. SIFP 89:2921. E, Dorsal view; F, Left pereiopod 5, dorsal view; G, Ventral view; H, Frontal view.

patches described by Williams (1966, 1974) are also usually quite distinct. Ventrally, the sternal region is ivory white as in the above species. The proximal portion of the meri of the walking legs is also white, but the latter become diffused with blue distally, this color becoming more intense on the outer segments of the walking legs. The dactyls of the latter range from deep red to burnt orange, as in *C. ornatus,* but are also diffused with blue, which usually is not seen in *C. ornatus* (Plate 1 G). The common name of Lesser Blue Crab seems appropriate for this species when viewed frontally (Plate 1 H) and the interior surfaces of the chelipeds range from light to cerulean or china blue, becoming darker on the distal portions and blending into olive drab dorsally. The color may even be purple on the underside of the meral ridge, carpal joint, and the tips of the fixed and movable fingers in some specimens. Younger specimens are a solid, uninterrupted blue in this region with the anterior and distal part of the palm appearing as if dipped in blue ink; the fingers tend to be more whitish. The most noticeable differences between this species and *C. ornatus* are seen in the propodi of pereiopod 5 which are translucent olive drab proximally and distally, banded with translucent blue medially; the joints are speckled with fuchsia, and the entire outer and inner surface of the dactyl is pale translucent blue (Plate 1 E, F).

Juveniles — Juvenile specimens (at least 25 mm carapace width cw, and larger) of both species may most easily be separated by the color of the propodus and dactyl of the swimmeret (pereiopod 5). If the propodus is regularly and distinctly banded and the dactyl is a uniform tan or yellow color, the species is *C. ornatus.* If the propodus is faintly and more irregularly banded and the dactyl is translucent blue, at times almost completely clear, the species is *C. similis.* Small juveniles (5-25 mm cw) of both *C. similis* and *C ornatus,* when viewed frontally, have the interior surfaces of the chelipeds olive drab to tan, but those of *C. similis* appear slightly diffused with blue. I have found these differences to be consistent in ecological collections from the Indian River area and the juveniles of the two species may thus be easily sorted in the field saving much time spent in identification in the laboratory.

The only other species which occurs commonly in the Indian River area and coastal regions to the north is the commercial blue crab, *Callinectes sapidus* Rathbun, 1896. Juveniles and adults of this species are not nearly as abundant as the previous two species, a possible result of an intensive local commercial fishery for blue crabs. Adults of *C. sapidus,* as the common name reflects, are usually of a distinct bluish hue overall, and both adults and larger juveniles (30 mm cw and wider) may be quickly separated from the preceding two species by the absence or rudimentary development of the submesial frontal teeth. Juveniles of *C. sapidus* have no distinct banding on the propodi or dactyli of the swimmerets, and in in adults these appendages are usually a distinct deep blue or blue-gray in color.

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Reviews:

H. Dickson Hoese and Richard H. Moore, **Fishes of the Gulf of Mexico, Texas, Louisiana and adjacent waters.** XV + 327 pp., 513 color plates. ISBN 0-89096-027-5, Texas A&M University Press, College Station Texas, 1977. $12.50.

Researchers and students of fishes of the Gulf of Mexico have labored in a literary twilight since the region became subject to serious ichthyological studies three quarters of a century ago. Comprehensive keys and field guides available were based primarily on Atlantic coast areas and modified by the user for the Gulf. Distributional comments of species frequently terminated with a cursory . . . "including the Gulf of Mexico". Now, the seventies have witnessed suddenly the appearance of three significant contributions (Parker *et al.,* 1972; Walls, 1975; and Hoese and Moore, 1977) which promise to make field work on fishes in the area, especially the northwest Gulf coast, some of the most rewarding and accurate of any place in the world.

The subject of this review, "Fishes of the Gulf of Mexico, Texas, Louisiana and adjacent waters", by H. Dickson Hoese and Richard H. Moore is certainly the most useful, complete, and accurate of the three. The field key by Parker *et al.* (1972) was not intended as more than an identification guide, but served its stated purpose admirably for half a decade. Walls (1975) is a semipopular approach, but suffers from lack of keys, inadequate line drawings, spotty and depauparate literature citations, and an appraoch too ambitious and not especially geared toward scientific investigation.

Although every regional handbook benefits from the endless appearance of the latest systematic revisions, Hoese and Moore have the added bonus of the experience of a mature generation of diving scientists, their contributions (e.g. Bright and Cashman, 1974), and their perspectives on the marine environment. This adds a new dimension to our information base on marine shelf fishes.

The most general criticism of this quite good work must be directed toward vagueness of scope. Specifically, the authors indicate uncertainty regarding geographic and vertical extent of coverage. The very title is set in two type styles throughout, emphasizing "Gulf of Mexico" with bold print, then qualifying with "Texas, Louisiana, and Adjacent Waters" in smaller or lighter characters. The map on the introductory section is of most of the Gulf of Mexico, with location legends diminishing in number from Louisiana eastward. This basic philosophy permeates the body of the work, with many species treated that are not, but might be, reported from the Texas-Louisiana region. This tends to leave the reader confused about the distribution of a number of species, although the very useful Appendix I clarifies the situation for most forms. However, one cannot help but get the impression that the vagueness is intentional, and certainly this is understandable in a work of this nature.