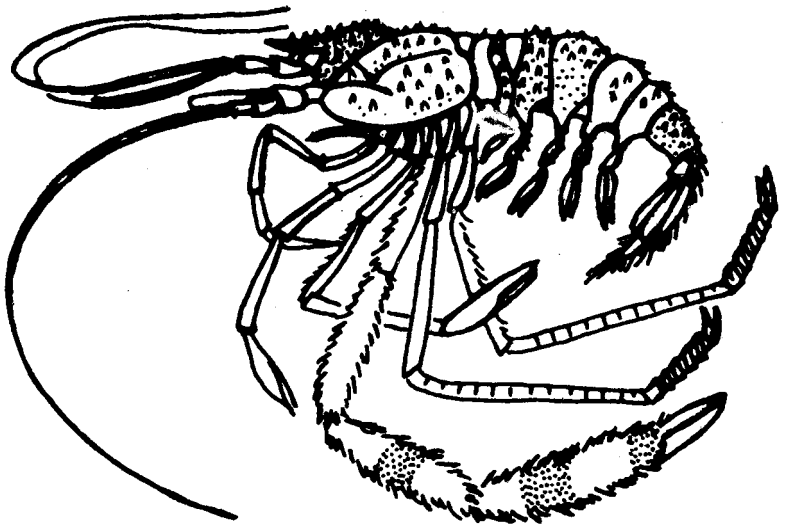
Ray Waldner

ASSOCIATION OF ISLAND MARINE LABORATORIES

OF

THE CARIBBEAN

Ninth Meeting



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INTRODUCTION

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The ninth meeting of the Association of Island Marine Laboratories of the Caribbean was held October 11 to 15, 1971 at the Hotel "Los Bordones," Cumaná, Venezuela, and hosted by the Instituto Oceanográfico, Universidad de Oriente, Cumaná. A committee consisting of Drs. Taizo Okuda, Luis J. Urosa, Andrés J. Lemus, José Carvajal R., Jaime Bonilla R., and Oliver Macsotay organized the meeting.

The meeting began the morning of October 11 with welcoming addresses by Dr. Felipe J. Martin Salazar, Vice-Rector Secretario, Universidad de Oriente, and Don Jorge Villegas, Gobernador, Estado Sucre, Venezuela. In the absence of the president and vice presidents of the Association, the opening address was given by Charles E. Cutress, Secretary-Treasurer.

The extraordinary success of the meeting reflected meticulous planning and organization by the committee in charge and the enthusiastic interest and unstinted support of the Universidad de Oriente and the Regional Government.

The 93+ registrants came from 11 countries. Fifty-three papers on a wide range of marine topics were presented, a record number for an AIMLC meeting. Simultaneous translation of the delivered papers was superbly accomplished by Sra. Janick Rossignol of Caraballeda and Sra. Lucía de Martínez of Nierida, both of whom won unreserved admiration of all participants.

Informative and enjoyable visits were made to the Estación Experimental del Instituto Oceanográfico and the Centro de Investigaciones Pesqueras del Ministerio de Agricultura y Cría. Long to be remembered diversions to the meeting were a barbeque arranged by the Consejo Municipal de Cumaná; dinner and folklore dance-music by the Extensión Cultural de la Universidad de Oriente hosted by the Rector; and an all day field trip to the salt pans on Península Araya operated by the Empresa Nacional de Salinas.

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In a long overdue acknowledgment, we wish to thank Sra. Elba Estévez de Hernández for her help in preparing the present and all past volumes of the Proceedings. With unending patience and cheerfulness, she has done all the final variable-space typing and otherwise has aided in preparing camera-ready copy for the printer. It has all been greatly appreciated.

ALGUNAS OBSERVACIONES HIDROGRAFICAS Y QUIMICAS DEL GOLFO DE PARIA

El Golfo de Paria se limita por la Península de Paria, la Isla de Trinidad y la parte norte del Delta Amacuro y se comunica con el Mar Caribe a través de la Boca de Dragones y con el Océano Atlántico por la Boca Serpientes. El Golfo tiene generalmente poca profundidad menos de 20 metros en su mayor parte zona suroeste, se encuentran varios ríos tales como: el Río Grande, el Río San Juan, el Río Guanipa y el Río Mánamo; la estación lluviosa en el Golfo es durante los meses de junio a diciembre.

Las observaciones fueron realizadas en el mes de diciembre de 1967 por M/N "La Salle." Dicho mes corresponde a la época de transición de la estación lluviosa a la estación seca en el Golfo de Paria. En reflejo de estas situaciones geográficas y climatológicas, las condiciones hidrográficas del Golfo se presentan en la forma siguiente:

1. Se observa el desarrollo de la capa discontinua de la salinidad y sigma-t en las profundidades entre 10 y 20 metros. Encima y debajo de esta capa discontinua se forma una masa de agua homogénea bien desarrollada, es decir, la capa superior se caracteriza por su agua salobre y la capa inferior, procedente del océano, contiene alta salinidad, alto sigma-t, baja temperatura y bajo oxígeno disuelto.

2. La distribución vertical de los factores hidrográficos y químicos indica la presencia de la surgencia en la parte este del Golfo.

3. De acuerdo con la distribución de temperatura y salinidad, se sugiere que el remolino se encuentra situado en la parte central del Golfo.

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Proc AIMLC 9: 2 April 1973

BULIMINACEA EN LA PLATAFORMA MARINA DE VENEZUELA (TAXONOMIA Y ECOLOGIA)

Varios géneros y especies de la superfamilia Buliminacea se encuentran ampliamente distribuídos en la plataforma y el declive continental de Venezuela central y oriental, con frecuencias que varían de acuerdo con las condiciones ambientales.

Se presenta un estudio taxonómico y ecológico de esos géneros y especies.

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Proc AIMLC 9: 2 April 1973

ALGUNAS PARTICULARIDADES SOBRE EL PLANCTON DE LA LAGUNA DE TACARIGUA, EDO. MIRANDA

Un estudio llevado a cabo en la Laguna de Tacarigua para conocer algunos aspectos sobre la composición, distribución y abundancia del plancton, fue realizado durante los mese de octubre de 1969 a enero de 1970, con una serie de muestreos mensuales. Se presentan los resultados de los análisis, de la biomasa del seston y del volumen desplazado en el periodo señalado.

Faunísticamente la laguna es pobre en variedades, pero las especies que son dominantes aparecen con una gran concentración y típicas de aguas salobres. Los grupos más abundantes fueron los copépodos con una sola especie Oithona hebes, rotíferos con la especie Brachyonus plicatiles y nauplius de copépodos. En menor proporción, larvas de gastrópodos, poliquetos, tintínidos, zoeas de Brachyura y ostrácodos. El fitoplancton era igualmente muy abundante, pocas variedades y con una alta densidad de Ceratium sp.

La concentración mayor de zooplancton fue encontrada en la estación XI, situada en la boca de la Laguna.

Los resultados se acompañan con los datos hidrográficos de temperatura, salinidad y transparencia.

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CICLO SEXUAL DE ORTHOPRISTIS RUBER (CUVIER)

Orthopristis ruber pertenece a la familia Pomadasyidae y es la única especie del género conocida en Venezuela. Es una especie de mercado con carne de excelente calidad, abundante en el oriente de Venezuela. Nuestros ejemplares han sido capturados con redes de arrastre al nor-este de la isla de Margarita a una profundidad entre 17 y 23 brazas. Se han examinado 364 ejemplares de febrero a julio de 1971, de los cuales 156 fueron hembras, 208 machos y 35 de sexo indefinido. Se estimó la condición de actividad gonadal por 3 métodos: 1. Examen macroscópico; 2. Determinación del índice de madurez; 3. Medida del diámetro de los óvulos.

Durante el mes de febrero de 1971, se examinaron 33F, todas en estado IV de madurez. En marzo 27F, de las cuales 24 se encontraban en estado IV y 3 en estado I. En abril 22F, 20 en estado IV y 2 en estado V. En mayo 28F, 24 en estado IV y 4 en estado V. En junio 45F, 7 en estado I, 11 en estado IV y 10 en estado V. En julio 18F, 3 en estado I, 5 en estado IV y 10 en estado V.

La menor talla capturada con las gonadas maduras fue una hembra de 160 mm. de largo total con un peso de 275,5 gr.

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EL MATERIAL ARENOSO DE LAS COSTAS DEL GOLFO DE CARIACO

Se han estudiado hasta ahora 70 muestras de playas localizadas en las costas norte y sur del Golfo de Cariaco, con el objeto de determinar tipos de sedimentos y distribución del tamaño del grano, orígen y condiciones de sedimentación, y contenido de carbonatos de éstos sedimentos playeros. La granulometría señala sedimentos de textura diferente para los 2 frentes de costa; así, aquellos de la zona norte son de marcada heterometría, diámetro de sus partículas mayor de 1.14 mm (0.21), con escogimiento que varía de moderado a muy pobre (Cϕ=0.77/2.21), y de una fuerte asimetría (SK=0.71/1.78). Mientras que para la costa sur, los sedimentos encontrados son de baja heterometría, con partículas tamaño arenas donde predominan aquellas con diámetro entre 0.84 y 0.295 mm (0.25 y 1.74ϕ). La clasificación varía de buena a moderada (Cϕ=0.34/1.01), y la asimetría es mas regular (SKϕ=-0.56 /1.04). La fracción limo-arcilla es muy reducida, y por tanto, indicadora del lavado a que se encuentra sometido el material de las playas. La representación triangular permite ver la diferenciación establecida, a la vez que da lugar para definir los tipos de sedimentos estudiados como: arenas de grano grueso y muy grueso para la costa norte, y arenas de grano fino y medio para la costa sur. A partir de las curvas acumulativas es posible establecer que las condiciones de sedimentación son bastante semejantes en ambos frentes de costa, los sedimentos tienen un origen común y un transporte escaso bajo la acción de una dinámica marina bastante moderada. En general, los porcentajes de carbonato son bajos para ambas costas, a excepción de algunas localidades en la costa norte que reflejan aumentos de cierta magnitud.

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ORGANISMOS CAUSANTES DE MAREAS ROJAS EN EL GOLFO DE CARIACO

Se observaron turbias o mareas rojas en el Golfo de Cariaco desde septiembre de 1970 hasta julio, 1971.

Se encontraron 4 organismos (Gyrodinium fissum, Mesodinium vubrum, Perietinium sp. y Noetilnea miliaris) responsables de estos fenómenos.

No hubo indicios de mortalidad de organismos causada por estos turbios.

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Proc AIMLC 9:4 April 1973

A STUDY ON THE EFFECTS OF DESALINATION EFFLUENTS ON THE LIFE CYCLE OF THE AMERICAN OYSTER CRASSOSTREA VIRGINICA (GMELIN)

The objective of the program was to assess the combined effects of increased temperatures, salinities and heavy metal concentrations on the life cycle of Crassostrea virginica. The alteration of these physicochemical parameters was produced by the discharge of desalination brines from MSF distillation processes in coastal and estuarine waters.

The experiments consisted of long-term, multivariate, flow-through bioassay tests conducted seasonally on juvenile and adult specimens of C. virginica. Limiting conditions for growth and survival of the juvenile and adult specimens were found at temperatures and salinities above 32.5°C and 35.00‰, respectively.

Dissolved copper concentrations in the range between 0.01 and 0.02 ppm affected the normal development of the oysters and produced heavy mortality particularly during the summer and fall seasons. The effect of the modified parameters contributed also to enhance the incidence of Labyrinthomyxa marina, a pathogenic fungus lethal to adult specimens. The effects of the effluents were also tested on the eggs and larvae of C. virginica using short-term static bioassays.

A dissolved copper concentration of 0.01 ppm in the seawater-brine mixtures allowed the embryonic development of the eggs but was lethal to the resulting larvae. The upper temperature and salinity tolerance levels for the early stages of C. virginica were very similar to those determined for adults and juvenile specimens.

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CARACTERISTICAS QUIMICAS DE LOS SEDIMENTOS DE LA LAGUNA DE CAMPONA

Con el objeto de obtener conocimiento sobre las características químicas de los sedimentos en la Laguna de Campona se realizó una observación en el mes de enero de 1970, efectuándose los análisis de carbono y nitrógeno orgánico, azufre, consumo de oxígeno y consumo de permanganato.

En general, como un rasgo característico de los sedimentos de La Laguna se aprecia muy abundante el contenido de la materia orgánica en ella. El máximo y mínimo del C-org. y N-org. fueron: 19.1% y 6.4% (C-org.) y 1.33% y 0.62% (N-org.), respectivamente. Así como también altos valores de azufre y consumo de oxígeno y consumo de permanganato. Estos elevados valores se encuentran en las partes noroeste y suroeste.

Sin embargo la razón C/N nos indica un equilibrio y desarrollo normal en el proceso de descomposición de la materia orgánica.

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COMPARACION DE LA FLUCTUACION MENSUAL DEL INDICE DE ENGORDE DEL OSTION DE LOS BANCOS NATURALES DE BAHIA DE MOCHIMA Y LAGUNA GRANDE

Ha sido el objetivo principal de este trabajo, la determinación del área y la época más conveniente para la explotación comercial del ostión natural. Con este propósito, se ha estudiado, la variación mensual del índice de engorde del ostión de los bancos naturales de Bahía de Mochima y Laguna Grande, durante el periodo de junio de 1967 a agosto de 1968. El índice de engorde fue expresado de la forma siguiente:

$$\frac{\text{Peso de carne deshidratada (g)}}{\text{Vol. intervalvar (ml)}} \times 100.$$

Se observó en los dos bancos naturales mencionados, una fluctuación mensual del índice de engorde semejante. No obstante, el valor promedio de 6.4 obtenido en los ostiones de Bahía de Mochima y 8.4 en las de Laguna Grande, constituye una diferencia bastante amplia. Este diferencia se hizo más acentuada durante el periodo de engorde de enero a abril con valores promedios de 7.4 y 10.3 para los ostiones de Bahía de Mochima y Laguna Grande respectivamente.

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ESTUDIO TAXONOMICO DE LAS FAMILIAS ECTOCARPACEAE, SPHACELARIACEAE Y DICTYOTACEAE (PHAEOPHYTA) DE LAS COSTAS OCCIDENTALES DEL ESTADO SUCRE - VENEZUELA

Miembros de las familias Ectocarpaceae, Sphacelariaceae y Dictyotacea, abundan sobre una variedad de sustratos y condiciones ecológicas en las costas occidentales del estado Sucre; por lo tanto el autor ha tratado de hacer un estudio taxonómico de estas familias.

Se dan en este trabajo las observaciones del autor sobre morfología, estructura, reproducción y distribución de unas veinte especies (Giffordia mitchellae (Harvey) Hamel, G. duchassaigniana (Grunow) Taylor, G. conifera (Børgesen) Taylor, G. rallsiae (Vickers) Taylor; Ectocarpus rhodochortonoides Børgesen; Sphacelaria tribuloides Meneghini, S. fusea (Hudson) C. Agardh, S. furcigera Kützing, S. novaehollandiae Sonder, S. sp.; Dictyota ciliolata Kützing, D. dichotoma (Hudson) Lamouroux, D. volubilis Kützing sensu Vickers, D. cervicornis Kützing, D. linearis (C. Agardh) Greville, D. bartayressi Lamouroux; Padina vickersiae Hoyt, P. gymnospora (Kützing) Vickers; Dictyopteris delicatula Lamouroux; Spatoglossum schroederi (Mertens) Kutzing estudiadas hasta ahora.

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CONSIDERACION DEL INTERCAMBIO DE CALOR ENTRE EL MAR CARIBE Y LA ATMOSFERA-GENESIS DEL HURACAN Y OTRO PAPEL DE LA SURGENCIA

Según los datos meteorológicos, existen tormentas tropicales en el Mar Caribe durante el verano. Si comparamos las distribuciones de la tormenta tropical en los Océanos Pacífico y Atlántico, podemos afirmar que la tormenta en el Océano Pacífico aparece más al sur y más frecuente que en el Océano Atlántico. Este fenómeno puede ser explicado por las diferencias de temperaturas de aire y agua en ambos océanos, es decir, en el Mar Caribe la temperatura del agua es más baja que en el Océano Pacífico.

Debido a que no hay diferencias de temperatura del aire entre ambos océanos el flujo térmico vertical desde el mar hacia el aire es más pequeño en el Mar Caribe que en el Océano Pacífico.

Como el fenómeno de la surgencia tiene íntima relación con la baja temperatura del Mar Caribe, el pequeño flujo térmico en el Mar Caribe se puede explicar por la acción de la surgencia y ésta puede cumplir papel importante en la represión del huracán.

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PESCA EXPLORATORIA Y ALGUNAS OBSERVACIONES SOBRE EL CAMARON BLANCO PENAEUS SCHMITTI EN EL MAR CARIBE FRENTE A LAS LAGUNAS DE UNARE, PIRITU Y TACARIGUA

Para la pesca exploratoria del camarón en la zona del mar Caribe; frente a las albuferas de Piritu, Unare, y Tacarigua, se realizaron dos campañas: una en la motonave la Salle desde el 7 al 10-3-71 y otra en el barco camaronero denominado Santa Rita, desde el 10 al 16-6-71, utilizándose en ambas ocasiones redes de arrastre camaroneras, siendo utilizada en la primera campaña de tipo experimental con 7 metros en la boca y en la segunda, de tipo comercial, cuyas medidas son de 21 metros en la boca y 26 metros de longitud.

Se muestrearon 63 estaciones comprendidas entre 65° a 66° de longitud y 10° 7' a 10° 27' de latitud. A profundidades comprendidas entre 5 a 33 brazas.

En esta zona se localizó una mezcla del complejo: Penaeus schmitti, P. brasiliensis, P. duorarum y P. aztecus subtilis, de la cual el P. schmitti es el más abundante. La captura promedio fue de 6,7 kg correspondiéndole una máxima de 15,0 kg. y una mínima de 1,7 kg por hora con arrastre comercial.

El muestreo fue más productivo en las horas del día y a profundidades comprendidas en el rango de 5-10 brazas y en fondo de tipo barroso.

En las capturas del P. schmitti las hembras fueron más abundantes, que los machos; 55,90% y 44,10% respectivamente así mismo presentan un promedio mayor en su longitud total 151 mm por 142 mm de los machos, la mínima talla correspondió a un macho de 109 mm lt., con un l.c. de 37,8 mm mientras que la talla máxima correspondió a una hembra de 199 mm l.t. y 45,9 mm l.c. El análisis de madurez en las hembras reveló que ellas no estaban completamente maduras.

Se establecieron relaciones entre largo total (l.t.); longitud del caparazón (l.c.) y el peso en ambos sexos.

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ESTUDIO TAXONOMICO DE LOS MADREPORARIOS DEL GOLFO DE CARIACO, SUCRE, VENEZUELA

Hasta ahora 22 especies enriquecen la fauna coralina de las aguas someras del Golfo de Cariaco; Acropora palmata, Agaricia agaricites, Cladocora arbuscula, Colpophyllia natans, Dichocoenia stokesi, Diploria clivosa, Diploria strigosa, Favia fragum, Manicina areolata, Millepora alcicornis, Millepora squarrosa, Montastrea cavernosa, Mussa angulosa, Phyllangia americana, Oculina diffusa, Porites astreoides, Porites porites, Solenastrea buornoni, Siderastrea radians, Siderastrea siderea, Stephanocoenia michelinii y Tubastrea tenuilamellosa. De esta colección, sólo Cladocora arbuscula, Solenastrea buornoni y Tubastrea tenuilamellosa constituyen nuevos registros para Venezuela. Para la recolección del material de su lugar de origen se empleó: máscara de buceo, chapaletas, barras de hierro y cuchillo y la profundidad osciló entre 0 y 3 m.

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COMPOSICION POR TALLAS DE LOS DESEMBARCOS DE CAMARON EN EL GOLFO DE VENEZUELA

El presente informe constituye el primer análisis hecho en base a los datos de distribución en frecuencia de tallas para el camarón blanco (Penaeus schmitti), pescado por la flota arrastrera que opera en el Golfo de Venezuela. El material básico fue obtenido de las estadísticas comerciales recopiladas durante tres años (68-70) y de muestreos efectuados durante 1970 por el personal del Proyecto.

Se han combinado estas fuentes de datos y se exponen algunos aspectos generales referente a la estructura de edad del recurso e informaciones complementarias, fundamentales en los cambios que se presentan en la distribución de tamaños del stock camaronero en el tiempo.

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OBSERVACIONES SOBRE EL INTERVALO BATIMETRICO REAL DE ALGUNOS MOLUSCOS SUBLITORALES, MARINOS, EN LAS COSTAS SEPTENTRIONALES DE VENEZUELA

Se han realizado experimentos, transportando numerosos ejemplares vivos de especies varias de pelecípodos y gasterópodos marinos, a profundidades distintas a las de su habitat, a fin de observar su reacción ante el aumento o disminución de los parámetros profundidad-presión. Se han determinado así los límites superiores y/o inferiores de tolerancia de muchas especies. Se han distinguido dos reacciones negativas: a) retracción máxima del animal en su concha, b) muerte del animal, asociado usualmente a distensión máxima del sistema muscular. Los traslados se realizaron con intérvalos de 5 m, entre las isóbatas de 5 y 40 m, dejando permanecer el lote de fauna una hora, y 24 horas. Las áreas utilizadas fueron, las ensenadas de Turpialito, Mochima, Cata, y frente a Punta Mosquito, Isla Margarita.

Especies como Polystira albida (Perry) y Glycymeris decussatus (Linné) murieron en el término de una hora a los 5 y 10 m, viviendo normalmente por debajo de la isóbata de 12 m. En cambio, Cittarium pica (Linné), Modulus modulus (Linné), Charonia variegata (Lamarck), Isognomon alatus (Gmelin), y Anomalocardia brasiliana (Gmelin), así como varias especies de Donax, murieron por debajo de la isóbata de 10 m. Melongena melongena (Linné), Mactra fragilis (Gmelin), Vasum muricatum (Born), murieron a los 20 m, y Cerithium eburneum Brug. y Cerithium litteratum Born, así como varias especies de Nerita, a los 30 - 35 m.

Al ser transportados más allá de los 25 m de profundidad, especies de familias como Muricidae, Fissurellidae, Limidae, Chamidae y Cardiidae, se refugiaron en sus conchas, sin mostrar actividad por 24 horas, volviendo a la normalidad al ser llevados a las aguas someras. Especies de las familias Marginellidae, Pectinidae, Veneridae y Naticidae, no alteraron su actividad en absoluto después de 24 horas a profundidades mayores de 25 m, pero sus reflejos se redujeron.

Los datos sobre el intérvalo batimétrico (mínimo-máximo) son frecuentes en la literatura malacologica. La mayoría de tales citas, han permanecido casi sin cambio desde hace un siglo, y se han basado en dragados y rastreos voluminosos, registrando sin distinción moluscos vivientes o solo conchas dispersas. Se concluye que numerosos moluscos a nivel específico, genérico o familiar, están mucho más restringidos batimétricamente, de lo que hasta ahora se suponía. Una vez que el intérvalo batimétrico sea conocido con precisión, podrán utilizarse las faunas de moluscos como indicadores de desplazamientos verticales de cualquier tipo, en la plataforma continental.

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SEASONAL VARIATION IN CHEMICAL COMPOSITION AND IN ANTIMICROBIAL ACTIVITY OF THE LIPID FRACTION FROM CHITON SQUAMOSUS (MOLLUSCA, POLYPLACOPHORA)

Preliminary tests with crude extracts of soft body parts of chitons collected in August, 1970, revealed a relatively high lipid content and a significant activity of the lipid fraction against Gram-positive bacteria. Subsequent studies were performed with chitons collected periodically at the same site in La Caleta during 1971. Lipids extracted by Soxhlet in petroleum ether and in other solvents were tested for antibiotic activity by standard paper disc method on seeded plates.

There was some individual variation in the lipid contents of different chitons, but it did not seem sex related; however, there appeared to be a seasonal trend. In contrast to the average lipid content of 51.4% in the two original samples of August, 1970, the chitons, found chiefly in the supralittoral level, in January, 1971 showed only 1.62% lipid. During March and April the average lipid contents rose to 3.85 and 19.7%, respectively. During April, when most chitons were found at or below tide level, the lipid contents of some animals was as high as 61.10%. The lipid fraction from individual chitons collected during March and April was consistently active against Gram-positive bacteria and produced inhibition zones of up to 21 mm. With Staphylococcus aureus, occasional small, presumably mutant colonies were found within the inhibition zone. The activity against Gram-negative bacteria was not as consistent. During June and July the chitons were found mostly in the supralittoral level. Their lipid contents averaged 1.98 and 13.69%, respectively, and the lipid fraction did not exhibit antimicrobial activity.

Most of the lipid fraction may be derived from yellowish material which forms a raised chain-like structure on either side of the dorsal part of the body. This material, in contrast to other body parts, was shown by chemical analysis to consist of 90% or more lipids. The seasonal changes observed, however, may be related to the reproductive cycle. The microscopic appearance of the ovaries suggests that spawning might have occurred after the end of April, and that the chitons that spent their energy in the process might tend to accumulate lipids in the months that followed.

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SEDIMENTS AND GEOLOGICAL HISTORY OF THE GULF OF CARIACO, VENEZUELA

Grab samples from the Gulf of Cariaco have been analyzed for grain size distribution, composition, and fauna. The geology of the surrounding area and seismic studies in the Gulf have been used to study the area of deposition.

The sediments of the Gulf are from five basic sources: (1) Windborne clays and silts from the surrounding arid region, (2) Clays and silts from the Manzanares and Cariaco Rivers, (3) Gravity sediments from the mountains bordering the Gulf, (4) Biogenic sediments, (5) Relic sediments. That part of the Gulf enclosed by the 60-meter contour is stagnant as evidenced by high hydrogen sulphide and organic content. The sediments are clays and silts with small biogenic content from pelagic organisms.

The sediments around the margin of the Gulf show great diversity in contrast to the uniform central portion. The most predominant sediment types are shell fragments and relic sediments. During Wisconsin time, the margin above 50 meters was exposed and received gravity sediments. At this time, the sill at the mouth of the Gulf retained a lake or lagoon which was fed by the Cariaco and Manzanares rivers. The mouth of the Manzanares River was probably five to ten miles east of its present position.

The Gulf of Cariaco lies in a graben between large east-west trending faults. There is evidence that this is a very young feature. The Caiguire formation, of Pleistocene age, contains metamorphic rock fragments in several conglomerate layers. Since there is no source to the south, it is assumed that these came from the Araya Peninsula before the Gulf was formed.

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A STUDY ON THE OCCURRENCE OF FISHES IN RELATION TO CORALS

Along the south coast of Curaçao, an inventory was taken of 17 coral fields of 16 square metres each in shallow water, viz. 9 Millepora sp. fields and 8 Acropora palmata fields. From these fields all fish were collected and one specimen of every species of coral. The corals of both types of field were compared for cover (percentage of sampling area covered by one coral species) and sociability (degree of aggregation of individual colonies of one species), using the Braun-Blanquet method for sociology of plants.

The fishes were determined, weighed and measured and these data statistically analyzed. Significant differences were found in average length and weight between fishes from the two types of coral fields. These differences may be caused by a difference in structure of the coral fields.

Species composition in both types of fields were similar. Cover and sociability of all coral species in all sampling areas were completely similar with exception, of course, of Millepora sp. and Acropora palmata. Further conclusions await completion of the study.

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LA PRESENCIA DE WILLEELLA ORDINATA BOERGESEN EN AMERICA

El género Willeella de las Charophytas fue establecido por Börgesen (1930) a partir de colecciones efectuadas en el Puerto de Okha (India) y nominado como W. ordinata gen. et sp. nov. Desde entonces se han estudiado especímenes en el Cabo Comarin (Sur de la India), en el Sur de Africa y en el Sur del Japón. Willeella ordinata se registra por primera vez en America a partir del material recolectado en Cumarebo, Edo. Falcón (Occidente de Venezuela). En el trabajo se señalan observaciones anatómicas, morfológicas y estructuras de reproducción, realizados en ejemplares venezolanos.

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PHYLLORHIZA PUNCTATA IN THE TROPICAL ATLANTIC

In the summer of 1969, five specimens of a large rhizostome were collected in Boquerón Bay on the west coast of Puerto Rico. During 1970 about 20 specimens were collected. In 1971 the medusa of this species was abundant in most bays and harbors on the north and west coasts of Puerto Rico. Occasional specimens of this medusa had been seen by fishermen for some years before 1969.

The bell of the medusa is hemispherical and up to 50 cm in diameter. It may be predominantly either blue or brown and may or may not have small, white spots. The mouth arms bear eight long appendages with terminal swellings. The young of the fish, Chloroscombus chrysurus, is almost always found with this medusa.

The species is identified as Phyllorhiza punctata Lendenfeld, 1884. Examination of the literature as well as of specimens from Australia, Philippines, Hawaii and Brazil reveal that Mastigias ocellatus (Modeer, 1791); M. albipunctatus Stiasny, 1920, M. andersoni Stiasny, 1926, M. scintillae Soares Moreira, 1961, Cotylorhiza pacifica Mayer, 1915, and Cotylorhizoides pacificus Light, 1921 are all synonyms.

First to record the species in the Atlantic was Soares Moreira, who described it in 1961 from São Paulo under the name Mastigias scintillae. The species also occurs in Jamaica.

The life history of the species has been observed for the first time. The planulae are attached to the arm disc filaments of the female. Planulae settle a few hours after release. Development of the scyphistoma and strobilation are essentially as in Cassiopea.

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CARIBBEAN PECTINARIIDAE (ANNELIDA: POLYCHAETA)

Examination of Caribbean pectinariids contained in the Yale Peabody Museum, Museum of Comparative Zoology and the U.S. National Museum reveals three species. One species also occurs in the Pacific Ocean and one is possibly a hybrid. The commonest species is here reported for the second time.

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NOTES ON GROWTH OF SEA ANEMONES IN RELATION TO TEMPERATURE AND SALINITY, AND A METHOD TO OBTAIN CLONES OF THESE ANIMALS FOR EXPERIMENTAL WORK

In 1967 at the Netherlands Institute for Sea Research, the effect of temperature and salinity on growth of the European acontiarian sea anemone, Metridium senile L., was investigated briefly. Temperature and salinity were varied in series of aquaria in which all other conditions were kept uniform. Groups of young specimens of Metridium were exposed to the different circumstances in the different aquaria and their growth was measured, taking the surface of the pedal disc as the criterion. The fact that Metridium senile frequently reproduces by means of pedal laceration was exploited to obtain groups of genetically identical specimens (clones). Such asexual reproduction can also be induced artificially by cutting off pieces of pedal disc, producing sufficient supplies of individuals of the same age and similar size. The use of clones is preferable to use of genetically non-identical specimens for reasons of comparability.

In April, 1967, a subsequent investigation was begun on the distribution of sea anemones in relation to light, temperature and salinity at the Marine Biological Institute in Curaçao. According to Correa (1964 - Corallimorpharia e Actiniaria do Atlantico oeste tropical), 23 different species have been recorded from Curaçao. It was supposed that clones of several of these species could be artificially produced, as had been possible with Metridium, so that a comparative study could be made. Preliminary experiments were disappointing. Twenty-five species of anemones were collected, 12 of which seemed to be more or less suitable for experimental work, but regeneration of cut off pieces occurred in sufficient numbers in only one species, Aiptasia pallida (Verrill). Some regeneration potential was found in Telmatactis rufa (Verrill), Lebrunea danae (Dutch. & Mich.) and Diadumene sp. (probably D. leucolena (Verrill)), but this was insufficient to grow suitable numbers of young anemones. Because of this negative result, growth experiments will be undertaken with offspring of ovoviviparous species (viz. Phymanthus crucifer (Lesueur), Bunodactis stelloides (McMurrich), Bunodosoma granuliferum (Lesueur)), when a sufficient number of young of these species can be obtained.

Of the actiniarians surveyed, several are new records for Curaçao, and this has prompted a systematic review of the group in the Dutch Antilles.

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BENTHIC DIVERSITY AND OLIGOMIXITY AT THE CARIACO TRENCH, VENEZUELA: A PRELIMINARY ANALYSIS

Ten qualitative benthic samples collected from the Cariaco Trench, Venezuela, were analyzed by major taxa. Species diversity was calculated for each station using the Shannon-Weaver formula to identify oligomixic communities. The Isopoda were identified to species and one previously described species is reported; twelve new species and two new genera are illustrated and described in the appendix of this thesis. It was found from this study that the shelf isopod fauna from Venezuela shows a zero degree of affinity with the intertidal isopod fauna of Puerto Rico, a nearby island in the Caribbean; that the presence of benthic organisms in anoxic conditions supports the report of seasonality in the depth of the anoxic zone; and that the record of pogonophorans at shallow depth and high temperature and the presence of Eurycope in shallow tropical waters are unusual and testify to the unique ecological conditions in the trench.

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SEASONAL SEA LEVEL VARIATIONS AT PUERTO RICO

The seasonal variation of monthly mean sea level from September 1, 1969, to September 1, 1970, at Magueyes Island, Puerto Rico, was observed from tide gauge data to have a range of 17.3 cm. This variation has been analysed in terms of the contributions of mean monthly atmospheric pressure and the separate effects of temperature and salinity upon the steric sea level computed relative to 200 decibars from 18 hydrographic stations at a single location. The analyses indicate that the standard deviation of the observed mean sea level variation is reduced by 22% by the variation in atmospheric pressure, 17% by the temperature effect on steric sea level and 17% by the salinity effect on steric sea level. The residual sea level variation which remains after all three factors are subtracted is similar to that obtained by Shaw and Donn (1964) at Bermuda.

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SALT AND WATER BALANCE IN MANGROVE SEEDLING ROOTS

The ionic and water contents of the isolated roots of the Rhizophora mangle seedling have been examined. Isolated roots equilibrated for 20 hours at 4° C. show a significant reduction in their water and K contents as compared to roots equilibrated at 35°C. Equilibration at 35°C in the presence of the membrane inhibitor ouabain (10^{-4}M) results in a significant reduction in the Na, K and water contents of the isolated roots.

The rate of transpiration of R. mangle seedlings is altered in the presence of ouabain. The apparent activation energy for the movement of water through the ouabain treated plant is significantly greater than that found in the case of the untreated plant. The Na and K contents of the roots of the transpiring plant are significantly greater than that of the isolated roots equilibrated for 20 hours at 35°C. In the case of the ouabain treated plant the Na and K contents of the roots are not significantly greater than that found in the isolated incubated root.

These data suggest that the roots of the mangrove seedling play a primary role in the regulation of their Na, K and water contents, and the rate of transpiration in this plant. The relationship between these two phenomena is discussed.

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AN ANALYSIS OF THE ADHESIVE PROPERTIES OF CHLORELLA VULGARIS

The adhesion of Chlorella vulgaris to glass surfaces is significantly increased in the presence of thymidine ($2X10^{-4}$M) and colcemid (0.25 micrograms/ml). Uridine and guanidine will not substitute for thymidine in this case. This effect is strongly inhibited by actinomycin D. Analysis of the life cycle of Chlorella vulgaris suggests that in the G2 phase this cell is significantly more adhesive than in any other portion of the cell cycle.

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SOME ASPECTS OF THE BIOLOGY OF MOLLUSCS IN TRINIDAD MANGROVE SWAMPS

The largest area of mangrove in Trinidad is in the Caroni Swamp, bordering the Gulf of Paria just south of Port of Spain. This swamp, which is the centre of an important oyster industry, consists of 40 sq km of mangrove and herbaceous swamp surrounding numerous channels and lagoons. It is brackish, with salinity ranging from about 4‰ in the wet season to nearly 30‰ during the dry. The tidal range is approximately one metre; the water is highly turbid with a rich nutrient content and high standing crop of plankton. The estuaries through the swamp are bordered by Rhizophora mangle, behind which are dense stands of Avicennia enclosing open areas of dead mangrove.

Twenty three species of mollusca have been recorded from the brackish water mangrove area, which are distributed as follows:

1. Mangrove trees: Littorina angulifera
2. Mangrove rhizophores: (motile species) Murex cailleti, Thais haemastoma floridana, T. trinitatensis, Melampus coffeus, Melongena melongena, Pugilina morio, four species of nudibranch. (Sessile species) Crassostrea rhizophorae, Mytilopsis domingensis, Modiolus americanus. (Boring species) Martesia striata, Bankia fimbriatula.
3. Mud below mangrove and open lagoonal mudflats: M. coffeus, M. melongena P. morio, Anadara ovalis, Phacoides pectinatus, Macoma constricta, Marginella sp., Bulla striata, Tellina radiata, Tagelus divisus, M. americanus.

Three species, C. rhizophorae, M. americanus and Melongena, are exploited commercially at present, although utilization of Modiolus and Melongena is very restricted.

Crassostrea occurs as a band approximately 30 cm in extent between the mean levels of high and low neap tides. The upper limit is controlled by desiccation and competition with Chthamalus rhizophorae, and the lower limit of distribution by competition with sponges, tunicates and tubicolous polychaetes. Within the zone of oyster growth there is competition with Balanus eburneus and B. amphitrite and predation by Panopaeus herbstii, Melongena, Pugilina and Sphaeroides testudineus.

Oyster settlement occurs mainly during the dry season and overcrowding is severe. There can be up to 400 oysters per 30 cm growth zone on a single rhizophore, with mean size of only 25 mm. The oyster crop, and the size of individuals, can be increased significantly using lines of cut mangrove stakes placed vertically into the mud floor of shallow lagoons. On these stakes oysters reached sizes of 40 mm in four months, at which size they are normally marketed. If left unattended overcrowding from successive settlements of oyster spat resulted in over 50% mortality after nine months. Oysters up to 100 mm could be produced after 18 months by careful removal of all competitors. This was easier with oysters on cut stakes than on the natural rhizophores.

Melongena is the main predator on large oysters, although it is unevenly distributed through the swamp and its activity is restricted by exposure of the oyster beds at low tide. Conchs larger than 7 cm long are rare as so many are collected by hand for the market.

Although present on the rhizophores, Modiolus is found more commonly in the mud below Rhizophora. This species grows to 80 mm long, occurring in patches with up to 200/M^2. There is heavy mortality during the dry season, probably due to lower water levels. Modiolus grows well, after removal from the mud, when suspended in nylon-net bags from the rhizophores, as long as they are kept below low water level. Growth rates and spawning season are being studied.

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ALGUNOS ASPECTOS SOBRE LA CONTAMINACION DEL RIO MANZANARES POR DESECHOS INDUSTRIALES

El estudio de la contaminación del Río Manzanares se considera necesario ya que a el llegan efluentes industriales que ocasionan modificaciones en la vida acuática y en forma general del río mismo. Para nuestro estudio determinamos algunos parámetros físico - químicos y bacteriológicos como fueron: Determinación de temperatura, oxígeno disuelto. Demanda bioquímica de oxígeno (D. B. O.), y estudio bacteriológico como Recuento total de bacterias; colimetría, y bacterias fermentadora de azúcares.

Observamos de acuerdo con los resultados obtenidos que estos desechos afectan negativamente tanto la vida acuática, como la masa de agua del río. Se encontró particularmente que las condiciones se presentan perjudiciales al medio, en la época de zafra del Central Azucarero ubicado en Cumanacoa (Edo. Sucre) y el finalizar esta se observa un cambio brusco de las condiciones en el medio, de una manera favorable.

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PERCNON GIBBESI, A SYMBIONT OF DIADEMA ANTILLARUM

In a number of localities about Puerto Rico, at depths of .25-10 meters, and featuring habitats of waveplaned limestone rock or dead coral areas of reef fronts, the brachyuran crab Percnon gibbesi has been found exclusively with the echinoid Diadema antillarum. In these habitats several crabs may share a cluster of urchins and move freely from one to the other showing no territoriality. The usual posture of the crab beneath an urchin is one facing away from the urchin test. From above the crab is visible, but well under the canopy of long spines. This association of crab and urchin as well as these habitats and bathymetric range for the crab have hitherto not been reported. Laboratory experiments involving choices among rocks, realistic urchin models and living Diadema indicate the crab's preference for Diadema, only slightly less so for the model, but not for rocks of a comparable size. Analysis of crab gut contents as well as observations on feeding show that the crabs feed chiefly by grazing small species of algae or sorting bottom debris which on occasion includes urchin fecal pellets. From these preliminary observations it seems that a genuine symbiotic relationship exists between Percnon and Diadema in Puerto Rico with the crab being the active member and concealment for the crab the sole benefit.

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THE EFFECT OF AN OCEAN DEPOSITED FILM ON THE ADHESION OF CHLORELLA VULGARIS

The adhesion of Chlorella vulgaris to plastic surfaces has been found to be facilitated by exposure of the experimental surface to ambient sea water prior to incubation in the presence of Chlorella. Short term exposure of the plastic surface to ambient sea water results in a deposition not composed of viable cellular material. This material promotes the adhesion of C. vulgaris to the exposed surface in from 1 to 3 hours of incubation. The nature and effects of this deposition or film is discussed. The effects of exposure of the plastic surfaces to different water masses is also presented.

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SEASONAL VARIATIONS IN CARIBBEAN SEA CHEMISTRY, I: OXYGEN VARIATIONS

Oxygen levels in sea water are being determined at a hydrographic station off the south coast of Puerto Rico. The amount of oxygen is determined using a Beckman Oxygen Analyzer and an oxygen sensitive electrode.

Comparisons have been made between the Beckman system, another manufacturer's instrument, and the classical Winkler wet chemical method. Results to date indicate reasonably good agreement for offshore samples among the three determinations.

The amount of oxygen found at the hydrographic station in the column conforms to previously found data in general. However, a core of water at a depth of 300 m shows an O_2 maximum. This water core may be the 18° water formed in the Sargasso Sea during the winter months.

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SEASONAL VARIATIONS IN CARIBBEAN SEA CHEMISTRY, II: VARIATIONS IN ALKALINE EARTH/CHLORINITY RATIOS

The ratios Ca/Cl ‰, Mg/Cl ‰, and Sr/Cl ‰ have been determined on samples taken over a period of 18 months from a station 30 kilometers south of Puerto Rico (approximately 17°36'N and 67°00'W). The station was occupied every 14 to 20 days from April 1970 to October 1971. Samples were taken down to 2500 meters using Nansen bottles and reversing thermometers to establish accurate depths.

Ratios were calculated using data from careful EDTA titrations for total hardness and hardness due to Ca and Sr. Sr was determined separately by atomic absorption spectroscopy, and Cl ‰ was calculated from S ‰ which was determined with an induction salinometer.

Results show apparent irregular variations in these ratios throughout the entire column sampled. These variations represent about 7% of the mean for Ca/Cl ‰, 6% for Mg/Cl ‰ and 40% for Sr/Cl ‰; however, a majority of the values are within literature values published from 1884 to 1959.

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THE IMPOVERISHMENT OF THE FISH FAUNA ON CORAL REEFS AROUND CURACAO

In Curaçao there are plans to establish a marine park on the south coast. In this area, as a result of extensive spear fishing and collecting of fish for the aquarium trade, some species of fish have become quite rare or have entirely disappeared. To assess the effect of complete protection, a study of the present situation was initiated in the area which hopefully will be protected soon. A similar study will be conducted after the area has been protected for some time.

Some of the pursued species, specifically groupers (Serranidae), angel fishes and butterfly fishes (Chaetodontidae), were inventoried by making counts within marked off (by nylon lines) areas 100 m long and from 5 to 120 feet depth while swimming back and forth at 20 foot intervals.

As comparison with counts made in the heavily fished area in Curaçao, counts were also made in relatively unfished areas in Colombia and Bonaire.

Striking differences were found in numbers of some species in the fished and unfished areas. Depth of occurrence of some species also seems to be affected. For instance, large groupers have completely disappeared from the study area in Curaçao but were present in Colombia. Angel fishes were present in large numbers and from a depth of 10 to 120 feet in Colombia but were few in number and only in deep water in Curaçao. Coney (Cephalopholis fulva) were present in far greater numbers (13.26 per km) in Colombia than in Curaçao (5.8 per km). The seemingly disproportionate number of coney in Colombia may in part be due to the fact that in one area the coney count at 50 to 70 feet was many times greater than in any area in Curaçao. Interestingly, the coney, generally most abundant in shallow water, has also been observed in large numbers at a greater depth, providing that the shallow and deep water habitats are similar. In Colombia, at a depth of 70 feet, a sandy bottom with dead coral caused by dynamite blasting seems to provide a substitute shallow water environment for the coney.

Some species of rock hind (Epinephelus adcensionis) and the longsnout butterfly fish (Prognahodes aculeatus), present in reasonable numbers in Curaçao, appear to be not or rarely observed in the Colombian waters surveyed. In contrast, the gray angel fish, occurring in vast numbers in Colombia, was not observed in the study area in Curaçao. Previous studies have shown, however, that it does occur in small numbers in a small area in Eastern Curaçao.

As a check against the possibility that diurnal rhythms of inactivity affected the census, each 100 m area in Curaçao was surveyed at three different times of the day. All species were counted in about equal numbers during morning, noon and afternoon, suggesting they were equally active during the entire day.

The study in Bonaire had not been completed at the time the abstract was written but was to be reported at the meeting.

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Proc AIMLC 9:22 April 1973

THE SYMBIOTIC ZOANTHIDS OF PUERTO RICO WITH OBSERVATIONS ON THEIR BIOLOGY

The symbiotic zoanthids of Puerto Rico were studied chiefly with respect to their taxonomy, host specifity, rate and nature of colony growth, and predation.

In addition to the four known West Indian species, Parazoanthus tunicans, P. swiftii, P. catenularis, and P. parasiticus, two undescribed symbiotic species, one belonging to Parazoanthus and the other to Epizoanthus were found.

The hosts for each of the six species of zoanthids are Plumularia sp. for Parazoanthus tunicans; Iotrochota birotulata or Thalysias juniperina for P. swiftii; Xestospongia muta or Xestospongia sp. for P. catenularis; Gelliodes ramosa, Callyspongia vaginalis, Spheciospongia sp. or Cliona sp. for P. parasiticus; Agelas oroides or Agelas sp. for Parazoanthus n. sp.; and Xestospongia sp. for Epizoanthus n. sp. (frequently with P. catenularis).

Colony growth of the sponge-dwelling species was observed and photographically documented over a 14 week period. All host sponges had in common exteriors with partially exposed spicules or fibers. It is thought such surfaces are conducive and/or necessary for settlement of larvae. Colony growth is by stolons which give rise to rows with variable numbers of polyps. In P. swiftii and Epizoanthus n. sp., the polyps only occasionally separate one from the other, but in all the other species the rows of polyps soon break up into clones of one to four polyps. The stolons of Epizoanthus n. sp. occur beneath the surface of the sponge. Growth is most rapid in this species and amounts to a boundary advance exceeding 2 cm in 14 weeks.

All sponge dwelling zoanthids studied markedly contrast in color to their hosts. That this might constitute a warning to predators was investigated. Injection into Mugil curema of extracts from P. swiftii and Parazoanthus n. sp. showed that both zoanthids are toxic. Controlled feeding experiments using P. swiftii, its host sponge, Iotrochota birotulata and the sponge predator, Holacanthus tricolor, showed that the zoanthid or the sponge with zoanthids were never eaten by the fish.

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Proc AIMLC 9: 23 April 1973

DAILY MIGRATIONS IN THE LONG-SPINED SEA URCHIN *DIADEMA*

The behavior of *Diadema antillarum* Philippi, the long-spined sea urchin, is of interest from several points of view. The urchin is common, often reaching population densities high enough (e.g. $5/m^2$) to be of ecological importance; it is an animal which has received extensive neurophysiological attention, mainly from N. Millot and his co-workers; and it may prove to be a model system for the behavior of certain other marine invertebrates.

The behavior of *Diadema* has been studied through the use of time-lapse cinematography *in situ*. In 1968, I made a preliminary study (results abstracted in American Zoologist 9:1075, also available as CARMABI publication #88) and since January, 1971 have been working at CARMABI using an improved camera system. I have been able to make 18-hour sequences, at a rate of two frames per minute, showing the daily migrations of the urchins underwater in their normal environment. An automatic exposure system permits the use of night light levels of 0.1 lux--about the same as full moonlight--which does not appear to disturb the animals. Samples of these films were shown.

Provisionally, pending detailed analysis, the new films tend to confirm the statements made in 1969, but a few amendments should be made. Migrations often carry the urchins further from the coral head than the "1-2 meters" earlier cited as typical. The time of dispersal, previoulsy given as "about 3 p.m.," turns out to be quite variable, ranging from 11 a.m. to 6 p.m., although 2 - 4 p.m. is quite typical. Reaggregation begins well before sunrise, typically 2 - 4 a.m., and involves what appears to be well-oriented taxis toward the coral heads.

The timing of dispersal and reaggregation suggests an internal clock or, at any rate, a control mechanism other than a reaction to illumination intensity. Experiments in tanks under constant illumination seem to confirm this.

It should again be emphasized that the behavior shows considerable variation depending on the environment. For example, in areas that are rich in coral, the pattern of aggregation is absent, or at least much less striking.

The behavior pattern of *Diadema* shows some very striking parallels with some features of the behavior of certain pagurids, notably *Clibanarius tricolor*, as described by Hazlett (1966: Studies Fauna Curaçao 23:1-143). Hazlett's description on pp. 20-26 can almost be read as a detailed, circumstantial description of *Diadema* behavior. It is interesting to speculate on the biological meaning of this parallel. If one could decide how the needs of this hermit crab resemble the needs of *Diadema* --and how they differ from other hermit crabs--one might have a clue to the biological role of the pattern.

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Proc AIMLC 9: 24 April 1973

DEVELOPMENT OF THE CUBOMEDUSAE, CARYBDEA MARSUPIALIS

For the first time the life history of this common inshore species of Cubomedusae has been observed in entirety. Carybdea marsupialis is present the year around in bays, harbors and mangrove channels. The species is oviparous and a few ripe specimens may be found in any season. The polyps have been found on dead bivalve shells on the bottom of mangrove channels.

Settlement of planulae occurs about two days after fertilization of ova. Polyps attain the definitive complement of 24 tentacles in about 72 days at which time the body length is 1.5 mm. From the 12-tentacle stage on, the polyps produce, asexually, hydra-like buds near the mid column. These buds are shed with five to 12 tentacles and henceforth resemble the parent polyp in morphology and rate of development.

The chief features of the solitary polyp are its long, contractile, cone-shaped peristome; its solid, capitate tentacles which lack nematocysts except for a single large one at the tips; nematocysts unlike those found in the medusa; overall ciliation; and total and direct transformation of the polyp into a medusa. Unlike scyphopolyps, the cubopolyp is not tetramerous until metamorphosis and it lacks periderm, septa, longitudinal muscle bundles and peristomial pits.

Onset of metamorphosis to medusa is evidenced by shortening of the polyp tentacles and squaring of the crown. The polyp tentacles coalesce into four groups of six as they are resorbed and ultimately become the four rhopalia, each with six pigment spots. Before resorption of polyp tentacles is complete, two medusa tentacles begin to form. Unlike polyp tentacles, these bear annular batteries of nematocysts. The calyx of the polyp swells and the peristome recedes within it to become the manubrium, and at the same time the hollow interior of the medusa bell is created. The stalk of the polyp rapidly decreases in size, but before it is completely resorbed, the two-tentacled medusa begins to pulsate and breaks loose from the substrate with the remmant of the stalk still present on the apex of the bell. About 10 days later two more tentacles appear, pedalia begin to form on the first two tentacles, the polyp stalk is completely resorbed, and the young medusa, except for size, resembles the adult sexual stage.

The several basic features by which the cubopolyp differs from either the hydropolyp or scyphopolyp, together with morphological peculiarities of the medusa generation, suggest that the Cubomedusae may comprise a taxon comparable in rank to that of Scyphozoa and Hydrozoa.

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Proc AIMLC 9: 25 April 1973

PRELIMINARY INVESTIGATIONS OF RELATED SPECIES OF INVERTEBRATES FROM THE TWO COASTS OF PANAMA, USING ELECTROPHORETIC TECHNIQUES

Investigations were carried out using polyacrylamide gel disc electrophoresis and were based on observations of the band patterns of malate dehydrogenase, lactate dehydrogenase, and myoglobin.

On the basis of patterns of malate dehydrogenase, affinities among three species of Littorina (Mollusca: Gastropoda) from the Caribbean coast of Panamá and three others from the Pacific coast do not lie always between species from the same nor from the opposite coast. Littorina aspera (Pacific) has closest affinity to L. modesta (Pacific) and L. angulifera (Caribbean) to L. fasciata (Pacific). L. lineolata (Caribbean) shows close affinity to both L. aspera (Pacific) and L. modesta (Pacific).

Five of the species of Littorina exhibited essentially identical patterns of myoglobin; the exceptional species was L. angulifera.

No affinities were noted among the six species as regards patterns of lactate dehydrogenase.

Electrophoretic patterns of bands of malate dehydrogenase of paired species of three genera of echinoid echinoderms (Diadema, Eucidaris, and Echinometra) from both coasts of Panama were also observed. These show rather little in common between species of the same genus, but sympatric species from the Caribbean (Echinometra lucunter and E. viridis) have nearly identical patterns.

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Proc AIMLC 9: 26 April 1973

THE LIVING PTERIIDAE (MOLLUSCA) OF THE WESTERN ATLANTIC AND EASTERN PACIFIC OCEANS

The pearl oysters (family Pteriidae) are distributed throughout the tropical waters of the world.

The taxonomy, anatomy, morphology, ecology and zoogeography of American species were discussed in terms of the relationships among the species and to their systematic positions. Special emphasis was given to aspects of the anatomy and habitat which differentiate the two genera, Pteria and Pinctada.

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Proc AIMLC 9:26 April 1973

THE SPAWNING SEASONS OF CARIBBEAN REEF FISHES

Observations on the maturation of gonads of reef fishes in Jamaican waters have shown that, for most species, spawning is concentrated around the period February to April. Seasonal fluctuations in the relative frequency of occurrence of spawning fishes are described for about 30 common species of near-shore reef fishes, all of which exhibit peaks of spawning activity at the above mentioned period.

Most species of grunts (Pomadasyidae) exhibit a more extended spawning season, from a peak in February or March to a minimum in September - November, as do surgeon fishes (Acanthuridae), and parrot fishes (Scaridae). The snappers (Lutjanidae), hinds (Serranidae), angel fishes (Chaetodontidae), and jacks (Carangidae) appear to spawn almost exclusively in the period February to May.

Data collected sporadically on offshore oceanic banks of the Caribbean are in general agreement with the data from near-shore reefs, but the snappers (Lutjanidae), which predominate in the deep reef community in depths of 60-200 m appear to spawn over an extended period with maximum activity from September to April, and minimal activity in July and August. There is some evidence to indicate that onshore and offshore spawning movements occur in certain species.

The observed peak in spawning activity in March precedes by two to three months the maximum in net primary plankton production and coincides precisely with the minimal water temperatures (26.5 - 27.0 °C) observed by Beers et al. (1968). Maximum water temperatures (circa 29.5°C) are reached in October, at which time overall spawning activity reaches a minimum.

The importance of arriving at a thorough understanding of the periodicity of spawning is emphasised, particularly for commercially important species. The degree to which island fisheries are dependent upon recruits spawned upcurrent is largely unknown, and locally enforced measures for conservation of spawning stocks may be ineffective is stocks densities are dependent upon other unregulated stocks.

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ESTUDIO TAXONOMICO DE LA FAMILIA SARGASSACEAE DEL ORIENTE DE VENEZUELA

La familia Sargassaceae (Subclase Cyclosporeae, División Phaeophyta) contiene uno de los más difíciles grupos de plantas marinas para trabajo taxonómico. Esto es debido al hecho de que diversas condiciones ambientales influyen en la morfología de las plantas, dando como resultado una identificación tentativa de las especies y al establecimiento de muchas variedades.

Para tener máxima confianza en la identificación de las especies, muchos investigadores han sugerido la necesidad de hacer un cuidadoso estudio en un área determinada, estudiando plantas adultas y desde diferentes habitat.

En este trabajo se elabora un breve resumen de los estudios que se han realizado sobre esta familia en Venezuela y de las caracterísitcas de 5 especies (S. filipendula C. Agardh, S. cymosum C. Agardh, S. vulgare var. foliosissimum C. Agardh, S. polyceratium var. ovatum Montagne y S. ramifolium Kutzing) identificadas por la autora después de una cuidadosa revisión del material (recolectado por la autora y existente en el Departamento de Biología Marina del Instituto Oceanográfico) desde diferentes lugares del Oriente de Venezuela tales como: Golfo de Cariaco, Bahía de Mochima, costa norte de la Península de Araya y en las Islas de Margarita, Coche y Cubagua.

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UN MODELO TENTATIVO DE LA MIGRACION DE ATUN ALETA AMARILLA EN EL OCEANO ATLANTICO OCCIDENTAL DEDUCIDO DE LOS DATOS DE LA PESCA DE ATUN EN VENEZUELA

Para el manejo racional del stock de atún aleta amarilla en el Océano Atlántico, es importante saber si existen una ó más poblaciones separadas.

Datos sobre captura por unidad de esfuerzo, distribución de frecuencias de tallas y distribución del esfuerzo pesquero, tomadas de las pesquerías con palangre de Venezuela, así como también el análisis de datos biométricos, sugieren que existen dos stocks de atún aleta amarilla, uno en el Caribe y otro en el Océano Atlántico Occidental al norte de las Guayanas, separados por las Antillas menores y el cinturón de las Aves (60-61°W). No existen evidencias de un intercambio significativo entre ambos stocks.

Este modelo coincide parcialmente con el propuesto por Honma y Hisada, quienes también distinguen dos stocks, uno en el Océano Atlántico extendiendose desde el Golfo de Guinea hasta la costa norte de Suramerica y el Mar Caribe y el otro en el Mar Caribe, Golfo de Mexico y la costa este de U.S.A.

Sin embargo, de acuerdo a éste último modelo existe un área de mezcla de los dos stocks en el Atlántico Norte Occidental hacia las Guayanas y costa norte de Brasil

Nuestros datos no confirman esta parte del modelo de Honma y Hisada.

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POSIBLE EFECTO DE MICROALGAS A LA FORMA DE CRISTALIZACION DEL CLORURO DE SODIO EN LA SALINA DE ARAYA

En la Salina Artificial de las Salinas de Evaporación Solar de Araya se ha observado en los últimos años disminución en la capacidad de producción debido a ciertos fenómenos negativos en relación directa con la producción y con la calidad de la sal como, son disminución de la evaporación diaria de la salmuera, necesidad de evacuación al mar salmueras concentradas, formación de cristales finos, esqueletales húmedos y quebradizos y bajo ciertas condiciones se observó que la planchada de sal formada presenta inclusiones de materia orgánica putrefacta de aspecto y olor desagradable.

Estos fenómenos negativos nos indujeron a efectuar observaciones detalladas y trabajos relacionados con el problema todo lo cual se expone en el siguiente informe con la finalidad de incitar a los interesados a efectuar investigaciones más detalladas tales como, encontrar métodos más efectivos, prácticos y económicos para combatir el problema como también efectuar estudios teóricos sobre la hipótesis planteada en el trabajo de los posibles efectos de las microalgas a la cristalización del Cloruro de Sodio y de los tipos de microalgas que puedan influir en caso de que se demuestre la hipótesis.

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OBSERVACIONES BIOECOLOGICAS DE METAMYSIDOPSIS INSULARIS BRATTEGARD (CRUSTACEA-MYSIDACEA) EN LAGUNA GRANDE, CARENERO, EDO. MIRANDA, VENEZUELA

Una investigación de los Mysidaceos se realizó en una laguna de mangle (Laguna Grande, Carenero, Edo. Miranda), con el objeto de conocer las variaciones mensuales, así como también algunos aspectos de morfología y desarrollo embrionario. Durante los meses de mayo a octubre de 1970 se encontró que la población está representada por una alta densidad de una sola especie, Metamysidopsis insularis Brattegard, representante nuevo para Venezuela. Especie típica de las regiones de mangles sombreadas y tranquilas en las zonas de Carenero, y con un rango de salinidad de 32‰ a 37‰, temperaturas entre 31°C y 34°C y valore de oxígeno entre 2.5 - 0.5 ml/l.

De los parámetros medidos, la salinidad resultó ser el factor determinante en la distribución de estos organismos. Los mayores porcentajes de esta especie se registraron en la segunda quincena de los meses de mayo (zona II) y de agosto (zona I), representados por formas juveniles. De las formas adultas resultaron ser más abundantes las hembras ovígeras con un tamaño promedio entre 4.5 - 5 mm, y con un número de 8 a 13 larvas por bolsa de gestación.

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FORAMINIFEROS INDICADORES DE LOS FONDOS DE LODOS REDUCTORES

Estudios ecológicos realizados en fondos de lodos reductores (arcillas y limos) a profundidades moderadas de la plataforma y el declive continental entre Cabo Codera y la Laguna de Unare como en otras localidades entre Puerto La Cruz y Cumaná, muestran que varios géneros de foraminíferos bentónicos son utilizables como indicadores características de dichos biotopos. Esos géneros son: Ammonia, Florilus, Fursenkoina, Cancris, Uvigerina, Brizalina, Sagrinopsis, Lagenammina y Bigenerina.

Las distribuciones y frecuencias de estos indicadores, en los biotopos reductores, depende principalmente de los valores del consumo de oxígeno por el sedimento y de la profundidad.

Se presenta una discusión de la ecología de cada indicador en base a datos bioestadísticos.

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ALGUNAS NUEVAS ADICIONES PARA LA FLORA MACROBENTONICA DE VENEZUELA

Colecciones continuas de las algas marinas macrobentónicas realizadas en varios lugares del oriente de Venezuela en los últimos 4 años han revelado muchas especies nuevas y nuevas adiciones para la flora macrobentónica de Venezuela. Se presentarán en este trabajo las observaciones del autor sobre 4 especies de algas marinas, las cuales son adiciones nuevas. Estas son Acrochaetium phacelorhizum Børgesen (Acrochaetiaceae, Nemalionales), Gelidium microdonticum Taylor (Gelidiaceae, Gelidiales), Coelothrix irregularis (Harvey) Børgesen (Champiaceae, Rhodymeniales y Dohriniella antillarum (Taylor) Feldmann-Mazoyer (Ceramiaceae, Ceramiales).

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SOME OBSERVATIONS ON THE FISHERY AND BIOLOGY OF PINK SHRIMP PENAEUS BRASILIENSIS NEAR THE ISLAND OF MARGARITA, VENEZUELA

Information about the fishery and biology of pink shrimp, Penaeus brasiliensis, near the island of Margarita was collected every month from February to June, 1971 from a commercial trawler based in Cumaná. The boats have an average length of 20 m, and all of them use the same kind of trawl net, measuring 21 m across the mouth and 26 m in length.

A total of 198 trawlings were analyzed out of which 123 or 62% contained shrimp. Pink shrimp P. brasiliensis, on the average, accounted for 95% of the shrimp caught, the other 5% by the brown shrimp Penaeus aztecus subtilis. The catch of brown shrimp was, however, high in the southern part where the bottom is muddy. In the northern part the bottom is sandy often mixed with shells.

The average catch of shrimp per hour of trawling was 12.4 kg taking into account the whole area. The minimum catch was 3.3 kg and the maximum, 63.3 kg. Except for four occasions all catches were were taken during night. The catch was comparatively low during day time, and every night fell during evening and morning.

Female shrimp were more abundant in the catch and constituted 66.28% and male, 33.72%. Female shrimps were also of greater average size. The largest female had 62.8 mm c.l. and 248.0 mm t.l. The largest male had 43.3 mm c.l. and 196.0 mm t.l. Four stages of maturation, underdeveloped, developed, yellow and ripe, were observed. A ripe ovary has an olive green color. The minimum size with ripe ovary was 31.4 mm c.l. and 142 mm t.l. The highest number of females with ripe ovaries was 47.5% observed in the month of June.

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CONTRIBUCION AL CONOCIMIENTO DE LAS DIATOMEAS BENTONICAS DE BAHIA DE MOCHIMA

Se analizaron 25 muestras de sedimentos provenientes de 5 estaciones localizadas en Bahía de Mochima, Edo. Sucre, Venezuela. Se identificaron 51 especies de las cuales 43 son nuevas para Venezuela. Se encontró una aparente relación entre las especies del género Mastogloria y el substrato.

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LA LONGITUD DEL TUBO DIGESTIVO DE CENTROPOMUS ENSIFERUS Y MUGIL LIZA EN RELACIÓN CON SUS HÁBITOS ALIMENTICIOS (PISCES)

Cumpliendo un programa de trabajo ictiológico en la Laguna de Tacarigua, situada en el centro de la costa norte de Venezuela, consideramos de interés incluir el estudio de la alimentación en las especies Centropomus ensiferus y Mugil liza por ser las de mayor importancia económica.

Se les estudió comparativamente el aparato digestivo y se hicieron mediciones totales y parciales del tubo digestivo (cavidad buco faringea, esófago, estómago cardíaco y pilórico, intestino y recto). Se les tomó las longitudes total y standar así como el peso del ejemplar en el momento de la captura. Se analizaron cualitativamente los contenidos estomacales e intestinales de cada individuo, determinándose así mismo, cuantitativamente dichos contenidos.

Los análisis efectuados en los contenidos estomacales e intestinales demostraron que Centropomus ensiferus es un carnívoro mientras que Mugil liza es iliófago.

Los resultados de las mediciones demostraron la íntima relación entre el tipo de alimentación y la longitud del tubo digestivo, presentando C. ensiferus una longitud del tubo, casi igual a su longitud; mientras que M. liza presenta una longitud del tubo, casi tres veces la longitud del cuerpo.

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PRESENCIA DEL ICNOGENERO COSMOPOLITA SKOLITHOS, DE EDAD PALEOZOICO INFERIOR, EN EL ESTADO DE SUCRE, VENEZUELA

A lo largo del margen septentrional de la Serranía del Interior, en el Oriente de Venezuela, aflora una espesa secuencia de areniscas arcósicas con abundantes galerías de Skolithos. Este nivel de arenisca, se presenta en los núcleos de anticlinales y escarpes de fallas, en la porción inferior de la Formación Barranquín (sensu lato) entre las poblaciones de Cumaná y Mariguitar. A primera vista es semejante a las espesas secuencias de arenisca rosada con estructura de estratificación cruzada de la citada formación, se distingue de ellas por su contenido arcósico, y sus abundantes galerías verticales de Skolithos. Estas galerías son indistinguibles de Skolithos linearis (Haldeman), que caracteriza areniscas del Paleozoico Inferior de Europa, América, Groenlandia y Tasmania, y se considera que se han formado en la zona litoral, en sedimentos marinos de alta energía.

Estas galerías se hallan en la base de la sección Infra-Cretácea, sin que se hayan hallado otros fósiles en este nivel o debajo de ella. Las relaciones estructurales de la arenisca de Skolithos con la Formación Barranquín suprayacente, precisa estudios ulteriores. No ha de descartarse la posibilidad, de que las galerías fuesen elaboradas por otros invertebrados vermiformes en el Cretaceo, en respuesta al estímulo ambiental semejante a la existente durante la trasgresión Cambro-Ordoviciense.

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IDENTIFICACION DE ACIDOS GRASOS EN HOLOTUROIDEOS POR CROMATOGRAFIA DE GAS

Se determinaron alrededor de 27 ácidos grasos en las especies Isostichopus badionotus y Ludwigothuria mexicana (recolectados en la bahía de Mochima) de los cuales se identificaron en forma de ésteres metílicos los siguientes: C_9, C_{10}, C_{11}, C_{12}, $C_{\bar{1}2}$, C_{13}, $C_{\bar{1}3}$, C_{14}, $C_{\bar{1}4}$, C_{15}, $C_{\bar{1}5}$, C_{16}, $C_{\bar{1}6}$, C_{17}, $C_{\bar{1}7}$, C_{18}, $C_{\bar{1}8}$, C_{19}, $C_{\bar{1}8}$, $C_{\bar{2}0}$, C_{20}, C_{21}, C_{22}, $C_{\bar{2}2}$, $C_{\bar{2}2}$, $C_{\bar{2}3}$, $C_{\bar{2}4}$. La identificación se hizo por interpolación del logaritmo de la distancia de retención, en las rectas de las series homologas de ésteres metílicos saturados, de una y dos insaturaciones. Ambas especies presentaron similitud en el contenido de ácidos grasos.

Los análisis se realizaron en un cromatógrafo Perkin Elmer Modelo 880, operando isotérmicamente a 203°C en columnas de cobre de 10' x 3/16". Se usó como fase líquida DEGS al 20% en cromosor W 80/100 mallas.

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CONTRIBUCION AL ESTUDIO DE LOS HOLOTUROIDEOS DE VENEZUELA

Con esta contribución, se inicia en Venezuela el estudio taxonómico de la clase Holothuroidea: Echinodermata. Se citan Brandothuria arenicola (Semper), Brandothuria impatiens (Forskal), Fossothuria cubana (Ludwig), Semperothuria surinamensis (Ludwig) y Microthele parvula (Selenka) como representantes de la familia Holothuriidae, además Isostichopus badionotus ubicada en la familia Stichopodidae.

El material de estudio fue colectado en Bahía de Mochima y Costa Sur del Golfo de Cariaco. Para el procesamiento de las muestras se utilizó hidrato de cloral al 0.1% en agua de mar, como anestésico y alcohol de 70% como fijador.

La observación de las espículas, carácter determinante en la identificación de las especies, pudo lograrse por disolución de la piel y otras estructuras en hipoclorito de sodio al 5.25%.

De las seis especies estudiadas, cuatro (4) constituyen nuevos aportes a la fauna de equinodermos de Venezuela.

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INTRODUCCION AL CONOCIMIENTO DEL GENERO ASTRAEA RODING (MOLLUSCA: ARCHAEOGASTROPODA) EN LAS AGUAS COSTERAS DE VENEZUELA

Abbott (1954, 1958 y 1962) señala el presente género para algunas islas del Caribe. Weisbord (1962) registra para Venezuela las especies Astraea brevispina Lamarck y A. tuber, en el Estado Miranda y el Distrito Federal, respectivamente. Finalmente, Flores (1967) cita a A. tecta, A. caelata y A. cf. tuber para las islas Las Aves. Este estudio comprende todo el material colectado entre 1963 y 1971, en expediciones realizadas por el Instituto Oceanográfico. Las cuatro especies antes señaladas han sido confirmadas en esta revisión. Además se ha encontrado una forma muy abundante en las costas exploradas, que hemos estimado como una subespecie de A. tuber, la cual representa una adición a la fauna malacológica de las aguas costeras venezolanas.

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ARTES DE PESCA USADOS EN EL ORIENTE DE VENEZUELA

Con el presente trabajo se trata de establecer un conocimiento detallado de los tipos de artes de pesca utilizados en Venezuela. En nuestro estudio hemos dividido a las Costas Venezolanas en tres areas o zonas: Oriental, Central y Occidental.

En esta oportunidad se presenta aquí los resultados preliminares del estudio realizado en la Zona Oriental; donde se puede observar que los artes de pesca utilizados por los pescadores son variados en forma, tamaño y uso; abarcan desde las arrojadizas a mano como las atarrayas, hasta las redes de arrastre operadas por barcos modernos.

En general los artes mas usados son: Redes de playa, de cerco, de ahorque, cordeles, nasas y atarrayas, con los cuales se captura la totalidad de la producción pesquera de la zona en referencia.

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