Species survey of French Polynesia
marine invertebrates of Tetiaroa Atoll
Summer and Fall 1998

(Note: Corals and Sponges are excluded in this survey)

By: Edward S. Tarvyd
Professor of Marine Biology
Santa Monica College

Kingdom:	Protista
Phylum:	Protozoa
Class:	Foramenifera
Family:	Homotremidae
	Homotrema rubrum

Covering the underside of coral rubble everywhere are colonies of Red Forams, small blotches of either light or deep red, from the surface waters to considerable depths.

The adult attached forams are dendritic, with irregular branching chambers obscuring early trochoid growth; often red in color.

Family Homotremidae

The three peculiar genera in this family bear little superficial resemblance to other foraminifera; they are often mistaken for bryozoans. Although the juveniles have a typical trochoid pattern of growth, the chambers soon become permanently attached to the substrate and grow upward in an irregularly branching, mass which obscures the early growth. The genera are also unusual in processing distinctive coloration of taxonomic significance. They are very common attached organisms, but empty tests are rarely found in sand accumulations.

Key to the Genera of the Family Homotremidae

1. Test with slender branching projections; surface finely perforate; large open apertures; light red color .....Miniacina

   Surface not perforate in adult other than by apertures; branches short, stubby 2

2.(1) Large apertures covered by perforated plates; dark red in color ..... Homotrema
   Apertures not covered by plates; orange red color ..... Sporadotrema

   Homotrema rubrum (Lamarch) Florida, USA, species

Throughout Tetiaroa Atoll these red sessile foram colonies are ubiquitous on the undersides of dead coral, coralline debris or shells (eg. Tridacna)

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Gecarcinidae

Cardiosoma carnifex (Herbst,1994)
("Tupa crab")

Ecology: Cardiosoma carnifex is a common land crab found throughout the Pacific Females must return to the ocean to deposit their eggs; juveniles return to land when they are quite small and remain terrestrial. Lives in burrows that are dug to the water table; burrows may be up to two meters in length. Is an opportunistic feeder … consuming a large variety of organic material. Can travel up to 40m for food. Dependent on sea water for pelagic existence; essentially nocturnal.

Cardiosoma carnifex is capable of withstanding dessication for a maximum of 192 hours.

Characteristics: Adult crab carapaces are 3 to 13cm in width; chelipeds are unequal, especially in males.

Distribution: It occurs generally in the tropical Indo-West Pacific from East Africa to the Pacific Islands, and in the Red Sea Regions.

Remarks: On Moorea it occupies habitats ranging from roadsides and mudflats to coconut groves. Tupa crabs occupy the top of the energy pyramid in many tropical islands where vertebrates are absent. Through their burrowing behavior, these crabs contribute to the turnover and aeration of the soil, leaf litter breakdown, and the rate of energy flow. Also, they often are a significant food source for humans on many tropical islands.

On Tetiaroa Atoll, tupa crabs are extremely abundant in the interiors of motus Tiarunu, Hiraanae and Oroatera around fallen trees and ground debris. They are also abundant along the land sides of hoas.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Calappidae
Subfamily:	Calappinae

Calappa hepatica (Linnaeus, 1758)

Ecology: Found in fine sand within 1 to 2 meters of the shore; found buried in sand, usually anterior toward the surface. Have personally caught specimens on numerous occasions on Onetahi motu, Tetiaroa Atoll in area between "Dirty Old Bob Bar" and Casuarina roots toward lagoon side (east to NE of Bar). Have also caught specimens on N side of "Pig Island", 1/3 of way toward reef from lagoon. My personally caught specimens have always been in about 0.5m of water. Apparently they are more active at night when they come out of the sand to search for food, small snails whose shells they easily break with highly modified claws – powerful claws or chelae. Carapace has warty texture, with six postero-lateral spines; lateral carapace extensions bear several large spines.

Characteristics: Species of Calappa are recognized by the wing-like extension of the posterolateral regions of the carapace under which the four posterior pairs of walking legs are concealed. The hands are greatly expanded with high, toothed crests. Carapace is ornamented by numerous tubercles and is not quite twice as broad as long. The front borders of the wing-like extensions of the carapace are serrated. Large specimens are 4 inches broad.

Distribution: Indo-Pacific … South Africa; Red Sea; Philippines; Japan; Wake Island; Hawaii; Society Islands

Remarks: Calappid crabs are called Box Crabs because they can tuck their legs into the body giving the appearance of a neat box. Carnivorous eating "gastropods, hermit crabs and bivalves" (G. E. Warner, pg. 87). A California Calappid is Mursia gaudiichaudii, commonly taken by otter trawl in 50 fathoms of water at White's Point, Palos Verdes. M. gaudichaudii lives on fine mud-like sediment, walks with legs greatly extended, highly sexually dimorphic (large males, small females) and "bites like hell". It is reported that M. gaudiichaudii extends to Chile where it is trawled commercially, and sold as whole crab in fish markets.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Carpilliidae

Carpilius maculatus (Linne, 1758)
"Seven Eleven Crab"

Formerly included in Family Xanthidae (Edmonson, 1946)
Others still include this species in Xanthidae (Goslinger, Behrens, Williams)
Xanthidae are referred to as: "Dark Finger Coral Crabs"

Ecology: "Peche de nuit sur le platier." Slow and clumsy, it inhabits rocky areas in depths of 3 to 35 meters. Eats Gastropods, easily cracking their shells. Pacific species of Carpilius are better adapted at this with their larger chela than the Atlantic species of Carpilius (Warner, pg. 89).

Characteristics: The genus Carpilius includes some of the medium-sized crabs to be found under stones on the reef, or more frequently in crevices of porous rocks. They have a smooth, strongly convex carapace, the lateral borders of which are entire. The chelipeds are unequal and very stout. C. maculatus (Linnaeus) is conspiculously marked by 11 dark red spots, two behind each eye, three across the middle of the carapace, and four in a transverse row in front of the posterior border. Young specimens less than 1 inch across may have as many as 28 round red spots on the carapace. Large specimens are 6 inches broad. Carapace is relatively smooth, and there are four blunt interorbital spines.

Distribution: Especially common throughout the Indo-Pacific, and in particular within French Polynesia. South Africa; Red Sea to Australia; Philippines; Malaysia; Taiwan; Japan; Society Islands; Hawaii

Remarks: A large crab consumed by some, but reputed to be toxic, and hence, avoided by others. The largest "7-11" crab I've ever seen was caught and photographed off of Tetiaroa airstrip (Wed.) at 9:30 P.M. on 10/18/98. These are found living in association with the "carpet sea anemones" (Stoichactis kenti) at west end of Tetiaroa airstrip.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyara
Family:	Parthenopidae (Edmondson, 1946)

Daldorfia horrida – new name by John Garth, 1981(personal communication with Garth)
Parthenope horrida – older name used by Charles Edmondson

Ecology: Slow and clumsy, inhabits Tetiaroa lagoon areas with sandy bottoms and occasional clumps of coral rubble debris. Probably eats mollusks, cracking their shells. Looks remarkably like a piece of old coral rubble debris. Found in shallow to moderate depths … a specimen taken of this genus was in 6 fathoms of water near Lihue, Kauai. None likely to be seen on the reefs or close to shore.

Characteristics: Pentagonal carapace marked by deep depressions and tubercles. The chelipeds are long, unequal in size, and covered with coarse spines. In Hawaiian specimens the breadth is about 1.5 inches.

Distribution: Indo-Pacific … Tetiaroa Atoll; Hawaii; Philippines probably; Fiji, probably (*Tideline*, an Inglewood, California stony coral and shell wholesaler, has a Fijian specimen on display)

Remarks: During the day, Santa Monica College collected one specimen, in shallow water of Tetiaroa lagoon (1 meter) just north of "Bird Island" where the hotel boats anchor to allow clients walk to "Bird Island" … sandy bottom. Is a "shell cracking crab" (Warner, pg. 88) … "slow walker" way of life, and resembles a piece of coral rubble (Warner, pg. 79) … Warner classifies it as a member of family Parthenopidae (Warner, pg. 165, Table 4)

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Grapsidae

Grapsus tenuicrustatus
("Grapsus grapsus")
(Grapsus grapsus tenuicrustatus Edmondson, pg. 304)

Ecology: Especially common on littoral rocks, usually basaltic rocks of high islands. Eats algal debris biota; nocturnal.

Characteristics: The carapace is about 3 inches across in large specimens, strongly arched on the lateral borders and marked dorsally by oblique and transverse ridges. The front is sharply turned down and the fingers of the stout chelipeds are deeply hollowed out at the tips. It's color is greenish to black with some red about it.

Distribution: Red Sea to the coast of Africa, into Japan, Hawaii and French Polynesia. Common on wharf basaltic rock at Gump and on sea wall (basaltic rock) at Moorea Village Hotel, Haapiti, Moorea.

Remarks: Grapsus grapsus is pretty much limited to the Atlantic and the coast of Western America. G. tenuicrustatus is consumed by Polynesians, particularly in the Marquesas. The tropical shore crab, Grapsus is exceedingly agile over vertical surfaces (Warner, pg. 71). It has the capability of being a rapid runner, is light in weight, has large eyes, and long legs characteristic of quick movement (Warner, pg. 71).

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Ocypodidae

Ocypode ceratophthalma (Pallas, 1972)
("Ocypode" = swift footed)

Ecology: Nocturnal; in beach sand burrows during the day…will enter water to escape being captured at night. This species forms colonies in fine, firm beach sand close to the sea … very abundant on lagoon motus (islets) of atolls.

Characteristics: Carapace is square-like with the lateral borders entire. There is no gap between the external maxillipeds, and the chelipeds in both sexes are unequal. These crabs burrow in the sand, and at low tide one may see the openings of their tunnels. Adults are seldom seen during the day, but as dusk approaches they become active, digging out their burrows and throwing sand up around the openings. The larger burrows extend down in the sand in an irregular course for about 1 to 2 feet. They are called "Ghost Crabs" because of their grey color and nocturnal habits.

Distribution: Tropical regions of the Indo-Pacific

Remarks: Ocypode ceratophthalma appears to be the most common species of this family in both Hawaii and the Society islands. With this species, the thick carapace is a little broader than long and the lateral edges are nearly parallel. The whole surface is finely granulate. In old specimens, the long eye stalks may reach beyond the cornea of the eye. The chelipeds are stout, unequal, the palm being short and high in the larger appendage. On the inner surface of the palm of the large cheliped is a low, transverse ridge of comb-like teeth [stridulating organ] that can be scraped against the ischium resulting in a grating sound. Some suggest that the rasping note made by the male crab represents a mating call to the opposite sex. Others suggest it maybe a warning sound indicating to possible intruders that the burrow is occupied, "no trespassing allowed". Larger individuals of this species are nearly 2 inches broad. They are exceedingly fast in running across sandy beaches, and they will commonly enter the water to escape being caught. When in the water, they will rapidly cover themselves with sand to escape detection.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Ocypodidae

Uca (Thalassuca) tetragonon, (Herbst, 1790)
Uca (Amphiuca) chlorophthalmus crassipes Adams & White, 1848)

Ecology: Uca tetragonon resides on land on the borders of lagoons in dense colonies. Fiddler Crabs (the genus Uca) are gregarious in habit. They live in burrows on muddy flats exposed at low tide, and must retreat to higher ground if an exceptionally high tide comes in (they'll drown submerged in sea water for extended periods of time … certainly during the six hours between high tide and low tide).

Characteristics: Males possess one enormous chela and one small one, whereas females possess only small chelae on both chelipeds. Males are constantly waving their large chela in a "body language" behavior. The behavior of the genus Uca represents the most highly evolved behavior amongst any crab species in their signaling one another.

Fiddler crabs are characterized by a thick, smooth carapace which is broader than long and converges posteriorly. Long eye stalks are protected by grooves. Uca was originally chosen as the genus for these crabs from the Tupi Amazonian Indian word "uca", which means to "Fiddler Crab".

Distribution: Hawaii, Tahiti, Africa, the Orient and the Tuamotus … a very large Indo-Pacific distribution.

Remarks: If predators go after the Uca, they typically grab a male Uca by its enormous claw. If the predator then attempts to carry it off, the claw automizes (breaks off) and the crab falls to the ground. It replaces this claw with its next molt or ecdysis.

A small colony of red fiddler crabs exists on the lagoon side of the flat land of the hoa between motus Hiraanae and Oroatera. The colony is approximately 30 meters from the lagoon entrance of the hoa on the Hiraanae.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Diogenidae

Various small hermit crab species on Tetiaroa Atoll

Calcinus etegans … blue and black banding of walking legs.

Calcinus nitidus … red walking legs

Calcinus seurati … white and grey bands on walking legs..

Ecology:

Characteristics:

Distribution:

Remarks:

Note: *family Diogenidae are the left-handed marine hermit crabs*
family Paguridae are the right handed marine hermit crabs

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Coenobitidae

Coenobita perlatus, H. Milne Edwards, 1837
"Big Red Hermit Crab"

Ecology: The adult red hermit crabs are usually in the shell of the marine gastropod, Turbo setosus, however the juveniles may use shells of up to 30 species of gastropods. Often associated with coconut groves but are also found on the beach. Nocturnal in habits.

Characteristics: Large, red coloration; adult inside shell of Turbo setosus, Gmelin, 1791

Distribution: Very common throughout French Polynesia

Remarks: Easily found at "school house" beach site on Tetiaroa Atoll, Onetahi motu … about 7:00 P.M. on into the wee hours of the morning. Will engage in communal mass feeding behavior, even in the day, if a dead fish washes onto shore (as seen in Summer 1998 at Hoa barrier portion of long Tetiaroa motu, Oroatera motu).

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Coenobitidae

Coenobita brevimanus, Dana, 1852
"Big Purple Hermit Crab"

Ecology: Adults prefer shells of Turbo setosus ("Maua") or Turbo petholatus "Maua rouge")

Characteristics: Large rounded purple claw.

Distribution: Large distribution throughout the Indo-Pacific

Remarks: As of 1978 most of the records of anomuran crabs from the Society Islands included the following:
Family Hippidae (mole or sand crabs): 2 species
Family Coenobitidae (land hermit crabs): 3 species
Family Diogenidae (left-handed marine hermit crabs): 18 species
Family Paguridae (right-handed marine hermit crabs): 2 species
Family Galatheidae: 3 species
Family Porcellanidae (precelain crabs): 10 species

The majority of these animals will be found on the coral reef at various depths. At least one porcellanid (Petrolisthes lamarckii) is common under stones on bench rock but most porcellanids, hermit crabs, and galatheids will be found on the coral itself. Porcellanids and galatheids tend to be cryptic in habit and will take shelter in coral crevices, as do a few hermit crabs although most are more likely to be found crawling on the surface of corals or on the sand between coral clumps.

The hermits (Coenobitidae) of genus Coenobita will probably be found either high on the beach, or quite far inland.

Two species of Hippa have been reported from Tahiti, and there might be a few others. These inhabit sandy beaches, in the area of breaking waves – similar to the Emerita of Southern California beaches, but Hippa is carnivorous instead of a filter-feeder and an be attracted with bits of fish or similar bait. *(Anomuran information obtained from Janet Haig, Associate Curation of Crustacea, University of SouthernCalifornia, Alan Hancock Foundation, 1978)*

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Coenobitidae

Birgus latro (Linnaeus, 1776)
"Coconut Crab" or "Robber Crab"

Ecology: This is assigned to a monospecific genus containing the largest terrestrial arthropod in the world. Almost entirely terrestrial and drowns in water, although females must return to the sea to release their eggs, and crabs may go to the beach and drink sea water to maintain their salt balance. On barrier reef islands crabs have been found to live in shallow burrows in the substrate or hidden among Pandanus roots and fallen coconut fronds. Larger crabs may inhabit the best places on an island, with sandy soil for burrowing and abundant palm fronds. Basically nocturnal, herbivorous (coconuts, leaves, Pandanus "keys") but will eat young turtles…and decaying tortoises on tortoise islands. May be cannibalistic.

Characteristics: Carapace is sharp-fronted and swollen posteriorly; possess a bulbous tail, relatively long and strong legs and large red eyes. Body is firm, symmetrical (except for unequal claws) and linearly arranged. Weights of 7 pounds (3 Kg) and measuring three feet (1 m) from leg tip to leg tip is not unusual. Weights of 15 Kg have been reported (33 lbs in weight). Can lift at least 28 Kg. Sexually dimorphic: largest female thorax length = 4.7 cm, largest male thorax length = 7.6 cm; adults vary in color from purplish-blue to blue-orange red to orange red-red. Tetiaroa's coconut crabs are blue, whereas Aldabra's coconut crabs are red.

Distribution: Widely distributed through the western Pacific and eastern Indian Oceans, occurring almost exclusively on oceanic islands or on small off shore islets adjacent to large continental islands. Despite it's wide geographical range, it probably does not occur on all the atolls since those that are dry do not provide enough food. Examples of distribution: Aldabra, almost extinct on Seychelles, on numerous islands (small) off Tanzanian coast, Christmas Island; still present in parts of Indonesia, the Philippines and Taiwan; on small islands off of Papua, New Guinea; occurs in Fiji, Phoenix islands, Samoa, Tuomotus, Marianas, and Vanuatu; abundant on Tetiaroa Atoll, French Polynesia … NOT in the Hawaiian group, NOT on Wake or Midway.

Remarks: Larval stages consist of a pelagic stage or phase lasting 17-28 days, and an amphibious phase of 21-28 days during which the young crabs migrate onto land having occupied gastropod shells. When they reach a size where the carapace measures about 1 inch (2.5 cm) across, the shell carrying habit is given up. Young coconut crabs carry shells for about 2.5 years, and Marlon Brando has heard that coconut crab may live up to 40 years of age (personal communication with Marlon Brando). The meat of adult

coconut crabs is said to be the most delicious crab meat in the world, somewhat resembling crab meat which has been marinaded in coconut milk.

Coconut crabs are slow growing; crabs in excess of 10 cm are about 5 years old. During molting, crabs remain hidden in their burrows, which they plug up with soil, for about 30 days. The exuviae are eaten in the burrow before the crabs emerge. It appears as if there may be specific areas for molting where the crabs bury themselves.

Coconut crab abdominal fat is alleged to be an aphrodisiac.

Most hermit crabs engage in a lengthy courtship but mating in coconut crabs is quick, simple and infrequent. Spermatophore morphology suggests that copulation occurs in the water, but field observations suggest that it occurs on land. Fertilized eggs are extruded from the female's body and carried beneath her abdomen, held in place by three specialized abdominal appendages. Larvae are released usually at night and at high tide. Larval release may be related to lunar and tidal rhythms. It may well be selectively advantageous for the coconut crab to release her larvae into inshore waters during the Spring Tide to ensure the greatest opportunity for the eggs to be flushed off the reef flat where egg predation might be quite severe. Out in the open ocean waters, larval predation may be reduced and a more constant supply of edible phytoplankton and zooplankton may be available for the developing larvae.

It is debated in the literature as to whether or not coconut crabs actually climb coconut trees. The author (Edward Tarvyd) personally observed a coconut crab climb a coconut tree to the height of approximately 30 feet at 8:00 P.M. in the evening on November 5, 1998, site: Onetahi motu, Tetiaroa Atoll, approximately 30 witnesses to the event (hotel clients of Hotel). Additionally, I am in possession of old black and white movies of Polynesians finding coconut crabs in tops of coconut trees (circa 1930s).

Coconut crabs are well represented in the interiors of the long Tetiaroa motus (i.e. Tiarunu, Hiraanae and Oroatera). Ed Tarvyd found the discarded carapase of a coconut crab on Rimutu in 1998.

Unfortunately a lot of coconut crab poaching by fishermen on Tetiaroa has been an on going problem for decades. These crabs end up for sale on the streets of Papeete near the central market place.

Tetiaroa Atoll represents an excellent site to rear, raise and ranch coconut crabs for introduction of the species throughout French Polynesia to sites where they no longer exist due to complete past over harvesting of this magnificent and splendid faunal species.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Paguridae

Aniculus aniculus (Fabricus)

(This appears to be the hermit crab on the Tetiaroa Barrier Reef at the end of the Hoa)

Ecology: Located on the North side of Tetiaroa Barrier Reef at the end of the Hoa between motu Hiraanae and motu Oroatera, exposed at approximately 10:30 A.M.... always in same species of Mollusc gastropod shell (green Turbo?)

Characteristics: Red and White stripped legs; can strongly adhere to substrate of barrier reef with its vice-like walking legs. Legs are covered with multiple dense chitinous "hairs".

Distribution: Tetiaroa Barrier Reef...probably throughout French Polynesian, Japan

Remarks: Probably an algae eating hermit crab, requiring high amounts of dissolved O_2 (due to where it lives in the wave wash area of the barrier reef.)

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Anomura
Family:	Diogenidae

Dardanus megistos (Herst, 1804)

Note: Edmondson puts these into the family Paguridae. This crab is very similar to Dardanus punctulatus of Edmondson (pg. 265). Edmondson's gets to be 12 inches long. Large forms of Edmondson's are found at a few fathoms in depth and are commonly in Triton shells (Charonis tritonia). Theses have a lot of yellow bristles covering the body.

Ecology: This hermit crab (large) is a nocturnal species on the lagoon floor. Usually found carrying a gastropod shell of Turbo setosus, but on a solitary observation one was found to be occupying the strombid shell of Lambis truncata.

Characteristics: Red coloration with white polka dots, hairy legs and chelipeds; rostrum is absent.

Distribution: Tahiti, Tuomotus, throughout French Polynesia, common throughout the Indo-Pacific, coastline of Mozambique, Australia, Sea of China and Sea of Japan.

Remarks: Found in shallow water (1 foot deep) at Club Med side of Moorea Village Hotel. They are also represented on the floor of Tetiaroa lagoon.

Phylum: Arthropoda
Class: Crustacea
Order: Isopoda
Superfamily: Oniscodidea
Family: Ligiidae

Ligia exotica (Roux)
"Rock Louse"

Ecology: Typically on stony beaches and also are found about wharfs and on piling at the water's edge. During the late morning into the early afternoon, they are frequently found under and within old mollusc shells on beach edge in "coral hash".

Characteristics: The body is elongate oval with the second pair of antennae very long. The uropods are terminal, the peduncle bearing two long branches. Its color is dark brown or almost black (Edmondson), French Polynesian specimens are silver. The body proper may reach a length of about 1.2 inches.

Distribution: Hawaii, French Polynesia, Indo-Pacific

Remarks: Found on large cement sea water holding tanks at Gump Research Station, Moorea. Also, occurs on old coral rubble, "hash", on Rimatuu motu, Tetiaroa Atoll at water's edge and slightly landward. Probably a scavenger for food.

Phylum: Arthropoda
Class: Insecta
Order: Diptera
Family: Culicoididae

Culicoides belkini

"Nono"

Ecology: Adult form remains buried in sand all day, to emerge about 5:00 A.M. to 7:00 A.M., dusk to 7:00 P.M. … in order to feed. Then it reburies itself in the sand. Breeding site needed is brackish water (like on Rimatuu motu) and a certain texture sand substrate to bury itself in as an adult. Sand is white sand; burial site demarkation line between water line of beach and the bushes. These are their egg sites.

Characteristics: Very small biting fly, not usually seen by person being bitten; ectoparasitic; initial bite relatively painless … followed by inflammation at the site, then itching sets in and possibly infection. Only females bite.

Distribution: Throughout the tropical Indo-Pacific. Introduced to Bora Bora by American troops in WWII. Two species exist in the Marquesas Islands: Simullum buissoni = "Black Nono"), introduced to Marquesas by German naval forces in bags of Fijian sand that had been taken aboard as ballast. Has a 400 meter flight, and eggs are layed in sand just above high tide mark.

Remarks: Located on Moorea at Mauna Ora Hotel and on various motus of Tetiaroa Atoll (eg. Rimatuu). Very much of a nuisance to people, tourists at hotels, hotel owners et cetera where ever it has established itself. Hotels where it is located in their sandy beaches will often have "Happy Hour" at their bars (reduced prices on drinks, entertainment, et cetera) to get their clients off the beach between dusk and 7:00 P.M., during the "feeding times" of Culicoides. Introduced via ballast sand from New Guinea during WWII. Occurs wherever ballast sand was dumped (with Culicoides) that possessed proper ecological conditions to establish itself. Exists on a few of the larger Tetiaroa motus which possess brackish water lakes (i.e. Rimatuu).

Phylum: Arthropoda
Class: Insecta
Order: Hemiptera
Family: Gerridae

Halobates sericeus, Eschscholtz

Ecology: Apparently out on the open ocean they ride bird feathers, floating debris, styrofoam, et cetera (Don Abbott, circa 1968, Hopkins Marine Station, personal communication).

Characteristics: The short-bodied water striders representing this family have lost their wings, but they show remarkable specialization in their legs for running and skipping on the surface of the ocean. The body is covered with a dense coat of fine hairs (pubescence) which protects the insect if it becomes submerged. H. sericeus body is ovate, ashy grey in color with some reddish marks on the posterior margin of the head. Adults: 3 to 4 mm in length.

Distribution: Halobates sericeus inhabits both the Atlantic and the Pacific oceans, including the off shore waters of Hawaii. In Hawaii, it lives ocean ward of the reefs, but storms often drive specimens ashore where they may be picked up on the beaches (Edmondson, pg. 313)

Remarks: Easily found in quiet, shaded Hoa water surface on Tetiaroa, hoa between motus Hiraanae and Oroatera. Also, dead specimens are found on beach of Onetahi amongst dried Sargassum and Turbinaria seaweeds.

Phylum: Annelida
Class: Polychaeta
Order:
Family: Serpulidae

Spirobranchus giganteus (Pallas, 1766)

Ecology: This species lives in calcareous tubes which penetrate living coral heads, from the inter-tidal zone to more than 30 meters in depth. Young worms settle on the coral heads and secrete a tube that kills the underlying polyps. New coral growth quickly surrounds the tube. Worm secretes additional tube material to keep pace with the coral growth. Worm lives permanently in tube. Tentacles catch tiny planktonic organisms, and are quickly withdrawn to ultra light changes and pressure changes.

Characteristics: Twin spirals of evenly spaced tentacles; tentacles are extremely variable in color: yellow, blue, purple, red, orange, or brown; possesses a round, yellowish operculum. Highly ornate.

Distribution: Circumpolar: western Indian Ocean and western Pacific to the Caribbean and eastern Atlantic.

Remarks: Abundant on coral heads in 2 to 3 meters of water in Tetiaroa Lagoon between Onetahi and Rimatuu, near reef (30m from reef). Abundant on coral heads between Club Med motus, Moorea ... coral heads between elevated ancient corals toward barrier reef side of motus. It is not known why the wide variety of tentacle coloration exists.

Phylum: Annelida
Class: Polychaeta
Order:
Family: Amphinomidae

Eurythoe pacifica Kinberg (Edmondson, pg. 109)

According to Ralph Smith – Eurythoe complanata = the only common large free-living polychaeta in the rubble. Note the glistening white setae.

Ecology: one of the most conspicuous worms on local reefs. Very common under stones and in porous rocks near the shore; gregarious in habit; large specimens = 6 inches in length. An orange colored shrimp, Jousseaumea mauiensis, is almost always assoiciated with this worm; amphinomids are predatory and scavengers; some species are attracted to lights at night; can catch fish (file fish) or eat dead fish (smelt).

Characteristics: Flattened, thick bodied species with parapodia bearing tufts of glistening white bristles, which if touched by the fingers, will penetrate the skin and result in an irritating wound. Family Amphinomidae is characterized with its members possessing a folded lobe of sensory tissue (caruncle) on top of the head and extending over two or three segments of the body.

Distribution: Mozambique to the Hawaiian Islands; Moorea…between two Club Med motus under coral debris lagoon side of elevated ancient corals in between outer sides of motus.

Remarks: Fast undulatory movements when coral debris is lifted exposing the worm to light…in morning light (personal experience)…poisonous bristles are waved back and forth in defense.

Phylum: Annelida
Class: Polychaeta
Order:
Family: Serpulidae

Spirorbis sp.

Ecology: Under flat stones in shallow water; under 20x to 40x magnification, one can see pinnately branched orange tentacles of a feeding Spirorbis sp.

Characteristics: Serpulid Worms secrete calcareous tubes in which they live, the tubes being firmly attached to rocks, shells, or other supports. The head of the worm bears numberous gills, which in an expanded condition, spread out like the petals of a flower. Most species possess an operculum which seals the tube when the animal is drawn in. On the under surface of flat stones are the minute, closely coiled tubes of Spirorbis.

Distribution: Atlantic (Florida waters), California (Monterey and San Pedro)…Hawaii, Tahiti,…Cosmopolitan in tropical and temperate seas.

Remarks: *Gump* property has these all over in as little as <1m of water along edge of property. Commonly Spirorbis is attached to brown algae (Alaria) taken at "the rock pile" or Elkhorn kelp site, 3 miles outside of San Pedro, California breakwater, from depth of 12m to 13m. Not on Macrocystis…which secretes too much mucus.

Phylum: Annelida
Class: Polychaeta
Order:
Family: Terebellidae

Loimia sp.

Keys out L. medusa Savigny in Reef and Shore Fauna of Hawaii, but probably not that species (Ralph L. Smith, 1980, Gump)

Ecology:

Characteristics:

Distribution:

Remarks: "Loimia sp., a large terebellid that forms a shell like tube among and under coral. The great white feeding tentacles may be seen extending in the late afternoon on inshore reefs.

Phylum: Echinodermata
Class: Asteroidea
Order:
Family Acanthasteridae

Acanthaster planci (Linnaeus, 1758)
"Crown of Thorn" or "Tatamea"

Ecology: Voracious predator upon scleractinean corals, nocturnal feeder when coral polyps are extended out of calices; some areas of the south and western Pacific have experienced population explosions of this species resulting in the decimation of living coral reefs. Its passage over living corals is marked by bleached, dead areas on the coral (Natural Dangers in Tahiti pg. 14) Exists down to a depth of 18m. Predators on adult phase of Acanthaster planci include Charonia tritonis (Triton shell snail) and Hymenoceros picta, Harlequin or clown shrimp; predators on larvae include various fish species.

Characteristics: Starfish or sea star with 10-20 rays and elongate spines which can inflict a very painful wound to divers when skin is punctured (14 to 16 arms, pg.14, Natural Dangers in Tahiti). Flabby body, up to 1m in arm tip to arm tip diameter; underneath corals in day; disc large, rays short and numerous; plates bearing sharp spines; pedicellariae two-jawed; several madreporites; in life, color is brown or yellow; found in 2 to 3 fathoms of waters. Skeleton of plates forming an open meshwork, bearing isolated spines or groups of spinelets but not fans.

Distribution: Western India across the entire Indo-Pacific to the Pacific coast of Mexico and the Galapagos Islands. This species ranges through the Indian Ocean and South Pacific ocean, and is abundant about Christmas Island (South Pacific).

Remarks: Once thought to be the scourge of the corals making up the Great Barrier Reef of Australia, circa 1970. Word went out that it was because too many people were collecting its adult predator Charonia tritonis (or the Triton shell). It was eventually established that it was the commercial fishing industry which was the primary culprit. They were taking huge amounts of fish which fed off of the larval forms of Acanthaster planci (zooplanktonic larvae), hence too many Acanthaster planci larvae survived to the settling stage … and the reefs were overrun with the adult forms, which had destroyed 100 sq. miles of Great Barrier Reef by 1970.

Note: Dive clubs off of Tahiti periodically go out and collect living Acanthaster planci, put them onto the dive boat, and transport them to the city dump when the boat reaches the dock.

During days of USA involvement in the Viet Nam War, divers from Navy Seals and from the US Air Force would, during R & R periods, inject Acanthaster planci with pole injectors capable of 100 injections of formalin. Crown of Thorns were not then collected, but left to die on the coral reef … decay ..and release its received formalin into the waters

to adversely affect other marine species (Gary F. – personal communication to Ed Tarvyd…Air Force Diver)

Phylum:	Echinodermata
Class:	Ophiuroidea
Order:	Chilophiurida
Family:	Ophiocomidae

Ophiocoma scolopendrina (mostly black with white undersides)
Ophiocoma erinaceus (All black…aboral and oral surfaces)

Ecology: In shallow water (1m to 2m) under oral rubble

Characteristics: Five arms; granules of disc spherical, not spinous; medium to large forms. Granules very coarse; arm spines four to five; coloration black or black and whitish … for Ophiocoma scolopendrina: coloration dark, underarm plates, at least proximately, more or less whitish.

Distribution: Indo-Pacific

Remarks: Crown of Thorns starfish appear to have been much more abundant on the coral heads of Tetiaroa lagoon in the late 1970's and early 1980's than they are now (1998).

Phylum: Echinodermata
Class: Echinoidea
Order: Diadematoida
Family: Diadematidae

Diadema setosum (Lesky, 1778)

Ecology: Abundant in shallow water in areas that have been recently disturbed, where it may form dense aggregations.

Characteristics: The spines of this species are generally more elongate than those of D. savignyi. Most diagnostic is the bright orange or red ring surrounding the anal opening.

Distribution: East Africa; Red Sea to the entire western Pacific.

Remarks:

Phylum: Echinodermata
Class: Echinoidea
Order: Diadematoida
Family: Echinometridae
Heterocentrotus trigonarius Brandt

(Heterocentrotus trigonarius is typical of the Southern Hemisphere as is Heterocentrotus mamillatus of the Northern Hemisphere.)

Ecology: common on algal reef of Tetiaroa (off of Hiraanae and Oroatera hoa area of Barrier Reef). In coral crevices and algal depressions of barrier reef where water wash and back wash is intense; exposed about 10:00 AM. Probably highly dependent on high amount of dissolved O_2 in water. Various urchins feed on algae, detritus, foraminifera. Most spp. graze over algal lawns; some spp. can clean particles from spines, tests and water column via pedicellariae.

Characteristics: Longer and sharper spines that H. mammillatus (Linnaeus) and purple in color; very thick test walls.

Distribution: French Polynesia, Johnson island and Wake island in the North Pacific, Howland islands just south of the Equator … does not extend into the Hawaiian chain.

Remarks: I have never seen a specimen of Heterocentrotus mamillatus in Tahiti, et cetera in 20 years of visiting French Polynesia. It is always Heterocentrotus trigonarius, which has much more pointed or tapering spines than Heterocentrotus mamillatus, which always has rounded, blunted tips on spines, lighter colored reddish spines with growth rings on the spines. Heterocentrotus mamillatus is typical of the Hawaiian Islands, not the Society Islands … common in various areas of Hana Bay, east Maui. Heterocentrotus trigonarius probably feeds on red calcareous algae and possibly Sargassum sp. and Turbinaria ornata.

Common Sea Urchins seen and studied by Stephen J. Gehbach
Gump Research Student, 1994

Diadema savigni is a member of the family Diadematidae, and can be found on the hard bottoms throughout the Indo-Pacific. It is solitary, and cryptic, and sometimes aggregating, but seldom exposed on all sides during the day. Consumes Sargassum sociale readily. Diameter: <30cm … can be recognized by its long, thin spines and blue black color, with banding in juveniles. Notable for an iridescent blue star pattern on the top of test.

Echinothrix calamaris, family Diadematidae, is found generally solitary and cryptic under coral heads and out crops during day, while emerging to graze at night. Has large white, often banded, primary spines and smaller brown seondary spines, with a aquamarine pentagonal pattern on the test; diameter: <20 cm.

Echinothrix diadema is a close relative of Echinothrix calamaris, possesses similar habits and morphology, with darker coloration, lacking also the pentagonal pattern of the test. There appear to be some individuals who share the characteristics of both species, having dark coloration, banding and a blue test epithelium.

Echinodermetra mathaei, family Echinometridae, … can be found wedged and burrowed into coral and rock crevices throughout the Indo-Pacific. This species has short, strong spines, variable coloration, and a maximum diameter of 10cm. Does not consume Sargassum sociale. There are four known sub-species of this animal.

Echinostrephus molaris, family Echinometridae, is found burrowed deeply into rock and eroded, dead coral throughout the Indo-Pacific. Diameter = <5cm, fine spines and dark brown-black coloration. Individuals of this species use their spines and Aristotle's Lanterns to bore into the carbonate rock, and are known to be capable of boring into steel.

Tripneustes gratilla, family Toxopneustidae, has short spines and variable coloration, with a diameter of <15cm. Consumes Sargassum sociale readily. Often seen in open, flat rocky areas, and occasionally covered with bits of debris held in place by tube feet.

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Diadematidae

Diadema savignyi Michelin, 1845

Ecology: Solitary and cryptic, sometimes aggregating, but seldom exposed on all sides during the day. Found on hard bottoms. Consumes Sargassum sociale, when available, readily. Active at night; commonly found in shallow water habitats, frequently abundant in areas of recent disturbance such as wharves or habitats recovering from storm damage.

Characteristics: Diameter: ≤30cm; can be recognized by its long, thin spines and blue-black color, with banding in juveniles. Notable for an iridescent blue pattern on top of the test. Elongate black and white spines, often with transverse banding on spines; anal sac is dark with light ring around the opening; bright blue pigment may be found on the aboral surface.

Distribution: Throughout the Indo-Pacific; East Africa; Red Sea to entire western Pacific and Society Islands; Southern Africa

Remarks:

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Diadematidae

Echinothrix calamaris (Pallas, 1774)

Ecology: During the day it is found generally solitary and cryptic under coral heads and outcroppings; emerges to graze at night. Found under coral heads and coral rubble in shallow reef environments. "…usually lives in rather deep water" (Natural Dangers in Tahiti, pg. 36)

Characteristics: Has large white, often banded, primary spines and smaller brown secondary spines, with an aquamarine pentagonal pattern on the test; diameter: ≤ 20cm. Possesses dark and white spotted anal sac. Spines are tubular with open distal tips and may be banded frequently.

Distribution: Natal, South Africa; Red Sea to the western Pacific and Hawaii. Throughout the Indo-Pacific.

Remarks: Capable of inflicting painful puncture wounds. Occurs in Hawaiian waters but is not widely distributed there.

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Diadematidae
Family:	*Centrechinidae*

Edmondson, 1946, pg. 88-89

Echinothrix diadema Linnaeus, 1758)

Ecology: A close relative of Echinothrix calamaris; possesses similar habits and morphology, with darker coloration. Found in the open or under stones on shallow water reefs or rubble areas.

Characteristics: Similar morphology to Echinothrix calamaris, but possesses darker coloration and lacks the pentagonal test pattern. Some individuals share characteristics of both species [i.e. E. calamaris and E. diadema], possessing dark coloration, banding and a blue test epithelium; possesses light and dark spotted anal sac (as in E. calamaris also); spines are pointed and closed at their tips.

It usually has its long spines banded with pale yellow or white alternating with green. Old species are almost black. The heavier spines in large specimens are approximately the length of the diameters of the shell (test), which is 2.5 to 3 inches. The ornamentation of the larger spines consists of narrow scales arranged in longitudinal rows. (Edmondson, 1946, pg. 89)

Distribution: Natal; South Africa; Red Sea to the western Pacific and Hawaii

Remarks: Handling this species should be avoided.

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Echinometridae

Echinometra malthaei (Blainville, 1825)

Ecology: Can be found wedged and burrowed into coral and rock crevices throughout the Indo-Pacific; found intertidally and in the subtidal, shallow areas; frequently erodes round holes into limestone reef, in which it seeks refuge from predators. These holes are formed by the abrasion of the spines and jaws.

Characteristics: This species has short, strong spines, variable coloration, and possesses a maximum diameter of 10cm. Spines are reddish with a white ring around the base. Tissue surrounding the test is black.

Distribution: Throughout the Indo-Pacific; western Indian Ocean, western Pacific to the Hawaiian Islands.

Remarks: There exist four subspecies of Echinometra malthaei. Does not consume Sargassum gracile when available. The green Echinometra sp. of Hawaii is very common. This species is related to Colobocentrotus (Podophorus) and Heterocentrotus, despite the fact that its spines are sharply pointed rather than club-like.

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Echinometridae

Echinostrephus molaris

Ecology: Found deeply burrowed into rock and eroded, dead coral throughout the Indo-Pacific.

Characteristics: Diameter: ≤5cm, fine spines and dark brown-black coloration. Individuals of this species use their spines and Aristotle's Lantern to bore into carbonate rock, and are known to be capable of boring into steel.

Distribution: Throughout the Indo-Pacific

Remarks:

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Toxopneustidae

Tripneustes gratilla (Linnaeus, 1758)

Ecology: Often seen in open, flat rocky areas, and occasionally covered with bits of debris held in place by tube feet. Commonly found in shallow lagoon areas and bays.

Characteristics: Possesses short spines and variable coloration, with a diameter of ≤15 cm; it has white and reddish spines separated by areas of pedicellariae which are variable in width. Color of animal may be black, white or greenish.

Distribution: South and East Africa; Red Sea to Hawaiian Islands

Remarks: Consumes Sargassum sociale readily when it is available. Frequently covers itself with debris and a wide variety of objects. One specimen, near the harbor entrance in Hawaii, was observed covering itself with a pair of undershorts.

The most dangerous of sea urchins is Toxopneustes pileolus; toxicity due to its pedicallariae which can cause temporary paralysis; is found buried on bottom sediment at depths over 40 meters (pg. 36, Natural Dangers in Tahiti).

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Exocycloida
Family:	Spatangidae

Brissus latercarinatus (Leske, 1778)
"Heart Urchin"

Ecology: Found in shallow water, where it is buried under the sand surface.

Characteristics: This ovoid species has uniformly short spines and brownish color; many specimens are 4 to 5 inches long, and one in the Bishop Museum from Johnson Island is 7.6 inches long

Distribution: East Africa; Red Sea throughout the western Pacific to Hawaii; Mauritius through the Indian and Pacific Oceans to Panama and the Mexican coast.

Remarks: Its tests are frequently found washed up on Aie motu, Tetiaroa Atoll, French Polynesia.

"The petal-like ambullacral areas are dorsal and are five in number, the anterior, unpaired one being aborted and without pores for the tube feet. The ventral surface is slightly convex with a crescent-shaped mouth near one end and a large anal opening close to the opposite margin. There is no lantern. In life the shell (test) is covered with short, slender, light brown or green spines." (Edmondson, pg. 94, 1946)

Phylum: Echinodermata
Class: Holothuroidea
Order: Actinopoda
Family: Holothuridae

Bohadschia argus (Jaeger, 1883)
"Leopard Sea Cucumber"
"Beche de Mer" (Bagnis)
"Rori"

Ecology: found in shallow water reef and rubble habitats. B. argus estrudes sticky defensive threads called Cuvierian tubules. Many specimens of B. argus contain the commensal pearl fish, Carapus sp., living in their cloacas. It moves with the aid of ambullacres, and as it advances, it defecates out balls of fine sand; feeds on plankton and detritus in sand.

Characteristics: Large oscellated sea cucumber, a common species which can immediately be recognized by its distinct pattern of mottling. 40 cm according to Allen and Steen (pg. 243) but 50 to 60 cm in length (according to Bagnis, pg. 119). The Holothurin (toxin) is concentrated in the viscera and in the tegument (integument?). Coloration of Bohadschia argus is black, spotted grey, or mottled.

Distribution: Seychelles to Australia; New Caledonia; New Guinea; Indonesia; Philippines and Southern Japan ... Society Islands.

Remarks: "...pearl fishes of the family Carapidae. They are commonly found in the Leopard Sea Cucumber (Bohadschia argus). Every specimen we have dissected invariably contained a slender, 5-10 cm., transparent fish in its gut cavity. A few other species are also known to contain fish, including the Prickly Sea Cucumber (Thelanota ananas) and the spiny black (Stichopus chloronotus).The same fish also inhabit Culcita and Acanthaster starfishes, as well as pearl oysters. We have never seen a fish outside of it's host in nature, but have artifically induced them to leave and re-enter in an aquarium situation. The fish enters (tail first) and exists through the holothurian's anus. Evidently the fish feeds on the gonads and other tissues of its host!" This means that Pearl Fish are parasites rather than being commensalistic.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria (Halodeima) atra, Jaeger, 1883

Ecology: This is one of the most common sea cucumbers in the Indo-Pacific tropics. Animals may form dense aggregations in the shallow water sandy habitats, just below the low tide mark. Many specimens are parasitized by snails of the family Melanellidae, which one sees when the tiny white shells are partially embedded in the tough skin, the snail probably sucking juices from the Holothuria atra.

Characteristics: Uniform black color and sausage shaped body frequently dusted with sand grains. Many refer to them as "dog shit" sea cucumbers.

Distribution: East Africa; Red Sea; throughout the western Pacific to the Hawaiian Islands.

Remarks: Young animals appear to be red in color, resembling red worms amongst the aggregations of sausage-like black adults. The young are buried in shallow sand during daylight, but they emerge at night. Very abundant off of Onetahi motu, Tetiaroa Atoll, off of the hotel area … probably due to the leach line sewage disposal system of Hotel Tetiaroa. Many are exposed to air during the low tides. Do these survive through to the next high tide? Do they perish due to dessication or over heating?

The young (red worm types) are very numerous in the tide pools at the west end (V7) of the airstrip at 9:30 PM; they are probably buried in the sand throughout the day to avoid U-V light.

"The species Macronalia nitidula Pease is a common form found on Holothuria atra. The shell is thin, polished, with five somewhat convex whorls, of which the three nuclear ones are slightly distorted. It usually has a brownish tint. Large specimens are 5mm. long." (Edmondson, pg.140)

The crab Lissocarcinus orbicularis Dana lives amongst the tentacles of Holothuria atra. L. orbicularis …has a nearly circular carapace with the anteroloteral boarders thin and cut into five shallow lobes. Black spots mark the carapace and legs. It is 12mm across.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Paratinopoda
Family:	Synaptidae

Synapta maculata (Chamisso and Eysenhardt, 1821)

Ecology: Found in shallow sandy habitats and grass beds. Nocturnal off of Tetiaroa's Honuea motu, but seen active in day off of Hotel Tahiti shallow reef area.

Characteristics: Lack tube feet, may exceed 2m in length. It is tan to brown with black markings. The tentacles are also tan with white lines along the margins of the pinnae. Very thin skin; animal almost resembles a garden hose; 140cm.

Distribution: East Africa; Red Sea; throughout the western Pacific to the Society Islands.

Remarks: Used to be very numerous on shallow reef outside restaurant area of old Hotel Tahiti. Seen at night on other side of "pig island" (Honuea motu) Tetiaroa, toward reef area. This is the species especially noted for its ossicles which are quite elaborate, and often depicted in text books…"little anchors, et cetera in design".

Phylum: Echinodermata
Class: Holothuroidea
Order: Paractinopoda
Family: Synaptidae

Euapta godeffroyi
"Yellow Stripped Synaptid" or
"Sea Leech"

Ecology:

Characteristics: Yellow stripped synaptid; longitudinally stripped. 100cm (according to Allen Steen). Lacks tube feet; basically it is a slender tube with a sucking disc at one end that provides a means of locomotion. "Gills" or "feeding tentacles" at oral end are referred to as arborescent diverticulae. Toxic mucus covers or coats the animal's body. Possesses a distinct serpentine appearance.

Distribution:

Remarks: Often mistaken by tourists for sea snakes along with moray eels and sand eels. On coral slab crevices outside V7 to airstrip on Onetahi motu, Tetiaroa Atoll.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria leucopilota or
Holothuria(Mertensiothuria) leucopilota (Brandt, 1835)

Ecology: Holothuria leucospilota inhabits shallow patch reefs where the posterior end of the body is under rocks and the anterior portion is extended into sandy areas; nocturnal in habits.

Characteristics: Long black sea cucumber…extends itself well. 50cm; elongate and uniformly black in color with elongate tentacles surrounding the mouth.

Distribution: West Indian Ocean and Red Sea; western Pacific to the Hawaiian Islands.

Remarks: Found at night by reef outside Tetiaroa village house area.

Phylum: Echinodermata
Class: Holothuroidea
Order: Actinopoda
Family: Holothuridae

Actinopyga mauritiana (Quoy and Gaimand)

Ecology: A slender fish, Jordanicus gracilus (Bleeker), 4 to 6 inches long, lives in some holothurians, including Actinopyga mauritiana. This commensal fish leaves and enters the Holothurian via its anus (cloaca).

Characteristics: Small, spotted, brown with whitish spots, an easily recognizable species…reddish brown, splotched with white. There are about 25 tentacles surrounding the mouth which opens ventrally. As in other species of this genus, five calcareous teeth surround the anal opening. The flat ventral surface bears pedicels (tube feet) and is distinct from the dorsal surface, which is marked by scattered papillae. Deposits in the skin include rough branched rods and minute smooth particles. Large specimens are 10 inches long.

Distribution:

Remarks:

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria impatiens (Forskål)
Holothuria (Thymiosycia) impatiens (Forskål, 1775)

Ecology: Commonly found in shallow water under rubble habitat.

Characteristics: Large, grey with dark papillae; the character of the surface and the color of H. impatiens is usually enough to distinguish it. Typically the skin is rough and wrinkled by the deposits in it. Its color is light or dark reddish brown often with two or three bands of a deep reddish hue encircling the anterior half of the body. There is no marked distinction between dorsal and ventral surfaces as prominent suctorial papillae resembling tube feet are scattered over the entire body. Deposits in the skin include "table, buttons with six holes, and scattered perforated rods". Specimens are 4 to 6 inches long. Rugose body with a uniform brownish color; body is covered with conical warts from which a filamentous appendage emerges.

Distribution: East Africa; Red Sea to the Hawaiian Islands. This species is also known from the tropical Atlantic and the Mediterranean.

Remarks:

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Echinometridae

Echinometra malthaei (Blainville, 1825)

Ecology: Can be found wedged and burrowed into coral and rock crevices throughout the Indo-Pacific; found intertidally and in the subtidal, shallow areas; frequently erodes round holes into limestone reef, in which it seeks refuge from predators. These holes are formed by the abrasion of the spines and jaws.

Characteristics: This species has short, strong spines, variable coloration, and possesses a maximum diameter of 10cm. Spines are reddish with a white ring around the base. Tissue surrounding the test is black.

Distribution: Throughout the Indo-Pacific; western Indian Ocean, western Pacific to the Hawaiian Islands.

Remarks: There exist four subspecies of Echinometra malthaei. Does not consume Sargassum gracile when available. The green Echinometra sp. of Hawaii is very common. This species is related to Colobocentrotus (Podophorus) and Heterocentrotus, despite the fact that its spines are sharply pointed rather than club-like.

Phylum: Echinodermata
Class: Echinoidea
Order: Diadematoida
Family: Echinometridae

Echinostrephus molaris

Ecology: Found deeply burrowed into rock and eroded, dead coral throughout the Indo-Pacific.

Characteristics: Diameter: ≤5cm, fine spines and dark brown-black coloration. Individuals of this species use their spines and Aristotle's Lantern to bore into carbonate rock, and are known to be capable of boring into steel.

Distribution: Throughout the Indo-Pacific

Remarks:

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Diadematoida
Family:	Toxopneustidae

Tripneustes gratilla (Linnaeus, 1758)

Ecology: Often seen in open, flat rocky areas, and occasionally covered with bits of debris held in place by tube feet. Commonly found in shallow lagoon areas and bays.

Characteristics: Possesses short spines and variable coloration, with a diameter of ≤15 cm; it has white and reddish spines separated by areas of pedicellariae which are variable in width. Color of animal may be black, white or greenish.

Distribution: South and East Africa; Red Sea to Hawaiian Islands

Remarks: Consumes Sargassum sociale readily when it is available. Frequently covers itself with debris and a wide variety of objects. One specimen, near the harbor entrance in Hawaii, was observed covering itself with a pair of undershorts.

The most dangerous of sea urchins is Toxopneustes pileolus; toxicity due to its pedicallariae which can cause temporary paralysis; is found buried on bottom sediment at depths over 40 meters (pg. 36, Natural Dangers in Tahiti).

Phylum:	Echinodermata
Class:	Echinoidea
Order:	Exocycloida
Family:	Spatangidae

Brissus latercarinatus (Leske, 1778)
"Heart Urchin"

Ecology: Found in shallow water, where it is buried under the sand surface.

Characteristics: This ovoid species has uniformly short spines and brownish color; many specimens are 4 to 5 inches long, and one in the Bishop Museum from Johnson Island is 7.6 inches long

Distribution: East Africa; Red Sea throughout the western Pacific to Hawaii; Mauritius through the Indian and Pacific Oceans to Panama and the Mexican coast.

Remarks: Its tests are frequently found washed up on Aie motu, Tetiaroa Atoll, French Polynesia.

"The petal-like ambullacral areas are dorsal and are five in number, the anterior, unpaired one being aborted and without pores for the tube feet. The ventral surface is slightly convex with a crescent-shaped mouth near one end and a large anal opening close to the opposite margin. There is no lantern. In life the shell (test) is covered with short, slender, light brown or green spines." (Edmondson, pg. 94, 1946)

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Bohadschia argus (Jaeger, 1883)
"Leopard Sea Cucumber"
"Beche de Mer" (Bagnis)
"Rori"

Ecology: found in shallow water reef and rubble habitats. B. argus estrudes sticky defensive threads called Cuvierian tubules. Many specimens of B. argus contain the commensal pearl fish, Carapus sp., living in their cloacas. It moves with the aid of ambullacres, and as it advances, it defecates out balls of fine sand; feeds on plankton and detritus in sand.

Characteristics: Large oscellated sea cucumber, a common species which can immediately be recognized by its distinct pattern of mottling. 40 cm according to Allen and Steen (pg. 243) but 50 to 60 cm in length (according to Bagnis, pg. 119). The Holothurin (toxin) is concentrated in the viscera and in the tegument (integument?). Coloration of Bohadschia argus is black, spotted grey, or mottled.

Distribution: Seychelles to Australia; New Caledonia; New Guinea; Indonesia; Philippines and Southern Japan … Society Islands.

Remarks: "…pearl fishes of the family Carapidae. They are commonly found in the Leopard Sea Cucumber (Bohadschia argus). Every specimen we have dissected invariably contained a slender, 5-10 cm., transparent fish in its gut cavity. A few other species are also known to contain fish, including the Prickly Sea Cucumber (Thelanota ananas) and the spiny black (Stichopus chloronotus).The same fish also inhabit Culcita and Acanthaster starfishes, as well as pearl oysters. We have never seen a fish outside of it's host in nature, but have artifically induced them to leave and re-enter in an aquarium situation. The fish enters (tail first) and exists through the holothurian's anus. Evidently the fish feeds on the gonads and other tissues of its host!" This means that Pearl Fish are parasites rather than being commensalistic.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria (Halodeima) atra, Jaeger, 1883

Ecology: This is one of the most common sea cucumbers in the Indo-Pacific tropics. Animals may form dense aggregations in the shallow water sandy habitats, just below the low tide mark. Many specimens are parasitized by snails of the family Melanellidae, which one sees when the tiny white shells are partially embedded in the tough skin, the snail probably sucking juices from the Holothuria atra.

Characteristics: Uniform black color and sausage shaped body frequently dusted with sand grains. Many refer to them as "dog shit" sea cucumbers.

Distribution: East Africa; Red Sea; throughout the western Pacific to the Hawaiian Islands.

Remarks: Young animals appear to be red in color, resembling red worms amongst the aggregations of sausage-like black adults. The young are buried in shallow sand during daylight, but they emerge at night. Very abundant off of Onetahi motu, Tetiaroa Atoll, off of the hotel area … probably due to the leach line sewage disposal system of Hotel Tetiaroa. Many are exposed to air during the low tides. Do these survive through to the next high tide? Do they perish due to dessication or over heating?

The young (red worm types) are very numerous in the tide pools at the west end (V7) of the airstrip at 9:30 PM; they are probably buried in the sand throughout the day to avoid U-V light.

"The species Macronalia nitidula Pease is a common form found on Holothuria atra. The shell is thin, polished, with five somewhat convex whorls, of which the three nuclear ones are slightly distorted. It usually has a brownish tint. Large specimens are 5mm. long." (Edmondson, pg.140)

The crab Lissocarcinus orbicularis Dana lives amongst the tentacles of Holothuria atra. L. orbicularis …has a nearly circular carapace with the anteroloteral boarders thin and cut into five shallow lobes. Black spots mark the carapace and legs. It is 12mm across.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Paratinopoda
Family:	Synaptidae

Synapta maculata (Chamisso and Eysenhardt, 1821)

Ecology: Found in shallow sandy habitats and grass beds. Nocturnal off of Tetiaroa's Honuea motu, but seen active in day off of Hotel Tahiti shallow reef area.

Characteristics: Lack tube feet, may exceed 2m in length. It is tan to brown with black markings. The tentacles are also tan with white lines along the margins of the pinnae. Very thin skin; animal almost resembles a garden hose; 140cm.

Distribution: East Africa; Red Sea; throughout the western Pacific to the Society Islands.

Remarks: Used to be very numerous on shallow reef outside restaurant area of old Hotel Tahiti. Seen at night on other side of "pig island" (Honuea motu) Tetiaroa, toward reef area. This is the species especially noted for its ossicles which are quite elaborate, and often depicted in text books…"little anchors, et cetera in design".

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Paractinopoda
Family:	Synaptidae

Euapta godeffroyi
"Yellow Stripped Synaptid" or
"Sea Leech"

Ecology:

Characteristics: Yellow stripped synaptid; longitudinally stripped. 100cm (according to Allen Steen). Lacks tube feet; basically it is a slender tube with a sucking disc at one end that provides a means of locomotion. "Gills" or "feeding tentacles" at oral end are referred to as arborescent diverticulae. Toxic mucus covers or coats the animal's body. Possesses a distinct serpentine appearance.

Distribution:

Remarks: Often mistaken by tourists for sea snakes along with moray eels and sand eels. On coral slab crevices outside V7 to airstrip on Onetahi motu, Tetiaroa Atoll.

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria leucopilota or
Holothuria(Mertensiothuria) leucopilota (Brandt, 1835)

Ecology: Holothuria leucospilota inhabits shallow patch reefs where the posterior end of the body is under rocks and the anterior portion is extended into sandy areas; nocturnal in habits.

Characteristics: Long black sea cucumber…extends itself well. 50cm; elongate and uniformly black in color with elongate tentacles surrounding the mouth.

Distribution: West Indian Ocean and Red Sea; western Pacific to the Hawaiian Islands.

Remarks: Found at night by reef outside Tetiaroa village house area.

Phylum: Echinodermata
Class: Holothuroidea
Order: Actinopoda
Family: Holothuridae

Actinopyga mauritiana (Quoy and Gaimand)

Ecology: A slender fish, Jordanicus gracilus (Bleeker), 4 to 6 inches long, lives in some holothurians, including Actinopyga mauritiana. This commensal fish leaves and enters the Holothurian via its anus (cloaca).

Characteristics: Small, spotted, brown with whitish spots, an easily recognizable species…reddish brown, splotched with white. There are about 25 tentacles surrounding the mouth which opens ventrally. As in other species of this genus, five calcareous teeth surround the anal opening. The flat ventral surface bears pedicels (tube feet) and is distinct from the dorsal surface, which is marked by scattered papillae. Deposits in the skin include rough branched rods and minute smooth particles. Large specimens are 10 inches long.

Distribution:

Remarks:

Phylum:	Echinodermata
Class:	Holothuroidea
Order:	Actinopoda
Family:	Holothuridae

Holothuria impatiens (Forskål)
Holothuria (Thymiosycia) impatiens (Forskål, 1775)

Ecology: Commonly found in shallow water under rubble habitat.

Characteristics: Large, grey with dark papillae; the character of the surface and the color of H. impatiens is usually enough to distinguish it. Typically the skin is rough and wrinkled by the deposits in it. Its color is light or dark reddish brown often with two or three bands of a deep reddish hue encircling the anterior half of the body. There is no marked distinction between dorsal and ventral surfaces as prominent suctorial papillae resembling tube feet are scattered over the entire body. Deposits in the skin include "table, buttons with six holes, and scattered perforated rods". Specimens are 4 to 6 inches long. Rugose body with a uniform brownish color; body is covered with conical warts from which a filamentous appendage emerges.

Distribution: East Africa; Red Sea to the Hawaiian Islands. This species is also known from the tropical Atlantic and the Mediterranean.

Remarks:

Phylum: Echinodermata
Class: Holothuroidea
Order: Actinopoda
Family: Holothuridae
Holothuria difficilis

Ecology: Under boulder rubble on barrier reef flat.

Characteristics: Small, nearly black

Distribution:

Remarks:

Phylum: Echinodermata
Class: Holothuroidea
Order: Actinopoda
Family: Holothuridae

Labididemas semperianum

Ecology: Found in shallow water coral rubble.

Characteristics: 15cm; small, whitish to cream colored, slightly purplish at one end (oral end?)

Distribution: Indo-Pacific

Remarks:

Phylum: Echinodermata
Class: Holothuroidea
Order:
Family:
Thelenota ananas (Jaeger, 1833)

Ecology: Found occupying 5 to 30m depths, where it inhabits the interface between reefs and sand.

Characteristics: This is a large species, reaching half a meter in length. The body is black with orange conical papillae arranged in a stellate fashion.

Distribution: Mauritius; Seychelles to Maldives; Australia; Fiji; New Caledonia; Indonesia; Japan; Guam; Society Islands.

Remarks: Found in 2m of water 100 feet from dock at Gump by Dr. John Bolland on September 13, 1998 (noon). It reminds me of a large sea cucumber vacuum cleaner covered with a shag rug.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Macrura
Family:	Palinuridae

Panulirus penicillatus (Oliver, 1791)
Spiny Lobster

Ecology: Spiny lobsters are scavengers, feeding at night on a variety of organic material, and hiding in crevices during the day. Panulirus penicillatus is the most common spiny lobster in the Indo-Pacific. Of commercial importance, this species migrates into shallow water seasonally, during the summer months.

Characteristics: Large specimens are 15 inches long. Species specific to P. penicillatus are the four spines merged at the base of the antennular segment. The mingled colors of red, violet and yellow also render them more or less inconspicuous in their native habitats. Palinurids differ from most other crustaceans in that none of the legs end in pincers, and the five pair of walking legs are about equally developed. Palinurids typically possess elongated and spiny antennae or antenna pair #2 (uniramous).

Distribution: South and East Africa; Red Sea; Maldives; Australia; Marshall Islands; Japan; Hawaii; Society Islands; Clipperton Island; Galapagos; Mexico.

Remarks:

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Macrura
Family:	Scyllaridae

Parribacus antarcticus (Lund, 1793)
Slipper Lobster

Ecology: Occurs to a depth of 15m; large specimens are up to a length of 8 inches; in Hawaii, a much larger form is Scyllarides squammosus (Milne Edwards) which gets to a length of 12 inches, and is found on the reefs up to a few fathoms in depth. Under coralline heads and debris; nocturnal.

Characteristics: Scyllarids have the carapace greatly compressed dorsoventrally. The antennae are reduced to flat scales, and the eyes are set in depressions in the edges of the carapace. Color: brown and mottled colors which blend in with the rocks and sand of their environment. Second antennae form flat shield-shaped structures, giving the head a flat paddle shape. Spines at base of the margin of the body are covered with numerous cirri. The body is covered with wart-like bumps. It is cream in color with irregular brown encrustations. There are numerous encircled spots along the margin of the carapace and head structures.

Distribution: Circumpolar: East Africa to Australia; Japan; Hawaii; Caribbean.

Remarks: Observed on night snorkle on Tetiaroa, Honuea motu (Pig Island) at Reef side. Fast for short distances.

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Macrura
Family:	Stenopidae

Stenopus hispidus (Oliver, 1811)
Coral Banded Cleaner Shrimp
Also referred to as "Barber pole shrimp" and "Bandana Prawn"

Ecology: This common cleaner shrimp waits in crevices or out in the open at its cleaning station, where it might very well be associated with other members of its species; nocturnal or crepuscular. It waves its long white antennae to attract fish. As the fish approach to be cleaned, the shrimp touches them with the antennae until the fish becomes quiet, allowing the shrimp to move about the fishes body in search of ectoparasites. Stenopus hispidus uses the chela of leg pairs # 2 and #3 to remove the parasites, which it consumes.

Characteristics: Red and white bands on body, long white antennae, and chelipeds are very distinct. Length to 5 cm. It is easily recognized by its brilliant coloration of three broad transverse bands of scarlet marking the anterior, middle, and posterior portions of the body, which otherwise is nearly white. The long and chelate third pair of legs has four transverse bands of scarlet. The upper surface of the body and the legs are covered by hooked spines, those in the front part of the body bending forward and those in the posterior part of the body bending backward, thus protecting the animal from front or rear attack. The sexes are very much alike and are almost always found together.

Distribution: South Africa; Red Sea; Malaysia; Vanuatu; Philippines to Hawaii.

Remarks: Shallow water off pier at old Hotel Tahiti used to have four to five cleaning stations of Stenopus hispidus active at night

Phylum:	Arthropoda
Class:	Crustacea
Order:	Decapoda
Suborder:	Brachyura
Family:	Portunidae

Scylla serrata (Forskål)
Swimming Crab

Ecology: This is an introduced crab to Hawaiian waters, and probably to Tahitian waters. It is the common edible crab of India, and is widely distributed in other parts of the world thriving in estuaries, mouths of rivers and bays.

Characteristics: Exceeding 8 inches in width of carapace; carapace is smooth, the front bearing four blunt teeth and the anterolateral border nine sharp ones of about equal size. In the males the chelipeds become very large. Is now of considerable value as food in Hawaii…and apparently in Tahiti.

Distribution: Native to India; now introduced to many areas of the world, Hawaii, Society Islands.

Remarks: Marimari Kellum of Opunohu Bay, Moorea had a large drying specimen of a female crab, brown in color, which a local fisherman had given her in early September 1998.

Phylum: Nemertinea
Class:
Order: Heteronemertini
Family:

Lineus hiatti (Not in Edmondson)
(I.D. by Ralph L. Smith (Berkeley, 1990)

Ecology: Found in coral rubble in shallow water at Gump Station, Moorea.

Characteristics:

Distribution: Moorea

Remarks: Fragments easily.

Phylum: Nemertinea
Class:
Order:
Family:

Baseodiscus edmondsoni (Coe)

Ecology: In coral rubble in shallow water at Gump Station, Moorea.

Characteristics: A small species, may exceed 1 foot in length, is marked by a broad reddish-brown stripe along the dorsal mid-line of anterior part of the body. Narrow transverse bands of the same color cross the longitudinal stripe. There is also a transverse band of the same color on the upper surface of the head. Numerous ocelli are on the lateral margins of the head.

Distribution: Hawaii; Tahiti

Remarks:

Phylum: Echiura
Class:
Order:
Family:

Orchetostoma erythrogrammon
I.D. by Ralph L. Smith (Berkeley, May, 1990)

Ecology: Bore in dead coral blocks, burrow in sand and gravel, or conceal themselves in crevices of porous rocks. Common nestler in shallow water rubble.

Characteristics: Conspicuous longitudinal red lines and greenish-edged yellow proboscis.

Distribution: Moorea

Remarks:

Phylum: Echiura
Class:
Order:
Family:

Anelassorhynchus porcellus
I.D. by Ralph L. Smith (Berkeley, 1990, May)

Ecology: Bore into dead coral blocks, burrow in sand and gravel, or conceal themselves in crevices of porous rocks. Common nestler in shallow water rubble.

Characteristics: Body without lines; proboscis as in Orchetostoma erythrogrammon

Distribution: Moorea

Remarks:

Phylum:	Arthropoda
Class:	Crustacea
Order:	Amphipoda
Family:	Gammaridae

Ecology: These are generally found in the decaying algal masses on or close to the shorelines of motus and islands. Generally very active at night consuming the algal debris.

Characteristics: Crustaceans with laterally compressed bodies and without a carapace. In some the first, in others the first and second segments, are united with the head. Gills are attached to the thoracic appendages. Posterior appendages modified for walking and jumping. Telson is folded beneath the abdomen. Compound eyes are stalkless, attached directly to head. Antennae long, thick, and faced forward. Sand hoppers or beach fleas are common representatives of this order.

Distribution:

Remarks: Amphi = variable; poda = legs
Common amphipods are placed into three familiar families:
family Gammaridae: beach hoppers and sand fleas
family Caprellidae: skeleton shrimp or caprellids
family Cyamidae: "whale lice", ectoparasites of cetaceans

Phylum:	Arthropoda
Class:	Crustacea
Order:	Isopoda
Family:	

Ecology: Like amphipods, many isopods can be located in decaying shoreline algal masses upon which they feed. Terrestrial, fresh-water, and marine isopods are known. Most of them are free living, but some are parasitic. Familiar terrestrial isopods are "pill bugs" ("rolly pollies" of our youth) and "sow bugs".

Characteristics: Isopods are typically dorsoventrally compressed, usually with seven thoracic and six abdominal segments. The eyes when present are generally sessile and consist of a single pair. The branchiae are modified abdominal appendages. Lack of carapace.

Distribution:

Remarks:

Phylum:	Arthropoda
Class:	Crustacea
Order:	Stomatopoda
Family:	Squillidae

Mantis Shrimp

Ecology: Highly predatory marine crustaceans, often living in vertical holes which they dig for themselves, and continue to maintain. Female stomatopods often spend the majority of their time in their holes. Male stomatopods are often seen wandering around the ocean floor, often in search of receptive females of their species. These are nocturnal feeding carnivores, feeding on crustaceans, worms, molluscs, and fish.

Characteristics: Members of this order have elongated, narrow bodies with a carapace which does not cover the last three or four segments. Eyes are stalked, and vision is especially fine and acute. The first five pairs of thoracic appendages, which represent maxillipeds, are leg-like with the last segment folding back against the one with which it articulates, like the blade of a jack knife. Of these maxillipeds the second pair is greatly enlarged and provides very efficient organs of offense and defense. To each of the three posterior thoracic segments is attached a pair of slender legs bearing exopodites. Gills are carried on the swimmerets (or pleopods). Stomatopods possess the swiftest reacting muscles known to exist in their "jack knife" thoracic appendages. Most authorities only recognize a single family: Squillidae.

Distribution:

Remarks: Stomato = mouth, -poda = feet, Squill,-a, -i (L) = a sea onion; a shrimp

Marlon Brando remembers that hese were very abundant on the Tetiaroa lagoon floor in the 1960's and 1970's. By the 1990's they were no longer observed (M.Brando, 2003, personal communication).

Phylum:	Arthropoda
Class:	Crustacea
Order:	Stomatopoda
Family:	Squillidae

Gonodactyllus affinis (Man, 1902)

Ecology: This is the most common relatively deep water gonodactylid. Lives in cavities in coral rubble. Often seen darting over the surface near its cavity. Depth: 5 to 50m.

Characteristics: Length: to 30mm. Species is highly polymorphic in color. Often individuals found below 20m are pink or red. In the genus Gonodactylus, the dactylus of the large claw is thickened at the base but lacks teeth on its inner border.

Distribution: Kenya; Madagascar; Seychelles; Laccadives to Thailand; Indonesia; Australia; Guam and the Society Islands.

Remarks:

Phylum:	Arthropoda
Class:	Crustacea
Order:	Stomatopoda
Family:	Squillidae

Gonodactylus platysoma (Wood-Mason, 1985)

Ecology: Found on shallow intertidal reef flats in coral rubble cavities, where it is commonly seen foraging at low tide in just a few centimeters of water.

Characteristics: A cream-colored mantis shrimp with an olive green network pattern covering the body. There are two large blue spots on the third and last segments. The antennae are green with white specks. Length: to 90mm.

Distribution: Seychelles to Australia; Guam; Enewetak and the Society Islands.

Remarks:

Phylum:	Arthropoda
Class:	Crustacea
Order:	Stomatopoda
Family:	Squillidae

Gonodactylus smithii (Pocock, 1893)

Ecology: Very common, often seen foraging and mating away from its cavity at low tide. Depth: to 20m.

Characteristics: This green species bears markings of blue and orange, and it is very colorful.

Distribution: Red Sea; Zanzibar; Chagos Islands; Maldives; Sri Lanka, Thailand, Viet Nam to Australia; Loyalty Islands, Indonesia; Guam; Enewetak; Society Islands.

Remarks:

Phylum:	Cnidaria
Class:	Anthozoa
Order:	Actiniaria
Family:	Stoichaetidae

Stoichactis kenti

Ecology: Found from shallow (1/2m) of water to 5m depths. These sea anemones often live in a symbiotic relationship with fishes of the family Pomacentridae; this anemone is commonly host to Dascyllus trimaculatus (Damsel fish) young and Amphiprion chrysopterus (Clown fish)

Characteristics: A large sea anemone with a rose colored body and usually light rosey brownish colored tentacles. For unknown reasons, these tentacles turn white at certain times of the year. The anemone can be rose, white, or orange in color. This is the largest, most common, and most beautiful sea anemone in Polynesian lagoons. Sizes: 15 to 40cm in diameter.

Distribution: Society islands … Moorea at outer region of motus of Club Med, attached to ancient elevated coral blocks; at Tetiaroa, in shallow water (Onetahi motu) outside village houses.

Remarks: Literally thousands of these are attached to elevated ancient corals making up "tidepools" at west end of Tetiaroa airstrip. They probably consume what is swept in via current from whole lagoon…especially gametes and larvae of Holothuria atra…probably also absorb amino acids from lagoon waters.

It is said that giant Stoichactis sea anemones can have a disc diameter of more than 60 inches. They are found in calm waters on the coral reefs.

Phylum:	Cnidaria
Class:	Anthozoa
Subclass:	Zoantharia
Order:	Zoanthidea
Family:	Zoantidae

Zoanthus spp.

Ecology:

Characteristics: The compound Zoantharia form clusters encrusting stones and other objects in shallow water. These organisms are sometimes called "soft corals". Individual polyps arise from budding from a basal tissue or from stolons. No skeletons are formed, but sand grains may become embedded in the tissues and give support and firmness to the polyps. In the water, the colony has the texture of wet leather.

Distribution: Hawaii; Society Islands

Remarks:

Phylum: Cnidaria
Class: Hydrozoa
Order:
Family:

Physalia utriculus Eschscholtz

Ecology: Free-drifting colonial forms of Hydrozoa which are typical of tropical Pacific open seas. They float on or near the surface, but sink to a 100m depth to avoid violent storms at sea. High winds often drive them onto shore. Found on beaches of Tetiaroa in August.

Characteristics: A small species of Portugese Man O' War, which consists of a float (blue colored gas sac), from the undersurfaces of which are suspended three forms of zooids (polyps of a colony):

1. Dactylozooids: long twisting tentacles laden with nematocysts
2. Gastrozooids: upside down bags with narrow underneath orifice
3. Gonozooids: clusters of grape-like polyps.

The gonozooids are the male reproductive parts, as only male Physalia colonies are recognized. It is assumed that the female zooids may become detached at an early stage as free swimming medusae whereas the male zooids remain attached to the colony. The nematocysts are amongst the most powerful amongst the Cnidaria, and are capable of inflicting painful stings. The brightly colored iridescent float is 1 to 2 inches long.

Distribution: Pelagic, tropical seas

Remarks: Physalia utriculus is found in the Pacific. It has but one fishing tentacle (dactylozooid) It's Atlantic counterpart, Physalis physalis (?), has 12 fishing tentacles (dactylozooids).

Physal – (G) = a bladder, bubble; a wind instrument
Utri, -c, -cul (L) = a leather bag

Phylum: Chordata
Subphylum: Hemichordata
Class:
Order:
Family: Spengelidae

Ecology: Fairly common in coarse sand banks opposite Gump station dock and at Vaiare. Glandiceps sp. also in fine sand flat near Haapiti, Moorea.

Characteristics:

1. ? (Three species collected at Gump)
   Large and conspicuously colored.
2. Glandiceps sp.
3. Ptychodera flava
   Small, pale yellow species taken under a clean flat rock at point north of Gump Station, Cook's Bay.

Distribution:

Remarks:

Phylum: Mollusca
Class: Bivalvia
Order: Veneroida
Family: Tridacnidae

Tridacna maxima (Röding, 1798)

Ecology: ≤30m depth range due to mantle laden zooxanthellae (Symbiodium sp.); larval stage as zooplankton for a few weeks; one of representative molluscan species in lagoons; one of only five (5) species of the genus Tridacna in the world; many specimens have a commensal shrimp living in mantle cavity; mantle always stretched out to fullest surface area possible, and pointed toward the sun, unless animal is distrubed, upon which it closes its shells.

Characteristics: Depth: ≤30m; 15cm in maximal length; mantle color very variable: florescent blue, brown, green, mottled. This species has the brightest mantle coloration of all of the giant clams.

Distribution: Indo-Pacific (Not Hawaii)
Tridacna maxima is the most widespread species of the genus Tridacna, much more so in distribution than the other six species of giant clams. Very common in French Polynesian lagoons.

Remarks: Very abundant on and partially imbedded within, Porites corals in Tetiaroa lagoon. These were highly depleted in numbers in the 1980's. This occurred when over 100 workers and their families lived in the village area of Onetahi harvesting them for food supplement.

The family Tridacnidae contains seven species:

Hippopus hippopus (Linnaeus, 1758): Horse's Hoof, Bear Paw or Strawberrry Paw

H. porcellanus (Rosewater, 1982): China clam

Tridacna crocea (Lamarch, 1819): Crocus, Saffron-colored or Boring Clam

T. derasa (Röding, 1798): Southern Giant clam

T. gigas (Linnaeus, 1758): Giant clam

T. maxima (Röding, 1798): Small giant clam

T. sauamosa (Lamarch, 1819): Scaly or Flutes clam

Only Tridacna maxima is found in Tetiaroa waters.

Phylum: Mollusca

Class: Bivalvia
Order:
Family: Mytilidae

Lithophaga teres (Philippi, 1846)
Date Mussel

Ecology: Covers hard calcareous floor of areas inside the barrier reef. Siphon holes all appear as old time key holes or laterally contracted "hour glass" shapes.

Characteristics:

Distribution:

Remarks: Seen in SSE sector of Tetiaroa Lagoon at base of coral heads between Rimatuu, Onetahi, and barrier reef. Holes, like "key holes", in flat basement calcareous slabs…separate sectors for incurrent and excurrent siphons? A lot of Lithophaga are found in rocks off of "Horse Shoe Kelp" (rockpile) area outside of Los Angeles breakwater in 12 to 13 fathoms of water.

Phylum: Mollusca
Class: Bivalvia
Order:
Family: Arcidae

Arca ventricosa Lamarck, 1819

Ecology: Often found wedged into deep crevices of boulder-like live coral heads out toward barrier reef. Will retract into crevice when disturbed.

Characteristics:

Distribution:

Remarks:

Phylum: Mollusca
Class: Bivalvia
Family: Pteriidae

Pinctada margaritifera (Linné, 1758)
Common Pearl Oyster; Black Pearl Oyster

Ecology: Found attached to coral rubble and rocks via byssus threads from intertidal reef to 20 meters in depth.

Characteristics: Easily identified by a series of jagged teeth around aperature of adult specimens, whereas younger specimens possess a series of similar jagged scales on valves of shell.

Distribution: South Africa; Red Sea to Tuamotus and Hawaiian Islands; Society Islands

Remarks: Catch "spat" in Tuamotus by lowering down plastic screening in passes to a given depth…after weeks, pulling it up when it is loaded with pearl oyster "spat". Oyster ropes go down to 18' depth; pearl oysters grow fast. Out of old pearl booklet –
2 pearls/1 oyster/2 years. May actually be much faster growing than this.

Phylum: Mollusca
Class: Bivalvia
Order:
Family: Isognomonidae

Isognomon sulcata (Lamarch, 1819)

Ecology: Under surfaces of rubble boulders are commonly covered with these flattened leaf-like mussels.

Characteristics:

Distribution:

Remarks:

Phylum: Mollusca
Class: Bivalvia
Order:
Family: Ostreidae

Crassostrea cucullata

Ecology: Small oysters, common on high intertidal rocks and pilings near Gump Station.

Characteristics:

Distribution:

Remarks:

Phylum: Mollusca
Class: Cephalopoda
Order:
Family:

Octopus cyanea
Common Octopus or Fée

Ecology: This octopus readily hunts in the morning and in the afternoon, very readily changing its colors to match the color background of the shallow reef on which it moves. Shallow water reef habitat and probably sand flat habitat also.

Characteristics: Shows very rapid color changes.

Distribution: Indo-Pacific

Remarks: Seen frequently at old Hotel Tahiti in reef below windows of restaurant during breakfast (8:00A.M. to 9:00A.M.). Also observed at barrier reef of Tetiaroa, SE of Onetahi motu (10:00A.M.). On this occasion, two octopods, laying side by side, were holding "arms"…one from each octopod, probably "mating" by passing spermatophore from male to female. Also, a recently deceased octopod was brought to me by one of my students. Octopod, though dead, continued color flash color changes for at least 20 minutes after death on beach at restaurant site of Onetahi motu. Actively hunted by torch at night and dusk by Tahitians with spear to impale octopod.

Phylum: Mollusca
Class: Cephalopoda
Order:
Family:

Octopus bocki
Pygmy Octopus

Ecology: Shallow water, coral rubble areas outside Gump Station. Occurs to depths of 0 to 30m. Shows food preferences, while a juvenile, to small sized galathoidean crabs and stomatopods over Apleus and xanthids. No preference for paguriodea, bivalves, gastropods, echinoderms, fish or sipunculid worms. Smaller octopods always have a more limited food range than larger ones. Fully mature at small size, short life span. O. bocki: possesses excellent chemoreception abilities. . O. bocki lives in reef rock at barrier reef of Moorea, but specimens are most easily collected from coral rubble.

Characteristics:

Distribution: Society Islands, Philippines, Fiji

Remarks: . O. bocki originally described from a single specimen collected in Fiji by Dr. Sixten Bock (early 1940s). Another species of octopod on Moorea is Octopus wolfi. Other Octopus spp. exist in French Polynesia.

Phylum:	Mollusca
Class:	Gastropoda
Order:	Mesogastropoda
Family:	Littorinidae
Subfamily:	Littorinacea

Mesogastropoda - possesses forms which contain a single gill
Littorinidae – "Periwinkle"

Littorina coccinea (Gremlin, 1791)

Ecology: On elevated ancient corals just inside barrier reef of Onetahi motu, Tetiaroa. Periwinkles can creep out of the water high on the rocks or stones walls and remain exposed to air for a long time, nearly a year in a Honolulu laboratory. Regained activity within a few minutes when returned to sea water. Rarely bathed by the ocean, usually just above the water line.

Characteristics: Called "Periwinkles"; possess a globular shell with a short, pointed spiral. Pink in color.

Distribution: Indonesia and the Pacific, Hawaii, Pitcairn Island, Society Islands, Tuamotus (very abundant), Gambiers, Austral Islands.

Remarks: Seen frequently in leis made of shell products in Tuamotus. Found on basaltic boulders lining Gump Research Station property (1998), always just above water line. Also found on fallen tree branches lying in water, partially exposed, on Gump property.

Phylum: Mollusca
Class: Gastropoda
Superfamily: Neritacea
Family: Neritidae

Nerita plicata Linné 1758

Ecology: On consolidated coralline beach slabs and ancient elevated coral heads inside barrier reef.

Characteristics:

Distribution: Indo-Pacific, on all of the archipelagos of French Polynesia

Remarks:

Phylum: Mollusca
Class: Gastropoda
Order: Archaeogastropoda
Superfamily: Trochacea
Family: Trochidae

Trochus niloticus Linné 1758
Trocha Shell

Ecology: This is a bottom grazing species ingesting algal tufts and the multitude of microorganisms found therein.

Characteristics: Shell is up to 15cm in diameter, reddish to pinkish with dashes of white and white stripping. Brown flexible protein operculum. Pyramidal in shape resembling "frosty ice cream" put into a cone (i.e. an elevated conical spiral).

Distribution: New Hebrides, introduced to Tahiti in 1957 when approximately 40 individuals were transported by plane from New Hebrides to Faaa aeroport, then placed onto the reefs off Tautira. Exists all throughout the Society Islands now (egs: Society Islands, Gambiers, Australs, Tuamotus). Also in Fiji, Indo-Pacific.

Remarks: This introduced species very rapidly colonized the reefs of Tahiti, occupying a ecological vacant spot on the fringing and barrier reefs. Shell is used extensively for shell work and shell ware, for the tourist trade (eg. bracelets).

Phylum: Mollusca
Class: Gastropoda
Order: Archaeogastropoda
Superfamily: Trochacea
Family: Turbinidae

Turbo setosus (Gmelin, 1791)

Ecology: Exists on wave washed portion of barrier reefs, frontal zone of barrier reef and algal flats portion of barrier reef.

Characteristics: 61mm x 61mm shell; thick, spiral shell with prominent ridges. White calcareous spiral operculum.

Distribution: Indo-Pacific

Remarks: Shells frequently found for sale as tourist curios in Papeete. Visceral mass of snail is considered a delicacy for Tahitians. Frequently, Tahitians seen on barrier reef are in search of this species as a food item.

Phylum: Mollusca
Class: Gastropoda
Order: Mesogastropoda (with one gill)
Superfamily: Cypraeacea
Family: Cypraeidae

Cypraea tigris Linné, 1758
Tiger Cowry

Ecology: Very often found associated with coral heads supporting the brown alga, Padina sp. and growths of the coral Acropora sp. Cowries are usually active at night, but they are often found in the day. When active, the mantle lobes of the animal are extended over the convexity of the shell, completely concealing it. In this condition numerous branched, tactile processes are developed from the surface of the mantle. All cowries are herbivorous.

Characteristics: Shell: 75 to 87mm. Adult cowries possess a broadly oval shell with a highly polished surface; the ventral surface possesses a long narrow aperture with teeth at its borders. The operculum is lacking. Tiger cowries are typically large, up to as much as 5 inches long. The polished shell surface is covered with black and brown dots or blotches, white background typically showing underneath this array of spotting.

Distribution: Indo-Pacific; found throughout all of the archipelagos of French Polynesia; not found in the waters of Rapa Island.

Remarks: Often seen for sale to tourists in the second story of the central Papeete market place stalls. When found by tourists or islanders, it is common to throw the shell repeatedly (and with force) down onto a soft fine beach sand to dislodge the mantle, muscles and visceral mass from the inner surface of the shell. The soft shell parts are then pulled out of the shell and discarded.

Phylum: Mollusca
Class: Gastropoda
Order: Mesogastropoda (with one gill)
Superfamily: Cypraeacea
Family: Cypraeidae

Erosaria obvelata (Lamarch, 1810)

Ecology: This is the most common gastropod in the coral rubble of the Gump Biological Research Station, Moorea, to be found in shallow water. Often associated with the brown alga, Pavona sp.

Characteristics: Shell: 22 to 26mm long. Typically a small cowry (about an inch in length) with a whitish ovoid shell. Dorsal surface of polished shell possesses parenthesis (“) and end of parenthesis(”) indentations following the longest axis of the shell. These concavities are often yellow in color.

Distribution: Jarvis Island, Society Islands, Marquesas, Tuamotus, Austral Islands.

Remarks:

Phylum: Mollusca
Class: Gastropoda
Superfamily: Strombacea
Family: Strombidae

Strombus maculatus Sowerby, 1842

Ecology: Found on fine sandy bottoms; depth, one to two feet of water to several fathoms.

Characteristics: Shell: 25mm; Strombus species possess thick shells with cone-shaped spires. The aperture may be broad with a dilated outer lip, or narrow with both lips thickened. An operculum is present. The living animal has highly specialized eyes like those of a cephalopod, and a foot, unadapted for creeping, which serves as a lever in the leaping movement characteristic of these mollusks. Strombus maculatus has a smooth, polished shell with a spiral encircled with fine striae. Shell is white, clouded and mottled with brown.

Distribution: Micronesia, Hawaii and eastern Polynesia; Society Islands, Tuamotus, Austral Islands.

Remarks: Very abundant in 1978 in one to two feet of water outside of Hotel Bora Bora, Bora Bora

Phylum: Mollusca
Class: Gastropoda
Family: Muricidae

Morula granulata

Ecology:

Characteristics:

Distribution:

Remarks:

REFERENCES

1. Reef and Shore Fauna of Hawaii
   Section 1: Protozoa through Ctenophora
   Edited by: Dennis M. Devaney and Lucius G. Eldredge
   Bernice P. Bishop Museum Special Publication 64 (1), Copyright 1977
   Bishop Museum Press, Honolulu, Hawaii
   ISBN 0-910240-22-1, (278 pp.)

2. Seaweeds of Hawaii
   By: William H. Magruder and Jeffrey W. Hunt
   The Oriental Publishing Company, Honolulu, Hawaii, 1979
   ISBN 0-932596-12-6, (116 pp.)

3. Reef and Shore Fauna of Hawaii
   By: Charles Howard Edmondson
   Bernice P. Bishop Museum Special Publication 22 (1),1946, (381 pp.)

4. Coral Reef Animals of the Indo-Pacific
   By; Terrence M Gosliner, David W. Behrens, and Gary C. Williams
   A Sea Challengers Publication, Monterey, CA, (1996)
   ISBN 0-930118-21-9 (314 pp.)

5. Indo-Pacific Coral Reef Field Guide
   By: Dr. Gerald R. Allen and Roger Steene
   Publisher: Tropical Reef Research, Singapore. 1994, (378 pp.)
   ISBN 981-00-5687-7

6. Atoll Research Bulletin, No. 442
   National Museum of Natural History
   Smithonian Institution, Washington, D.C., April 1996
   Crustacea Decapoda of French Polynesia
   By: Joseph Poupin, (114 pp.)

7. Atlas des Crustacés Marins Profonds de Polynésie Française
   By: Joseph Poupin
   Service Mixte de Surveillance Radiologique et Biologique
   Cedex, France, September 1996 (59 pp.)

8. Quelques Crustacès Decapodes Communs de Polynèsie Française
   Rapport Scientifique du Service Mixte de Surveillance Radiologique et Biologique
   By: Joseph Poupin
   November, 1994 (86 pp. Plus color plates)

9. Pacific Crustacea
By: Spencer Wilkie Tinker
Charles E. Tuttle CompanyPublishers
Library of Congress Catalog Card No. 64-19685
1965, (134 pp.)

10. The Biology of Crabs
By: G.F. Warne
Van Nostrand Reinhold Company
ISBN 0-442-29205-8, (202 pp.)

11. Natural Dangers in Tahiti
English translation: Homer Morgan
Pacific Promotion Tahiti, S.A.
ISBN 2-911-228-00-6, 1995 (55 pp.)

12. Underwater Guide to Tahiti
Text: Raymond Bagnis; Photography: Erwin Christian
English version: Sandra and Bill Reed
Les Editions du Pacifique, 1977 (152 pp.)
ISBN: 2-85700-034-0