POLYNESIA

EXPEDITION I

1989

French Polynesia, Society Is.

3 Sept 1989

Tahiti. Collections made on w. side Tahiti Iti & E. coast of Tahiti Nui. Low tide 3-IX-89 was 8 A.M. in Papeete (per. obsv.). The U.S. Hydrographic charts for American Samoa predicted loa tide at 2:45 PM. Obviously the Samoa tides aren't in sync with Tahiti tides. The max. tide range at Tahiti can't be more the 1'-2', because in places the coast road is no more than 12" above the water line.

PAP #1: W. coast of Tahiti Iti, between Toahotu & Vairao. Rock/algae washes on tidal flat (innermost lagoon). Algae included Caulerpa, Padina, & a calcareous Sargassum-like form. ← Turbinaria Depth 1'-2'. A.0097.1

→ Turbinaria

Pap #2: Same locality as Pap #1, but wrack zone, from washed up Sargassum-like algae (many talitrid amphipods, a grapsoid crab, insects, perhaps higiaomerph isopods). A.0097.2

PAP #3: S.E. coast of Tahiti Nui, near Faaone. Coral rubble in reef lagoon. Coral rubble & algae washed. 1'-2' depth. Many urchins & sea cucumbers present. A.0097.3

Sample #4: Land snails from garden of Hotel Tahiti (one live, three dead shells). Live specimen from Papaya tree. Dead specimens (shells) had small amount of mud & water inside them; living in this mud/water were some flat worms (~50 worms total, in all 3 shells) that resemble leeches to the naked eye. Preserved with snail & shells in EtOH. A.0097.4a A.0097.4b

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9/4/89
Samples 5 & 6: Bora Bora, s. coast. Sample #5 coral rubble/algae wash on shore, 0'-1' depth, in white coral sand with ulva-like turf algae on rubble pieces & scattered Padina. A.0097.5 Sample #6 is land snail from grounds of Bora Bora Beach Club hotel. Mid-day air & H_2O T° (above thermocline) both ~ 81°F. Thermocline at ~ 3' (drop to 78°F) A.0097.6

Sample #7

5 sept. 1989. Bora Bora. 2 land crabs from burrows ~ 30' above tide line on So. side of island. Specimen with both chelipeds taken while in copula at burrow entrance.

A.0097.7

Sample #8

6 sept. 1989. Bora Bora, (west side of Motu Piti Aau (a barrier island off E. coast of Bora Bora). Rock & coral pieces scattered on coral sand flat, with small clumps of algae. (sample in 2 bags) 1'-3' depth. H_2O T° = 80° F. Air T° = 80°-90° F. (shade / sun)

A.0097.8

Sample #9

6 Sept. 1989. same locality as #8. Rock washes on shore, in tide line. (This sample contains 2 eels taken from under shell fragments) also some land hermits and a small ghost crab.)

A.0097.9

Sample #10

6 Sept. 1989. Same locality as #8, but on east side (windward/coral reef side). Rock/coral rubble washes in tide line, to collect orange isopod-like creatures (~ 4-6 mm long).

A.0097.10

Sample #11

A.0097.11

6 Sept. 1989. Same locality as #10. Green Ulva-like turf alga on rocks at tide line.

Sample #12

6 Sept. 1989. Vial w/ selected inverts from #8 (above),

including cucumbers, crabs, and an echiuran (?), as well as a couple orange isopod-like creatures from #10 above. This sample should be separated out to lump "isopods" with sample #10 and everything else with #8. A.0097.12

Sample #13. E. coast of Bora Bora, Pt. Taurere. Rock & coral rubble washes along tideline, 0'-2' depth. this sample includes many crabs (+ one Uca). 9/7/89. A.0097.13

Sample #14. E. coast of Bora Bora. Night light sample off pier in front of Bora Bora Beach club, 2100 Hrs., ~ 10' depth. Looked like slim pickins (on water strider, some megalopa, perhaps some ostracods). A.0097.14a

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Moorea Lab. Notes.

Rick stiger - stomatopod biology
Bonnie stiger - freshwater nerite biology.

Species of gastropods facing local extinction due to shell collectors:

(1) Charonia tritonis (Triton). A principal predator on crown-of-thorns. Loss of tritons in Polynesia have been hypothesized to be one of the main reasons Acanthaster has exploded. Tritons bring $120-$150 on the local market.

(2) Cassis cornuta

(3) Turbo marmorata

(4) Trochus niloticus (troca) - The "naccreous topshell" is harvested in high numbers (2000 tons in New Caledonia in 1978). used for jewelry & ti buttons & a bit for mo

The black pearl oyster of Polynesia is Pinctada margaritifera. Trochus niloticus originally ranged from the Andaman Is. to Fiji, but has been introduced to many Pacific islands. Where introduced, it has become well established as a conspicuous member of the reef community. One introduction of 40 animals to the Cooks (Aitutaki) in 1957 established the species on that island. By 1980 the local species Turbo setosus had been driven to near extinction, presumably thru competition with T. niloticus. Apparently T. niloticus is a very poor disperser and by the 1980 still had not reached any other Cook Is. In 1981 it was introduced by man to some other cook islands (as a harvestable resource). (From Sims 1985).

Halimeda: Includes 31 species widely distributed in warm seas (Chlorophyceae: Udoteaceae: Caulerpales); ~~Each~~ contribute to reef building.

Algal genera known from French Polynesia: Browns= ↑Sargassum, Turbinaria (the calcareous Sargassaceae), Dictyopteris, Dictyota, Padina, Zonaria, Colpomenia, Macrocystis; Greens= Ulva, Enteromorpha, Cladophora, Chaetomorpha, Valonia, Valoniopsis, Acetabularia, Neomeris, Codium, Halimeda, Udotea, Caulerpa. Reds= Gelidium, Pterocladia, Lithophyllum, Gracilaria, Spyridea, Polysiphonia. Plus many others. 9 species of Sargassum have been reported, and 2 species of Turbinaria (T. ornata is the common one).

French Polynesia, Society Islands, Moorea. Gump So. Pacific Biological Research Station (U.C. Berkeley).

9 Sept. 1989: Collections made on barrier reef crest, & just inside reef (outermost region of Moorea lagoon, between Tareu & Avaroa passes). Water T° = 79° F.

Sample #14. Plankton net skim of surface drift algae in lagoon (Gina's folly). A.0097.14

Sample #15. Plankton net washes of attached Sargassum (2 species) and dead coral rubble on barrier reef crest & just inside crest in lagoon (0'-4'). A.0097.15

Sample #16. Coral rubble collected & broken apart at lab with hammer (from 2'-4'). A.0097.16

Sample #17. From grounds of Gump Lab (terrestrial insects & isopods). A.0097.17

Sample #18. Intertidal sample from front of Gump lab. Rubbe washes, algae washes, coral rubble broken open with hammer. (Paopao Bay) A.0097.18

Sample #19. Land crab from mud banks in front of lab (presumably the same as taken on Bora Bora. Goinot (1985, 5th Internat. Coral Reef Congress) lists 4 Gecarcinoidea from Polynesia (Cardisoma carnifex, C. hirtipes (?), Discoplax longipes, & Epigrapsus politus). My guess is this guy is Cardisoma carnifex (Herbst, 1794). A.0097.19

FRENCH POLYNESIA

① Sprinkled over 1.5 million mi^2 of ocean.

② Total land area = 1,544 mi^2

③ 130 islands & atolls in 5 archipelagos (some islands are listed below).

I. Society Islands:

Windward Islands: Tahiti, Moorea, Maheta
Leeward Islands: Bora Bora, Huahine, Raiatea.

II. Austral Islands:

Rimatara, Rurutu, Tubuai, Raivavae

III. Marquesas Islands:

Nuku Hiva, Hiva Oa, Fatu Hiva

IV. Tuamotu Islands:

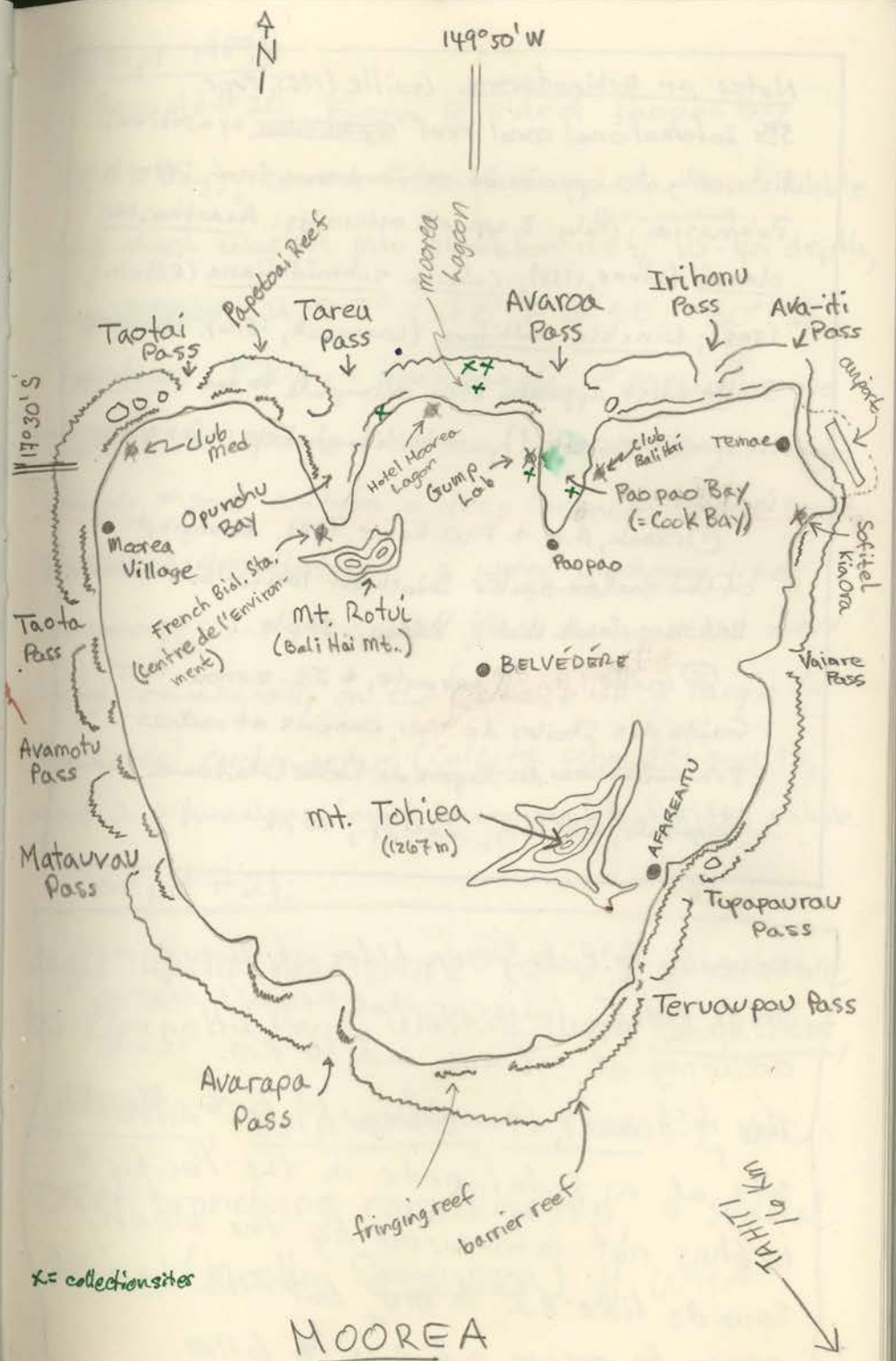
Rangiroa, Manihi, Arutua

V. Gambier Islands:

Mangareva, Timoe

④ Tahiti is 4,050 miles from California, 3,350 miles from Australia, 5,900 miles from Japan, 4,900 miles from So. America

⑤ Marquesas time is ½-hour ahead of rest of French Polynesia! (officially so!)



Notes on Echinoderms. Guille (1985. Proc. 5th International coral reef ~~expedition~~ symposium) lists only 30 species of echinoderms from French Polynesia. Only 3 spp. of asteroids: Acanthaster planci (Linne, 1758); Culcita schmideliana (Retzius, 1805); Linckia multifora (Lamarck, 1816). However, Guille's list appears very incomplete to me (Diadema isn't even on it!). Additional key refereuces include:

① Clark, A.M. & F.W. Rowe. 1971. Monograph of the shallow-water Indo-West-Pacific Echinoderms. Brit. Mus. (Nat. Hist.), 238 pp., 31 pls.

② Guille, A., P. Laboute, & J.L. Menou. 1985. Guide des Etoiles de mer, oursins et autres Echinodermes du lagon de Nelle Calédonie. Faune Tropicale, ORSTOM, 220 pp., 70 pls.

According to Rick Steger tides at Moore are "solar tides" (whatever that means!), always occuring at ~6 A.M. and 6 P.M. (local). This is because, according to Rick, Moorea sits at a tidal node in the Pacific & is thus not influenced by the moon! Sounds like B.S. to me, but the tides did seem to occur ~6 A.M. & 6 P.M.

10 Sept. 1989

Sample #20. From E. side of Paopao Bay (= Cook Bay), across from Gump Lab. Coral rubble and algal washes into plankton net (scuba collection), 10'-40' depth, for 30 min. H_2O T° = 78° F @ 40', 80° F at surface. #20A is wash sample. #20B is orange Tedania-like sponge from same sample (bright orange). Sample #20A contains a deep lavender sponge (erect, Stylea-like growth form), 2 wierd mushroom-like anemones, 1-3 very small black shrimp that were living commensally on the surface of a large (10" diameter) cushion star (Culcita schmideliana ?), and 2 sipunculans found burrowing into Porites rubble.

A.0097.20

Sample #21.

Algal washes near shore (0'-2') at entrance to Opunohu Bay. Washed were Sargassum, Turbinaria, Colpomenia, Padina (?), an erect branching coralline red, & several others. (mostly Sargassum). A. 0097.21

Sample #22.

Night light off lab boatdock. Gina's folley #2.

A.0097.22

11 Septemper 1989

Sample # 23: Lizard found dead in skiff at lab boat dock. A.0097.23

Sample # 24: Terrestrial isopods from lawn at Gumplab. Small lizard taken inside dormatory. A.0097.24

Sample #25: coral rubble & algae washes into plankton net in Moorea Lagoon, 1'-4' depth. This sample includes some slimy blue-green algae(?) that was releasing a lot of bubbles underwater, a stalked purple sponge, some more of the small black shrimp commensal on Culcita, and a lot of Halimeda fragments from a lot of Halimeda washings. In two lots, in a plastic bag & a plastic jar (25a, 25b).

A.0097.25

13 September 1989

Cook Islands, Rarotonga. First day in Rarotonga & we've already fallen in love with the Cooks. Unlike French Polynesia, where the local Polynesians are surly, rude, unhappy and seem to dislike tourists & the whole economic scene no doubt forced on them by the French, the Cook Islanders are warm, friendly, happy people who laugh and smile constantly. Tourism is not heavily commercialized in the Cooks, more locally produced food is available, and prices are reasonable (slightly lower than U.S. prices). Rarotonga is a lovely island (like Tahiti before the France developed tourism there perhaps), rather like a 19th century south seas island. The "Edgewater Hotel" is a fine place to stay, with an excellent beach in front. An initial walk on the barrier reef (just ~ 100m off-shore here) revealed 2 species of Linkia, an enormous urchin, giant anemones, several species of cucumber, and A large encrusting sponge covering ~ 20 ft^2 and growing to a thickness of ~ 5" (this is sample #26). The large lavender Linkia had commensal ostracods (?) living on the oral surface that scampered in & out of the ambulacral grooves.

14 Sept. 1989

Rarotonga. Sample #27 is driftwood in intertidal zone at Ngatangia Harbour, S.E. side of island. Gina saw mites, amphipods, barnacles & sphaeromatids in wood. Sample #28 is intertidal & shallow subtidal (to ½ m.) at same beach (Ngatangia Harbor), rock & algal washes (algae were sparse, short, brown turf on small rocks). Sample #29 is from S.W. side of island. Samples taken by washing rocks and algae in coral lagoon near Rutaki Passage (algae washed included Sargassum, Turbinaria, Halimeda, Dictyota(?), and a grass-like green turf alga. A purple Liukia found here lacked the commensal ostracods we noticed on the Edgewater Resort beach specimen, but instead had 2 copepods on its oral surface. Lots of crabs & amphipods in #29.

15 Sept. 1989 (Rarotonga)

Plankton net washes made at 30'-40', washing coral rubble in pockets amoungst a luxurient live reef off the west coast of the island (outside barrier reef). Sample #30a

is wash sample, & contains many Ciukia &
small crabs, at least one odd anomuran,
& several nudibranchs (+ many snails & hermit
crabs). Sample #306 is the large fragments
washed & removed from the sample – this was
saved so Gina can check to see how many
crustaceans we may be loosing in the reduction
process. For this dive we used a commercial
dive outfit – "Dive Rovatonga" ($35 N.Z. @ for
dive + gear). H_2O T° on this dive was 76°-77°
F (no thermocline felt to 40'; Eric [dive leader
& owner of Tumunu Restaurant] says there is a
thermocline at 100'; he also says temperatures
hit a high of 27°C in Feb-March.).

A.0097.30

16 Sept. 1989. Cook Islands, Aitutake Is., collections made on west side of island, near Rapae Cottage Hotel. Sample #31 is worms from mud flats (resemble acorn worms). A.0097.31 Sample #32 is two calappid crabs, a coenobita, and a bivalve (all from the shore & tide flats uncovered by low tide). A.0097.32 at 6-7 p.m. the tide low standing water.

17 Sept. 1989. Aitutaki. Lagoon off Rapae Cottages.

Sample #33: Entire coral head broken apart and washed in bucket of dilute alcohol. A.0097.33 Head was about .5 m in diameter, roughly circular, and about ½ dead and ½ alive — thus the sample includes animals living in both dead and live coral. The coral was almost certainly Pocillopora (resembled P. damicornis or P. elegans of the eastern Pacific). This sample contains many crabs, shrimp, & fish, including a 6" eel; also a large brittle star and many small amphipods. Depth = 3' (about midway between shore & barrier reef).

Sample #34: Rocks and algae washed from inner-most lagoon area, near shore, in ~1' water. A.0097.34

Sample #34 includes wases of many algae, including a fern like Caulerpa (2 species actually, one fine & plant-like, the other thick-stemmed & somewhat gelatinous; both green), another possible type of Caulerpa w/rhizomes and single emergent stalks that are bi-colored (green/white), Sargassum, Turbinaria, a Caulerpa (?), and others. The sediment in this inner lagoon area is very fine, clay or silt on top of fine-grained coral sand. It is anoxic ~ 1 cm below the surface. Many crabs in this sample, and perhaps amphipods & tanaids.

The lagoon here at Aitutaki seems to be especially rich, perhaps the richest (most diverse for inverts & algae) we've seen yet on this trip. The density of black sea cumbers (many/m^2) is also greater here than anyplace else we've seen. The deep sulfide layer below ~ 1 cm. sediment also attests to a high organic input to the lagoon.

Tides here ~~may be~~ may be ~1.5 hours later than Auckland tides (local times); low tide at Aitutaki on Sept. 17th appeared to be ~ 6 P.M.; at Auckland (by the U.S. Hydrographic tables) low was at 4:22 p.m. (& also at 3:48 A.M.). Tides on all these Pacific islands seem to be different, and none so far have been close to the tables for Apia (Amer. Samoa).

18 Sept. 1989

Aitutaki. Scuba collection made in 40'-80' depth off w. coast of island (off Nikaupara), outside barrier reef (on forereef slope) (so. of Arutanga Pass). two collections made. Sample #35 is coral rubble sample from ~40' (dead coral taken in 10 gal. bucket & broken apart on-shore). A.0097.35 Sample #36 is plankton net wash underwater in 60'-80' A.0097.36a of live coral & coral rubble. H_2O T° = 76°-77° F; no thermocline to 80'. The coral reef here is, as at Rarotonga, incredibly diverse & healthy - world class! And, as at Rarotonga, the invertebrate crypto-fauna is not rich in this healthy

coral habitat.

Aitutaki: shore collections on w. coast, near Rapaea Cottages.

Sample #36: Top 1 cm. scooped in area of dense flocculent on surface (where sample #31 taken). A.0097.36b Beneath this thin layer of flocculent the sandy mud was black & anoxic. This is presumably the flocculent material the acorn worm (?) were feeding on.

Sample #37: Washed rocks, shells & rubble in litteral (~ 1' deep at high tide). This sample split into 2 factions, 37a is filtered through netting (~~.25 mm ?~~ 240 µm) A.0097.37a and contains many small insects (or asellotes). Sample 37b is filtered through the round plastic seive (.75 mm ?). A.0097.37b There are many shore crabs in sample 37b (perhaps including a Coenobita or two picked up higher on shore.

Sample #38: Rotting log in intertidal zone torn apart (12" section). many teredines and small crabs. A.0097.38

22 Sept. 1989

Fiji, Viti Levu Is., Nandi area. Sample #39 is a wash zone collection made on the A.0097.39
Sand beach between the hotels Sheraton & Regent, just no. of Nandi. Cirolanid isopods, a gastropod, & various bivalves taken. The cirolanids were very sparse — this sample representing ~1 hr. collecting & sieving by both Brusca & Wetzer. Sample #40 is from just south of Sheraton Hotel, high intertidal & wash zone (ocypode, bivalves).
A.0097.40

24 Sept. 1989

Tonga, Tongatapu Is. Collections made in Nuku'alofa area (No. side of island).

Sample #41. Rock washes on W. side of Vuna Wharf (in front of National Treasury, adjacent to Royal Palace), shore to 2' depth. H_2O T° = 84° F (very warm & shallow). This sample includes Ligia, Linkia, many crabs, & many snails. A.0097.41

Sample #42. Beach wrack (mostly sea grass) on beach just W. of Royal Palace. Many beach-hoppers & insects. (In shampoo bottle). A.0097.42

Sample #43. Sea grass (live) in ~2'-3' depth on beach just W. of Royal Palace. A.0097.43

note: Monarch butterflies (?) noted on Tongatapu island!

24 Sept. 1989 (cont.)

sample #44. A.0097.44

Tonga, Fanga'uta Lagoon. Washes of rocks, algae & several different kinds of demosponges. Crabs, fishes, amphipods, tanaids (?), etc. Sample of encrusting sponge also taken (color in life - green exterior, orange interior); this sponge encrusted rocks over patches of several feet in size. The lagoon is primarily mangrove-lined, but at a locality near the "Joe's Kahana Lagoon Resort" hotel there is some man-made rock "dikes" extending into the lagoon. This was the area sampled. Some Ligia also thrown into this sample, as well as a terrestrial centipede. (↗ should be removed to sample #45)

Sample #45 is terrestrial sample from under leaf litter & rocks. Two kinds of isopods, centipedes, etc. A.0097.45

note: Tonga is the first Pacific island encountered on this expedition to have Ligia. Does this mean Ligia hasn't yet dispersed to the Cooks & French Polynesia ??

25 Sept. 1989

Tonga. Entire island of Tongatapu circled by car, each beach road & access examined, but collections made only in N.E. corner of island, near Kolonga village. The south coast of the island is uplifted a couple hundred feet, which makes for dramatic cliffs & outrageous views from Houma (in the w.) to Nakole (in the E.), but no beach access – hence no collecting. The E. coast, from Nakole (northy) has some nice pockets of coral sand beach but only a couple access roads (e.g. Oholei beach road, Holaika Estates road). However, there is little apparent marine life on these sandy beaches (Coenobita, a limpet, Nerita). The N.E. coast, especially the Kolonga region is the best collecting we found. Two rock/coral rubble/algae washes made in

Kolonga area.

Sample #46: Tonga, Tongatapu Is., N.E. corner of Island, near village of Kolonga. Sandy shore with boulders & scattered smaller rocks with some green algae. Washes made from shore to depth of ~ 2'. This sample is in a plastic jar, plus a separate shell (dead) in a plastic bag. A.0097.46

Sample #47: Tonga, Tongatapu Is., N.E. corner of island, just W. of village of Kolonga. Sample taken from small sea-water lagoon. Rock & coral rubble washed, plus some dead drift seagrass from lagoon bottom. Depth = shore to ~ 1.5'. A.0097.47

Sample #48: Centipede found on floor in bathroom of "Kahana Beach Resort" hotel, on Fanga'uta Lagoon. A.0097.48

Also, what appeared from the air to be a coral lagoon exists on the coast directly adjacent to the Tonga airport, but we found no access roads by land. →

Although no live coral was see on Tongatapu Is., some New Zealand tourists (Mary & Andrew - Mary is Sir David Fleming's daughter) claimed to have seen it in the lagoon at "The Good Samaritan Inn" on the far N.W. corner of the island (the only place on the island we didn't get to ourselves!). The absence of coral on Tongatapu is rather mysterious, as it apparently occurs on the other islands in Tonga. There does appear (from shore) to be a barrier reef ~1 km off shore in the Kolonga region & live corals may occur on the seaward side of that reef but this isn't certain. Most of the island seems to be comprised of old "fossil" coral rock (limestone), including the cliffs & sea rocks all along the south shore of the island. This rock is mined extensively in quarries for construction materials.

29 Sept. 1989

New Zealand, North Island, Northland, Tasman Sea, mouth of Hokianga Harbour. Shore collections made just inside Hokianga Harbour, at town of Opononi. This "harbour" is actually an enormous bay, salt water at Opononi, receiving drainage of several rivers (eg. Waihou River, Waima River).

Sample #49: Terrestrial isopods from garden of hotel, ~ 75 m from shore.

A.0097.49

Sample #50: shore collection, including spray zone amphipods, high intertidal rock washes, drift & floatsom washes of sponges & algae, & under log insects & other critters. This was a high tide collection (~ 8 A.M.).

A.0097.50

10/03/89

We mailed two packages of specimens back to SDNHM as follows:

1 from Moorea @ a cost of $140.72 USD
weighing 18 kg.

1 from Nadi @ a cost of $139.80 USD
weighing 10 kg.

approx. another 8 kg were hand carried on the plane.

A total of ≈ 36 kg of specimens were brought back for the research collections.

Specimens were packed in whirl top bags (double) each w. black electrical tape over the wire ends and then put in plastic shipping containers, i.e. tupperware-like.

POLYNESIA EXPEDITION II 1993

1/5 - 1/6 En route
1/6, 1/7 W.S. (Aggie's)
1/8, 1/9 W.S. (Vaisala)
1/10, 1/11, 1/12, 1/13 W.S. (Aggie's)
1/14, 1/15, 1/16 A.S. (Rainmaker)
1/17 -
1/18, 1/19, 1/20, 1/21 Vava'u (Paradise)
1/21 A.S. (Rainmaker)
1/22 Honolulu (Pacific Marina)
1/23, 1/24 Kona
1/25, 1/26 Kokee lodge (Kauai)
1/27, 1/28, 1/29 Islander Hotel (Kauai)

Note: All samples from #6 on for Polynesia Exped. II were washed in freshwater & seived through a 240 µm screen before preservation.

WESTERN SAMOA

7 Jan. 1993

Western Samoa, 'Upolu Is., NW side (about in line with Faleolo Airport & mulifanua Wharf), ~3 km offshore (outside reef) on rocky outcropping. scuba collection 50'-65'; coral rubble. This area was scoured by a large typhoon in 1989. The corals, sponges, bryozoans, etc. are just now beginning to return. The rocks were dominated by encrusting coralline red algae. Large (to 1 m) coral heads & fragments (all dead) littered the bottom; this material was washed thru a .475 mm plankton net for ~30 min. 4 sample bags. (sample #1) Air T° = 80 F. (A.0183.1) H_2O T° = ~28°-29° C (no thermocline). According to local dive operator, Jake Sologa, the entire N. coast of Upolu was scoured by the 12/91 typhoon. I predict these sample are probably depauperate. This sample washed in fresh water prior to preservation, and screened through a 750 µm sieve.

Note: Shops at Pago Pago airport have excellent gov't maps & topos (+ books) of islands.

8 Jan. 1993

western Samoa, Savaii Is., NW side of island at Vaisala. Snorkling in lagoon @ 2/3 distance from shore to fringing reef. Samples taken from coral rubble & some live coral in 3'-8' depth. This area was pretty well devistated in a hurricane in 1991, that destroyed the local airstrip (Asua) and much of the Vaisala Hotel. However, the lagoon reefs are coming back pretty well and are about 20% recovered it appears. Unlike the NW coast of 'Upolu Is., the lagoon here has live coral of at least a dozen varities, many echinoderms, some algae & sponge growth, and crustaceans. These samples (sample #2 - 5 bags) should be much richer than sample #1 (from 'Upolu). (A.0183.2) sieved thru 750µm sieve.

There is some kind of crazy littoral fish here that hops out of the water onto rocks, where it sits "sunning" itself in air. When approached it hops from rock to rock, avoiding returning to the water. A ligia-like behavior.

9 January 1993

Western Samoa, Savai'i Is., near Asau on NW side of island. Misc. animals picked up along coast road, including terrestrial millipedes, isopods, and a slug, and a littoral crab & amphipods (sample #3 - one bag). Also 2 Coenobita, and some terrestrial gastropods, and 1 ocypode. (#.0183.3)

Western Samoa, Savai'i Is., NW coast, just east of Hotel Vaisala. Rock, coral, & coral rubble washes made inside (& just outside) small lagoon. High littoral to ~ 4' depth. Some turf algae, a small bit of Padina, and some small clumps of Pocellopora & Acropora (?) washed. Sample #4. (1 bag) washed in fresh water; screened thru 750 µm sieve. (#.0183.4)

11 Jan. 1993 (cont.)

Sample #8: 'Upolu Is., No.-central region, between Pt. Utumau'u and Solosolo Village. Washes of Padina, an erect coralline alga, and a thick felt-like brown mat-alga. Low tide in ½ m depth. (1 bag). Silt removed by washing through 240 µm sieve. (A.0183.8)

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12 Jan. 1993

Western Samoa, 'Upolu Is., north-central coast, in area between Lauli'i and Safuatata. Four samples taken in ½ m. depth at low tide.

Sample # 9; "Higgins sample" – 2 cm of sediment surface scraped w/ mermaids bra. Topmost 5 mm fine silt, coarse sediment below this. (A.0183.9)

Samples 10-12 (below) were washed in fresh water, & the silt was removed by washing through a 240 µm mesh sieve.

Sample #10: Sargassum wash (only Sargassum). This species of Sargassum was thick & coarse, lacking flotation pneumophores. one bag.
(A.0183.10)

Sample #11: Caulerpa wash. Rootlets with attached sediment, as well as "leaves" washed. one bag. (A.0183.11)

Sample #12: Halimeda (?) wash. Alga + attached sediments washed. Two bags.
(A.0183.12)

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13 January 1993

Western Samoa, 'Upolu, on trail to top of Mt. Vaea (~400m elevation). Sample #13 (millipede & slug). Killer trail - about 1 hr. practically straight up; ~90°F & 95% humidity. At the top - Robert Louis Stevenson's grave & and a dramatic view of Apia.
(A.0183.13)

15 January 1993 AMERICAN SAMOA

American Samoa, S(W) side of Tutuila Is., between Afao and Āmaluia, (Leā Tātaua County)
One sample taken snorkeling, rock and coral rubble wash, surface to 1 meter depth. Good collection of crabs and molluscs, also 1 echiuran taken.
Sample #14 (specimens relaxed in epsom salt and freshwater for ca. 1 hr.) (A.0183.14) contains large hermit crab in a 2½ in. long badly worn gastropod shell. Ant. 2 golden, bases of eye stalks bright blue, bases of Ant. 1 bright blue, i.e. 

. Small "xanthid-like" crab was bright orange-red carapace (carapace width ca. 17mm) and bright red chelae, banded pereopods.
Sample #15 (1 bag) washed through 250 µm netting. (A.0183.15)

Sample #16. S. side of Tutuila Is., north of PPG airport, public beach near Āvau, Itū'au Co., mostly Halimeda and rock washes in 0.5–1.5 m depth. (2 bags) (A.0183.16)

Sample #17. S. side of Tutuila Is., public beach in Fega'alu Bay (Itū'au County), S. of entrance to Pago Pago harbor. Collection from 0.5–1.0 m, dead coral only no algae or live coral, area badly disturbed by storms. Sediment stirred w. spoon then swept. (2 bags) (A.0184.17)

Sample 18. Same location as #17. Collection of hermit crabs, many likely juveniles (possibly Birgus? - wishful wishing on rw's part) from high intertidal. (A.0183.18)

16 January 1993

American Samoa, SE side of Tutuila Is., near the town of Amouli (Sā'ole County) dead coral rubble wash, 1m or less depth. (1 bag) Sample 19. (A.0183.19)

Sample 20. Just north of Breakers Pt., south of Aua (near entrance to Pago Pago harbor), Sua County, live coral broken and washed into plankton net snorkeling 1 to 1.5 m depth. 1 plastic jar containing rubble, urchins, a vial inside contains more fragile decapods. Pocillopora-like corals. (A.0183.20)

Sample 21. Same locality as sample #19. dead small shell collected dead along side road where car was parked. (A.0183.21)

Sample 22. Top 3 cm. of sediment taken with Higgins' "mermaid's Bra", SW region of Pago Pago Harbor (near Rainmaker Hotel). Put directly into 90% EtOH. (A.0183.22)

TONGA

19 January 1993

Tonga, Vava'u Group, Mala Islet (= Mala Malafakalava), between Pangaimotu Is. and Kapa Is. scuba collections, 6'-18' depth. H_2O T° = 80° F. This near shoal reef is known locally as the "coral garden at Mala". Many large coral heads on flat limestone bedrock. Beautiful area.

Sample #23. washes of coral rubble and live coral (small heads sacrificed). (3 bags + 1 jar) (A.0183.23)

Sample #24. 5 gal. bucket of dead coral brought back to pier and broken up. (1 bag.) (A.0183.24)

Note: John (of Sea Breeze Resto) and the Tongan Beach Resort have boats for hire (the latter has good SCUBA facilities).

20 January 1993

Tonga, Vava'u Island Group, Pangaimotu Is., Utungake shore (so. of Tongan Beach Resort). Scuba collection in 20'-110' depth. silt layer over coral rubble & limestone reef.

sample #25. Washes of live coral (sacrificed) and coral rubble, 20'-110'. (2 bags) (A.0183.25)

sample #26. Dead coral rubble (5 gallons) returned to dock where it was broken apart. No live coral in this sample. (2 bags). (A.0183.26)

sample #27. Sediment sample for Bob Higgins. Top 2 cm. scraped into Higgins' "mermaid's bra", 30 ft depth. (A.0183.27)

Sample #28. Sediment sample for Bob Higgins. Top 2 cm. scraped into Higgins' "mermaid's bra", 100 ft. depth. (A.0183.28)

Sample #29. Night light off pier at Paradise Hotel, 2130, 5'-6' depth. (A.0183.29)

21 January 1993

Tonga, Vava'u Group, Easternmost islands, on barrier Reef ('Umuna, Kenutu, Lolo). All 3 islands are uninhabited (though frequently visited).

Sample #30. Small sample taken at Kenutu (W. side) by dragging 240 mm plankton net over surface of turtle grass bed. (1 bag). (A.0183.30)

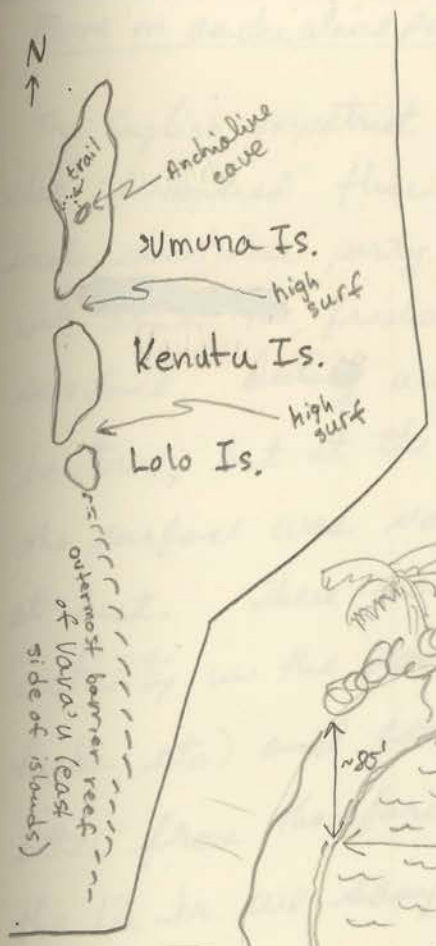
Sample #31. Coral rubble wash in 3ft. depth, W. side of Kenutu Is. (1 bag) (A.0183.31)

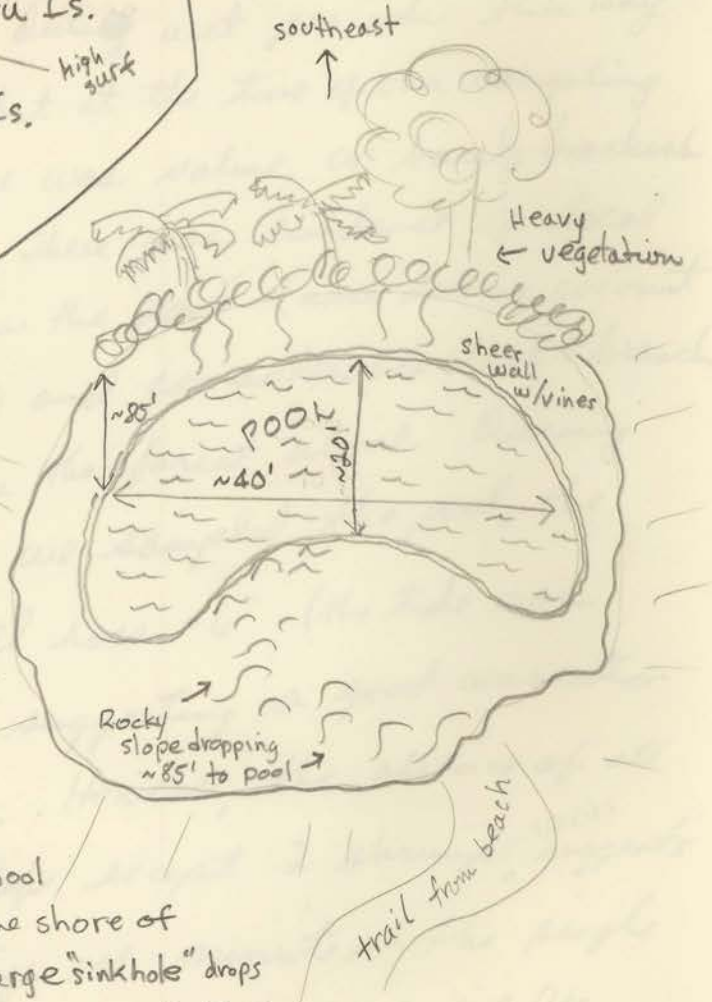
Sample #32. Shrimp captured by dip netting in anchialine pool, 'Umuna Is. (A.0183.32)

Sample #33. Sediment sample, 2ft. depth, anchialine pool, 'Umuna Is. (A.0183.33)

Note: Only 2 animals were seen in pool: (1) small red shrimp (captured), which are abundant on rocks in shallows, & (2) 1 solitary large shrimp (Processidae?) about 4" long. The entire pool was examined by snorkeling & with dive lights. Only one large shrimp was seen. No fish; nothing else.

Anchialine Pool on ʻUmuna Is., Vavaʻu, Tonga





This un-named pool is ~85' above the shore of ʻUmuna Is. A large "sinkhole" drops almost vertically to the pool. Dive lights could not penetrate to deepest holes along SE side. Depth in center ~15'-20'. Saline at time of sampling, but said to have freshwater lens during rainy periods.

More on anchialine pool:

The English ex-patriot ("John of Ocean Breeze Cabo") who "discovered" this cave and pool claims locals sometimes party on the island and will drink the freshwater skimmed off the surface. During wet periods this may be true, but at the time of our sampling the surface was saline, or barely brackish at best. There was evidence of local activity in the pool (some debris, coconut husks, etc) and considerable leaf & branch litter from the forest about. During the 1½ hr. we sampled the pool, the water level rose ~6" (the tide was rising), suggesting a ~~good~~ connection to the sea. However, the absence of all marine life except 2 shrimp species suggests the openings are minute. The single large shrimp are slow (but failed to capture) may have entered the system

as a larva, & matured in the pool. The area observable by snorkeling clearly showed no other large shrimps, or other marine life. I believe the small red shrimps we took may be procarids.

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afternoon sun at 1 PM - 2 PM gives best light, but good flashlights (dive lights) are necessary.

HAWAII

24 Jan. 1993. Hawaii, Big Island (Hawaii), No. Kona/so. Kohala coast, ~1.5 Mi. so. Hapuna Beach state Park. (~19° 58' N 155° 51' W). Snorkeling in 0'-15' depth.

Sample #34. Washes of coral rubble, broken-up live coral (Pocillopora, Porites), and littoral algae-covered stones.
(HA.0183.34)

28 January 1993. Hawaii, Kaua'i Is.

Samples 35 & 36: E. side of Kaua'i, "Anchor Bay" @ Nawiliwili Bay, Lihue. Sample #35 is a sediment sample for R. Higgins taken in ~ 1 m depth on a shallow bay bottom. (A.0183.35) Sample #36 is rock & algae washes along north shore of bay; litteral to ~ 1 m depth. (A.0183.36)

Sample 37. E. side of Kaua'i, benchrock shore reef ~ 100m. north of "Islander on the Beach" Hotel (and ~ 100m south of "Sheraton Coconut Beach Hotel." Algae washes in surf line (no rock washes; algae scraped off rocks in strong surf). Isopods seen in sample (Colidotea edwardsoni?). (A.0183.37)

Polynesian Expedition

III

26 June - 30 June: Moorea, Society Is.
30 June - 1 July: Tetiaroa, Society Is.
9 July - 13 July: Vava'u, Tonga
16 July - 19 July: Taveuni, Fiji

Moorea - Society Islands

26 June 1995

Sample #1 Taken off of Gump Biological Laboratory. Wood sample, 3-10 feet of water. Wood was broken apart on shore and shaken in fresh water. Sieved through 240 µm mesh. RCB/RW95.1 17°31'S 149°49'W

Sample #2 Lagoon off Gump Lab. Cook's Bay (Paopao Bay). Saltwater and fresh water washes of Halimeda. 10~15 feet of water. RCB/RW95.2

27 June 1995 17°31'S 149°49'W

Sample #3. Forereef crest. To Right of Tareu Pass. (see map from first expedition) Spur and groove formation. Sample taken of coral rubble washes along grooves, suspended material caught in 240 µm plankton net. Sample was processed RCB/RW95.3

on shore. Rinsed with fresh water. Sample was separated by swirling Rubble and sand in bucket and pouring suspension through 240 µm mesh. Shell and Rubble packaged separtely from the condensed suspension to see if crustaceans can be more easily sorted this way. 40-60 feet. North side of island. Time of dive - 9:00 A.M. 17°29'S 149°53'W

Sample #4 Ligia and Onscidians taken from concrete slab of workshop of Gump Lab. 17°31'S 149°49'W
RCB/RW 95.4

Quantitative Samples 17°29'S 149°50'W

5 replicates. 1/2 M square quadrats were taken of coral rubble habitat. Samples were taken by marking off a 30ft square area and dropping the PVC quadrat at random five times within this area. Large chunks of coral and rocks were removed and placed into large sampling bags. A dust pan was used to transfer the shell and sand within the quadrat into the sampling bags. The bags were closed off and taken back to the Wet Lab for processing.

First site: The south side of the barrier reef directly across from Cook's Bay. Cored to determine anoxic layer and water depth was measured

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Replicate # 1 - Sample #'s 5, 6, 7
RCB/RW 95.5
RCB/RW 95.6
RCB/RW 95.7

Water depth 53 cm

Core - 5.3 cm depth - no anoxic layer

Sample filled 5 gallon bucket 25 cm

Sample # 5 - Replicate 1

This sample was processed by fractioning the entire sample into coral rubble and rock and sand. Sand was swirled in fresh water to bring animals into suspension. Suspension was then sieved through 240 µm mesh. Coral rubble was broken apart with a hammer and the small pieces were placed in fresh water. Suspended animals were also sieved through the 240 µm mesh.

Theoretically, this sample should contain the majority of animals for this replicate. 1 bag

Sample #6 - Replicate 1

Left over sand and small rubble from large coral rubble and rock processing. 2 Bags

Sample #7 - Replicate 1

Left over sand fraction from swirling suspension processing. After being sieved through a (window screening) ___ µm top screen. 5 Bags. One of the 5 bags of sand was kept to check success of swirling procedure.

Replicate 2 - Samples 8, 9, 10

Water depth 60cm
Core 7.9 cm no Anoxic layer
height in 5 gallon bucket 15 cm

Sample # 8 - same as Sample #5 but for Rep. 2 RCB/RW 95.8

Sample # 9 - same as Sample # 6 Replicate 2 RCB/RW 95.9

Sample #10 - same as Sample #7 Replicate 2. One of 4 bags retained. RCB/RW 95.10

Replicate 3 - Samples # 11, #12, # 13

Water depth - 70 cm
Core - 7.9 cm slight Anoxic layer
Height in 5 gallon bucket - 15 cm

Sample # 11 - same as Sample 5 - Rep3 RCB/RW 95.11
Sample # 12 same as Sample 6 - Rep3 RCB/RW 95.12
Sample # 13 same as Sample 7 - Rep3
One of 7 bags retained RCB/RW 95.13

Replicate 4 - Samples 14, 15, 16

Water Depth - 55 cm
Core 7.9 cm - Anoxic layer at 5 cm
Height in 5 gallon bucket - 15 cm

Sample 14 - same as 5 - rep 4 RCB/RW 95.14
Sample 15 - same as 6 - rep 4 RCB/RW 95.15
Sample 16 - same as 7 - rep 4
one of 8 bags retained RCB/RW 95.16

Replicate #5 Samples 17, 18, 19

Water depth - 63 cm

Core - 9.2 cm Anoxic layer 2.6 cm

Height in 5 gallon bucket - 18 cm

Sample 17 - Same as Sample 5 rep 5
RCB/RW 95.17

Sample 18 - Same as Sample 6 rep 5
RCB/RW 95.18

Sample 19 - same as Sample 7 rep 5
one of 7 bags retained
RCB/RW 95.19

28 June 1995

Sample 20

Algal turf scrapings off intertidal reef flat. Sample was treated with MgCl and sieved through 750, 240*, and 63* µm mesh. Faaupo Pointe 17°30'S 149°45'W (near airport)
RCB/RW 95.20a & RCB/RW 95.20b

* these samples were saved.

Sample 21

Coral Rubble and sand samples. Same locality as sample 20. Approximately 7 gallons of substrate was collected and processed by swirling buckets in fresh water and sieving the suspension through a 240 µm mesh RCB/RW 95.21

Sample 22

Same locality as above. Grapsus grapsus hand collected by Wendy Moore.
RCB/RW 95.22

Sample 23

Same locality as above. Grapsid crab
RCB/RW 95.23

29 June 1995

Collections from dive on outside of barrier reef between Aroa Pointe And Faaupo Pointe. Across from Moorean Airport. 17°29'S 149°46'W. Depth b/w 40-60 feet. 100' visibility Time of dive 7:00 A.M. Samples 24 + 25 + 26

Sample 24

Plankton net was filled with coral rubble And rocks from spur and groove. Some was broken off of larger fragments others were small and laying on the bottom. Rubble was broken apart on shore with a hammer And rinsed with fresh water washes. Sieved through 240 µm plankton net. RCB/RW 95.24

Sample # 25

RCB/RW 95.25

Ascidians from Sample 24

Sample # 26

Coral rubble was collected from same dive site. 40 feet of water. Coral rubble And Sand were placed in large flour sack And was brought to surface on Anchor line.

2 bags. 1 of washings in fresh water And 1 of sieved Sand top screen - window screening bottom screen 240 µm. RCB/RW 95.26a RCB/RW 95.26b

Collections from channel between Motu Fareone And Motu Tiahura 17°29'S 149°55'W

Samples 27 and 28

Sample 27

Algae And Algal holdfast. Sampled from 2-2.5 feet depth. 63 µm screen saved from this sample RCB/RW95.27a & RCBRW95.27b

Sample 28

Algal covered coral rubble scooped up in dust pan from 2 - 2.5 feet of water. In channel near edge of Motu Fareone. 200×50ft field of this substrate. Seems to be teeming with Animals. Would have been a good site for quantitative comparison. - note for future reference. Sample was swirled And sieved through 240 µm mesh. 63 µm screen was saved from this sample as well.

RCB/RW95.28a
RCB/RW 95.28b

TETIAROA MAP - low island atoll
copied from
Arial photo at
GUMP LAB

Tetiaroa

42 km North of Tahiti. Low coral atoll with a lagoon. 13 islets totalling 490 hectares. Tahuna Iti is a seabird refuge and the marine lagoon has been designated a marine reserve. Area between barrier reef and lagoon is very shallow, 4-5 feet. Only small boats can travel into the lagoon. 17°05'S 149°30'W

1 July 1995

Sample 29

(1-3 feet)

Algal encrusted coral from a shallow reef on the south side of Onetahi island. Coral rubble was collected from Porites heads and placed into large flour sacks. Rubble was broken apart on land and rinsed with fresh water. Sieved on 240 µm mesh, no top screen. RCB/RD 95-29

Sample 30

Same site as #29 but coral rubble was collected from sand grooves between old Porites heads 3-4 feet depth. Rubble was processed in the same way as sample 29. This sample is relatively clean. RCB/RD 95-30

Samples 31-36

Sand samples collected in one to four feet of water from large sand flats. Samples were chosen based on coarseness

of the sand and therefore should remain separated. Sand was rinsed with fresh water through a 500 µm top screen and the 63 µm bottom screen was saved for meiofauna sampling. May also contain Asellotans. However, All the sand looked depauperate.

RCB/RW 95.31 – RCB/RW 95.36

Sample # 37

Terrestrial isopods and Amphipods collected from the shore of Rotomahana Lake, Waimangu Thermal Valley, Rotorua, North Island New Zealand.
38°23'S 176°30'E

RCB/RW 95.37

Tonga - Vava'u Group
July 9, 1995
Sample # 38

Washings of coral rock taken 3 to 4 feet depth. Pangaimotu Island, 100 meters south of Tongan Beach Resort. 4 bags - one of which was meiofauna. Coral rock was broken on shore with hammer. 18°60'S 174°00'W
RCB/RW 95.38a & RCB/RW 95.38b

Sample # 39

Coral rubble, washings and surface sediment into a plankton net. Sieved through a top screen to remove large pieces. 240 µm sieve fraction retained. 3 bags. Depth 3'-4'. RCB/RW 95.39

Sample #40

Two Halobates sp. collected off of Tongan Beach Resort dock. 3:15 pm. Placed in vial. RCB/RW 95.40

Sample #41

Night light sample from Tongan Beach Resort pier 9:00 pm.

RCB/RW 95.41

July 10, 1995

Sample #42

Coral Rubble collected at 70' to 90' off of the North side of Nuapapu Island. 1 bag. (large bag)
RCB/RW 95.42

Sample #43

Same site as #42. Coral Rubble and Rock washed into a 240 µm plankton net 20 to 30 feet of water. 2 bags + Majid commensal on crinoid (crinoid was dark brown-purple w/white band across middle of each arm; arm span = ~12")
RCB/RW 95.43a & RCB/RW 95.43b

Sample #44

Dive on the South side of A'a Island coral rubble and Rock collected in cotton sac from 50' to 100' depth. 3 bags
RCB/RW 95.44

Sample #45

Same site as #44. Coral Rubble washed into 240 µm plankton net. Collected from 60' to 120' depth. 3 bags RCB/RW 95.45

Sample #46

Same site as #44. Pieces of wood submerged at 60'. Meiofauna fraction retained by skimming water from bucket - could contain macrofauna as well, no top screen. 2 bags RCB/RW 95.46a
RCB/RW 95.46b

Sample #47

Beetle collected from laundry line outside hotel room at the Tongan Beach Resort.
RCB/RW 9547

July 11, 1995

Sample #48

Dive off of NW corner of Tu'ungasika Island coral rubble and sand suspended from bottom with dust pan and washed into 240 µm plankton net, 125 feet. 6 bags.
RCB/RW 95.48

Sample # 49

Same site as 48. Rubble and sand washed into cotton sac. 60 feet. 1 bag.
RCB/RW 95.49

Sample # 50

Same site as 48-49. Rubble and sand washed into cotton sac. 30 feet. 2 bags RCB/RW 95.50

Sample #51

Two nudibranchs from same dive. Collected At 80 feet. RCB/RW 95.51

Sample #52

Dive off of NW corner of Falevai Island Sample collected from bottom of Swallows Cave. 30 feet. 3 bags. RCB/RW 95.52

Sample #53

Same site as 52. Rubble collected from 120 feet outside of Swallow's Cave. Meiofauna skimmed from surface water - could contain isopods. Wendy Moore turned into a prune washing this sample in the shower.
RCB/RW 95.53a & RCB/RW95.53b

Sample # 54

Crinoid sampled from outside Swallow's Cave. 20 feet
2 bags. Crinoid + appendages and symbionts!
RCB/RW 95.54

July 13, 1995

Sample # 55

From manatee-like seagrass in 2' to 3' of water off shore from Tongan Beach Resort. Some coral rubble and live coral was collected with this sample and was broken apart with a hammer on shore. RCB/RW 95.55

Sample #56

Live coral (sacrificed) and coral rubble samples broken apart with a hammer. Collected from exposed reef (low tide) 100 M North of Tongan Beach Resort. Reef was composed of loose coral rubble and patches of live coral - Moderate Siltation. Meiofauna sample was taken from skim water prior to sieving through a 240 μm net. Top screen retained large coral chunks. Large Crustaceans were also collected from this site. 3 bags RCB/RW 95.56

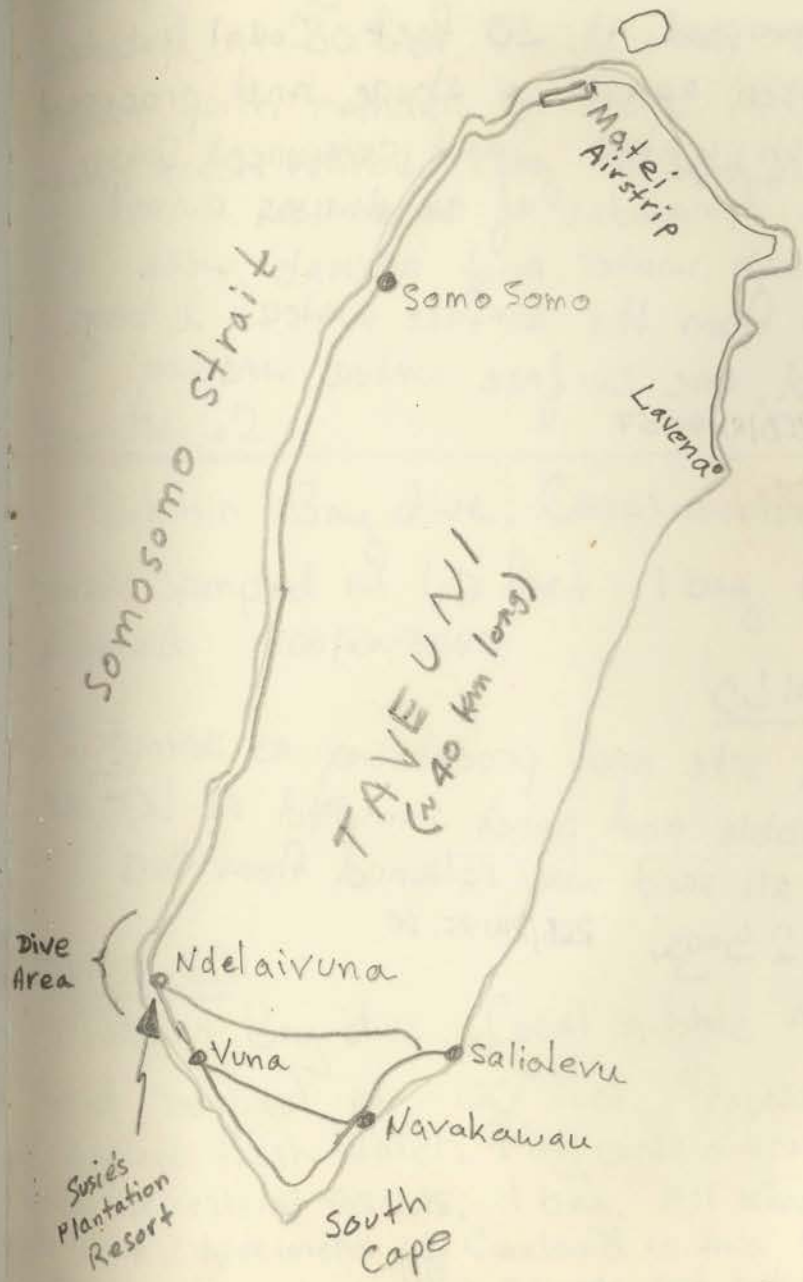
Sample # 57

Algal sample collected from reef described in #56. Diverse types of algal patches were collected and washed in salt water. Sieved in the field. One cirolanid was spotted on the sieve. 1 bag RCB/RW 95.57

Sample #58

Same sampling as #57 however, this Algal collection was brought back to the room and soaked in fresh water prior to processing. RCB/RW 95.58

Taveuni Is., Fiji 7/16/95 - 7/19/95



16 July, 1995

Sample #59 Fiji, Taveuni Is.

Coral Garden's reef dive. Coral rubble and sand sampled at 30 feet. Coral rubble was broken apart on shore and processed with fresh water. Sand component was retained. Remainder of sand was rinsed with fresh water and animals were skimmed from the surface water. 2 bags. One sand, one surface water washing.
RCB/RW95.59

Sample #60

Same site and processing as sample 59. Coral rubble and sand sampled at 60 feet. However, all sand was retained from this sample. 2 bags. RCB/RW95.60

Sample 61

Dolphin Bay dive. Coral rubble and sand sampled at 30 feet. Rubble was broken apart with hammer on shore. Processed with fresh water. 1 bag. All sand retained.
RCB/RW95.61

Sample 62

Dolphin Bay dive. Coral rubble and sand sampled at 60 feet. 1 bag. All sand retained. RCB/RW95.62

Sample 63

Dolphin Bay dive. Coral rubble and sand sampled at 100 feet. Processed with recycled fresh water. May contain grasses and other terrestrial insects. 1 bag. All sand retained. At least 2 specimens of Ciroland in this sample. Of course, Rick took this sample and he's got a nose for Ciolanids. Thanks PEET! RCB/RW95.63

Sample #64 - 17 July 1995

Night light sample off of Taveuni, Susie's Plantation Resort. 4ft. depth.
RCB/RW 95.64

17 July 1995

Sample #65

Dive on Fish Factory Reef. Steep vertical wall. Current ~9 knots. Sample of coral rubble and sand taken at 100 feet. Coral broken apart on shore and processed with fresh water. 2 bags. This site with highest diversity of soft corals seen on this expedition.
RCB/RW 95.65

Sample #66

Same site as 65 coral rubble and sand taken at 70 feet.
RCB/RW 95.66

Sample #67

Same site as 65. Coral rubble and sand taken at 30 feet. 3 bags. RCB/RW 95.67