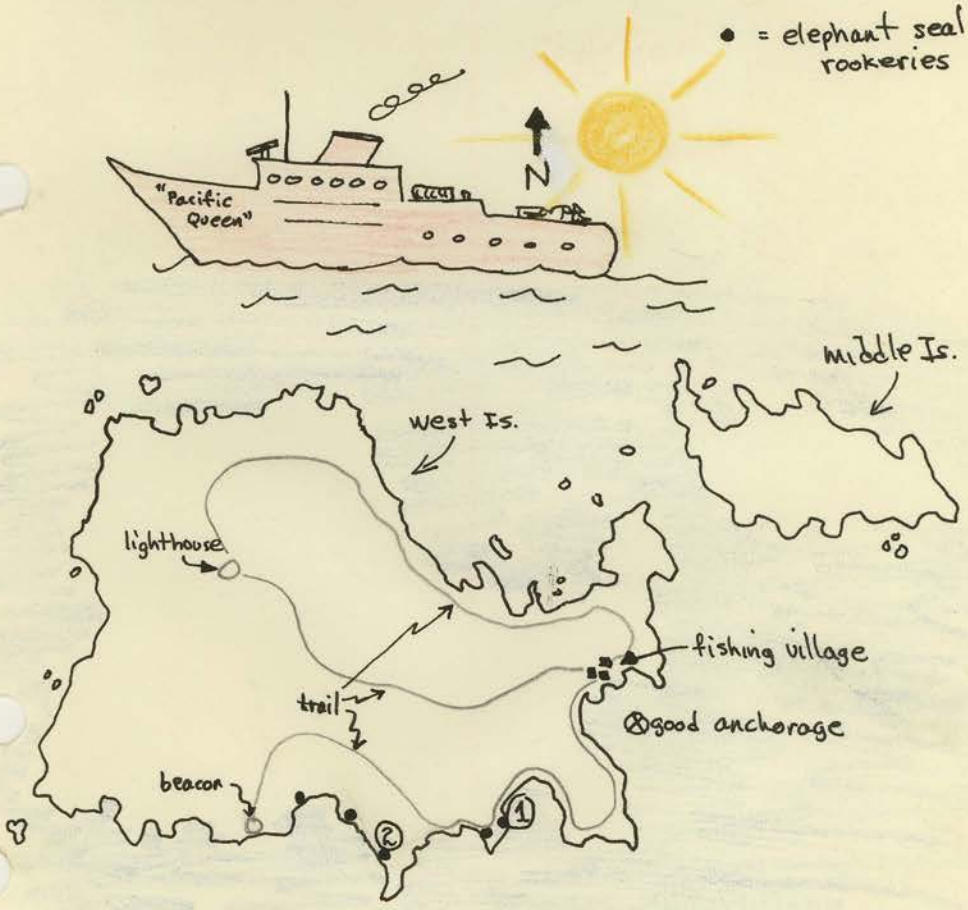
6 Jan. 1975

Mexico, Baja California (west coast), Islas San Benitos (Benito del oeste).

First field trip of the year, a b.e.e. trip, with Lloyd Findley, Anna Mary, Peggy Donahue, Buddy Winn, Adrienne Findley and others, including 2 girls sent over by good ol' Roy Houston (Lloyola Univ), Jandy Wean & Anne Falconer. First trip last year was b.e.e. also.

0830 - 1430 on shore for cetacean and Pinniped observations.



(entire w. side of Island with sea lions)

6 Jan. 1975 (cont.)

Elephant Seal Counts (1st & 2nd harems south from village) – see map, previous page.

① 1 dominant bull
2 subordinant ♂
8 adult ♀
4 pups
2 immature ♀
(+ 4 ♂ in water, nearby)

② 1 dominant male
35 mature females
18 pups
1 immature ♀

→ 3 fights between ♂ witnessed (in water)

→ attempted copulation witnessed between ♀ and subordinant ♂. ♀ said no.

→ ♂ (dominant) chased ♂ (subordinant) out of harem – seen 3 times

→ a young pup, obviously of this seasons birth (1-3 weeks old ?) was washed into shallow water and was seen to do some darn fine swimming but still had problems getting back up on the beach.

6 Jan. 1975 (cont.)

Reptiles. Numerous Uta stansburiana, all small.

Mammals.

Zalophus californianus (calif. Sea Lion)
Mirounga angustirostris (No. Elephant Seal)
Orcinus orca (Killer whale) - pod of 3 off No. end of Island.
Delphinus delphis (?) - ca. 20 individuals.

Plants

Agave shawii (Century plant) - abundant; none w/ flowers.
Atriplex barclayana (salt bush) - abundant; none w/ flowers.
Mammillaria neopalmeri - abundant; none w/ flowers.
Mesembryanthemum sp. - ?
Opuntia prolifera - cholla; abundant
Sueada - abundant; no flowers
Euphorbia misera (cliff spurge) - abundant; none w/ leaves or flowers.
Frankenia palmeri
Lavatera venosa (mallow) - abundant; in flower

6 Jan. 1975 (cont.)

Inverts

Land snails (collected by L.T. Findley for Dr. W.B. Miller, U. of A.)

Strongylocentrotus purpuratus

Anthopleura elegantisima & xanthogrammica

Lottia gigantea

Collisella spp.

Littorina scutulata

Stenoplax conspicua

Nuttallina sp. (fluxa?)

Haliotis cracherodi
" rufescens
} shells only

Norrisia norrisi

Tegula eiseni

Astraea undosa

Crepidula onyx

Pachygrapsus crassipes

Tigriopus sp. (californicus?)

Ligia occidentalis

Pandalirus interruptus (shells only)

Pollicipes polymerus

Mytilus californianus

Marine Algae

Codium

Enteromorpha

Macrocystis

6 Jan. 1975 (cont.)

Birds (San Benitos)

Osprey
Cormorant (double-crested)
Xantus murrelet (?)
Black oystercatcher (?)
Western Gull
American Oystercatcher
Black turnstone
Willet
Wandering Tattler
Kestrel
Common Raven
Long-billed Curlew
Rock wren
Robin
Yellow-Crown Night Heron
Savannah sparrow (abundant)
Moux Shearwater
Cassin's Auklet (considerably offshore)

---

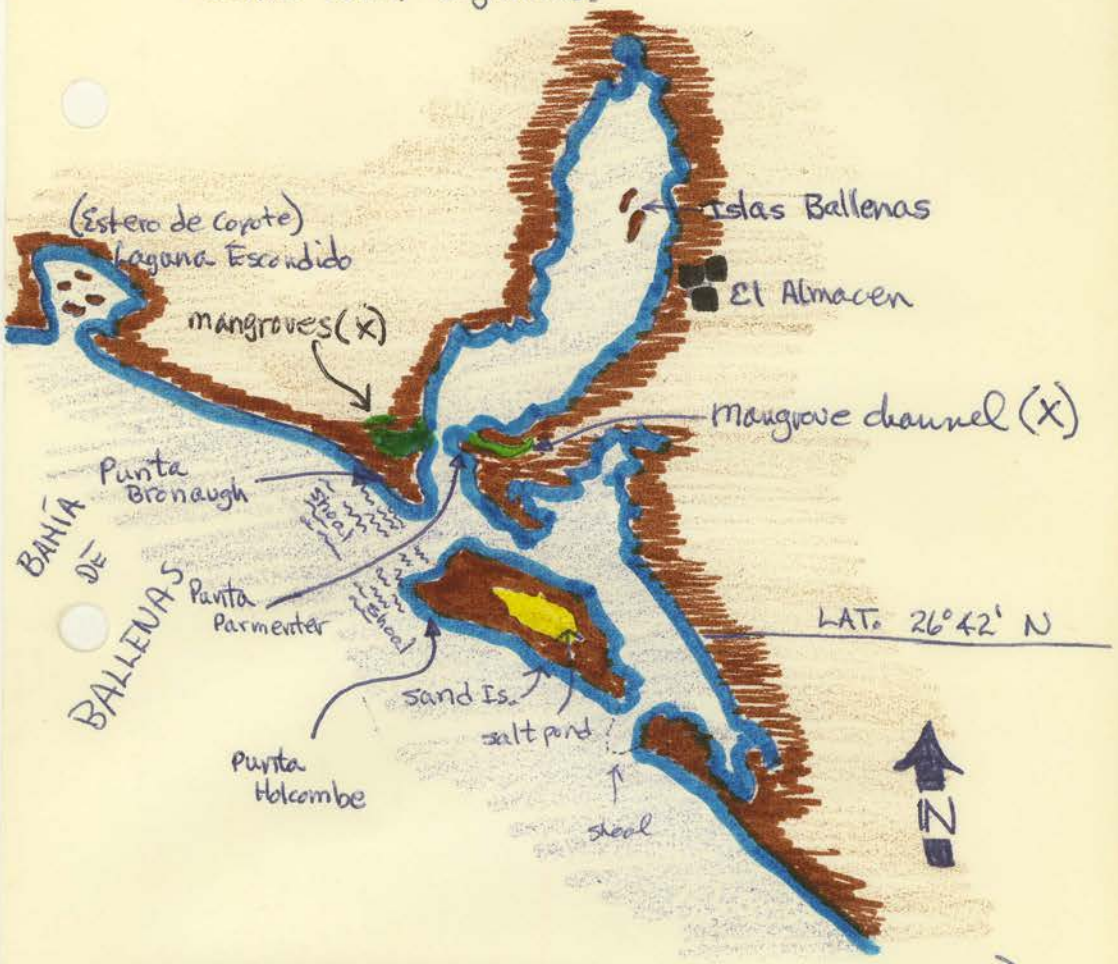
bird list compiled by Dale Birkenholz, Helen & Edgar Gasdorf, & myself (as usual I could contribute little to the bird I.D.'s !!)

6 Jan. 1975 (cont.)

The islands appear little changed from last visits in Jan. and Feb. of '74. The first elephant seal colony was considerably smaller than it was last year but the others appeared about the same, as did the sea lion population. It's very hard to keep people (esp. photographers) away from the elephant seals – they can't resist the temptation to get just a little closer. I'm more convinced each time I visit Baja that human disturbance is effecting the pinniped populations here adversely – likewise I'm certain the cetaceans, grey whales in particular, are annoyed greatly by trips such as these. Stories the crew have told me about [redacted] antics in whale chases are ever more evidence of the adverse ecological stresses put on the ecosystem by b.e.c., and trips contracted out w/o b.e.c. leaders are even worse, as we saw last Jan. on San Benitos. Is the cost worth the rewards?

7 Jan. 1975

Mexico, Baja California Sur (west coast),
Bahía San Ignacio.



[redacted] (spring tidal flux at least 8-10 ft.)

Collections made in Mangrove channel (x). Inverts collected for U.A. Invert. collection and numerous seine hauls made for U.A. fish collection. All collections intertidal.

7 Jan. 1975 (cont.)

The mangrove stand here is healthy and fairly large – to our surprise. No whites seen, just Red (R. mangle) and black (A. germinans). H_2O T° at mouth of mangrove channel = 17° C. About 25 people went up the channel with us and all got into the mangrove scene – mud, foul smells, etc. Steve Pollack got hit pretty good with a sting ray – Buddy and Peggy got into pulling the seine. The channel had some really large schools of Paralabrax maculatofasciatus (spotted cabrilla) and mullet (Mugil cephalus?). Many grunion (Leuresthes tenuis) and some other Atherinids (Atherinops?).

Inverts and fish will be I.D. at Tucson.

Whale activity very good. At least 25 adult grays seen; 2 pups, one probably born today and perhaps premature. It's mother was nowhere in sight and it was floundering, unable to swim yet (Ca. 12 ft. long).

7 JAN. 1975 (cont.)

Although only one mangrove channel was worked the degree of mangrove leaf litter present suggests others must exist further on in the lagoon. The turtle grass (Zostera?) beds are quite extensive here, though the grass is low growing, to 8" max. height. Numerous turtle bones were present on the beach by no living turtles were seen. Coyote tracks are all over the beach and what looks like Coenobita tracks also. Other plants seen include:

Allerdfea
Spartina
Batis
Salicornia
Frankenia
Mammillaria (w/fruit)
Cholla
Lemaireocereus (?)
Monanthochloe
Mesembryanthemum

Birds (of San Ignacio)

1. Sanderlings
2. Marbled Godwit
3. long billed Curlew
4. Common Egret (abundant)
5. Great Blue Heron
6. Little Blue Heron
7. Green Heron
8. Cormorants (flock of ca. 200)
9. Brown Pelican
10. Mangrove Warbler (1 seen)
11. Whimbrel
12. Semipalmated Plover
13. Black Brandt
14. Brandt's cormorant
15. White Ibis
16. Snowy Egret
17. Dunlin
18. Northern Shrike
19. Willet
20. Snowy Plover

Inverts

Anthopleura xanthogrammica

Anthopleura elegantissima

Renilla sp. (abundant on floor just off Punta Pasmenter)

Sicyonia sp. ("Japanese" or "target" shrimp)

Tetraclita squamosa

Portunus xantusii xantusii

Cryptolepus rhachianecti (?) (gray whale barnacle)

Balanus tintinnabulum

Bulla gouldiana

Callianassa sp.

Alpheus sp.

Neverita

Octopus bimaculatus (living in hole in whale vertebra)

clams:
- Ostraea lurida (abundant) - on rocks
- Tagelus californianus (abundant)
- Tagelus subteres (abundant)
- Anomia peruviana
- Chione californiensis
- Protothaca asperrima or Chione fluctifraga (?)
- Cryptomya californica
- Anadara tuberculosa
- Trachycardium panamense (shells abundant)

Balanus sp. (on oyster shells)

snails:
- Cerithium stercus muscarum (abundant)
- Crucibulum spinosum
- Astraea undosa
- Nawanax inermis (abundant; copulating)
- Pseudomelatoma penicillata
- Cerithidea mazatlanica
- Tegula eiseni
- Nassarius sp. (abundant)
- Acanthina tyrianthina (common)
- sp. ? (resembles Neorapana grandis of the Galapagos) - common

7 Jan. 1975 (cont.)

Octopus sp. (small; picked up in mangrove channel; no marks)
2 crabs - not identified
Eurytium affine (burrowed into banks of channels w/ Upogebia & Palaemon ritteri Pachygrapsus)

heart urchin - sp.?
Some sea stars greatly resembling Othelia tenuispina but fatter & w/o dark tips on arms.

9 Jan. 1975

Ship's Manifest

m 1. Arnold, Elena ✓
A 2. Axelrod, Sidney (M.D.) °
A 3. Bell, Fern ✓
Op 4. Birkenholz, Dale °
– 5. Bradley, Sue ✓ (ships helper)
m 6. Blevins, Tom ✓
A 7. Clem, Silva °
A 8. Donahue, Peggy ✓
A 9. Dungan, Leona °
m 10. Falconer, Anne ✓
A 11. Findley, Adrienne ✓
Op 12. Gasdorf, Edgar ✓
Op 13. Gasdorf, Helen ✓
m 14. Grieve, David ✓
A 15. Hailey, Eric
A 16. Huffman, Tom °
m 17. Hill, Ron (Mesa college organizer) ✓
Op 18. Kabler, Ruth ✓
m 19. Krafft, Karen ✓
m 20. Krafft, Kim ✓
A 21. Lewis Denna ✓
m 22. McCoy, Sue ✓

° = w/o visa
✓ = w/ visa

9 Jan. 1975 (cont.)

m 23. MacLean, Tom ✓
A 24. Mackey, Anna Mary (R.N.) ✓
A 25. Monell, Mona °
m 26. Mosel, Doralyn ✓
m 27. Noble, Denise ✓
A 28. Powell, Charles °
A 29. Powell, Clara °
A 30. Pollack, Steve °
m 31. Ray, Dawn ✓
— 32. Rokop, Sandy ✓
m 33. Ryan, Janet ✓
A 34. Schewel, Heidi ✓
m 35. Thomas, Dana ✓
A 36. Turhollow, Anne ✓ } Roy's girls
A 37. Wean, Sandy ✓ }
A 38. Winn, Buddy ✓
39. Lloyd Findley ✓ } b.e.e. leaders
40. Rick Bruscar ✓ }

— = freebie
m = mesa college group
A = U of A group
Op = b.e.e. open party people

9 Jan. 1975 (cont.)

mesa group 14 at 288 = $3832

U.A. group 16 at 312 = $4992

2 at 100 = $200

Open Party People 4 at 324 = $1296

total = $10,320 (b.e.e. gross)

Crew

Ed McEWEN
Eddie McEWEN
Tom MONEY
Jay FABER
Claude KEVERETT
HERB LEDHOLT

0730 this morning Mrs. Clara Powell (age 69) fell and injured her hip during rough seas. Dr. Axelrod's and Nurse Mackey's diagnosis is: least - bad bruise
worst - broken hip
probable - fractured hip or femur

Seas and winds so bad we couldn't get ashore easily at Cedros Is. anyway. Cpt. and crew agree quickest medical aid for Clara is obtainable by taking her on the Queen directly to San Diego. We are presently anchored in lee (1130) awaiting

25 MARCH 1995

Mexico, Sonora, Puerto Peñasco

The 4th spring break trip with Earl Segal (Cal State Northridge); Alan Rubin & Diane Perry T.A.'s; Joe Franz attending. Good group - good students. Good tides (spring equinox).

Misc. Observations:

Many young Aplysia californica (but no eggs); few other slugs (aeolida, Berthelliia, etc.). Sargassum dying out; Colpomenia abundant. Codium sparse. Terpios hardly present at Horse Beach.

Size of Encope beds at Bolla Bay reduced.

10 May 1975

Mexico, Golfo de California, Isla Angel de la Guarda (Puerto Refugio).

Another B.E.E. trip - as a tutor to Margie. Denver Museum of Natural History again. Marty Hartman, Karen Kloverstrom, etc. A good group. Had trouble with my karma yesterday - better today.

Refugio beaches are covered with Onchidella binneyi - 10-30 per rock - population density in +2' to -5' range over 10/ft². Other inverts:

Othdia tenuispina
Echinaster tenuispina
Heliaster kubinijii
Ophioderma panamense
Ophiocoma alexandri
Ophiocoma aethiops
Ophiothrix spiculata
Echinometra vanbrunti
Astrangia (pedersoni?)
large cirri-formids (w/o commensals)
numerous chitons, including Acanthochiton exquisita.
Tridachiella, onchidiella, navanax, etc.

Acanthochiton exquisita (Carpenter)

10 May 1975
Puerto Refugio (cont.)

many many Clibanarius digueti; in large clusters.

Terpios, Pseudosuberites

Ala cornuta

Heterocrypta (?)

Epiactus

Selenkothuria; Brandtothuria; burrowing anemones

Petrolisthes - many kinds

OTHER BIOTA:

Sargassum - to 15' tall

Codium - small, short clumps

Padina - mucho

Colpomenia - mucho

Chuckawalas - numerous burrows, few lizards
Zebratailed lizards - numerous

Osprey - several sighted; no nesting

verdins

rock wrens

cliff swallows

sparrows (black throated)

Heermann's Gulls

Cat. Sea Lions - still good population of ~~500~~ 800 individuals on Isla Granito. No obvious breeding yet although a few bulls had small harems started (5-7 ♀) and one young pup was

10 May 1975 (cont.)
Puerto Refugio

seen, probably the only birth yet this year.

2 finbacks seen outside Refugio, none in the bay – perhaps finally ~~too~~ much competition with visiting boats.

No turtles seen but captain Juan asked me if the crew could go get one. I said no and explained why. He didn't much give a shit.

sporadic cardons w/ 1–3 flowers; others with ~~flowers~~ fruit that had obviously already already flowered; others (on same plants) with buds yet to flower. these cardon here must not be like saguaro in that they apparently bloom for some time, spacing out the blossoms even on a single plant over several weeks.

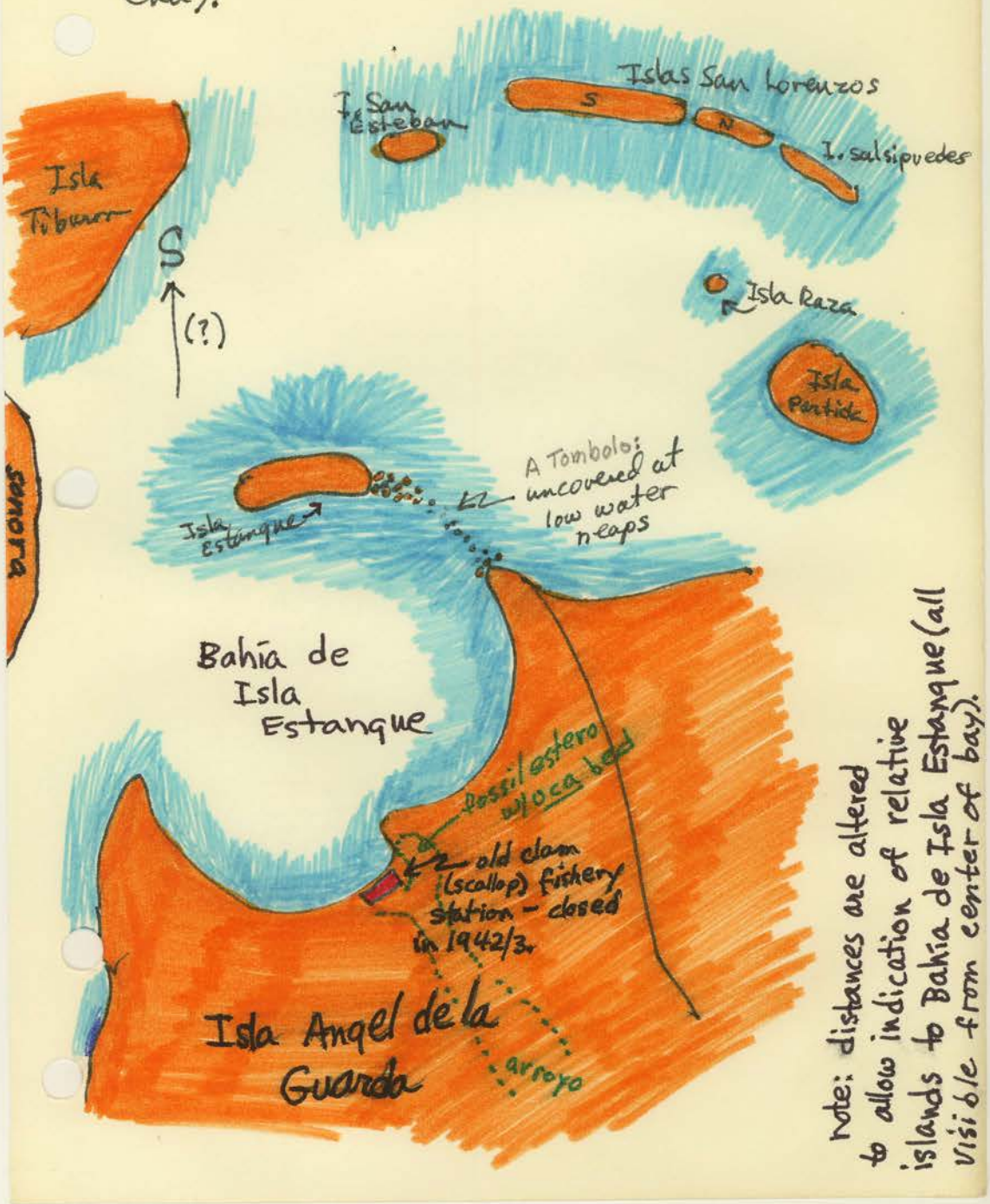
Fouquieria splendens – no flowers

Pachycormus discolor – no leaves

no agave or yucca here.

11 May 1975

Mexico, Golfo de California, Isla Angel de la Guarda (Bahía de Isla Estanque - southern end).



11 May 1975 (cont.)
Bahía Isla Estanque

A really beautiful bay, quite large. Here lies the only attempt at a permanent settlement on the midriff (except Seris on Tiburon). In the early 40's the Mexican government set up a scallop processing plant here that lasted about 2-3 years. There is no fresh-water so water is brought in from Guaymas usually, once a month or so (now). There are 3 mexican men living here now - off the sea. They were pleased to see us - enjoyed rapping. One of our crew helped them w/ an outboard engine that wasn't functioning. Interesting remains. Many piles of scallop shells, turtle shells, shark & trigger fish carcasses, off of which they no doubt subsist nearly entirely.

Walked up the arroyo behind the camp. Many chuckawallas, Fouquieria diqueti in bloom here. The arroyo here hooks up with a fossil estero that is part of a larger salt pan. It is quite low and kept moist by percolation under the beach berm. There is 6"-1.5' of highly saline H_2O here, in which a large Uca (mordax?) colony subsists.

11 May 1975 – evening
Mexico, Golfo de California, Isla San Esteban.

Night walk & tequila by a campfire with the Denver group. Very nice. This island is unique amongst those of the midriff in having a really rich flora, at least in the arroyo we visited (which appears to be the only accessable beach to land). There are:

Jojoba
Yucca
large forests of sour pitahaya
Baccharis sp. (not desert broom)
~~cliff~~ Bush mallow
Fouqieria diqueti
Lycium sp.
Acacia (Harry columbe calls it mesquite Bush).

A piece of pottery (seri) was found, the first collected here to my knowledge. It was found about ½ mile up the arroyo from the beach (photo taken).

Inhibitions dropped tonight – as planned. Good times all around.

12 May 1975
Mexico, El Golfo de California

MORNING: Isla San Esteban

many, many very large Aplysia, most over 12 inches long; egg masses present. Many Pyenogonids also (as in Puerto Refugio, 10 May 1975).

EVENING: Isla San Pedro Martir.

several good sized sea lion rookeries. Brown boobie, blue-footed boobie and Brown pelican nests - all with eggs and young. Good photos taken. Difficult walking due to steepness of single leeward arroyo, many loose rocks & trying to avoid the nests. If you move slowly and stay low (not breaking the horizon) you can get within a few feet of all these nests. Any closer or quick, erect movements will cause the birds to abandon the nests. In the case of the young boobies this means an abortive attempt at flying, ending in their crashing out on the steep mountain sides. In the case of the pelicans this means the young would be away from the nest, probably to end in an abandonment by the parents. Either is, of course, bad.

12 May 1975 (cont.)
Mexico El Golfo de California, Isla San Pedro Martir

this is a good example of the bad effects of these natural history trips. In a group such as this one, with cautious leaders like Harry Columbe and myself, not much damage is done. Even being extremly careful we probably were the direct cause of several deaths. With other groups, using less cautious leaders and overzealous participants, I'm certain the damage can be excessive. Especially when repeated trips are made. To land on this beach one must disrupt a large sea lion rookery. Another reason to leave the island alone. As usual the excitement is just too much for some of these people and they do direct damage despite our warnings. There are also those who appear to simply not believe us when we describe the ill effects of chasing a fledgling bird or scaring the sea lions off their beachhead. I just don't believe it's worth it. Perhaps I'm wrong though. I hope I am.

13 May 1975
Mexico, Golfo de California, midriff region

We entered a very dense fog last night and had no means of navigation for approximately 12 hours. When it burned off about 10:30 this morning we were way off course, at the south end of Isla Angel de la Guarda. Apparently there was a strong south-to-north breeze that helped push us off course. This boat, like nearly all Mexican vessels, is without radar or other navigational aids. To my knowledge they don't even use coast piloting or dead reckoning. It's all in their heads. Afternoon in Bahía de Punta San Francisquito (Baja). Joshua-Tree Yucca still present & healthy. Possible Sally Lightfoot seen.

14 May 1975
Mexico, Gulf of California, Isla Raza.

Heermon's Gulls abundant but Elegant Terns (? Royal Terns) practically absent. Approx. 1/4 the number as last year. A camera crew from B.B.C. are living on the island & have been there for 3 weeks. According to them there are more terns present this day then the previous 3 weeks. To me this indicates they are breeding at least a month later this year then last or the number of breeding individuals has dropped dramatically since last year. If the latter is the case visits such as ours is no doubt part of the cause. Our people inadvertently caused the terns to spook at least a few times, resulting in a good number of eggs being lost to the gulls. There is no doubt as to the ill effects of our (man's) presence on this island - the only question is one of degree.

Good shots of finback gotten today as a mother & pup circled the ship while anchored at Raza. Osprey with young on So. Point. Sally Lightfoot abundant.

8 June 1975
Mexico, Sonora, Puerto Penasco [Station Beach]

morning tide worked with zonation data sheet. Seems to be working O.K. This morning H_2O-level was ± 2.5' higher than indicated on tide calendar. Reason was probably strong offshore winds. It appears that the lower limit of Eriphia squamata is definitely +0.5'; of Selenkothuria lubrica +1'. Leucetta & Leucosolenia was observed to occur as high as +3.5', as long as there is 1" or more standing water under a rock.

Other inverts seen:

Haliclona permollis
Craniella arb (? - walking sponge)
Geodia mesotriaena
Phyllodoce (abundant)
Aplysia californica (abundant)
Arbacia incisa
Chromodoris banksi sonora (salt n' pepper)
Anthopleura dowii
Modiolus capax
Epialtus minimus

Panopeus purpureus
Pilumnus townsendi
Pilumnus gonzalensis
Pilumnus limosus
Petrolisthes sanfelipensis
Pachycheles setimanus
Eriphia squamata
Epiactus minimus
Epialtoides paradigmas
Ala cornuta

plus the usual gang of P. Penasco inverts.

formalin washes made at evening tide - two valviferan Capitated on Sargassum (Colidotea n.sp.?)(Erichsonella n.sp.?).

H_2O T° = 26° C Air T° = 32°-35° C

9 June 1975

Mexico, Sonora, Puerto Penasco (Worse Beach)

Crustaceans collected:

Euryplax offine
Podochelas sp.
Epialtus minimus
Pilumnus townsendi
Ponopeus purpureus
Pachycheles setimanus
Petrolisthes sanfelipensis
Petrolisthes cremulatus
Pilumnus limosus
Petrolisthes hirtipes
Epialtoides paradigimus
Pilumnus gonzalensis
Callinectes bellicosus
Speleophorus schmitti
Petrolisthes gracilis
Stenorhynchus angusta
Petrolisthes tiburonensis

Sargassum wash brachyurans (I.D. by Mary Wicksten):

Podochela latimanus (Rathbun)
Epialtus minimus Lockington
Eucinetops lucasi Stimpson
Inachoides laevis Stimpson
Pitho picteti (Saussure)

10 JUNE 1975

Mexico, Sonora, Puerto Penasco, Bahia Cholla.

Good low tide revealed upper portion of Encope grandis bed. Few E. micropora present. One Mellita longifissa found, buried ± 8" down. One Astropecten armatus found w/ 2 commensal porcelanids on the aboral surface (preserved), perhaps Minyocerus kirki. Tidal Channel at head of bay w/ plenty of Uca:

Uca crenulata
Uca musica
Uca ~~monilifera~~ princeps

Eurytium albidigitum
Tetragrapsus jouyi
Callinectes bellicosus

✓ Plants seen at head of Cholla Bay:

Salicornia (glasswort)
Batis (saltwort or "pickleweed")
Allenrolfea (Iodine Bush)
Atriplex (saltbush)
Monanthochloe (saltgrass or "spikegrass")
Frankenia (Alkali Heath)
Suaeda (sea blite)

→ Stomach analysis of the goby Gillichthys mirabilis revealed ghost shrimp Upogebia sp.

→ the tube snail Tripsycha tripsycha is occassionally found with Clibanarius digueti living in it.

→ Balanus amphitrite lives as high as Tetraclita does, or even a little higher, up w/ the periwinkles.

11 JUNE 1975

MEXICO, Sonora, Puerto Penasco (station Beach).

Rotenone collection (fish) made in large tidepool in front of marine station (± +3'). Inverts most markedly affected by rotenone were pistol shrimp, tidepool shrimp & octopods.

Anna Mary and I made records of the flora & fauna associated with Sargassum in tidepools at the +2' level.

Leucetta
Leucosolenia
Aglaophenia
Plumularia
Columbella fuscata
2-3 types encrusting bryozoa
misc. gastropod eggs
minute hermit crabs
sepulid worms
misc. juvenile crabs (Leptodius, etc.)
the idotheid isopod Colidotea (?)
misc. amphipods
encrusting white sponge
Haliclona sp.
a pycnogonid (lg. - robust)
a small sea anemone w/ grey tentacles and a brick red stalk; no obvious verrucae but w/ a few shell-fragments attached
spider crabs: Epialtus minimus (1)
Epialtoides paradigmus (2)
Pitho picteti (7)
Eucinetops lucasi (5)
Ala cornuta (3)
Podochela [redacted] latimanus (4)
[redacted] other species masking crabs (preserved)
Inachoides laevis (6)
Algae: Caulerpa
corallines, including Jania adherens
Botryocladia

→ Libbie has found Amphioxus in the stomachs of flatfish & the round stingray.

12 June 1975

Mexico, Sonora, Puerto Peñasco (Estero Morua).

Sampling done at rocky point at mouth of Estero. Pseudosuberites pseudos present in large, massive clumps. Terpios, various gorgonians and large Heliaster abound.

Libbie still collected flatfish in the channel entering the bay, from the mouth (in toward the estero from the mouth). Stomach analysis of these fish revealed the following inverts:

① Dynamenella sp.
② mysids (ca. 3 cm. long)
③ cumaceans (ca. 8 mm. long)
④ gammarid amphipods (w/red eyes).

The species of each of these crustaceans were all identical (ie. there were only 4 species represented), indicating a fairly discriminate selection of food types by the flatfish ( ). These are the 1st cumaceans I've encountered in the Gulf. Substrate analysis of the region the fish collected follows:

Estero crustaceans noted:

Uca crenulata
Uca musica
Uca princeps
Eurytium albidigitum
Callinectes bellicosus

16 June 1975

Mexico, Sonora - on the road to Puerto Lobos

ROAD LOG: Caborca to Puerto Lobos

Drive out of Caborca to Desemboque Road - head towards Desemboque (60 mi. from Caborca to Desemboque, if you want to join the tourists there). After about 10 miles on this road you come to a paved road on the left w/ a sign "TO Puerto Lobos". It is 47 miles from this turn-off to Lobos:

miles

0 - Road to Lobos begins
5 - shacks along side of road; power substation
9 - pavement ends
10 - road forks; cattle guard; stay right
11 - ranch house on right
12 - cattle crossing; take left fork

Senita cactus and organ pipe abundant through here; 20-30 mph road; no soft spots.

15 - cattle guard and watering trough
18 - ranch on right; keep left; cardons appearing
19 - road forks, stay left
22 - stay left (sign to Lobos)
25 - BAD BUMP - SLOW DOWN
25.5 - fork, stay left
26 - cross large river bed
27 - cattle guard
29 - small ocotillo coral and ranch; road forks, stay right.
33 - Ranch on left
34 - small ranch on left and road to it!
38 - Large fork in road - take smaller road to right.

16 June 1975

ROAD log to Puerto Lobos, cont.

40 - Fork, stay to right (Road to left goes to San Lorenzo Beach).

note: After arriving at Lobos we discovered that the beach here is called San Lorenzo now. The turn off above is a good graded road that takes you right into Lobos. We didn't know that and continued on the old Lobos road, and the rest of this log is for that road. I recommend the San Lorenzo road, however, as it is considerably better.

41 - dd road meets San Lorenzo Rd.

42 - old road meets San Lorenzo Rd.

46 - Puerto Lobos

BIRD LIST

Brown Pelican
Heerman's Gull
Eared Grebe
Elegant Tern
Gull-Billed Tern (?)
Royal Tern (?)
Osprey
Western Gull (?)

16 June 1975 (cont.) – Puerto Lobos

The rocky pt. of Puerto Lobos is interesting. The high intertidal-spray zone (zone I of Brusca, ms.) has a very dense coating of black alga (cyanophyta?). Just below this (zone II of Brusca, ms.) the rocks are coated with a slimy reddish-orange alga. Periwinkles and Nerites abound. The 2 tropical creatures Pharia pyramidata and Phatiria unifasciales are common here, as is Porites californica and Palythoa ignota, and Nidorellia armata.

The little mussel Brachidontes semilaevis is common here and almost appears to be boring into the rocks, particularly rocks covered w/ the tube snail Petaloconchus flavescens (?), or P. macrophragma.

Other surprises here include Xanthodes hebes, that is dull orange color. As in P. Penasco, the only large fiddler appears to be Uca princeps.

The estero here has ~~white~~ black mangrove only (the one with the pneumatophores or aireal roots), Avicennia germinans. Interestingly enough it seems that the closer to the water this tree is (the moist the habitat), the more pneumatophores it has. Solitary trees high up on the dunes or in the high grasses lack any pneumatophores – or possess only a small cluster very close to the main trunk.

Other plants here include: Salicornia, Batis, Allenrolfea, Suaeda, Atriplex and Monanthochloe.

Strombus gracilior and Strombus galeatus are not uncommon here; Tegula rugosa is more abundant here than anywhere I've seen; the marsh crabs Goniopsis pulchra & Sesarma sulcatum also occur here.

16 June 1975 (cont.)

There appears to be some confusion surrounding the asteroid Nidorellia armata. In some specimens the spines are movable (jointed) as described by Brusca (1973) and illustrated by Ricketts and Steinbeck (1941). In others they are immovable, as seen in Orcaster occidentalis. It is almost as if the ones w/ movable spines were hybreds between orcaster and Amphiaster !! Below are descriptions of these 2 sea stars.

1 July 1975. I think these are the same beasts. What happens is Type 2 dries out and the skin pulls away from the base of the spine revealing the ball and socket - type joint !!! - ie. movable

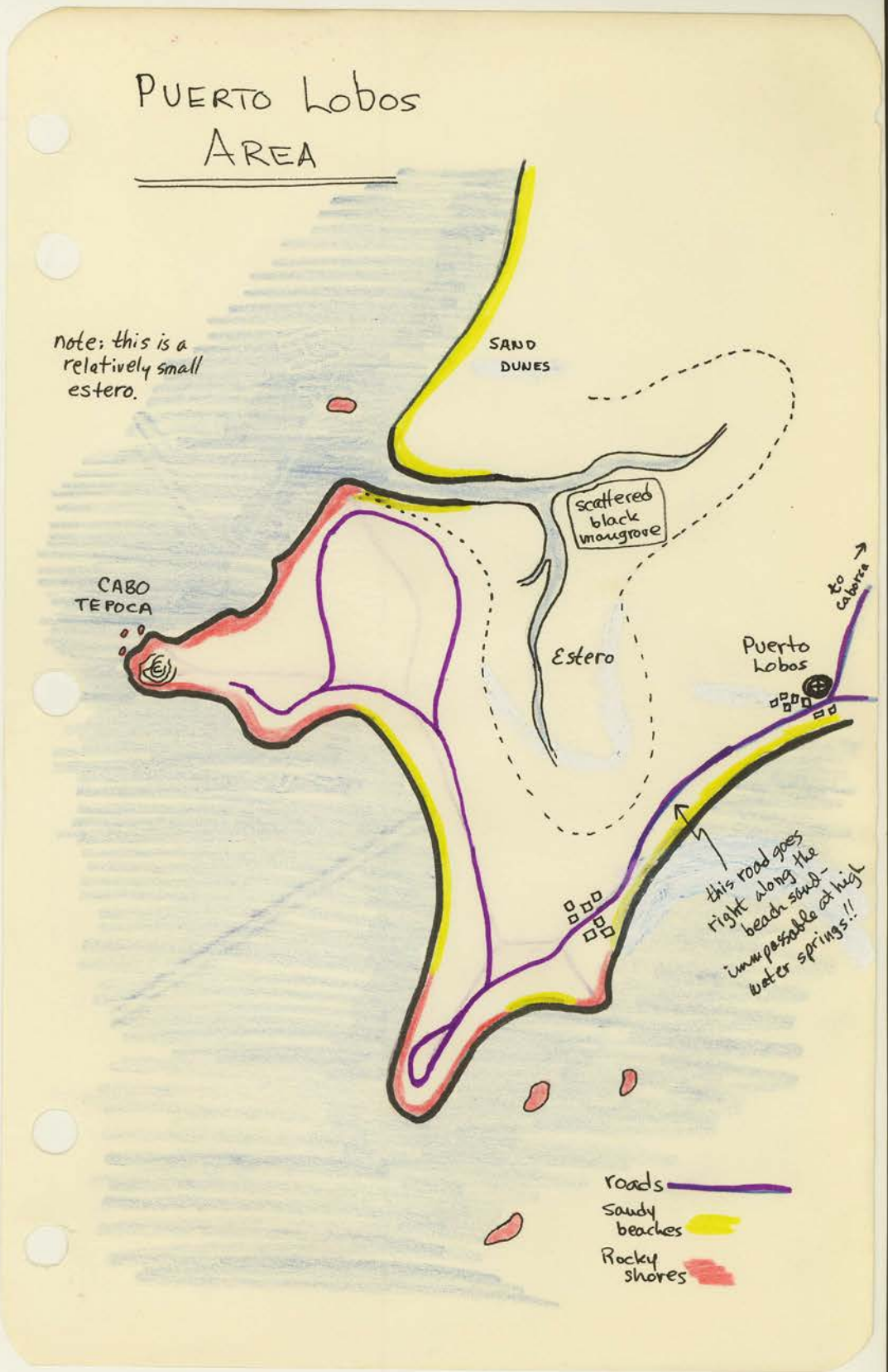
Species 1: as described in Brusca (1973), Farmer (1968) and Steinbeck and Ricketts (1941).

Species 2: aboral surface w/ pale olive green with immovable dark brown or purple spines and marginal plates. Ambulacral grooves curve up on arm tips to reach aboral surface.

covering brown background to varying degrees and

Judging from photos in my collection the 2 are identical except for the difference in spines. The question may be resolved by more collecting on the present expedition.

PUERTO LOBOS AREA



17 June 1975
Mexico, Sonora, Puerto Lobos

The drive to Lobos from Cabora is interesting as it appears to be a transition zone for the flora of the northern Sonoran Desert vs. the southern. The following plants were seen, living together, between Caborca and Lobos:

Saguaro
Cardon
Sweet Pitahaya
Sour Pitahaya(??)
Senita
Ocotillo (Fouquieria splendens)
Elephant Trees (Pachycormis discolor)
Limber Bush
Atriplex sp.
Cholla (chain Fruit) – Opuntia sp. (fulgida?)
Brittle Bush

Big find of the day - a solitary Pachygrapsus crassipes on the rocks, mid-tide level, on exposed point of Cabo Tepoca. So P. crassipes unquestionably does occur in the Gulf!! The wind has been very bad here since we arrived. It is constant at 30-40 knots from the sea (ca. WSW). Locals say these blows usually last 3-4 days. There are no cockroaches visible here, perhaps this place is so remote the little bastards haven't made it out here yet. Lance informs me cockroaches have been around since early Devonian (ca. 380 million years). That makes them one of the oldest & earliest evolved land "bugs" still living. The Codium sp. alga is massive and abundant here, clumps to 10" across are not uncommon.

18 June 1975
Mexico, Sonora, Puerto Lobos (Cabo Tepoca)

Summary of Puerto Lobos - feelings and questions: Species diversity seems low here. The rocky intertidal is dominated by Tegula rugosa, C. stanfordiana, S. lubrica, H. kubiniji, Nerita scabricosta & Tetragrapsus jouyi. The subtidal is dominated by Pseudosuberites pseudos, Terpios (?), and algae. Everything else seems spotty and appears to be living on the extreme of their capabilities. Very few southern Gulf forms were seen, a few Phataria unifascialis, Pharia pyramidata, and Nidorellia armata. Likewise, many typical northern Gulf forms were rare or absent, such as Othilia tenuispina, Brandtothuria spp., Turbo fluctuosus, and all the little snails of the "anachis-type". In general, the rocky shore environment gives the appearance of being an unusual, depauperate zone of overlap or transition between upper & southern Gulf forms. The existence of Pachygrapsus crassipes here is especially interesting in this regard. The point of land here is definitely an exposed rocky shore and wave shock is extreme. This may be another factor contributing to its depauperate fauna (and flora!!).

H_2O T°, rocky shore 21°-22° C; estero 28°-29°C.

18 June 1975 (cont.)

The geology of Puerto Lobos is primarily a diabase, which is a very hard, non-porous igneous rock. It is similar to basalt (remelted crustal material) but the cooling process takes place much deeper (ie. slower) resulting in a denser, less porous rock. The absence of surface porosity and the hardness of these diabase rocks (eliminating burrowers) makes for very poor larval and spore (algae) settlement. The rocks on this beach are thus virtually an algal desert, w/ few species of inverts attached to them. The dominant inverts are either strong clingers (Heliaster, Selenkothuria, Pentamera, Tegula, Nerita) or active movers (Ophioderma). Fragile forms such as Ophiothrix, Ophionereis, opithobranchs, porcelain crabs, etc. are virtually absent here due to wave shock and lack of algal cover.

Likewise, the sand at P. Lobos is a ground-up diabase, with few shell fragments. This may result in a $CaCO_3$ shortage in local habitats.

Examination of plankton at Lobos revealed almost no invert larvae, only brachyurans. Nerita scabricosta is more common here than the smaller Nerita funiculata.

D.A.T. tells me the offshore rocks here are some of the best sport fishing area of the entire Gulf of California.

Liocerithium judithae is proving to one of the commonest small gastropods throughout the Gulf.

18 June 1975 (cont.)

The estero here is also rather depauperate. Uca crenulata predominates, also present are U. musica, U. princeps, E. albidigitum, C. bellicosus and T. jouyi. Again, as in the rocky shore biota, a few specimens of more tropical fauna were found, always associated with the few black mangroves present here and included: Goniopsis pulchra and Sesarma sulcatum.

I must remember to check to see if (by Ricketts, Calvin & Hedgpeth) more or fewer species occur along the California coast in exposed vs. protected rocky shores. Must compare diversity in other areas in this regard also — in the Gulf. Below is the rocky littoral species list —

Mollusca (in order of dominance - in numbers)

1. Colisella stanfordiana
2. Radsiella petaloides
3. Liocerithium judithii
4. Morila ferruginosa
5. Chiton virgulatus
6. Tegula maculostriata
7. Mitrella guttata
8. Nerita scabricosta
9. Tegula rugosa
10. Acanthina angelica
11. Stenoplax magdalenensis
12. " conspicua
13. Cardita affinis
14. Turbo fluctuosus
15. Cerithium sp.
16. Callistochiton gabbi

18 June 1975 (cont.)

17. Prototheca grata
18. Arcopsis solida
19. Chromodoris sedna
20. Mitra fultoni
21. Gadsiella guatemalensis
22. Diodora alta
23. Crassispira pluto
24. Olivella dama
25. Onchidella binneyi f. o. hildae
26. Tellina (liberna?)
27. Modiolu capax
28. Isognomon janus
29. Brachiodontes semilaevis

[Sandy shore-estuary: Tellina (liberna?) & Cerithidea mazatlanica]

Shannon-Wiener calculated species diversity for mollusca at Puerto Lobos rocky littoral = H' [redacted] = .7924

Echinoderms (in order of importance – numbers)

(1) Leeward side of Cabo Tepoca:

[redacted]

Selenkothuria lubrica
Heliaster kubiniji
Neothyone gibbosa
Ophioderma teres
Ophioneris annulata
Ophiothrix spiculata
Ophioderma panamense

Arbacia incisa
Eucidaris thouarsii
Phataria pyramidata
Othelia tenuispina
Ophiocoma alexandri
" aethiops
Brondothuria arinicola
Isostichopus fuscus

(2) windward side of Cabo Tepoca:

[redacted]

Ophioderma panamense
Selenkothuria lubrica
Heliaster kubiniji
Ophioneris annulata
Pentamera chierchia
Ophioderma teres
Ophiothrix spiculata

Crustaceans (in order of abundance)

Tetragrapsus jouyi
Petrolisthes gracilis
Eriphia squamata
Xanthodius habes
Leptodius occidentalis

[redacted]

Eurytium affine
Petrolisthes tuberculosis
Pachygrapsus crassipes

18 June 1975 (cont.)

For a list of the fishes of this region see notes of Dr. D.A. Thomson, Univ. of Arizona, Tucson, Ariz. 85721.

In trying to use the Shannon-Wiener Diversity Index to littoral invertebrates I have come to the conclusion that it gives a false picture of the real diversity, as well as the "potential diversity" in these organisms. The reason for this is that littoral invertebrates are distributed in a clumped and random fashion. A single transect or small number of quadrats simply does not insure one of getting a good representation of what is on a particular beach. A difference of 1 meter often means the difference between no Orchidella and 20 Orchidella per square meter for example. I believe a diversity measurement that does not take into account evenness or numbers of individuals is a better way to measure diversity in littoral insects. Perhaps simply Hmax (= log of the number of species observed in a habitat). The quality of ones data then seems to increase.

Puerto Lobos estero crustaceans

U. princeps	Sesarma sulcatum
U. crenulata	Goniopsis pulchra
U. musica	Eurytium albidigitatum
T. jouyi	Callinectes bellicosus
L. occidentalis	Callinectes arcuatus

21 June 1975

On the road to Puerto Libertad from Pitiquito (just south of Caborca). The road out of Pitiquito is a good dirt one, although narrow and not especially obvious. It opens up to a much wider, good dirt road as soon as it gets out of town. There are hardly any turn-offs or turn-outs for the first 25 miles, until you get to a large ranch called Bamori. There is a large fork here, either one supposedly going to Libertad. We took the right fork as it was reputed to be a better road. The road all the way in was good but wash-pan in places. 20-40 mph average - 3½-4 hours to Libertad.

LOG

Pitiquito 0 miles

Bamori ca. 24 miles

27.4	cattle guard	
30.1	Fork, go left	
30.5	Fork, go right	parallel roads
30.9	Fork, go left	parallel roads
33.8	Fork, go right	
34.5	Y; ranch on left	
36.5	Fork & cattle guard, go right	
41.3	ranch on left	
44.5	cattle guard	
44.7	Fork, go right (sign to Libertad)	
46.4	cattle pen on left	
47.8	cattle guard	
49.9	Road forks 3 ways, take middle fork	

21 June 1995 (cont.)

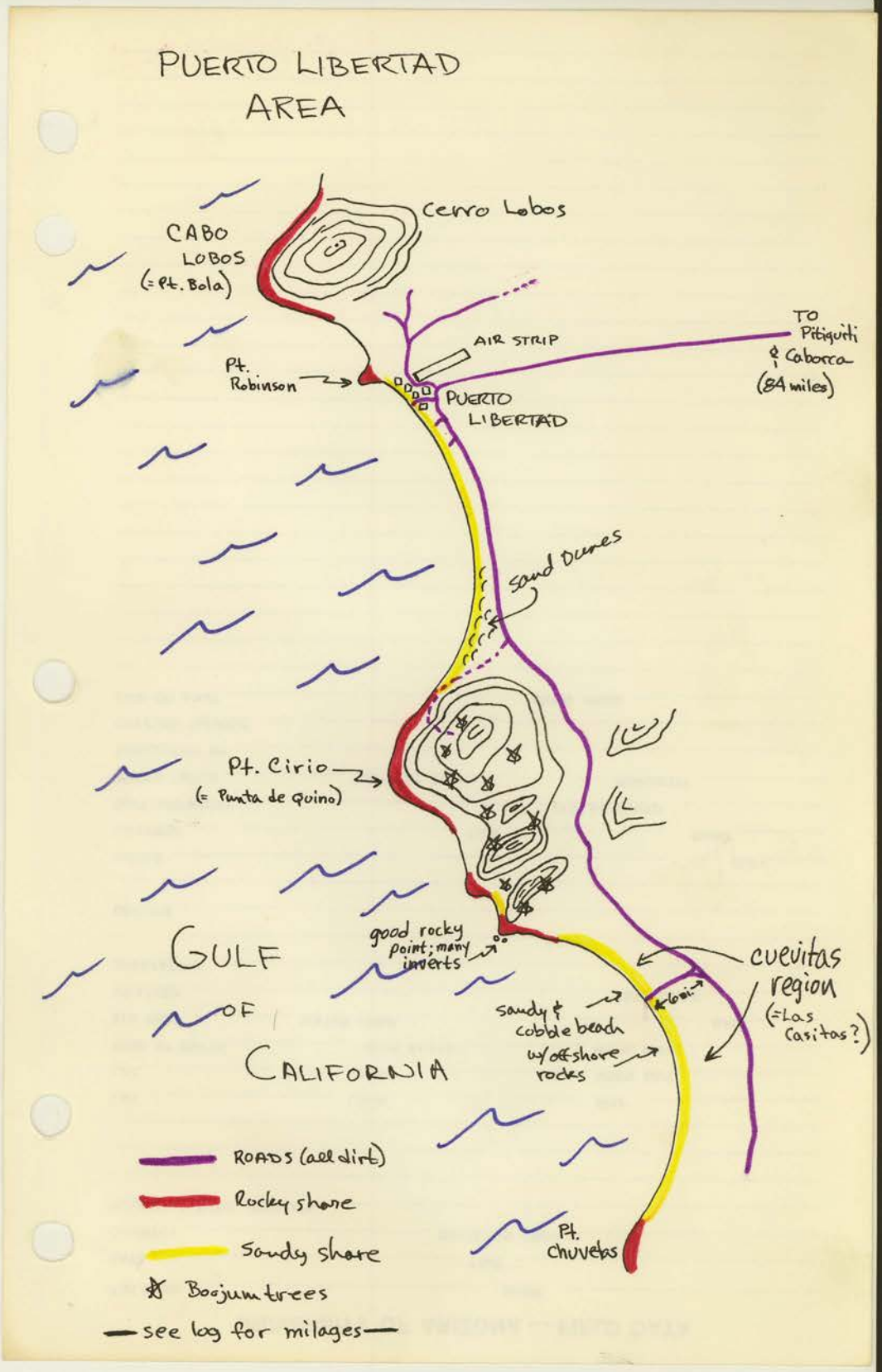
Log to Libertad, cont.

54.1 Cattle Guard
59.0 Corral on left, ranch house on right
64.5 Large Ranch
67.0 Large Ranch
67.4 First Cordon Cactus seen.
69.5 Fruit Elephant Trees seen
83.7 Arrive – Puerto Libertad

Plants seen on road to Libertad:

(1) chain Fruit and slate-pencil and jumping cholla
(2) mesquite
(3) Palo Verde
(4) ocotillo (Fouquieria splendens)
(5) saguaro [in flower and fruit]
(6) Creosote
(7) organ pipe (=sweet pithaya)
(8) senita
(9) purple & green prickley pear
(10) ironwood
(11) yucca [single groove, ca. ½ way in, ca. ½ mile wide]
(12) desert miseltoe
(13) barrel cactus
(14) cardon
(15) elephant tree
(16) jojoba
(17) brittlebush
(18) limberbush

PUERTO LIBERTAD AREA



21 June 1975

Libertad is a nice sandy bay, but with very few rocks; so, we moved on south (on the road to Kino) to a bay just south of Libertad (just s. of the mountains seen from Libertad). Below is the log to this bay (Bahía Cuevitas?):

Miles	
0	Libertad (intersection of Pitiquito road)
2	Fork, stay right
2.2	Fork, stay left
4.1	Fork, stay left
6.4	Reach base of mountains, continue on main road as it turns inland to skirt around east border of mountains.
11.5	Elephant trees very thick here
12.4	cholla very thick here
17.6	Here is the turn off to go back over to the sea. The road over is VERY BAD – but can be driven by any car that isn't too low or going too fast. From here it is 6.1 miles to the beach.
23.7	The beach here is cobble, grading in sand w/rocky outcroppings. Very, very nice. The beach slope is very gradual, making diving fun and easy. Boojums are visible on the mountains around us here. Rocky points exist on either side of this bay that are really rich in invertebrates

22 June 1975

Mexico, Sonora, ca. 5 mi. South Puerto Libertad (Bahía Cuevitas ?).

Morning low tide observations. Peñasco marigram indicates a −3 ft. tide at 6:30 A.M. At 7:00 A.M. the tide was flowing here; began coming in at ca. 6:30. The low level here didn't appear to be a −3 ft. There were no Porites or Palythoa, but none were seen snorkling below this level either. Also, the diversity seems quite low here. The reason for this low diversity and absence of Porites, Palythoa and algae is perhaps two-fold: (1) the general substrate here is small granite rocks and boulders embedded in a muddy or silty sand, grading into a cobble beach. The muddy sand is high in H_2S. this isn't the best substrate for larval settlement or burrowing organisms. (2) There are suggestions of a high level of scouring going on here, especially the virtual absence of large clumps of alga. the sediment type would seem to indicate the possibility certainly. Collecting is much better on the rocky point north of the bay here, where Palythoa does occur. Low tide was closer to 6 A.M. here I believe, than 6:30 or 7:00, which places it ½ hr. ahead of P. Penasco data, and not as low.

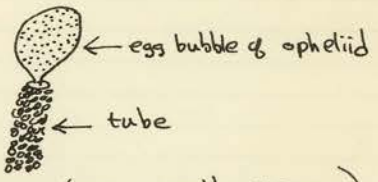
Animals seen this morning include:

Leucetta losangelensis
[redacted] Geodia mesotriaena
Anthopleura doweii
Astrangia sp.
flatworms (small)
Epitomapta tobagae
Protothaca grata (living in muddy sand around and under large rocks).
Trivia solandri
Acanthochitona (arragonites ?)
Leptodius occidentalis

22 June 1975 (cont.)

species list (high to mid intertidal, cont.):

Opheliid polychaete (living in tube of sand grains attached to rock bottoms; many w/gelatinous bubble of eggs emerging from mouth of tube as below).



Tetradita squamosa (very small, sparse)

[redacted] Ampithoe sp. (amphipod)

Ligia occidentalis

Tylos punctatus

Petrolisthes gracilis

Petrolisthes nobilii (?)

Epialtus minimus

Pilumnus limosus

Tetragrapsus jouyi (abundant)

Panopeus purpureus

unknown masking crab

[redacted] Ophionereis annulata

Ophioderma panamense

Brissus latecarinatus

Aplidium sp.

Heliaster kubinjii

[redacted] Ophiocoma alexandri

Ophiocoma aethiops

Pilumnus townsendi

Pilumnus gonzaensis

Xanthodes hebes

Ala carnuta

Glyptoxanthicus meandricas (albino)

Petrolisthes hirtispinosus
" crenulatus
" gracilis
" nobilii
" schmitti

Epialtus minimus

Speleophorus schmitti

Pilumnus limosus

Pachygrapsus crassipes

Leptodius occidentalis

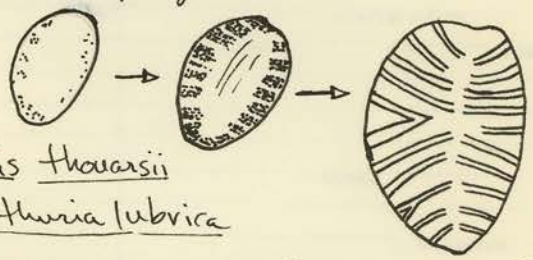
Panopeus purpurus

22 June 1975 (cont.)

species list - Low intertidal & subtidal:

Echinometra vanbrunti
Isostichopus fuscus
Pseudosuberites pseudos (large, massive, mony heads)
Terpios zetelci (common)
Lophogorgia sp.
Linkia columbiae
Pharia pyramidata
Phatiria unifasdalis
Othelia tenuispina
~~Echinaster tenuispina~~ Echinaster tenuispina
Astrometis sertulifera
Ophioderma panamense
Orchidella [redacted]hildae (in patches by the thousands)
Cypraea annettae annettae
Trivia solandri

growth from young to adult:



Eucidaris thouarsii
high intertidal { Selenkothuria lubrica
Pachygrapsus crassipes (single gravid ♀) — in high splash pool, H_2O T° = 31-33° C
Ophionereis annulata
Palythoa ignota
Porites californica
[redacted] Halichondria sp.
Berthillina [redacted]ilisima
Thoe sulcata sulcata
Herbstia pubescens

22 June 1975 (cont.)

The argument continues over the credability of the 2 species of Asteroidea: Astrometis sertulifera vs. Echinaster tenuispina. The coloration of both species is absolutely identical – as follows:

Aboral surface. mottled gray-green w/ indistinct dark bands across arms. spines violet-blue at base, red-orange on tips. spines more-or-less random across arms; forming a distinct circle around the disc.

Oral surface. spines grade into short, unicolorous spines (slight color pattern may remain but pale) at ambulacral grooves. Grooves wide, w/ numerous tube feet

The main differences are: (1) base of arms constricted in Astrometis, not in Echinaster, and (2) Body limp and w/o much skeletal support in Astrometis, but stiff and rigid in Echinaster.

In my opinion, what Brusca (1973) calls Echinaster tenuispina is representative of juvenile Astrometis sertulifera. The name E. tenuispina appears (from what literature I have available) to be a junior synonym to othelia tenuispina and no longer available. The description in Brusca (1973) is therefore of small, juveniles of A. sertulifera. These guys tend to live in shallower H_2O (littoral) than the adults and to show the 2 differences mentioned above.

If this is true then A. sertulifera is a very very common sea-star in the gulf. The photo of E. tenuispina in Caso (1961) is obviously a badly preserved or air-dried specimen of O. tenuispina.

22 June 1975 (cont.)

Anna Mary and I discovered the defense reaction of Onchidella hildae this afternoon. When he is mechanically stimulated (poked at) he rounds-up, clings tightly to the rocks, and exudes a milky blue fluid out the edges of the mantle. I tasted this fluid by putting a drop on my tongue - it burned like a strong Mexican chile sauce. Very effective.

This area of coastline (coevitas) is really nice - one of the most beautiful I've visited. There are cirio's on the hills surrounding this large arroyo, and all around our camp are Elephant Trees, Brittle Bush, Lumber Bush, Frankenia and others. The Dipodomys and lizards here are so tame they walk into camp and eat out of your hand. 8-10 man-o-war circled over our camp this morning for a few hours, to eventually be replaced by a pair of Osprey. As the sun was setting tonight Anna Mary and I stood on the point and watched Manta Rays doing their back-flips, while a coyote cried in the desert behind our camp. The moon is full tonite, giving a silvery glow to the waves below the bluff where we are camped - and a pleasant warmth to the softness surrounding our desert home.

22 June 1995 (cont.)

An attractive white porcelain crab was found to be not uncommon here. Length of carapace is to 7 or 8 mm., width ca. 8 mm. The animal is basically white, the chelae w/ grayish coloration on the dorsal surface, occasionally lavender. The carpace is tinged w/ gray and lavender on the front and side. The walking legs are pale lavender. The antennae are lavender and white ringed. Color photo taken of this, with a Petrolisthes cremulatus.

Megalobrachium smithii (I.d. by Janet Haig)

This area has a good number of dragonflies, large ones, resembling Libellulidae. There were also several seen P. Lobos, and I see them nearly every time I go to P. Peñasco. What this is implies, to me, is that they are living a life cycle w/ eggs and juveniles in sea water. There is absolutely NO fresh water around here or Lobos, not even open storage tanks, Nothing!!! I'm kicking myself now for not bringing an insect net and "borrer" along. Will try to capture one some other way.

Took a walk to Boojum-Loud this afternoon, to contemplate the cirio forest on one of the small mountains in the Punta Cirio range.

23 June 1995

Mexico, Sonora, ca. 7 mi. S. Puerto Libertad

"The <u>real</u> University has no specific location. It owns no property, pays no salaries and receives no material dues. The <u>real</u> University is a state of mind. It is that great heritage of rational thought that has been brought down to us through the centuries and which does not exist at any specific location. It is a state of mind which is regenerated throughout the centuries by a body of people who traditionally carry the title of professor, but such that title is not part of the real University. The <u>real</u> University is nothing less than the continuing body of reason itself"

Phaedrus,
in: Zen and the Art of Motorcycle Maintenance
by R.M. Pirsig

This description is especially apropos in this situation - it's a shame every student here isn't carrying a University state-of-mind.

14 June 1975
Mexico, Sonora, ca. 7 mi. so. Puerto Libertad
(Bahía Cuevitas ?)

Many tarantula-wasps were observed today in appeared to be a moth-like feeding behavior on the flowers of a frankenia bush, very near the beach. Do the males feed on nectar??

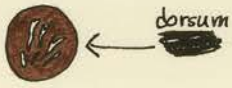
A mass of oligochaete worms were found living in (and feeding on?) decomposing beach drift (primarily Sargassum) at the high tide line (below the splash or spray zone). The Sargassum dump was large, the interior very warm (85-90° F). Specimens well preserved in 50% isopropyl.

Matt Gilligan also found some of these worms about 1 mile further down the beach - indicating they are indeed probably marine worms!!

A flock of 50 brown pelicans was seen this morning - the largest flock I've ever seen.

It was observed by Buddy Wiens that Ligia here seem to all go into the little pockets or "miniature coves" along the shore to molt, as the floors of these little caves are covered w/ Ligia molts.

A black widow spider (?) was found under a large granite boulder in the spray zone. Her web had a number of Tylos punctatus in it, as well as a black ground beetle (Tenebrionidae).



Sea water temperature (at 1530) is 29°C above the thermocline, and 27°C below the thermocline (in 4 ft. H_2O). The thermocline is ca. 12"-18" below the surface.

25 June 1975
Mexico, Sonora, Bahia Kino

Road log – Puerto Libertad to Kino Bay:

Puerto Libertad	0 miles		
Road to Cuevitas (FORK RIGHT)	17.6	"	(see log; previous notes of June 21) [redacted]
Large Ranch	30	"	
Desemboque de los Seris	39	"	– 1st sour pitahaya seen (Machaerocereus gummosus)
Estero de los seris (= Estero Vibora)	68	"	– seine collection made, D.A.T. & Matt Gilligan
Punta Chueca	80	"	– large Seri camp; good ironwood carvings; Jose Luis living here now.
Bahia Kino	102	"	– one long goddamn haul through some primative and beautiful country.

25 June 1975 (cont.)
Estero de los Seris (= Estero Vibora), 68 miles So. of Libertad.

Stopped for a quick look at this small but pristine estero. The Callinectes bellicosus are more plentiful than I've seen them anywhere before. Goniopsis pulchra is here, as are the small cirolanid isopods in the sand, coming out to devour fish & bite peoples toes. Water T° = 27°C in deepest channel (4' at low water) and 31°C near shore. Much higher in mangrove regions. No oysters. A lot of Turtle grass washed up, probably from Tobaben or offshore.

27 June 1975
Mexico, Sonora, Kino (Estero de la Cruz)

Laguna de la Cruz is an enormous estero, one of the largest I've seen inside the Gulf; larger than Sargento even. There is a lot of "Kino Bay" development going on here and the shore and water is pretty shitty. Despite this it is [redacted] an extremely rich area. The Uca crenulata and Uca princeps beds are enormous here. Uca mexicana is here in small numbers, as is a 4th species of fiddler that looks a lot like crenulata but is much too big to be one. Specimens of this, crenulata and princeps have been preserved. The mangroves are good here, healthy once you get away from the development. Still no mangrove oysters seen however. There is a handsome, salmon-colored sponge here, living in great numbers in the main channel, below the 0-tide level. Molluscs common here are: Cerithium stercusmuscarum; Tellina (?); Pitar berryi and Pitar brevispinosus; Tagelus politus; and Calliostoma nepheloide (not supposed to occur north of Mazatlan; uncommon). A very small species of Callonaissa, and a minisculo species of Apoquebia (ca. 2mm long) also occur in the mud here. T° near head = 42°C.

U. macrodactylus

GRAVID Goniopsis pulchra taken; eggs = 3.6% body weight

Ocypode occidentalis common here!

Plants include Allenrolfea, turtle grass, Batis, all 3 mangroves, Monanthochloe, spike grass, and others.

27 June 1975
Mexico, Sonora, Bahía Kino

Strong offshore winds have washed in many Janthina snails and Portugese man-o-war (Physalia). The beach is also littered with pieces of a large Demospongia resembling Tethyos (which it may indeed be) and sponges identical to the type we found in Laguna dela Cruz this morning (figured below). A few Porpita are also washed up. Alex Kerstitch showed up today in his sail boat. Since I found out from Mike Ducey that he earns his living selling shells he rips off from mother Nature I've lost most of what little respect I had left for him. The "La Sirena" met us here last night, with Carl O'Kelly aboard. They collected 3 teat olives (Oliva porphyria) at San Pedro Martir Island. Each one was in [redacted] a hole inhabited by a dipper lobster, and each was dead w/a large chip out of [redacted] the posterior portion of the lip. [redacted]. Is it possible [redacted] Evibacus eats these olives? [redacted]

Philipi thinks so. So does D.A.T. They claim the jaws on Palimus are strong enough to chop into a persons finger pretty deep — so, maybe so. Rocky shore crabs here are: T. souyi, P. gracilis, P. purpureus, E. albidigitum (?)

28 June 1975
Mexico, Sonoran coast, Isla Tiburon. SCUBA collections at extreme southern end of island, across from Isla Turner (next bay south of Bahia Peño).

Water temps. 29°C; slight thermocline, ca. 27°-28° C below this. Shore rocky; bottom of bay sandy w/occasional outcroppings of rock. Depth collections made 10-30 feet. Would have been good diving if water was more clear - as it was visibility was only 5-10 feet. The area looks really rich however. Predominant inverts include the following.

Pseudosubeirtes pseudos (abundant; large heads; yellow orange and red)
Geodia mesotriaena
Agaophenia sp.
Eugorgia aurantica
Psammogorgia arbuscula (?)
Lophogorgia sp. (stalk pure white; zooids pale pink)
Palythoa ignota
Porites californica
Baseodiscus punnetti
the large terebellid polychaete that has an equally large stalk worm living commensally with it. This is the same couple I've found to be common in the Algodones region of Sonora. Specimens preserved in EtOH for I.D. and inclusion in Handbook revision.

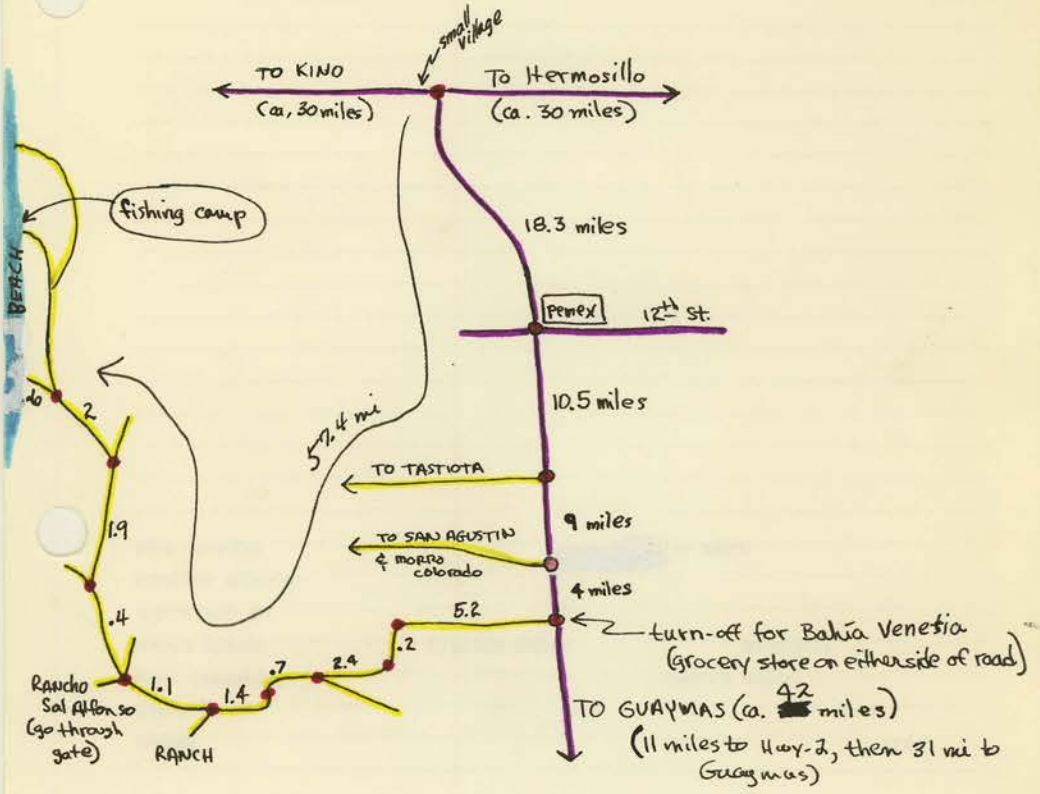
28 June 1995 (cont.)

Cypraea sp?
Jenneria pustulata
Dendrodoris krebsii
Axius vivesi (abundant)
Pylopagurus sp. (in its spiney house of hydrocoral)
Herbstia comptacantha
Glyptoxanthus meandricus [1 ♂ ; 1 gravid ♀]
Phascolosoma sp.
Heliaster kubinijii
Phataria unifascialis
Nidorellia armata (w/o movable spines)
Astrometis sertulifera
Othelia tenuispina
Ophiocoma alexandri
Ophiocoma aethiops
Eucidaris thouarsii
Echinometra vanbrunti
Centrostephanus coronatus
Isostichopus fuscus
Pentamera chierchia
a very long, solitary ascidian (ca. 6" long and 2" wide).
Stenorhynchus debilis; Glyptoxanthus meandricus; H. camptacantha;
Tetragrapsus jouyi; E. affine; P. purpureus; Pachygrapsus transversus; E. squamata

Philipi saw tracks on Tiburon of ① deer ② coyote and ③ a large cat (puma?). Was Tiburon connected to the mainland during the pleistocene glaciation?

29 June 1975 Venecia
Mexico, Sonora, Bahía [redacted] (ca. 30 miles N. Guaymas.

Road log/Map: Guaymas turn-off from Hermosillo-Kino Road, to Bahia Venetia.

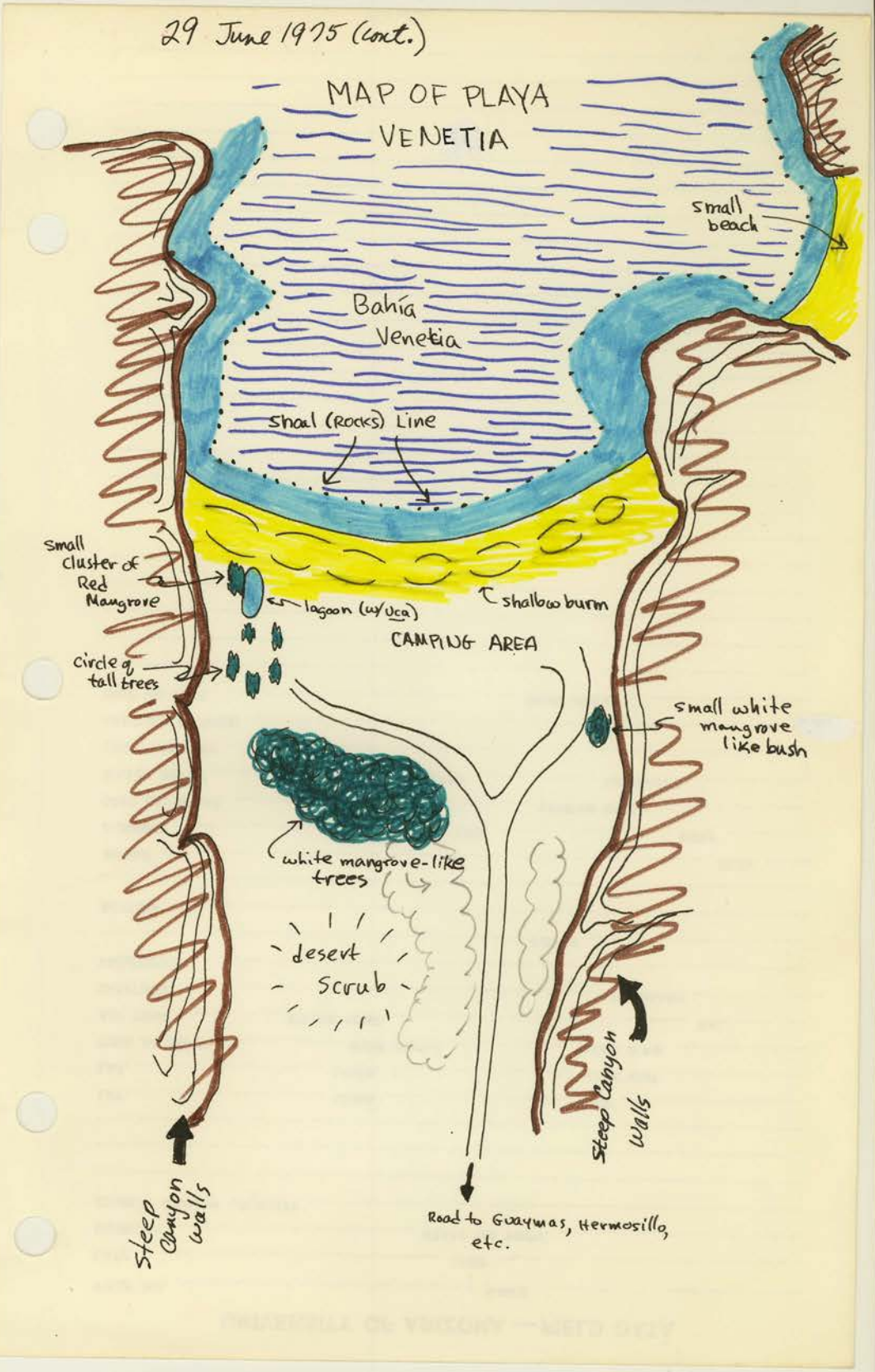


numbers indicate milage to next red dot!! Total milage from Guaymas turn-off = 57.4 miles.

Paved Road
Dirt Road

The road in is fairly good. Apparently this beach, called "playa Venetia" by the locals, is rarely visited by gringos; it's pretty much a mexican beach. This fact is also attested to by the large amount of garbage present.

29 June 1975 (cont.)



29 June 1975 (cont.)

This little arroyo, ending at playa Venetia, gives the appearance of being a remnant of what was once a small estero. The fossil lagoon, very small, is now filled only by high water spring waves, washing over the beach berm. The small stands of white mangrove and small population of Uca crenulata further attest to this possibility. The whites, being the more "terrestrial" of the 3 mangrove species probably simply continued to survive after the berm was formed that cut off the estero, to kill it. This process of cutting off a flourishing estero, to bring about its demise (as opposed to its filling in through succession) has been witnessed by myself in Bahia San Gabriel on Isla Espiritu Santo. It no doubt occurs commonly. I have seen numerous instances of estero's dying out (by the above 2 causes as well as man-made procedures) but as yet I haven't seen the creation of a new estero, or the process by which this might occur. Is it possible that all the Sonoran esteros are relicts of a former time when rivers reached the coast; and they are all dying out, one by one, now that no rivers exist?? Is a "negative estuary" nothing more than a feature of dried-up river mouths?

Found a Heliaster kubinijii feeding on a Selenkothuria lubrica here; Sally Lightfoot is also here, on the rocks of the south point.

30 June 1975
Mexico, Sonora, Bahía Venecia

Gnathophyllum panamense collected here. Color in life as follows: Body black to dark brown w/large orange spots interspersed w/small white spots. Chelae apricot color; legs lavender; telson apricot colored; antennae lavender. Body length, tail fan extended, = 25 mm.

SCUBA observations:

Tedania nigrescens (?)
Terpios (abundant)
Pseudosuberites pseudos (abundant; variable color)
Physalia (many in water and washed up on beach)
gorgonians noticably absent
Porites californica (with columnar growth form; as seen in San Carlos-Algodones region)
Baseodiscus mexicanus
Baseodiscus punnetti
Lithophaga sp.
Pinna sp.
Spondylus calcifer
Turbo fluctuosus
Littorina modesta
Cerithium maculosum
Conus princeps and Conus gladiator
Stenoplax conspicua
many amphipods
Ligia sp. (on beach).
Excirolana sp.
a stomatopod
many small shrimps
only 1 or 2 types of porcelain crabs
Uca crenulata (on shore by fossil lagoon)
Stenorhynchus debilis (common)
Epialtus minimus
Herbstia comptocantha
Ala cornuta

(Hippa pacifica (ID by Garth Haig))

30 June 1975 (cont.)

Grapsus grapsus (on rocks)
Pachygrapsus transversus
Ochetostoma edax
Heliaster kubiniji
Selenkothuria lubrica
Pharia pyramidata
Phataria unifascialis
Nidorellia armata
Ophiocoma aethiops
Ophiocoma alexandri
Ophiothrix spiculata
Eucidaris thouarsii
Echinometra vanbrunti
Axius vivesi

Gravid Grapsus grapsus taken. 83 gms = 9.1% body weight

Collections made by SCUBA in 20'-45' by Libbie Hall and Yvonne Matuf included Oreaster occidentalis, Mithrodia [redacted] bradleyi, Lytechinus pictus, and an unusual seastar I cannot I.D.

There a little Tetragrapsus-size crabs here that share a habit with Ligia. They can be found (w/Ligia) feeding on dead, cast of fishes on the shore. They are a handsome red-orange in life with an oval carapace. Specimens have been preserved in alcohol. — Cyclograpsus escondidensis (Id by Garth)

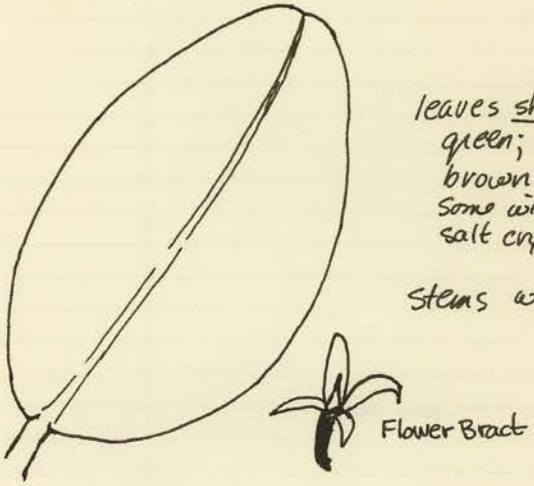
Libbie Hall found Dardanus sinistripes carrying 2-3 Calliactis variegatus each during a night dive here. She also found a Strombus galeatus w/a commensal shrimp living in it. The shrimp superficially resembles Pontonia but keys out to Palaemon. Shrimp preserved in 80%

30 June 1975 (cont.)

Succulents growing w/in 300 ft. of shore:

species 1. Resembles red mangrove except some plants growing to height of ca. 50'-60' and tree-like, w/o prop roots and well away from the water.

5 July 1975 - O.K. Red Mangrove



leaves shiney yellow-green; numerous brown insect scars; some with small white salt crystals on surface.

stems woody; brown.

species 2. Resembles white mangrove, w/o any prop roots or pneumatophores of any kind. Many many of these 50 - 300 ft. from shore. Small shrubs (12" high) to tall shrubs (10' high).

5 July 1975, not white mangrove

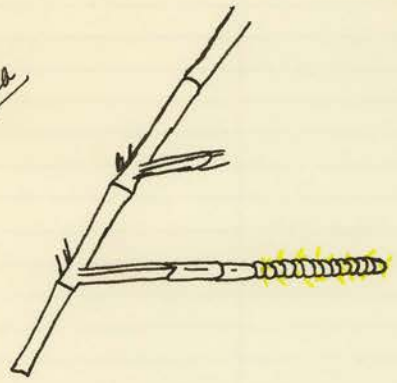
leaves more succulent than above; uniform pale dusty green; numerous brown scars.

stems woody; brown

30 June 1975 (cont.)

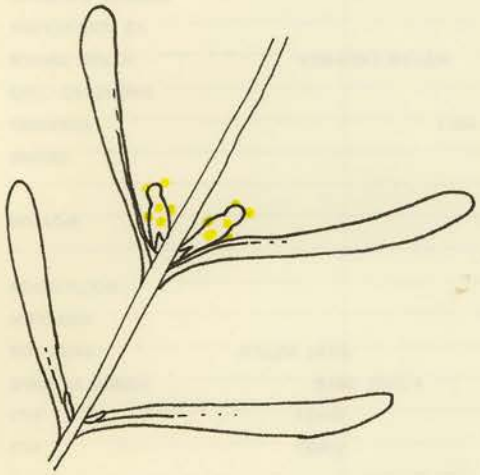
Species 3. Resembles Allenrolfea. Bushs 2-3 ft. tall.

5 July 1975 O.K. - is Allenrolfea



stems woody brown at base, grading into succulent green at apex; Little yellow hairs on extremity of branches; stems cross-section: ⬭

Species 4. Resembles Batis. Low bushes of vine-like growth (to 1 ft. tall).



stems woody brown or succulent green to yellow-green; pods green to yellow-green; flowers on club-shaped structures a junctions.

5 July 1975 - OK. is Batis!

1 July 1975
Mexico, Sonora, Bahía Venetia (ca. 30 mi. N. Guaymas)

Observations on *Purpura pansa* (a very appropriately named snail). Exudes a milky white, viscous fluid when agitated, that quickly turns pale green in the air. After a few minutes more (3-4) this turns purple, staining hands, clothing, etc. and emitting an obnoxious sulfurous odor, reminescent of fireworks. Keen (1971:552) discusses this purple dye.

Other invert seen include (SCUBA in 5-20'):

Phyllactis corinnata
Palythoa ignota
Astrangia sp.
Porites californica (in deeper region colors vary from pale green to lemon yellow)
Lineus geniculatus
Isostichopus fuscus
Ophioneries annulata
Centrostephanus coronatus
many different cowries and cones, including
Jenneria pustulata
Hoffmannola hausi (opisthobranch)
Littorina modesta
Littorina aspera — density of 210 in² (= 30,240 ft.²)
? *Lytechinus picta* — feeding on *Padina*
test color w/alternating rows of pale lavender and dark purple; spines lavender to straw color and white banded

3 July 1975

Mexico, Gulf of California (sonoran coast), Isla San Pedro Nolasco

Went out from Playa Venetia on the "La Sirena" to SCUBA dive Isla San Pedro Nolasco. The island is very similar to San Pedro Martir in sigl and in that sheer cliffs drop off into the sea and down to about 50'-75' before they begin sloping onto the sea bed bottom. The mountains of Nolasco are not as high as those of Martir I don't believe, and there is no evidence (visible from sea) of bird rookeries on Nolasco, although certain slopes had a good coverage of guano, and many brown pelicans are in the area.

The dive was excellent, one of the best I've experienced, and very similar to Isla San Ignacio Farallones off Topolobampo. Anna Mary and I dove to 50'-70' to record observations — her first dive below 30'. Visability was 45'-55' and water temp. was 27° C from surface to bottom (no thermocline). A few sparse sea lions were in the area, no pups seen but one yearling observed. Looks like the harems have all pretty much split up for the year. The area is dominated by cuidarions and echinoderms.

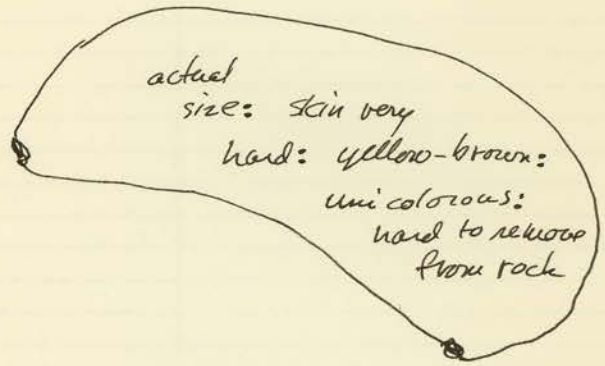
3 July 1915 (cont.)

Animals observed:

Tethya zetleri
Pseudosuberites pseudos
Aglaophenia sp. (tall, solitary, abundant)
Gorgonia sp.
Muricea californica
Anemone: gregarious, column red-brown like Bunodosoma, tentacles w/ lavender tips, verrucae in close rows entire length of column (= B. mexicana?)
Eurythoe complanata
Balanus tintinnabulum (large, 1" tall)
Panulirus (inflatus?) - the darker, blackish spiney lobster (photographed); this dark species has shorter spines than the red one (P. gracilis) and a small tail (in proportion to the cephalothorax).
Geograpsus lividus
Grapsus grapsus - ♂ tend to be darker, w/ a more predominantly green color, while ♀ tend to be more predominantly reddish (and larger).
Pachygrapsus transversus
Othelia tenuispina (small)
Echinaster tenuispina (= Asthenetis sertulifera?)
Mithrodia bradleyi
Oreaster occidentalis
Pharia pyramidata
Phataria unifascialis
Ophioderma teres

3 July 1975 (cont.)

Ophiocoma alexandri
Ophiocoma aethiops
Eucidaris thouarsii
Diadema mexicanum
Isostichopus fuscus
a large, tough, solitary Asidian



4 July 1974
Mexico, Sonora, Bahía Venetia (ca. 30 mi N. of Guaymas

The last 4 weeks have been spent assisting Don Thomson with a Marine Ecology course. One objective of the course has been to gather data on species diversity in 4 major taxocenes: Fish, Crustacea, Echinoderms and Molluscs. The Shannon-Wiener index has been used to calculate H (diversity), J (evenness), and N = total number of specimens collected and S = total number of species collected. The data were assembled by 2 teams of students, an r-team and a K-team, each team composed of 8-10 people.

FISH DATA

Rocky shores (tide pool poisons)

Locality	latitude	N r	N K	S r	S K	H r	H K	J r	J K
Norse Beach	31°20'	-	306	-	11	-	1.67	-	.72
Puerto Lobos	30°16'	412	353	10	7	1.0	.81	.46	.42
Cuevitas (Libertad)	29°43'	822	697	21	16	1.6	1.78	.60	.64
Kino	28°50'	—	—	—	—	—	—	—	—
Isla Tiburon	28°44'	74	265	9	22	1.6	2.3	.73	.75
Bahía Venetia	28°07'								
San Carlos									

Sandy shores (seines)

Chollla Bay	31°20'	-	2477	-	13	-	.69	-	.26
Puerto Lobos	30°16'	198	178	6	6	1.53	1.46	.85	.87
Estero Sargento	29°20'	290	346	8	7	.73	.65	.35	.34
Estero Vibora	29°0'	288	5451	13	12	1.01	.14	.39	.06
Estero de la Cruz (Kino)	28°48'	8196	308	16	16	.09	1.66	.03	.60

4 July 1975 (cont.)

CRUSTACEAN DATA – (brachyurans and porcelains only) quadrats throughout littoral zone

"Rocky Shores"

Locality	Latitude	N r	N K	S r	S K	H r	H K	J r	J K
Norse Beach	31°20'	—	—	—	—	2.42	2.41	.81	.82
Station Beach	31° 18'	—	—	—	—		1.38		.86
Puerto Lobos	30° 16'	304	224	6	5	.81	1.00	.46	.42
Cuevitas (Libertad)	29° 43'	—	526	—	17	—	1.70	—	.61
Kino	28° 50'	363	454	4	5	.30	.19	.21	.11
Tiburon Is.	28° 44'								
Venetia	28° 07'								
San Carlos									

"Sandy Shores"

Estero Morua	31°15'	—	—	—	—	.81	.06	.81	.08
Puerto Lobos	30°16'	59	41	6	4	1.3	1.0	.73	.75
Estero Sargento	29° 26'	—	17	—	3	—	1.03	—	.99
Estero de la Cruz	28° 48'	44	-	5	-	1.08	—	.67	—
San Carlos									

MOLLUSC DATA – quadrats throughout littoral zone

"Rocky Shores"

Norse Beach	—	—	—	—	—	—	—	—
Puerto Lobos	774	301	22	26	1.95	2.60	.6	.8
Cuevitas	669	306	44	43	2.5	2.9	.68	.78
Kino	447	(1730-1077)	14	(13-15)	1.55	(1.9-1.4)	.57	(67-.48)
San Carlos								

"Sandy Shores"

Puerto Lobos	207	975	8	2	.83	.67	.60	.98
Laguna de la Cruz	344	328	5	4	.90	.53	.56	.38
San Carlos								

4 July 1975 (cont.)

ECHINODERM DATA – Continuous Transect

"Rocky Shores"

Station Beach	211	1129	5	12	.99	1.79	.62	.72
Puerto Lobos	1279	39	6	5	.16	.98	.28	.61
Cuevitas	984	1079	17	18	2.03	1.93	.72	.68
Kino	569	417	3	10	.06	.49	.05	.21
Venetia								
San Carlos								

After examining these data I felt H' didn't give a good picture of what the diversity really was like, because it was so strongly influenced by J (evenness). So I compiled a list of TOTAL SPECIES observed (H_{max}) for Crustaceans to plot against H'. The data follows:

CRUSTACEANS (Brachyurans & Porcelains only)

Locality	H_2O T°	H_{max}	H'	S
Norse Beach	29-33°C	3.18	2.42/2.41	24
Station Beach	26-27°C	2.98	1.38	12
Puerto Lobos	21°-25°C	2.08	.86/1.00	8
Cuevitas (=Libertad)	27-29°C	3.14	1.70	23
Kino	28-30°C	1.39	.30	4
Tiburon Is.	27-29°C	2.20	.19	9
Venetia	27-30°C	2.71	–	15
San Carlos	30-31°C			

6 July 1975
Mexico, Sonora, Bahía San Francisco (shangri-la trailer court).

The point here used to be one of the most beautiful regions along this coast, for swimming or diving. In addition to the beach litter on the shore here now (a drift line of styrifoam cups and plastic bags) there are 2 outflows, right on the beach, from local septic tanks. One (or both?) is pumped by a large hydraulic pump so it must pump several large tanks. The water his is murky now and the whole beach smells like a sewer (so does your body after diving here).

Invert collection made by snorkling; three photos taken:

(1) Astrometis sertulifera, Nidorellia armata (young), Othelia armata, Phataria unifascialis

(2) Diopederma donianum (?) - specimens saved

(3) 4 species of cucumber

1) top 2 animals: B. impatiens
2) next down: B. arenicola
3) } dark, smooth purple species = N. gibbosa
4) }
purple/white, papillate species = P. chierchia

An excellent relaxant for Echinoderms is Finquel (MS-222)

19 October 1975

Mexico, Baja California Norte (w. coast), Punta Banda.

Collections made in 2 locals, ① near La Bufadora (on the exposed, outer coast, actually below Bahía Todos Santos proper) and ② just inside the long spit that forms the inner bay of Bahía Todos Santos. Nancy Moffat and I collected in locality ①; John Hendrickson in locality ②. We were looking for Echinoderms and sponges and found the fauna at each of the 2 localities were completly different in these taxa. The outer coast had Strongylocentrotus purpuratus & franciscanus, Patiria miniata, Pisaster ochreaceous, Ophiothrix spiculata. The inner bay had Ophioderma variegatum and Ophiopteris papillosa.

FOR DEC. 31, 1975
ENTRY SEE NEXT NOTEBOOK
(1976)