COSTA RICA, Puntarenas Province, Golfo de Nicoya, Punta Morales.

I. South side of Pt. Morales, beach sandy, grading abruptly into fine silt-clay. Numerous scattered small, rocky outcroppings, about 300 m. apart. Rocks are consolidated clays, with abundant small barnacle & oyster growth. No algae (perhaps on minute red?). Low tide -7'6" (-2m) at 12:30 pm. Collections made at water line between 11:00-12:00. Rocks & assoc. mud sediment washed in formalin (2%).

Largest invert seen was *Leptodias occidentalis* (?). Very few sponges (a few small orange patches). *Oxyopode* present on high sand beach. Tidepools 36°C.

No *Tetraopes* found!! MKW identified a *Parapeneus bermudensis* Ben. & Roth.

II. North side Pt. Morales, mangrove channel at site of new Univ. Costa Rica marine laboratory. Samples taken from top 1 cm. of fine organic detrital-silt layer,
and from under rocks. Tide pool $T^o = 37^oC$ ($T^o$ in flowing channel not measured).
The mangroves in this particular channel, which extends about 2 km inland, are only about 5 m tall (S. mangle), as opposed to the 10-12 m giants of most of the Nicoya Gulf. This "scrub" appearance resembles the Gulf of California mangrove lagoons, where a 5 m R. mangle is a large mangrove tree. Claus Gauss (a German marine chemist/1° productivity type here) suggests this stunting may be due to salinity stress. I doubt it. Most of the sediment in this area is covered with a diatom film, brown in the channels; green in & about the mangroves. MKW identified S. sarracena, S. sarracensi, C. tertia, U. rugosa (Lockington) from here. I question the latter.
(AHF cat. #1920) 22 Feb. 1980

Costa Rica, Puntarenas Province, just outside mouth of Golfo de Nicoya, Tárcoles (Playa Tárcoles). n 9°45'N 84°50'W.

Beach is dark sand, medium-sized grains, with considerable organic detritus. Isolated rocky points separate sandy stretches. Rocks are small to large, well-embedded in substrate. Several large polychaete colonies, ace an amphipid, exist between rocks. Formalin washed taken at low water line of rocks & associated sediment.

Low tide 0.0' (1:30 pm). Surf T° = 29°C. Two sample sites: (1) w/o polychaete colonies (2) w/polychaete colonies. Both sites had what appeared to be an abundant brown diatom carpet. — note: these samples were accidently combined! One stomatopod collected (lateral) = Gonodactylus festae Nobili ♂ (Id. by Ray Manning). Several shrimp taken, including Palaemon ritteri Holmes & Alpheus californicus Holmes (Id. by MKW).
Costa Rica, Guanacaste Province, National Park Santa Rosa. Collections made on rocky shore outside mangrove estero. H₂O T° = 26° (probably an upwelling area). Rock & turf algal washes made by Brosca, Mackey, M. Murillo and Ana Dittle.

Excirolana braziliensis under rocks set in coarse mud.

(3) Cirrolana sphaerosperma taken in algal turf washes.

Ophiophragmus sp. (Id by Gordon Hendler).

Shrimp collected & Id by M.K. Wicksten:

Alpheus levinsculum Dana 1 juvenile

A beautiful site, secluded, w/sandy beaches, rocky shore & mangrove channels all within easy walking distance of one another. Would love to dive here. I would have also, under other circumstances.

This site is on the extreme so. base of Cabo Sta. Elena (N10°48'N).
27 April 1980


Shrimp collected by M.K. Wickett:
- Hymenopus sp. (1 specimen)
- Caridinae panamensis Aleco (1 specimen)
- Alpheus sp. (2 specimens)
- Thor paucalis (Heller) (7 specimens)

Barnacles collected by Bill Newman:
- Selenus trigonus
- Chthamalus sp. 1
- Chthamalus sp. 2

Brittle stars Id'd by Gordon Hubler:
- Ophiosthys speculata

Pinnotherid crab Id'd my MKW as "new species"
Isopods collected from Heliconia sp. flowers. Also, millipedes taken from room at Hotel "El Sitio" in Liberia, Guanacaste Prov. These small Liberia millipedes are colored exactly the same as much larger (3-4") specimens seen, but not collected, in Monteverde. Color in life: dark brown or black with yellow plates on lateral margins of body segments.
Costa Rica, Pontarenas Prov., Pontarenas.

Collections made in mangrove forests along highway going into town. Large crab taken from under log on mud substrate. The roots and trunks of the red mangroves in this region are entirely free of any visible fouling organisms (not even barnacles). Dead mangroves & debris examined for isopods without success.

Note: This sample was probably lost (crab), however, crabs collected later this month at Playas Coco appeared identical (with a distinct pair of light spots on posterior region of carapace).
Costa Rica, Guanacaste Province,
Playas Coco

Area Map:

Area description:

This is the same area Spright did his work in (2 papers in Veliger). His paper with the species list provides a good set of place names for the area. By his nomenclature, the tombolo is "Punta Centinela", on the larger "Punta Miga", as
indicated on this map.

The area in front of the river ("Quebrada San Francisco"?) is fairly silty. It is also the area with the most dense population of *Ocyode gaudichaudi*. The river is periodic (perhaps only flowing during the rainy season). Most of the rest of the beach is medium-grained sand or rocky shore (headlands). The *Ocyode occidentalis* seem to prefer the sandier parts of the beach. Also, the 2 co-occur along some stretches of beach, but the *O. gaudichaudi* seem to hang out right along the water line, and even in the surf itself. The *O. occidentalis*, on the other hand, seem to stay in the high intertidal and spray zones. The *O. gaudichaudi* are a beautiful mottled brick red (the no doubt capable of changing color).

Collections:

Collections were made on Pt. Miga, in the area of the tombolo (indicated in blue on the map). Both general rock washups and specific habitat collections were made.
Low tide was ~ +2 m (by USGS tide charts). Surf $T^o = 33^oC$; tide pools reached ~ 93°F; offshore $T^o = 31^oC$ on surface, and 30°C at depth of 3 ft. In collection area (no. side of Pt.) surf was weak, $\frac{1}{2}$-1 ft. swells, even under constant mild breezes.

In general appearance shore appears sparse, like so many tropical shores. Little obvious algae, although close inspection reveals patches of turf and other clumps of algae; numerous scattered clumps of mussels & Tectoclitia (both predominantly on vertical rock faces). Balanoids abundant. Under rock fauna is rich, in contrast to surface fauna. No doubt the surface gets too hot & too dry for much to live on it (except on vertical surfaces?).

Under rock fauna consists of numerous kinds of solitary ascidians, encrusting sponges (swell), bryozoans, holothurians, Bethellina, Ophiocoma teres, O. alexandri, Ophionereis annulata, gobies, rock oysters.
Rock oyster removed from rocks by locals on N. side of point, but not on S. side. High intertidal region has numerous *O. gaudichaudii* here, in narrow sand strip above rocks (between rocks and cliff); suggest that where space/resources are limiting, *O. gaudichaudii* can out-compete *O. accidentalis* at this latitude. High intertidal also with many small hermit crabs in *Perita* & other shells.

Offshore is abundant coral rubble (dead) mostly *Pocillopora*, and scattered isolated heads of living *Pocillopora* & *Porites*. The living *Pocillopora* heads are small (6" to 1 ft diameter) & not real healthy looking. Many fish, especially *Abudelfduff* and *Thalosoma*.

**Sample #1.** Hydroids removed from small tidepool in lower intertidal. Into this jar was also placed a small stomatopod (*Gonodactylus?*) collected by Phil Pepe from burrows in coral rubble. *Labeled #3 in field.*

*Gonodactylus festoe* (Wilson) - id by Ray Manning
Sample #2 - labeled #4 in field.

Balanoid barnacles scraped from rocks with knife by Anna Mary Mackey; mid-intertidal. (contains sphaerozoids & snails).

Sample #3 - labeled #5 in field.

Algae scraped from vertical rock face in low intertidal region; strong surge present.

Sample #4 - labeled #6 in field.

Large cluster/mat of tubes; either polychaetes or amphipods! Mat formed a hillock or mound 2 ft. across & 3" deep; lower mid-intertidal region.

Sample #5 - labeled #7 in field.

Another mat of tubes (polychaetes probably; tubes longer than those of sample #4). Pepe says probably Spiochaetopterus sp. The tubes are parchment-like.
Sample #6 - labeled #8 in field.
Living & dead *Tetraclita* scraped from rocks; mid-intertidal region. (Contains sphaeromatid isopods, a beetle, some spiders (?), & various gastropods).

Sample #7 - labeled #9 in field.
Living & dead oysters scraped from rocks. Some "star-like" limpets were also put into this jar, for McLean.

Sample #8 - labeled #10 in field.
General rock washes from mid-intertidal tide pools. Water T° = 93°F. Samples washed thru .05 mm sieve. No formalin used, just sea water and scraping with putty knife.

In addition, an *O. gaudichaudii* was put in this jar for Garth, as well as a subtidal hermit crab for Haig. Hermit was living on hard rock bottom - not sand.
Costa Rica, Guanacaste Prov.,
Playas Coco.

Same locality as 17 Aug 1981. Collections made
at Pt. Cacique, n. end of Bahía el Coco.

Sample #1 - labeled #11 in field

This is a mixed sample, containing the
following:

1. A *coenobita* sp. from high intertidal and
   spray zones

2. A *ligia* sp. from high intertidal.

3. Some amphipods & shrimp collected by
   Pepe at Pt. Centinela, from coral rubble.
   There may be an isopod in here from the
   same region!

4. A wasp (?) that digs holes in the sand
   of the hi intertidal & splash zones.

5. A porcelain crab & some stomatopods
   from Pepe's coral rubble collections (Pt.
   Centinela).

6. Pepe's basalt rock borrows fauna (from
   Pt. Centinela), including: a crab, various
Stomatopods, pea crabs, “Upogebia-like” shrimp, Alphaeus sp. These critters were living in the cracks & crevices & holes in the basalt. Whether or not they were creating burrows themselves isn’t known, but I doubt it.

Sample #2 - labeled #12 in field

Four jars (3 small, 1 medium) containing driftwood with what appears to be Limnoria burrows. The driftwood on this beach contains burrow holes of 3 distinct diameters:

1) minute; Limnoria; 2) medium; unlined, packed throughout with what appears to be fecal pellets of digested cellulose; no animals seen 3) large, CaCO3-lined burrows - Teredo?

Sizes are: (1) (2) (3) 00

→ no Limnoria found in lab examination of wood (Feb., 1972; AHE).
Costa Rica, Guanacaste Prov.,
Playas coco.

Basalt rock washes made from Pt.
Miga. Actually, the "basalt" of this collection
& of Pepe's collection of 18 Aug is probably
a kind of Olivine or Serpentine. We brought
a sample back for Id. Also placed in this
jar is a large "terrestrial" crab that is abundant
along the sandy beaches here during the
night hours; runs along water line like
Ocyopode does! A ground & crab seen but
not taken. Both chelae of the crab that
was collected broke off (they were
manifestly unequal).

Second sample taken today was
wood cut from old stumps of pier pilings
on beach, near outflow region of Rio
Quebrada San Francisco. No apparent Linaria
burrows seen in wood. (Note found in subsequent lab
examination either)