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Coastal and Estuarine Data Archaeology and Rescue Program

## Charles M. Breder, Jr.: Bahamas and Florida



Andros and The Tongue of the Ocean (NASA)

April 2003



US Department of Commerce  
National Oceanic and Atmospheric Administration  
Silver Spring, MD



Mote Marine Laboratory  
Sarasota, FL

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April 2003

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COVER PHOTO: Andros and The Tongue of the Ocean (NASA). NASA Photo ID: STS043-151-106,  
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## Charles M. Breder, Jr.: Bahamas and Florida

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### ABSTRACT

Dr. Charles M. Breder, a well known ichthyologist, kept meticulous field diaries throughout his career. This publication is a transcription of field notes recorded during the Bacon Andros Expeditions, and trips to Florida, Ohio and Illinois during the 1930s. Breder's work in Andros included exploration of a "blue hole", inland ecosystems, and collection of marine and terrestrial specimens. Anecdotes include descriptions of camping on the beach, the "filly-mingoes" (flamingos) of Andros Island, the Marine Studios of Jacksonville, FL, a trip to Havana, and the birth of seahorses. This publication is part of a series of transcriptions of Dr. Breder's diaries.

### INTRODUCTION by S. Stover and K. Hale

This publication is another in the series of field journals of the ichthyologist Charles M. Breder Jr. transcribed by the National Oceanic and Atmospheric Administration (NOAA) and Mote Marine Laboratory for NOAA's Coastal and Estuarine Data/Document Archaeology and Rescue Project (CEDAR). The Project's goal is to provide a strong historical information framework for current rational decision making and restoration programs in South Florida and the Caribbean.

C. M. Breder's journals demonstrate the intense nature of his dedication to his chosen field. His fastidious notes and diagrams are a valuable source of information on coastal and estuarine ecosystems in South Florida and the Caribbean in the early 1900s. This journal covers Breder's involvement in the 1932 and 1933 Bacon Andros Expeditions, and excursions to laboratories on the west coast of Florida and various other areas associated with his research through 1939.

Andros Island, the chief island of the western Bahamas, is also the largest in the group. It is a large flat island 1600 square miles in size. The western shore is a barren muddy bank. The southern part of the island is crossed by three large creeks or Bights, which offer today's anglers some of the best bonefish fishing in the world. Most towns and villages are located on the eastern coast where the Barrier Reef lies offshore along the oceanic depression, the Tongue of the Ocean. When Charles Breder accompanied the 1932 Bacon-Andros Expedition to the island, the population was 5,000. Today there are approximately 9,000 inhabitants. The second largest coral reef in the Western Hemisphere is found in Andros. This area is now popular with oceanographic researchers and scuba divers because of its marine caves and "Blue Holes", openings into submerged limestone caverns visible from the surface as dark blue spots.

One of the interests pursued by the Andros Expedition was the ecosystem of the island's Lake Forsyth. Breder investigated the variety of marine fish sustained by this fresh-water lake. In his 1934 Zoologica paper, Breder suggests the lake supports these fish due to the amount of

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calcium present in the lake. As a point of interest, Breder mentions in the journal the Chickcharnie legend of the Seminole Indians and slaves who once inhabited the island. The Chickcharnies, miniature creatures or leprechauns, supposedly nest in the local 70-foot pine trees and exert both good and evil influence over the island's daily events.

In the 1930s and 1940s, two facilities played an important role in advancing marine and biological research in Florida: the Bass Biological Laboratory in Englewood and the Palmetto Key Laboratory. The Bass Laboratory was founded by John F. Bass, Jr. in memory of his father. Its purpose was to furnish research facilities to investigators in biological fields, and act as a specimen collection station for universities and other research facilities. Bass chose Englewood, Florida because of its proximity and easy access to various different environments including freshwater streams and rivers that flowed into nearby Lemon Bay and Charlotte Harbor and eventually to the Gulf of Mexico. These waterways including the Caloosahatchee, Peace and Myakka Rivers abound with a variety of aquatic life. This area continues to play a prominent role in regional and state environmental issues.

The Palmetto Key Laboratory was established in 1938 as a field station of the New York Zoological Society on Palmetto Key (currently known as Cabbage Key). Charles M. Breder organized the set-up of the facility and Mr. Marshall Bishop of the Peabody Museum, Yale University oversaw the day to day operation. Its principal purpose was to study the life history and habits of tarpon. The initial research was supported by Gratia Rinehart and performed in cooperation with the U.S. Bureau of Fisheries. Further information on the Palmetto Key Laboratory can be found in "C. M. Breder, Jr.: *Palmetto Key Laboratory 1942*."

#### C. M. BREDER, JR. PUBLICATIONS FROM THE ANDROS EXPEDITIONS

1932

An annotated list of fishes from Lake Forsyth, Andros island, Bahamas, with the descriptions of three new forms. American Museum Novitates; no. 551, 8 p., 3 figs.

Specimens collected in February 1932 during the Bacon Andros Expedition. "A preliminary taxonomic list on the first collection of fishes from... this peculiar, isolated lake of fresh water inhabited by marine types".

1933

A pearl fish from Nassau. Bulletin of the N.Y. Zoological Society, 36(3):79.

New locality records of *Abdefduf analogus* including one from the United States. Copeia, no.4:191-193.

The Bacon-Andros Expeditions. Bulletin of the N.Y. Zoological Society, 36(3):54-65, 17 photos.

Young tarpon on Andros Island. Bulletin of the N.Y. Zoological Society, 36(3):65-67.

1934

A new *Gambusia* from Andros Island, Bahamas. American Museum Novitates; no. 719.

"*Gambusia manni* Hubbs, known from both New Providence and Andros Island, appears to be absent from the southern part of the latter island. In its place there occurs another and similar form that may be described as [*Gambusia hubbsi*]."

Ecology of an oceanic fresh-water lake, Andros Island, Bahamas with special reference to its fishes. Zoologica, 18:57-88, 10 figs.



## DIARY AND TRANSCRIPTION

The handwritten diary of Dr. Breder's field activities in the Bahamas and Florida was written in a bound black and brown notebook in ink.

The diary was transcribed by hand. Minor editorial changes, such as closing parenthesis were made. Indecipherable entries were noted with "[?]". Editorial comments such as current names of species were noted in brackets and/or capital letters. Numbers outside the margin of the transcribed text are the page numbers of the original notebook.

The scientific names used in the dairy are sometimes different from currently accepted ones. For example, Breder spelled "*Lutjanus*" as "*Lutianus*". Breder used both "*notatus*" and "*notata*". Breder's spelling of place names varied, e.g. Bahring Point was Behring Point, and Bokellia was Bokeelia.

Scans of the diary pages are included as individual JPG files in the CD and can be referred to as needed.

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Merriam-Webster's Geographical Dictionary. 1997. 3<sup>rd</sup> ed. Springfield, MA: Merriam-Webster.

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## PHOTOGRAPHS OF ANDROS



Plate 1. Aerial view of Andros Island. (Courtesy of L. Kellie Dixon, Mote Marine Laboratory.)



Plate 2. Blue Hole, Andros Island. (Courtesy of L. Kellie Dixon, Mote Marine Laboratory.)



Plate 3. Terrain, Andros Island. (Courtesy of L. Kellie Dixon, Mote Marine Laboratory.)





Bacon - Andros Expedition  
1932



[NOTE LOCATION OF BACON'S LAKE AND STAFFORD LAKE.]

## BACON - ANDROS EXPEDITION

1932

- Jan 14      Aboard S. S. Caledonia. Cast off 6:10 P. M. Light S. W. wind, light mist on horizon. Mr. D. Bacon and C. Breder. Turned in 11<sup>00</sup>. 1
- Jan 15      Turned out 9<sup>00</sup>. Light white fog. Slowed to less than 15 knots. Position at noon 36° 32 N 74° 36 W 237 miles from Ambrose Light. At 3:30 little rifts of Gulf Weed and streaks of blue water appeared. No flying fish. This disappeared shortly and green water returned. This continued until darkness 6<sup>00</sup>. Wind rather strong, continued S. W., for flight of fishes. No life seen other than a few gulls. Air much warmer and balmy. Turned in 10<sup>20</sup>.
- Jan 16      Turned out 8<sup>30</sup>. Sky overcast. Well in Gulf Stream - weed but no Exocoetids as yet. Made an observation 10:55 to 11:25. S. E. Breeze. One seen on lee side (west - port bow). Just out and in again. Are they further south or not flying on account of stiffness of wind and slowness of boat (15± knots)? By 4<sup>00</sup> no more flying fish seen although scattered observations were made right along. One porpoise and a few petrels far off. Position at noon 30° 27N 76° 04 W 373 miles from last position. Made another observation at 4:45 to 5:15. East wind stiff. Saw a shark dorsal and caudal tip only. Blue shark? Turned 10<sup>30</sup>.
- Jan 17      Turned out 8<sup>00</sup>. Arrived at the anchorage about that time. Taken ashore in the tender "Lady Cordona". Went direct to Pirates Nest with Mr. L. Huntington and J. Sands on the "Escape". Spent the rest of the day unpacking and discussing plans. 2  
Tested cistern H<sub>2</sub>O - Sp. G. 1.000+. Turned silver nitrate distinctly milky and brown. pH 8.0  
Turned in 10<sup>30</sup>.
- Jan 18      Turned out 7<sup>30</sup>. Spent the A. M. repacking scientific apparatus and discussing plans, etc. Sky overcast. Wind still up but not as much as last night. Spent the P. M. in Nassau getting material for trip. Turned in 9<sup>00</sup>.
- Jan 19      Turned out 7<sup>30</sup>. Made off for Clifton (S. W. bay). Left Pirates Nest. 10:25 Anchored 12:00. Saw many *Parexocoetus mesogaster* on the run down (at about 10 knots). Sea flat, light S. E. breeze.  
Went ashore in P. M. White sand beach in center of bight flanked on south side by aeolian formations. Saw young *Abudefduf*, *Lutjanus*, *Apodus*, *Eucinostomus*. Little sea life. Back from shore various small anolis common. Collected a series of Cerions and other tree snails. The others favored cabbage palms - one snail on each finger of frond usually. Also more than one in a colony generally. Most about five to six feet from ground. Took a number of photographs of lizards, snails, etc. Got aboard just before sundown. Sky somewhat overcast. This end of New Providence 3  
is very attractive. Turned in 9<sup>00</sup>.

- Jan 20            Turned out 6<sup>30</sup>. Rain and a light breeze. Left harbor 7<sup>00</sup>. Came across to High Cay. Arrived and anchored inside for lunch 10<sup>45</sup>. Numerous Exocoetids seen, most common in the middle of the Tongue of the Ocean. One a *Cypselurus heterurus* (?) "hung" with practically no forward motion alongside. The behavior in the fairly stiff breeze was more like that of a gull than a flying fish. Gulf weed fairly common but no little fishes could be seen associated with it. This may be because of rough water and not a scarcity.
- 4                Continued down to Salvador Pt. inside of "barrier" reef. Very good looking reef country but bad with a draught at 4' 6". Picked up two local boys as pilots and continued, scratching the marl bottom of North Bight most of the time. Passed between Chatham Rocks and Big Wood Cay and continued between the latter and Pat Cay. Anchored for the night just beyond the western point of Big Wood Cay. The chart is poor and inaccurate and the water at half tide a bare 4' 6" in most places shoaling up gently to the numerous Cays many of which are not on the chart at all. Trolled most of this distance with no results. Just below High Cay two *Strongylura* (*raphidoma* or *acus*?) leaped for the lure unsuccessfully. Dropped anchor about 5<sup>00</sup>. Wind higher and a little rain. Turned in 9<sup>00</sup>.
- Jan 21            Turned out 7<sup>00</sup>. Rain and high wind in night. Set out for Commissioner Forsyth's place. Had to pass outside of reef into very confused seas and breakers somewhat dangerous. Anchored off the residency (see chart). Met Mr. Forsyth and discussed plans. Let the pilot boys go and got another. This one Andrew Mellon used on his Galapagos trip and is supposed to be very good. The data on the fresh water seems to be as follows. Marine forms such as *Sphyraena*, *Lutjanus*, etc. are present "acclimated" to fresh water. Frogs breed there in late spring and early summer. Some of the lakes are stagnant and completely land locked. Others are more or less connected with the sea. A dead alligator was found here some years ago - drifted over from Cuba according to native data. Iguanas are here in some numbers especially in Pine Cay. Eggs laid in late summer and fall. Snakes are scarce. Fishes are present in all fresh waters but according to the loose conversation are all marine types. Took new pilot "Nehen" and came into South Bight with out passing outside. Anchored for night just after sunset as shown on chart. Just enough water to keep afloat. Near the residence saw only one *Anolis* (red backed form).
- 5                The legends concerning "yahoos" and "chico"\* appear to be derived from the "Red Bay" people which are mixed black and Seminole - came here about 100 years ago and peopled the woods with mythical elves, etc. unknown to the Africans themselves.
- Turned in 9<sup>30</sup>.
- Jan 22            Turned out 7<sup>00</sup>. Made way through the bight as shown on chart. Emerged from Loggerhead Creek. Spongers active sorting their catch. Trolling caught a *Carcharhinus limbatus* of about 3' which subsequently got away. The black tips were more intense than any previously seen. Saw a single *Strongylura notatus* about 8" long with a tail a very brilliant red. Inside these bights there is little of anything but soft marl and sponges. Bird life peculiarly absent as well as fishes. The place is strikingly barren. Anchored off wide opening. Took dingy with outboard motor and dory in tow to River Lees Camp at a grove of madera trees. The shoal water was some what difficult to get through up to the River Lees where a depth of 6 or 8 feet held. Lower the bottom was similar to that in the bights. Barren and no bird life. As soon as River Lees was reached bird life appeared. A variety of ducks 100 - 200 white herons, kingfishers, etc.
- 6

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\* "Chico" probably refers to "Chickharnies", the miniature creatures of legend.



After camp was made looked about in the nearby brush. Only insect sounds could be heard. Caught one small *Hyla* and a variety of tree snails and small dark ones on the marl near the water. Saw a small Anolid. Turned in 8<sup>20</sup>. Up at 2<sup>00</sup> on account of rain.

Jan 23 Turned out 6<sup>30</sup>. Reinforced the collection of snails. Visited a "fresh pond" in back of camp, see chart. Very barren. Saw a number of *Lutjanus griseus* in mangrove roots at camp site in River Lees. Mr. Huntington saw a *Spheroides* sp.? Broke camp and got away by 9<sup>00</sup>. Had a little engine trouble. Where the River Lees enters Turner Sound a number of fairly large *Tarpon* were leaping. Some ducks on the Sound. Spent some time getting through the tangle in "Haul Under" the stream connecting the sound with Lake Forsyth. There is a fair current there but little bird life. Came across to an old camp site on the inside of a peninsula pointing eastward. The grove of pines forming it was too far from the water for convenience so we went to the opposite shore and established a new one. It took till about sunset to grub out a new place and get fixed for the night. The landscape has an eerie and weird aspect with the sculptured limestone rock. Got a small *Eleutherodactylus* while grubbing. There are fish in the lake and small Peocillides were seen in rock pools along its shore. Turned in at 9<sup>20</sup> at last set to do some work. 7

Jan 24 Poisoned small shore pool with copper sulfate and formalin. It held a number of small *Cyprinodon*, 1 *Gambusia (manni?)* and 2 *Gobies* sp? Also insects and 1 crab. Sampled shore water of Lake Forsyth (#1) sp. g. 1.001 Temp. 22.2 °C present. pH 8.5 Shot a few *Anolis*, *Ameiva* (not). The colored guide left for the "Escape" to get more gasoline for the centerboard motor.

Yesterday at the old camp site saw some old hatched lizard eggs attached to the vertical stems of plants. In every case they were single.

Got some live *G. manni* (?) All ♀? Photographed them.

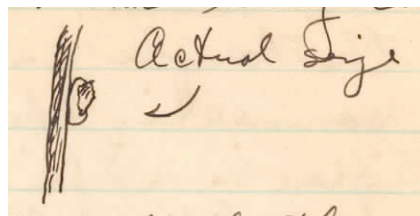
After lunch seined a single haul of a 40' net in soft mud and coral rock. Rather difficult seining but a good catch.

|                                 |                                 |
|---------------------------------|---------------------------------|
| <i>Eucinostomus gula</i> sp.    | several hundred large and small |
| <i>Caranx ruber</i> ?           | about 12                        |
| <i>Strongylura notatus</i>      | 3 adults                        |
| <i>Eleotris pisonis</i> ? (not) | 1 - 6"                          |

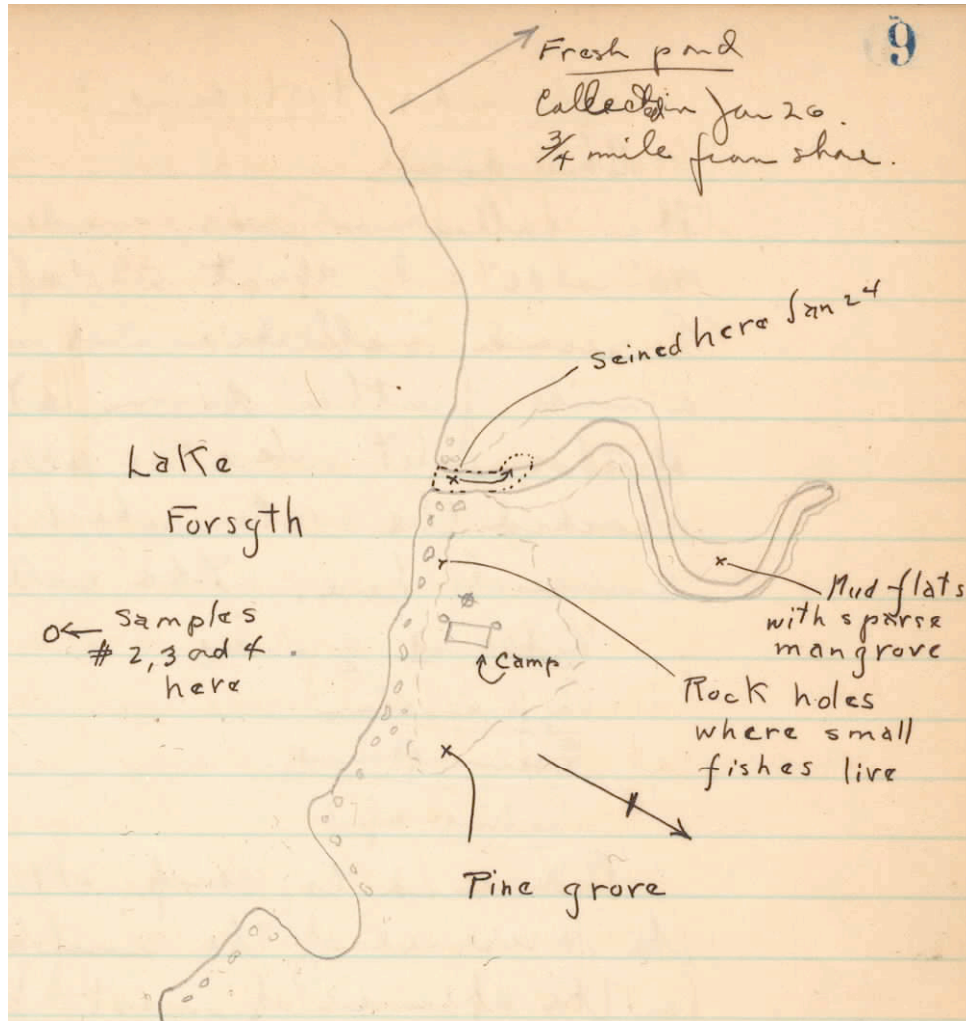
All these are marine forms more or less marked by a tendency to enter fresh water. Preserved all but about a dozen *Eucinostomus* saved for bait. (These are loose in a square can.) Took a good swim - the first since leaving N. Y. !

Tramped about at night but found nothing but tree snails. Heard a few voices from inaccessible places which may have been frogs or water birds.

Turned in at 9<sup>45</sup>. At 3<sup>00</sup> a. m. our guide got back with gasoline ! A remarkable trip about 18 hours - we had figured on 2 or 3 days for him to make it in.



8



Jan 25

Turned out 7<sup>00</sup>. Raining intermittently.

Took water samples about  $\frac{1}{4}$  mile off shore, surface and bottom. After the rain two *Hylas* appeared in camp. One photographed and collected. After an early lunch took skiff in outboard motor to nearby head of lake and did some collecting. Only 3 birds were seen in entire trip; 2 buzzards and 1 duck sp? The first and upper-most collecting site (photographed) yielded the following on one haul.

|                                 |              |
|---------------------------------|--------------|
| <i>Strongylura marinus</i>      | 1            |
| <i>Strongylura notatus</i>      | 12±          |
| <i>Eucinostomus gula</i>        | 30±          |
| <i>Gobius</i> sp.               | 1            |
| <i>Cyprinodon</i>               | 2 very small |
| <i>Spheroides testudineus</i> ? | 1            |
| <i>Chriodorus</i>               | 1            |

10

This collection was made in a "creek" 40' wide and about 5' deep at its greatest. A second collection was made about a mile further down at the "mouth" of this inlet where the scrubby mangroves reached the water which is a little unusual here. The collection was.

|                         |         |
|-------------------------|---------|
| <i>Lutjanus griseus</i> | 2 small |
| <i>Cyprinodon</i>       | 2 small |
| <i>Eucinostomus</i>     | 2 small |
| <i>Gobius</i> sp.       | 1       |

Returned to camp. It is clear that the presence of the snappers accounted for the absence of most other fishes.

A small poisoned pool at camp yielded 1 *Gobius* sp. and one *Gambusia manni* (?)  
♂

Got 2 frogs at camp. A careful examination of surrounding territory failed to reveal any more. Are they attracted by the camp lights? Turned in 10<sup>00</sup>.

Jan 26 Turned out 630. Set out on an overland hike to a closed fresh water pond. Seining in it the following only were taken.

*Strongylura notatus* 1  
*Gambusia manni* many *Cyprinodon* many

11

#### List of species in Lake Forsyth

- 1 *Eucinostomus gula*?
- 2 *Caranx ruber*?
- 3 *Chriodorus atherinoides*
- 4 *Strongylura notatus*
- 5 *Strongylura marinus*
- 6 *Eleotris pisonis*
- 7 *Sphoeroides testudineus*
- 8 *Lutjanus griseus*
- 9 *Gambusia manni*?
- 10 *Cyprinodon variegatus*?
- 11 *Gobius* sp?

The abundance of these little fishes suggests the absence of many larger forms. 12  
Although numerous they were hard to catch due to their minute size and the soft sticky mud in which we sank waist deep. This mud is different than that previously encountered being in large flocculent lumps suggesting the presence of organic matter. Numerous shells of *Physa* were found but these were all dead. Why? See chart for locality. The country about this pond is a flat flood plain of cracked marl and covered with mangrove "bushes". It is reminiscent of African veldt. Took a photo of a mangrove digging a hole with one of its aerial roots. Many large crab holes were seen but absolutely no lizards. These seem to be confined to the pine groves and coppices.

Some of the larger *Cyprinodons* appear to be mature ♂s in breeding colors although scarcely an inch long. Is this a dwarfed local race or a specific split? Study gonads!

Temp 85 °F today with a strong N. E. breeze. Prior to this time the day temps have been uniformly 79°±.

Shot a number of Analids near camp a little before sunset. At that time they 13  
came down to the jagged coral of the water's edge and catch insects. Photographed several. They are easy to photograph but hard to shoot or catch by hand. The extremely uneven terrain is very awkward.

Took a number of pictures of the stiff "Ca" froth whipped up by the wind and its settling and collapse onshore.

No frogs could be found after dark. One scorpion in bed.

Prior to shooting the above lizards made another seine haul in the "creek" by camp. We got exactly the same species collected there on Jan. 24.

- Eucinostomus gula* 50±  
*Caranx ruber* 1  
*Strongylura notatus* 2  
*Eleotris pisonis* (not) 1  
 We have thus apparently gathered the representative fishes of this hole.
- 14 The complete lack of other forms of life that can be taken in a seine is striking. So far only dead *Physa* and a few dragonfly nymphs. Shore crabs are evident both near and far from water by their holes but very few are to be seen. Also a few hermit crabs are about and not nearly as many tree snails as at Clifton on River Lees.  
 Turned in 9<sup>30</sup>.
- Jan 27 Turned out 7<sup>30</sup>. Temperature 64 °F on rising. Visited the camp site used by Mr. Forsyth. See chart. A seining party failed to reveal any new species. Those collected follow.
- Eucinostomus gula* 20±  
*Chriodorus atherinoides* 1 very large  
*Strongylura notatus* 1  
*Cyprinodon* 3  
*Gobius* sp.? 2  
 Tramped through the good pine woods. Got a few lizards and a frog. These all in the pine woods. In the fringing mangroves collected a number of hatched lizard eggs and 5 unhatched ! These held for hatching. It appears these lizards come down to the mangroves to lay.  
 Took more "lizard" eggs near camp. They are not lizard eggs but the chrysalis of some fly; the pupae of which are grass green. Spent the P. M. shooting lizards and taking photographs of various items missed so far.  
 Turned in 10<sup>00</sup>.
- 15 Jan 28 Turned out 7<sup>00</sup>. Broke camp and started down. Fair wind. Reached River Goose by noon (see chart). Had lunch there and collected a few *Cerions* in the palmettos. No lizards here. This Goose River country is distinctly different than the River Lees. The channel is deep and the banks nearly vertical. The depth at least 8' in most places. Bird life more evident, ducks, cormorants, kingfishers, cranes.  
 Below this point the "stream" widens and becomes shallow. Reached the Escape about 4<sup>30</sup>. Shifted anchorage to off Little Loggerhead Creek.  
 Turned in 10<sup>00</sup>.
- Jan 29 Turned out 7<sup>30</sup>. Came across to Behring Point [BAHRING] at a leisurely pace. Caught 2 *Caranx hippos* trolling about 18" and 30". Stomachs contained fish remains. Gonads undeveloped. A *Barracuda* and a *Scomberomorus* (?) got off the hook. Saw a *Ginglymostoma* cruising the bottom. Let go of the pilot (William Hibben), a good man.  
 Anchored under Gross Cay. Bought some *Calamus bajonado* and *Haemulon album*. The former had nearly ripe gonads. The latter (one large - 18") a ripe ♂.
- 16 Jan 30 Started back for Nassau 8<sup>00</sup>. Exocoetids very thick in Tongue of the Ocean this time. Arrived Nassau 11<sup>30</sup>. Spent the P. M. about town. In the slip we saw many *Mugil* (about 15") at night. Also *Abudefduf* (1), *Pomacentrus* 2, *Barracuda* (1 small), *Jenkinsia*? schools. Visited the market and sponge docks (Sat. night). Very interesting local color. Turned in on "Escape" at dock 9<sup>30</sup>.

- Jan 31            Turned out 7<sup>30</sup>. Saw a *Dasybatis* 3', *Tylosurus acus* (?) 15", *Kyphosus* (1), *Pomacentrus* 8 large and dark gray. Also a *Siphostoma*. Came over to Pirate's Nest in the late A. M. with Mr. Bacon and Huntington. The latter left for Miami by plane. Address L. D. Huntington, Homestead, Fla. Had a good swim off the beach. On the sea side caught an *Epinephalus striatus* and *E. guttatus*. A large number of *Acanthurus* were about. Mr. G. Sands and his daughter visited in the P. M.  
                      Wrote some letters in the evening. A high north east wind developed. A howling gale by 9<sup>00</sup>. Turned in 9<sup>30</sup>.
- Feb 1            Turned out 7<sup>30</sup>. Wind still high (Marroned on Key). The bar to be crossed is dangerous in this weather. Little can be done as the sea is violent and animal life on land hidden away.  
                      Collected a few sea shells in the A. M. Photographed some fighting hermit crabs. The two fighting drew a number of "spectators" that formed a ring about the participants but took no part in the quarrel which was finally given up with no apparent injury. Unable to do anything in particular on account of weather. Collected some *Cerions*.  
                      Built a fire on the beach in the P. M.  
                      Turned in 9<sup>30</sup>.
- Feb 2            Turned out 7<sup>30</sup>. The storm has somewhat abated. Went to Nassau at 10<sup>00</sup>. Mr. Sands took us for a visit to the New Aquarium which is neither good construction nor has it proper management or particularly good fishes. Only the common sorts. Drove to Lake Killarney and collected fishes. Only *Gambusia manni* (?) present. In fair numbers and seem to be somewhat larger than those of Andros Island. Took a water sample. Did not see a single lizard on the entire trip.  
                      Returned to the Cay just after sunset.  
                      Turned in 10<sup>30</sup>.
- Feb 3            Turned out 7<sup>30</sup>. Tramped about the cay looking things over. Little activity. Saw a few *Gobius soporator* in rock pools. Collected a few shells. Some fishermen did some seining operations off the cay. They got 2 *Scomberomorus maculatus* and some small Bonito (sp?) not seen close enough to be sure of.  
                      Took a swim in the P. M. and went to town. Got back by sunset. Have ticket to sail to Miami on the 8th (Monday).  
                      Turned in 9<sup>30</sup>.
- Feb 4            Turned out 7<sup>30</sup>. Went to Rose Island and examined the reef. It is small but pretty and healthy look. Fishes are relatively few. Saw the following.  
                      *Acanthurus* (blue and yellow kinds)  
                      *Thalassoma* (young)  
                      *Iridio bivittata*  
                      *Scarus abildgardii*  
                      *Lutjanus apodus*  
                      Took a swim.  
                      Visited Nassau on return. In the slip at Mr. Sands wharf, saw  
                      *Fistularia* 2  
                      *Canthigaster rostrata* 1  
                      *Hepsetia stipes* many  
                      Got by to the cay about sunset and turned in 10<sup>30</sup>.
- Feb 5            Turned out 8<sup>00</sup>. Another good day. Dead calm.  
                      Spent the A. M. gathering my stuff together. Took a swim. In the P. M. went to Nassau. *Clupanodon* in large schools replaced *Hepsetia* at the dock today.

Turned in 11<sup>00</sup>.

Feb 6            Turned out 8<sup>00</sup>. Collected shells at the west end of Pirates Nest. Took a swim. Got a living and active Brotulid fish in the surf. Nearly transparent and active and vigorous. What sp?

                 Took a nap in the P. M. and wrote some letters. The rest went to Nassau while I rambled about the island. Turned in 11<sup>00</sup>.

Feb 7            Turned out 7<sup>30</sup>. Went to Nassau and picked up Mr. Sands. Then went to North Cay. Had a swim. Looked around and collected some shells. Took him back to Nassau late in the day and spent the remainder gathering the last minute packing details together.

                 Turned in 11<sup>00</sup>.

Feb 8            Turned out 7<sup>30</sup>. Took a last swim off the beach of "Pirates Nest" and made for Nassau. Finished up all details there and made the boat for Miami. Got aboard the S. S. Munamar and left at 5<sup>00</sup> P. M.

20                Mr. Bacon gave a parting salute with the Escape.

                 Turned in 9<sup>30</sup> - sea dead calm.

Feb 9            Arrived Miami 11<sup>00</sup>. Got through the customs formalities by noon. Spent the rest of the day looking the town over. Got the "Havana Special" 10<sup>00</sup> P. M. for N. Y.

Finis

## Second Andros Expedition 1933

- Jan 15      Aboard the "Miamian" - Penn R. R. Station, N. Y. 10:15 A. M. Clear and warm. 21  
Mr. D. Bacon.  
Just south of Wilmington, Del. the first turkey buzzard was seen. From there on fairly common.  
Baggage sent by boat - see page 146 for contents.  
Turned in 10<sup>30</sup>.
- Jan 16      Up 8<sup>00</sup>. Jacksonville - air clear - frosty. In the St. John's River were seen numerous clumps of the water hyacinth.  
Large numbers of water birds along the Indian River just north of Titusville. Ducks, herons, bittern, sand pipers. Some very dense stands of cabbage palms in this section.  
Arrived Miami 4:30. Took a walk about town. Had dinner about the S. S. "Muargo". Cast off 8<sup>30</sup> P. M. A fresh N. E. wind, cool.  
Turned in 10<sup>30</sup>. A fair sea running.
- Jan 17      Turned out 8<sup>30</sup>. Off Whale Key, Berry Islands. Sea smooth. Very few Exocoetids seen. Too far off to identify. Gulf weed fairly common. Landed 11<sup>30</sup>. Too much of a surf was running for the "Escape" to come and get us. Sent the men back in the dory but stayed ashore. Examined some tide pools opposite to Pirates Nest (on New Providence). A few of them were occupied by some Goby (*Gobius soporator?*) about 1 1/2" long and a single *Abudefduf saxatilis* 3/8" long. Put up for the night in some rooms over the drug store. (Lightbourn's place) 22  
About the docks at Mr. Sands Place were seen a few fairly large schools of *Hepsetia stipes*. "Loafed" about town and along the wharf. The sponge fleet is in and the docks loaded.  
Turned in about 10<sup>30</sup>.
- Jan 18      Turned out 8<sup>30</sup>. Took 3 photos of the Silk-cotton tree now nearly dead to compare with that of Townsend 1886.  
Hibben arrived from Andros Island to act as our guide. The "Escape" got across the bar for us in the forenoon. Got some of the stuff aboard.  
At the dock a number of *Tylosurus acus?* about 8 to 12" long were cruising about and feeding on *Hepsetia*. There also were schools of *Jenkinsia?* Saw a young *Pomacanthus arcuatus* with the juvenile pattern. Also a few large *Abudefduf*.  
A fair breeze is blowing but the sea has dropped off considerably.  
After lunch made for "Pirate's Nest", the bar not being bad. Spent the P. M. unpacking and looking over gear. On the beach a holothurian was found cast up. A slight pressure caused to shoot forth with considerable violence a large *Fierasfer*. 23  
This specimen was living and active and over 6" long. For most part of its flesh was entirely transparent. The area surrounding the ventral column was a rich Van Dyke brown. Radiating out from this, along most of the hemal spines and neural spines were similar marks to this. Irregularly they were missing however. The head region was suffused with bronze. The peritoneum was similarly colored but in addition contained silvery reflections. This fish showed considerable vitality as an hour later it was swimming about in a mason jar.  
Took a swim just before sundown.

Before coming to the cay visited the fish market at Nassau. Little to be seen. The species noted were in the following order of abundance, about 90% being the first.

*Haemulon album* large  
*Epinephelus striatus* large and small  
*Neomaenis griseus* medium  
*Haemulon* sp. (yellow striped) cut up  
*Holocentrus adscensionis*  
*Balistes vetula* (3)  
*Lachnolaimus maximus* 1 large

24                      Worked on nets in the evening and wrote some letters. It seems that Hibben has not slept for the last 3 nights coming over on a full sponge boat and walking to town last night from Clifton. He says that the flamingoes had a good year last season. "Filly-mingoes" in local parlance. Analids are as common as ever on the key and a snake was killed some time ago by one of Mr. Bacon's men.

Jan 19                Turned out 7<sup>30</sup>. Got most of the stuff aboard the Escape and went to Nassau for the last supplies.

At the dock there the following species were seen

*Pomacanthus*  
*Thalassoma* (young)  
*Hepsetia*  
*Jenkinsia* (?)  
*Eucinostomus californiensis* (1 large)  
*Monocanthus hispidus* (1 about 6")  
*Scarus* sp. several small striped ones

The *Pomacanthus* seem to be nesting. All in pairs (about 15 pairs seen). They patrol an area about some shell or rock hole about 4' in diameter. There is pursuit if any others encroach on such a territory. Other species were not seen to be bothered. This means that no nests are closer than 4' apart, most more 8 or 10' or over.

25                      Same fish was seen like a *Thalassoma*, bright yellow on the head and diagonally backward. Possibly an abnormal individual or a color phase unknown to me.

At the dock on Pirate's Nest were seen large school of *Jenkinsia* (?) early in the morning.

Later at Mr. Sands dock the *Abudefduf* that was seen on the 17th was noted to still be about.

Had lunch in Nassau and then went over to "Pirate's Nest" for final packing. Got everything on board and cast off 3:45 for Clifton. Saw only 2 Exocoetids (*Parexocoetus*?) Compare with the first trip - the same date one year ago. Slowed down to trolling speed and continued at that until Clifton was reached.

Dropped anchor at Clifton 5:45. Took 2 photos clouds and sunset over Golding Cay. The sea was calm and the sky partly overcast.

The party consists of Mr. D. Bacon, myself, Fred (the cook), Atheran Sevin (boatman) and Hibben (colored guide).

At sunset *Tylosurus (acus or raphidoma?)* about 3' long jumped about the boat. A dozen or so were evident and reacted as usual to a flash light but did not come close enough to identify. A single large *Neomaenis griseus* hung under the hull. The evening was spent discussing plans for the trip.

26                      Hibben told the following about the Filly-mingoes of Andros Island. They breed in Grassy Creek and molt in the wide opening and later leave for Cuba. First the males leave the young to molt. When they return the females leave and after they



return the entire family leaves for Cuba. The year before last he counted 2,300 nests.

There are 4 white people on Andros. Mr. & Mrs. Forsyth and 2 sponge traders at Nichols farm. There are only about a dozen of the Red Bay People left. They are now mostly spongers but still shoot their fishes with bow and arrow. Supposed to be mixed negro [SIC] and Seminole emigrants from Florida. All together there are about 5,000 people on Andros, all in towns along the East coast. Most are spongers but many have small gardens in back of their homes.

The clergyman seen last year is gone and the boy that was building a boat gave it up and is still there.

Turned in about 10<sup>00</sup>.

Jan 20

Turned out 6:30. Cast off 7:35. Made for High Cay. Sea fairly calm. Clear. Very few Exocoetids about. Not more than 10 seen in entire evening. *Cypselurus* (?) They flew poorly although a good flying breeze was blowing. Gulf weed common. Passed inside of High Cay 11:40. Trolled a little with no success. A few Exocoetids inside of reef, one very small and bright colored (5" long  $\pm$ ). May have been *Cypselurus furcatus*. Passed outside of reef at Bahring [BAHRING] Point on account of light conditions. Trolled here and lost a spoon - bitten off. *Barracuda*? Passed in again at Golding Cay. Here a fisherman had gone aground hard and others were trying to get him off.

27

Dropped anchor at the residency and went ashore. Engaged 10 boys and Bert (Mr. Forsyth's house boy) to catch lizards, frogs and snakes. Left the small game getter and some formalin intending to call back for them on the return. Mr. Forsyth was away on a trip. Some of the boys had the most unusual names. A small dock has been built, Mr. Forsyth's boat is being fixed up and a drainage ditch has been constructed. Altogether, things look pretty good here compared with last year at least.

Made off for South Bight and got well within it by 4:00. Saw an unusually large *Barracuda*. Hibben says one was caught here a little over 6', the largest he ever saw.

Saw a large *Ocyurus chrysurus* being jerked near the residency.

28

Got stuck in the marl just a little distance from our destination. As we had to wait for tide I went ashore on a little unnamed cay. It held little of interest. The shore was of aolean rock or marl, the latter being riddled with crab holes. Two species of fishes occupied the rock pools, 1 *Abudefduf saxatilis* ( $1/2'$ ) and about 50 very young *Cyprinodon bonaci* (?)  $1/4$  to  $3/8"$ . Some algae covered the rocks but as usual most things seemed choked with marl. Oysters (pearl oyster type) were common. Collected a few. No sign of lizards were to be seen but the lizard-egg-like pupae were on the few mangrove bushes.

Hibben says that *Epinephelus* (3 species) are spawning now, also *Barracuda*. That *Tarpon* presumably spawn in May and June and that young may be taken now in a number of fresh and salt ponds including some close to the residency.

Had dinner aboard (still in the marl) and were forced to wait for the tide.

Turned in about 10<sup>30</sup>.

Jan 21

Did not get out of the mud until about 4:00 a. m. with the aid of some nearby spongers. Anchored in the channel. Turned out 8<sup>00</sup> and went ahead to opposite the fresh water of south Andros.

Got off for the freshwater lake in South Andros (South Bight Lake on labels) at 10<sup>30</sup>. Mr. Bacon, Hibben and myself in the skiff. This is connected to the sea by the creek marked but only navigable for about a mile. A mile further walk brought us to water that could be seined in.

29

Hibben believes that it is also connected to the sea by Deep Creek and on the west by Muddy Point Creek as indicated on the route map (which see). On it is also indicated the general crescent form with the south pointed horns. This form is not to be taken too literally.

Physically the lake is very like Lake Forsyth. It is shallow, bottomed with soft marl and aeolean coral rock. The former tends to be mostly slightly firmer than that predominant at Forsyth. As the water freshens *Batophora* begins to appear and becomes part dominant by the time the water becomes strictly fresh.

30 The shores are for most part low and flat with a stand of stunted mangroves very similar to that of Lake Forsyth. This country has the similar "African veldt" appearance noted last year. Stands of pine well back from the water are poor, mostly dead and clearly hurricane wrecked. A single Analid was seen. Terrestrial snails are represented only by dead shells, and few of those. A single lone hermit was seen. A few dragonflies and their nymphs were noted. No *Physa* or other aquatic snails were seen.

Seining yielded:

*Strongylura notatus*

*Eucinostomus californiensis*

*Cyprinodon bonaci* (all small - the largest seen was caught)

*Gambusia* sp.

The fishes were few, all preserved. At no place seen did there appear to be any likely hoard of many fishes. Large and medium sized *Lutjanus griseus* were fairly numerous and seen about the mangrove roots. These may account for the comparative paucity of the other smaller forms.

The *Gambusia* may be *manni* but are larger than any hitherto seen and decidedly a steel blue. They also behaved differently, staying strictly to the surface and literally swimming into a dumped seine. The easiest fish to catch I ever saw. Tame as aquaria fish. This may be a new species. There was a surprising amount of variation among the live individuals, including the presence or absence of the eye bar and tail dots.

31 In the salt and brackish parts of the creek were seen a small Hawksbill turtle which displayed astounding speed, some medium sized *Lutjanus griseus*, many *Cyprinodon bonaci* all  $3/8$ " or less, mostly less, one *Tylosurus* sp. "skittering" (about 2 long), one *Ginglymostoma* (about 3 feet).

The soap characteristic of these fresh waters was here in every individual cove. Some was collected for analysis. Used as a lather it showed all the characteristics of soap suds including a slippery feeling and the removal of ordinary dirt.

This place has the dead and barren look of the Lake Forsyth region emphasized to a slightly greater degree.

Got back on board about 5<sup>00</sup> p. m. Hibben says that bonefish (*Albula volpes*) may be caught in this creek where they came to feed on crabs that are abundant with numerous holes all over.

Took a photo of the Lake where the seining was done.

Turned in 9<sup>30</sup> dead tired.

Jan 22 Turned out 6<sup>30</sup>. Got under way 7<sup>30</sup> for Grassy Creek. Arrived there about 2<sup>00</sup> p. m. Made our way up it a considerable distance to an anchorage. Took a row about the place. Along the shore there are very bright colored *Pomacentrus*. They act as though they had nests in rock holes but they are very small, not more than 2" long. Numerous active free swimming crabs are about. *Neomaenis griseus* of various sizes. In a small mangrove stands were *Eucinostomus* and *Tetraodon testudineus*. The latter about 2" long.

32

From the "Escape" anchorage were caught 2 *Calamus bajonado* and 1 *Haemulon sciurus*. *Echeneis naucrates* about 15" long were attached to the hull.

The bottom is covered with small corals.

After poking about a bit came aboard and took a nap.

Hibben went off fishing for bonefish (*Albula*). The shores here are well undercut and there is a constant lapping as the waves slap against them.

Hibben returned after dark with no fish. Several were caught, straightening out hooks. Fished from the stern of the Escape. One yellow shark *Scoeleodon?* hooked but got off. Many fishes leaping about the boat may be *Caranx* or *Tarpon* of a small size.

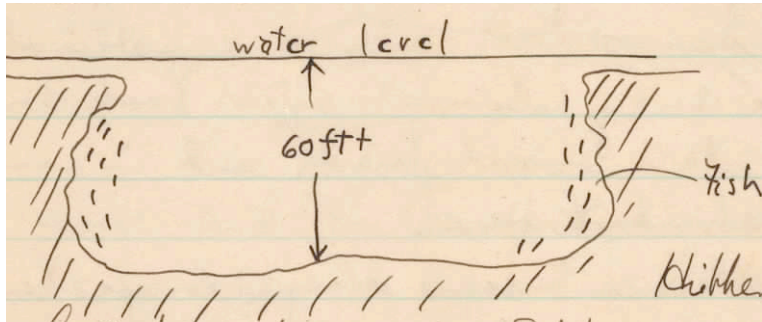
A few herons can be heard calling. Flash light shows nothing - no *Tylosurus*.

Spent the evening discussing plans. Turned in 10<sup>30</sup>.

Jan 23      Turned out 7<sup>30</sup> and took the dory to see a "Blue Hole" about 10 miles inland 33  
from the anchorage. Sailed most of the way. There is a complete reticulation of inland water ways here, most of which will just about pass the dory although in some places it was necessary to walk the boat.

Saw numerous *Albula vulpes* in water scarce deep enough to float them and one small shark of some kind, also small *Eucinostomus* and in puddles *Cyprinodon*.

The "Blue Hole" itself was a remarkable place well worth visiting. A sudden declivity forming an undercut bowl which contained a large number of fish. *Haemulon sciurus* and



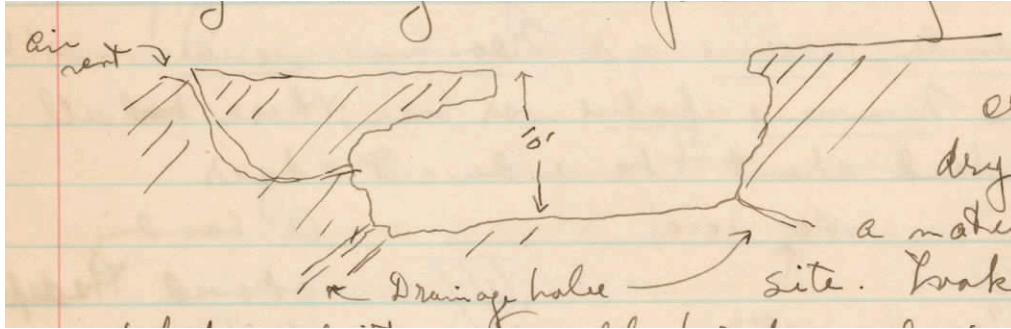
*Neomaenis griseus* mostly. One *Neomaenis apodus* was seen; these all harbored about the undercut edges. A sounding showed the depth to be in excess of 60'. Hibben says that last year he saw *Sphyraena* and *Epinephelus striatus* and *Mugil* here. Also sea turtles in large numbers. A baited hook caused all the fish to disappear under the shelving edge. Finally one *Haemulon* was caught.

On the way home there was much delay because of adverse wind and low water. 34  
An *Albula* of about 3' was caught ♀ with roe.

Got back to the Escape after dark about 7<sup>30</sup> very tired from dragging the skiff over the marl flats.

Turned in 10<sup>30</sup>.

Jan 24      Turned out 6<sup>30</sup>. Took a tramp ashore near the anchorage. This is the most different type of country from the generalized Andros landscape yet seen, it being covered with a dense almost jungle like stand and is pitted with immense holes large enough to camp in; one especially being inviting. It is formed as follows. It is dry and formed a natural camp site. Took some photos of it. Small birds and insects are relatively abundant here.



A fisherman came alongside yesterday when we were away and caught margate fish *Haemulon album* and *Ocyurus chrysurus* at the anchorage.

35 Dropped down to the mouth of Grassy Creek and fished. Caught some *Hemirhamphus brasiliensis*. The following fishes were seen. *Sphyraena* about 4' *Ginglymostoma* about 3', *Epinephelus striatus* in a hole under the "Escape", schools of *Haemulon* sp. *Scarus* sp. (blue).

After lunch Mr. Bacon went fishing on the reef and I examined the shore. A very pretty tide pool about 10' across was photographed. It contained principally the typical tide pool fishes. Poisoned it and collected the entire population (see collection for species).

Tramped about the place a bit and saw the usual dearth of life. A few lizards and little else. Returned to the vessel about 5<sup>00</sup> after having a short swim. The tide pool examined seems to be the only one worth bothering with within a days working range.

The fishes caught on the reef were *Lutjanus analis*, *Balistes vetula*, *Haemulon album*, *Calamus bajonado*.

The party returned shortly before dark and the anchorage was shifted slightly to safeguard against a possibly uncomfortable night.

Turned in 10<sup>00</sup>.

36 Jan 25 Turned out 6<sup>30</sup>. Made off for Deep Creek at day break. Got there 10<sup>00</sup>. There is an interesting settlement there that we visited and photographed. A colored Baptist minister is also head man, runs the town is constable and the story has it is a gay dog.

James A. Lundy

Deep Creek, Andros.

An *Echeneis* hung on the dory all day.

Went up Deep Creek as far as Rolls and the other settlement but not as far as Black Point, a third.

Sailed in the dory around the point and had a swim. A beautiful clean beach is here, better than any so far seen on Andros. Saw a *Lactophrys bicaudalis* there. This is not as "fishy" a place as Grassy Creek but interesting from a human standpoint.

Turned in 9<sup>30</sup>.

37 Jan 26 Turned out 7<sup>30</sup>. Seined in an inlet opposite Deep Creek settlement. Got a good sample of some tarpon-like herring.

Made for Mangrove Cay. Got there 10<sup>30</sup>. Went ashore and seined a small land-locked pool and got small *Tarpon atlanticus*. The pool was dirty in extreme the water being a brick red. It was filled in the 1926 hurricane and is now half fresh. It is bottomed by soft mud and is filled with dead button wood. Seining was particularly difficult. If these fish actually came in 1926 they are remarkably

stunted. Hibben says some nearly 3' have been taken out of here. It is surprising that Tarpon can even live in there. The natives supposed they have bred there but such seems unlikely. The pool is about 2,000' x 1000' and has been ditched to the sea this year. The only life in the place in addition to the Tarpon were some small crabs.

Went aboard for lunch. The lizards came aboard as follows.

|                     |    |        |                  |     |          |
|---------------------|----|--------|------------------|-----|----------|
| Herman Rolle        | 34 |        | Sydney Avery     | 10  |          |
| Donald King         | 4  |        | Rusdine Rolle    | 48  |          |
| Gentry Hepburn      | 36 |        | Stafford Nairn   | 10  |          |
| Edney Green         | 50 |        | Earline Strachan | 22  |          |
| Lee Simms           | 56 | 1 frog | Arthur Nairn     | 19  |          |
| Rudolph Storr       | 5  |        | Wilfred Barr     | 39  | 1 snake  |
| Jeffrey Evans       | 31 |        | Percy Hepburn    |     | 3 snakes |
| Bertram Rolle       | 32 |        | Samuel Rolle     | 48  |          |
| Prince A. Straehan  | 52 |        | Arthur Clarke    | 15  |          |
| Michael Flowers     | 52 | 1 frog | Johan Bastain    | 10  |          |
| Dudley Miller       | 40 |        | Cleveland Gaiter | 7   |          |
| Moses Helburn       | 42 |        | Aubrick Roy      | 6   |          |
| Christopher Swating | 37 |        | Zacharias Rolle  | 23  |          |
| Harold Straechon    | 33 |        | Leuter Haley     | 30  |          |
| Jerome Rawley       | 56 |        |                  |     |          |
| Muriel Finlayson    | 28 | 1 frog | Total            | 882 |          |

For this collection which counting the broken specimens not counted above an 38 even 5 pounds was paid. One penny a piece for most of the Analids and as high as a shilling for a large "chicken" snake. All the material was gathered on Mangrove Cay. No "curly tailed" lizards are in the collection, these being rare in the locality covered. They are said to frequent the Bight shores more than the ocean front.

Arrangements were made for further collecting with the two following for both curly tailed *Leiocephalus* and smaller *Tarpon* than obtained this trip.

Settled up and made off for Behring [BAHRING] Point. All the details planned for the trip have been finished successfully.

Barton F. Borne

Jackson Hepburn

Mangrove Cay, Andros Island, Bahamas

Dropped anchor at Behring [BAHRING] Point anchorage at 6:10.

Turned in 10<sup>30</sup>.

Jan 27 Turned out 7<sup>00</sup>. Made off for High Cay after repacking lizards and snakes. A nice morning until we got about half way across the Tongue of the Ocean. Then it 39 began to blow from the north west and we came rolling in under a heavy sea. Reached Nassau about 300 p. m.

Very few Exocoetids were seen on the way over, about as in the outward trip and apparently all were *Cypselurus* (*heterurus*?).

Made directly for Mr. Sands dock and got mail, etc. The wind is continuing high and we may have a storm.

All told the trip was a huge success. In the tank are the following collections.

Fishes.

A sample from South Bight Lake

*Hemirhamphus* from Grassy Creek

Herrings from Deep Creek

*Tarpon* from Mangrove Cay

Amphibians

Frogs from Mangrove Cay  
Reptiles  
*Anolis*, *Leiocephalus*, etc., from Mangrove Cay.  
Snakes

(Chicken snake - large) from Mangrove Cay  
(Thunder snake - 2) from Mangrove Cay

In addition to the material are numerous photographs, notes and arrangements to get natives to catch more material as needed.

Plans are now laid for further collecting in the vicinity of Nassau on day trips.

40 The wind freshed considerably and by the time we reached "Pirate's Nest" it was blowing at least 35 and from a mean quarter for the Cay. We got ashore as best we could with only essential supplies and a good drenching just before the sun went down.

Spent the rest of the day cleaning up and looking after necessities.

Turned in 10<sup>30</sup> with a high wind and heavy sea.

Jan 28 Turned out 8<sup>00</sup>. Storm bound, not even able to get to the "Escape". Took a tramp about the island. Very little to be seen, everything having taken cover and as the tide was high and pounding the tide pools could not be worked.

Had lunch and went on another tramp on the falling tide, the weather though is too wild to expect much activity. In the pools on the west end of the Cay were seen numerous *Gobius soporator* of about 4" and others more numerous of about 1 1/2". Is this a measure of the time of spawning? Saw the brown marked *Pomacanthus* collected on Andros at Grassy Creek and a young dog snapper or school master. No *Abudefduf* about at all. The place is peculiarly clean of shells and other debris although new Gulf weed is being draped by the receding waters.

41 Practically no lizards are to be seen at all and the storm rages on.  
In the evening the sea and winds quieted down slightly.  
Turned in 10<sup>30</sup>.

Jan 29 Turned out 7<sup>30</sup>. The weather is much better and the sea calmer. Went to Nassau and picked up Mr. Sands and made off for Rose Island. Took a bit of a tramp there and had an exceptionally pleasant swim.

Few fishes were seen - *Kyphosus sectatrix*, *Iridio* sp., *Scarus* sp., *Hepsetia*, *Abudefduf*.

Got back about at dusk after spending a pleasant restful Sunday.

Turned in 10<sup>30</sup>.

Jan 30 Turned out 8<sup>00</sup>. Went to Nassau for the day. At Mr. Sands dock were seen *Caranx ruber* and numerous *Hepsetia* together with other small fishes some of which were Scombrids such as young *Auxis*? and *Sarda*?

There is a heavy roll on the bar. Took a view of Nassau from the Water Tower.

Got back to the cay in the P. M. and explored the west end for shells, etc. The place is still swept clean of debris. The only fishes seen were numerous *Gobius soporator* in the rock holes. Much Gulf weed is being cast up by the heavy surf. There is little that can be done here under such conditions.

42 Wrote a letter in the evening and turned in about 10<sup>30</sup>.

Jan 31 Turned out 7<sup>30</sup>. The sea is still running a heavy swell. Spent the A. M. packing up the stuff in a preliminary fashion. Had a good swim.

The water is too rough to do anything here and the beaches are swept clean. There is a lot of sargasso, mostly old beached stuff that is adrift but it contains no fish life.

Examined the tide pools at low water. Still clear of debris - only a few shells found. Engaged in a little rifle practice in the P. M. Mr. Bacon speared a *Dasyatis* off the dock but it got away. Saw *Gobius soporator* only in the tide pool.

Sand flies have put in their appearance.

Turned in 10<sup>30</sup>.

Feb 1 Turned out 7<sup>30</sup>. Mrs. Bacon arrived in the A. M. Went to town in the P. M. Spent the day and evening socially. Turned in 11<sup>00</sup>.

Feb 2 Turned out 8<sup>00</sup>. Went to Nassau and booked passage to Miami for tomorrow via United Air Ways. Took a swim in the P. M. and packed.

Turned in 11<sup>30</sup>.

43

Feb 3 Turned out 8<sup>00</sup>. Finished packing and went to Nassau. Saw a *Eques acuminatus* at Mr. Sand's dock. Had lunch with Mr. and Mrs. Bacon. Got aboard the seaplane at 2<sup>30</sup> and there met Roger Harris.

Arrived Miami 4<sup>30</sup>. Got a good view of Andros Island. It is worse than desolate from the air and the western most bank shows up excellently from the air, sponge beds being quite visible.

Got the 10<sup>00</sup> train for Jacksonville where I hope to connect with a plane in the A. M. (no reservations open at Miami).

Turned in 11<sup>30</sup>.

Feb 4 Turned out 6<sup>30</sup>. Got off at Jacksonville but the rain and low clouds and generally thick weather induced me to buy a R. R. ticket to N. Y. instead of an air. Got the 7<sup>50</sup> out of Jacksonville for N. Y.

44



# Calendar-1938

## January

| Sun   | Mon   | Tue | Wed | Thu | Fri | Sat                                                                                 |
|-------|-------|-----|-----|-----|-----|-------------------------------------------------------------------------------------|
|       |       |     |     |     |     | 1  |
| 2     | 3     | 4   | 5   | 6   | 7   | 8                                                                                   |
| 9     | 10    | 11  | 12  | 13  | 14  | 15                                                                                  |
| 16    | 17    | 18  | 19  | 20  | 21  | 22                                                                                  |
| 23/30 | 24/31 | 25  | 26  | 27  | 28  | 29                                                                                  |

## February

| Sun | Mon                                                                                  | Tue | Wed | Thu | Fri                                                                                  | Sat |
|-----|--------------------------------------------------------------------------------------|-----|-----|-----|--------------------------------------------------------------------------------------|-----|
|     |                                                                                      | 1   | 2   | 3   | 4                                                                                    | 5   |
| 6   | 7                                                                                    | 8   | 9   | 10  | 11  | 12  |
| 13  | 14                                                                                   | 15  | 16  | 17  | 18                                                                                   | 19  |
| 20  | 21  | 22  | 23  | 24  | 25                                                                                   | 26  |
| 27  | 28                                                                                   |     |     |     |                                                                                      |     |

## March

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|
|     |     | 1   | 2   | 3   | 4   | 5   |
| 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| 13  | 14  | 15  | 16  | 17  | 18  | 19  |
| 20  | 21  | 22  | 23  | 24  | 25  | 26  |
| 27  | 28  | 29  | 30  | 31  |     |     |

## April

| Sun                                                                                  | Mon | Tue | Wed | Thu | Fri | Sat |
|--------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|
|                                                                                      |     |     |     |     | 1   | 2   |
| 3                                                                                    | 4   | 5   | 6   | 7   | 8   | 9   |
| 10                                                                                   | 11  | 12  | 13  | 14  | 15  | 16  |
|  17 | 18  | 19  | 20  | 21  | 22  | 23  |
| 24                                                                                   | 25  | 26  | 27  | 28  | 29  | 30  |

## May

| Sun                                                                                  | Mon | Tue | Wed | Thu | Fri | Sat |
|--------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|
| 1                                                                                    | 2   | 3   | 4   | 5   | 6   | 7   |
| 8                                                                                    | 9   | 10  | 11  | 12  | 13  | 14  |
| 15                                                                                   | 16  | 17  | 18  | 19  | 20  | 21  |
| 22                                                                                   | 23  | 24  | 25  | 26  | 27  | 28  |
| 29  | 30  | 31  |     |     |     |     |

## June

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|
|     |     |     | 1   | 2   | 3   | 4   |
| 5   | 6   | 7   | 8   | 9   | 10  | 11  |
| 12  | 13  | 14  | 15  | 16  | 17  | 18  |
| 19  | 20  | 21  | 22  | 23  | 24  | 25  |
| 26  | 27  | 28  | 29  | 30  |     |     |

## July

| Sun                                                                                   | Mon | Tue | Wed | Thu | Fri | Sat |
|---------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|
|                                                                                       |     |     |     |     | 1   | 2   |
| 3  | 4   | 5   | 6   | 7   | 8   | 9   |
| 10                                                                                    | 11  | 12  | 13  | 14  | 15  | 16  |
| 17                                                                                    | 18  | 19  | 20  | 21  | 22  | 23  |
| 24/31                                                                                 | 25  | 26  | 27  | 28  | 29  | 30  |

## August

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|
|     |     | 1   | 2   | 3   | 4   | 5   |
| 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| 13  | 14  | 15  | 16  | 17  | 18  | 19  |
| 20  | 21  | 22  | 23  | 24  | 25  | 26  |
| 27  | 28  | 29  | 30  | 31  |     |     |

## September

| Sun | Mon                                                                                     | Tue | Wed | Thu | Fri | Sat |
|-----|-----------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|
|     |                                                                                         |     |     |     | 1   | 2   |
| 3   | 4  | 5   | 6   | 7   | 8   | 9   |
| 10  | 11                                                                                      | 12  | 13  | 14  | 15  | 16  |
| 17  | 18                                                                                      | 19  | 20  | 21  | 22  | 23  |
| 24  | 25                                                                                      | 26  | 27  | 28  | 29  | 30  |

## October

| Sun   | Mon   | Tue | Wed                                                                                    | Thu | Fri | Sat |
|-------|-------|-----|----------------------------------------------------------------------------------------|-----|-----|-----|
|       |       |     |                                                                                        |     | 1   |     |
| 2     | 3     | 4   | 5   | 6   | 7   | 8   |
| 9     | 10    | 11  | 12  | 13  | 14  | 15  |
| 16    | 17    | 18  | 19                                                                                     | 20  | 21  | 22  |
| 23/30 | 24/31 | 25  | 26                                                                                     | 27  | 28  | 29  |

## November

| Sun | Mon | Tue | Wed | Thu                                                                                    | Fri | Sat |
|-----|-----|-----|-----|----------------------------------------------------------------------------------------|-----|-----|
|     |     | 1   | 2   | 3                                                                                      | 4   | 5   |
| 6   | 7   | 8   | 9   | 10  | 11  | 12  |
| 13  | 14  | 15  | 16  | 17                                                                                     | 18  | 19  |
| 20  | 21  | 22  | 23  | 24  | 25  | 26  |
| 27  | 28  | 29  | 30  |                                                                                        |     |     |

## December

| Sun | Mon | Tue                                                                                      | Wed | Thu | Fri | Sat |
|-----|-----|------------------------------------------------------------------------------------------|-----|-----|-----|-----|
|     |     |                                                                                          |     |     | 1   | 2   |
| 3   | 4   | 5                                                                                        | 6   | 7   | 8   | 9   |
| 10  | 11  | 12                                                                                       | 13  | 14  | 15  | 16  |
| 17  | 18  | 19                                                                                       | 20  | 21  | 22  | 23  |
| 24  | 25  | 26  | 27  | 28  | 29  | 30  |
| 31  |     |                                                                                          |     |     |     |     |



Florida - N. Y. Z. S.  
1938

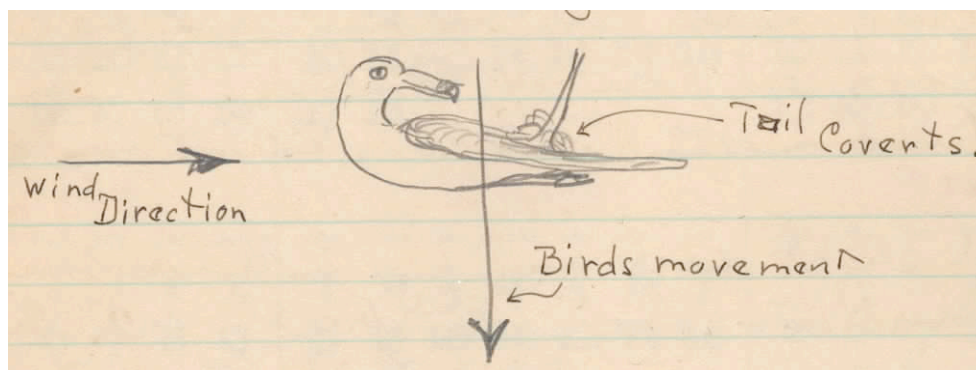
Feb 1 Cast off pier 34 on board S. S. Seminole 12<sup>00</sup> noon. With Ethel. Hartshorn came 45  
to see us off. Weather clear and crisp. Sea calm - exceptionally so for this time of  
year. Adult herring gulls following (only) after leaving Ambrose light ship.  
Turned in 10<sup>00</sup>. Still calm and not very cool.

Feb 2 A slight swell running. Gulls very numerous. Passed into blue water abruptly  
10<sup>15</sup>. No weed to be seen. A school of a dozen *Tursiops* came along side about noon.  
No Exocoetids. Spent most of A. M. photographing the gulls. Spent most of  
yesterday laying plans for a new aquarium.

Got some movies of porpoises in the P. M. and some still shots of gulls.  
Overcast and some light rains in the P. M.

The gulls can scratch the underside of their necks while soaring without any  
particular disturbance of their equilibrium. Turning the head to right or left, which  
they continuously do causes them to drift to the same side (because of changed wind  
pressure).

One did a most peculiar act; it raised its head up and looked back over its  
shoulder. This act caused a considerable disturbance of equilibrium, so that it  
dropped vertically not very fast, but very uniformly that the old proper forms 46  
folded to fall straight. The tail feathers bent up and the tail coverts all fluffed out  
by the air currents being at right angles to their normal direction, somewhat as in  
the following sketch.



Worked on aquarium plans in the evening.  
Turned in 10<sup>30</sup>.

Feb 3 Arrived Charleston in the early A. M. Got ashore 8<sup>00</sup>. Walked around town and  
visited Burton at the Charleston Museum. Spent the morning discussing things with  
him and his curators. He had some very large *Pterophryne* and *Histrion* - nearly 12"  
long. These may be gotten at Charleston at certain seasons. A Miss Susan Norris  
has been successful in keeping them in aquaria and might be induced to ship some to  
New York. Write him about it later.

He drove us about town and gave us lunch. Got aboard the Seminole at 200 P. M.  
Cast off 3<sup>30</sup> for Jacksonville. Many gulls following.  
Turned in 11<sup>00</sup>. 47

Feb 4 Arrived Jacksonville before daybreak. Drove south to Marine Studios at 8<sup>00</sup>.  
Inspected the place, still in the process of construction with Douglas Burden, Iliia

Tolstoy, Ralph Poal and Charles McBride. It is a huge undertaking and represents a great outlay. *Gambusia*, leopard frogs and tadpoles are in one of the small standing pools of brackish water.

Drove on south to Titusville and put up at the Bay View Hotel. On the way passed through much Spanish moss (live oaks), orange groves in fruit. A violent fire raged in some scrub palmetto. Saw many mockingbirds and the first pelican. Gulls feed from visitors hands at Daytona like pigeons in a park.

Very sick with an attack of malaria?

Feb 5           Headed south reaching Ft. Lauderdale. Out up at Hotel Brevard - still sick - in bed by 3<sup>00</sup> P. M. Visited the Parine's who have a road stand here.

Feb 6           Feel a little better. Arrived Miami about 10<sup>00</sup> A. M. Put up at the Venetian Hotel. Davidson and his boat are off on a short cruise. Took a drive through Miami Beach in the afternoon and then walked about town. In the evening took a swim.

48           Purple grackles are thick in Boulevard Park.  
Turned in 12<sup>00</sup>.

Feb 7           Found the Davidson's on their "Miss Nancy". They want to collect material for the aquaria. Send them a "Marine Fishes". Did a little shopping in the A. M.

Called on Mr. Surman at the North Miami Zoo. He has a good place and the Galapagos tortoises are in excellent condition. He is concerned about their future. (Photo for xxx). [NOT FOUND IN DIARY]

Gave dinner to the Davidsons in the evening and discussed methods.  
Turned in 12<sup>00</sup>.

Feb 8           Turned out 7<sup>00</sup>. Visited with the Davidsons. They took us up the Miami River to fresh water. There is a considerable amount of water hyacinth there. He can supply:

Water hyacinth  
Coral pieces  
Starfish  
Octopus  
Conchs

Later we put along the water front. It was rough and windy with occasional squalls. Anchored in the lee of a small island for lunch. Pelicans are about but not numerous. Got a bit of sun.

Back to the hotel by 5<sup>00</sup>.  
Rain in the evening.  
Turned in 11<sup>00</sup>.

49

Feb 9           Turned out 7<sup>00</sup>.  
Started for Key West 8<sup>30</sup>.  
Made ferry in plenty of time - saw a few *Abudefduf saxatilis* about dock.  
Sparrow hawks abundant all along way.  
Arrived Key West and put up at La Concha Hotel about 5<sup>00</sup>. The town is much improved. Spent the evening looking it over.  
Turned in 11<sup>00</sup>.

Feb 10          Turned out 6<sup>30</sup>.  
Made boat for Havana.  
Saw flying fish, porpoises and man of war birds, also *Physalia*. Sea fairly rough. Made port at 3<sup>30</sup>.

Put up at Hotel Packard - penthouse apt. In the evening looked over town in one of the conventional tours.

Turned in 2<sup>30</sup>.

Feb 11 Turned out 8<sup>30</sup>.  
Made contacts with the State Dept. and University.  
Spent the evening with the following  
Dr. Pedro M. Chacon 50  
Box 2355  
Havana, Cuba  
and his daughter

He has elaborate plans for a public aquarium for Havana. The general scheme is not unlike that of that Shedd Aquarium. It is to be located along the Malecon somewhat west of the Maine Monument. He should have literature on fishes, etc.

Turned in 11<sup>00</sup>.

Feb 12 Turned out 8<sup>00</sup>.  
Met Dr. Chacon in the A. M. and visited the University of Havana. There we met Dr. Arayon, a colleague of Dr. Rivero.  
From thence we went to the Mayonato Aquarium. Send them literature. One of the sisters is established in Miami. 815 N. W. 22nd Ave. (Miss Alicia Mayonato).  
In the afternoon visited Dr. Carlos de la Torre. He is still vigorous. Has a large collection of colored plates of fishes and shells to publish. Send literature.  
Walked about Havana in the evening. A fiesta is in progress.  
Turned in 12<sup>00</sup>.

Feb. 13 Loafed around in the A. M. and visited the botanical garden. 51  
Spent most of the P. M. resting.  
In the evening drove around with the David Mosnata viewing the fiesta. Later went to the theater "The Shanghi".  
Turned in about 1<sup>00</sup>.

Feb 14 Walked around in the A. M. and did some shopping.  
In the P. M. went to the yacht club with Mr. Durland and Miss Isabell Mosnata.  
In the evening visited a rhumba palace with latter. Turned in about 1<sup>00</sup>.

Feb 15 Boarded the S. S. Cuba for Key West. sailing time 9<sup>00</sup>. The two Miss Mosnatas and Dr. Chacon came to see us off. Ethel got seasick. Arrived Key West 3<sup>30</sup>.

Archie Durland  
Emelia Mosnata  
Isabell Mosnata  
854 Linea St.  
Vedado, Cuba

Señor Laredo Brue  
Presidente de la Republica  
de Cuba  
(write for Mosnatas)

David Mosnata  
22 Consulado St.  
Havana, Cuba

Mr. Archibald Durland  
Jefe de Ferias y Exposiciones  
Secretaria de Agricultura  
Havana, Cuba

Mr. Durland relates that the government is trying to raise fish in tanks 50 x 20 52 x 10' deep - carp, bass, sunfish. There are from six to ten of these monstrosities. Find out from B of F.

Turned in 11<sup>00</sup>.

- Feb 16 Visited the Key West Aquarium yesterday P. M. They have 2 large octopus and a number of very big sea anemones - but all lack color. There is a considerable volunteer growth of small long-thin armed specimens and some tube worms. There are several *Cassiopea*, some small tarpon and a bonnet shark *Sphyrna tiburo*. This fish avoids obstacles very well, unlike the hammerhead. The rest of the display is conventional stuff.  
Turned out 7<sup>00</sup> and spent the A. M. [with] E. L. Pierce. We visited a very nice aviary at the Key West Lighthouse. They are raising white crowned doves there and have a considerable number. (Send paper on Andros Island.)  
Had lunch with the Pierces and left Key West for the 3<sup>00</sup> P. M. ferry.  
Reached Homestead after dark and put up at the Seminole Hotel.  
Turned in 10<sup>20</sup>.
- 53 Feb 17 Turned out 7<sup>00</sup> and took the Tamiami Trail for the west coast.  
There is an abundance of water bird life along the ditches and short-nosed gars are incredibly numerous.  
Arrived 3<sup>00</sup> at the Bass lab. Mr. Bass is away but Springer is in charge. Spent the rest of the day getting settled.
- Feb 18 Spent the morning on the beach. Went to Placida in the P. M. to make arrangements for the use of a boat to get to Palmetto Key (locally known as Cabbage Key). Dr. Baughman and Dr. Vischer are working here at the lab.  
Turned in 11<sup>00</sup>.
- Feb 19 Turned out 7<sup>30</sup>.  
Went to Placida with Ethel and Dr. Baughman. Hired launch and went to Rinehart's Island. It is a grand place. Saw *Ogonephalus* and *Strongylura notata* dead in beach.  
Next visited Mr. and Mrs. Coggeshall's island a short distance away. Also a nice place.  
Stopped at Boca Grande for lunch.  
In the evening tried to do some jack lighting from the bridge towards Englewood. saw only 2 *Hemiramphus* (*Hyporhamphus*?) and 1 bonnet shark.  
Turned in 11<sup>00</sup>.
- 54 Feb 20 Rested in the A. M.  
Drove to Salt Spring in the P. M. This place is full of *Gambusia*. It has some sort of underground outlet and alternately becomes clear and turbid. Many *Gambusia* with black mottling.
- Feb 21 Went to Myakka State Park. Seined in the Myakka River. Got  
*Amia* 20  
*Lepisosteus platystomus* (many)  
*Ictalurus punctatus* (3'± about 14)  
*Ameiurus nebulosus* (numerous)  
*Lepomis pallidus* (many) - These are pre foulish [?] and seem very deep bodied not like N. J. species.  
*Lepomis auratus* (many)  
*Pomotis microlophus* (many)  
*Abramis crysoleucas* [?] (some)  
*Dorosoma cepedianum* (1)  
*Gambusia* (abundant)  
Sucker (sp.?) - like *Erimyzon*?

This place is remarkable with a "paleozoic" aspect. Should be good to camp in late spring (April to May) for the study of fish reproduction. Later mosquitoes are undoubtedly bad.

Both Dr. Baughman's and Vischer's family were along.

- Feb 22            Rested in the A. M. Spent the P. M. about the lab. A large sea turtle was brought in - slaty gray which I think was *Caretta kempfi*. This is to be checked by the lab. 55  
Spent considerable time discussing shark and similar problems with Springer.  
Bid adieu and turned in 11<sup>00</sup>.
- Feb 23            Started out for north about 10<sup>30</sup> A. M. Made a detour to St. Cloud to visit some of Ethel's relations. They were not at home. Put up at the Hotel DeLand at DeLand at 5<sup>30</sup>. as soon as passing about Orlando skies darkened and some rain fell.
- Feb 24            Turned out 8<sup>00</sup>.  
Arrived Marine Studios 11<sup>30</sup>. They have a *Carcharias (commersonii?)* that just gave birth to its young. A harbor porpoise was brought in while we were there. It has a peculiar plaintive whistle like rubber being rubbed on damp glass made while under water. (A lonesome call?) Took photos of these creatures and the place.  
Made Jacksonville by 7<sup>00</sup> and put up at Haven Hotel.  
Send MacBride papers.
- Feb 25            Set out 9<sup>00</sup>. Arrived Columbia, S. C. about 5<sup>00</sup>. Put up at a tourist hotel. 56
- Feb 26            Set out 8<sup>15</sup>. Arrived Washington, D. C. 7<sup>00</sup>. Put up at Hotel Washington.  
Encountered snow between Columbia and Richmond. Cloudy most of the way.
- Feb 27            Had lunch with Orsinger and talked with Dr. Mann.
- Feb 28            Visited with Shulty in the A. M. with Hildebrand. Looked over the Wash. Gov. with Mann in the P. M.  
Theater in the evening.
- Mar 1            Visited with Eisenberg [?] and Hildebrand in the A. M. Drove to Philadelphia in the P. M. and put up with the Chutes [?].
- Mar 2            Visited the Fairmont Park Aquarium in the P. M.
- Mar 3            Ester (Allen) stopped in the A. M. Left for home 2<sup>00</sup>. Arrived about 5<sup>00</sup>.

Finis



# North Carolina - Florida 1938

- June 21 Left N. Y. on B & O at 2:35. Picked up Jackson, Nesbit, Higgins, Feidler and Leach at Washington. 57
- June 22 Arrived Asheville, N. C., at 9<sup>00</sup> A. M. Registered at Battery Park Hotel for American Fish Soc. Meeting.  
Last night worked out the following with Nesbit. If the short wave exp. came out influencing the movements of fishes we plan to treat some known homing weak fish at Montauk Pt. this fall.  
Left for a visit to Mt. Mitchell and the Pisgah Preserve. Stopped at the Mt. Mitchell game farm and fish station. Was with Dr Gutsell, Jorg Fearnau and Mrs. Chas. Hayford - driven by an interested native - Mr. Fanning. Took some photos of the typical N. C. mountain scenery.  
Banquet in the evening.  
Dr. Linder, working in shrimp at New Orleans, wants to cooperate on the use of the "Anton Dorhn" if obtained. Turned in 2<sup>30</sup>.
- June 23 Turned out 9<sup>00</sup>. Attended meetings of the A. F. S. all day and in the evening. Turned in 12<sup>00</sup>.
- June 24 Left Asheville by bus at 6:45. Arrived at Jacksonville, Fla., 9<sup>00</sup> P. M. Raining. 58
- June 25 Left Jacksonville 9<sup>00</sup>. Arrived Venice 5:50. Bass Lab came for us. Got settled. In the evening went to a dance at Chadwick (now Punta Gorda beach).
- June 26 A *Tarpon* caught nearby by an angler measured 50<sup>1</sup>/<sub>2</sub>" s. l. 59<sup>1</sup>/<sub>2</sub>" t. l. A nearly ripe ♀, stomach empty. Saved scales for study and studied fish for possible placement of tags. Bishop has not shown up as yet.
- June 27 Got Orlando Coleman to take us to Palmetto Key. Put up in temporary quarters in a little guest house.  
A little angling off the island with live fish for bait.  
*Eucinostomus*  
*Opisthonema*  
*Sardinella*  
Caught.  
*Galeichthys gilberti* (very common) ♀'s with ridges on ventrals. Reported to be carrying eggs at this season.  
*Felichthys marinus* (one spine)  
*Bairdiella chrysoura* (one)  
*Cynoscion nebulosus* (one)  
*Elops saurus* (one) 59  
Saw many *Scomberomorus maculatus* leaping but they would not bite. Sharks and sting rays about.  
On the way over numerous porpoises were playing.  
Unpacked our stuff and got to bed by 10<sup>00</sup>.
- June 28 Seined in a rail road ditch about 2 miles north of Boca Grande. It was well filled with *Tarpon* 18" long. The net we used was too light to hold them. Only one was caught - 75 cm to fork of tail. Given U. S. B of F no 15000 - button tag through the

operculum. Other fish taken in the seine were *Pogonias chromis* (1) 2'; *Eucinostomus* sp.? (1) very deep in body, about 12"; *Lagodon rhomboides* (2) 10"; many *Gambusia* and *Mollienesia* (?) about.

Tried some trolling off Palmetto Key in the evening with no luck. Conditions very unlike last night. Wind blowing.

Turned in 10<sup>00</sup>.

June 29      Spent the A. M. at Palmetto Key. Examined the alligator pond and the new empty pool. The latter is more full of larval mosquitoes than any place I ever saw before.  
60      A snow-white owl was seen - the full adult of the Florida Barred Owl.  
In the evening went to Bokeelia [BOKELLIA] and picked up Marshall and Elizabeth Bishop. Spent the rest of the day getting established.  
Turned in 11<sup>00</sup>.

Jan 30      In the A. M. went to the railroad ditch. Seined two tarpon and tagged them. Took movies of the operations. These were also taken. *Pogonias chromis* (1) 18", *Scianops ocellatus* (1) 15". *Lagodon rhomboides* (5) 10", *Eucinostomus* (1) 12", *Centropomus* (1) 10" (preserved). Besides *Gambusia* and *Mollienesia* there were seen *Cyprinodon*. Males in good color.  
Spent the P. M. in the island.

July 1      Spent the A. M. making arrangements for Bishop's work. He carried on some collecting on the beach. Came to Boca Grande to get the 6:05 P. M. for Tampa. Nesbitt left to go to Charleston there. Got the 11<sup>55</sup> for New York.

July 2      En route to New York on Seaboard cruiseline.

July 3      Arrived New York 9:05 A. M. E. S. T.



California - Ohio  
1938

|         |                                                                                                                                                                                                                                                                                                        |    |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| July 12 | Left N. Y. 3:40 P. M. E. S. T. on board "The General" with Ethel.                                                                                                                                                                                                                                      | 61 |
| July 13 | Chicago - changed to Union Pacific.                                                                                                                                                                                                                                                                    |    |
| July 14 | Crossed divide.                                                                                                                                                                                                                                                                                        |    |
| July 15 | Arrived Berkeley 8:31 P. M.<br>Put up at the Hotel Durant.                                                                                                                                                                                                                                             |    |
| July 16 | Went to San Francisco with the Rudders.<br>Had lunch at the Seal Rocks. Visited Golden Gate Park. In the Japanese gardens are a large number of some species of stickleback.                                                                                                                           |    |
| July 17 | Went to Alameda Airport and flew over the city and harbor. Spent the rest of the day driving around Berkeley and Oakland.                                                                                                                                                                              |    |
| July 18 | Went to Muir Woods with Jen Rudder.                                                                                                                                                                                                                                                                    |    |
| July 19 | A. S. I. H. meeting - Chairman Nominating Committee.<br>Board of Governors meeting in the evening.<br>Offered use of Atz for indexing ichthyological part of Copeia.                                                                                                                                   |    |
| July 20 | Meetings - Slate elected. Confirms with Sette. Interested in population studies - Margaret Story to cooperate with Palmetto Key Station.                                                                                                                                                               |    |
| July 21 | Meetings. Annual dinner.                                                                                                                                                                                                                                                                               |    |
| July 22 | Meetings at Palo Alto - Movies at Berkeley.                                                                                                                                                                                                                                                            |    |
| July 23 | Steinhart Aquarium R. Lanier - McFarlane moved to Hotel President in late P. M. Palo Alto.<br>Spent evening with Myers.                                                                                                                                                                                | 62 |
| July 24 | Spent day with Myers and drove around Palo Alto.                                                                                                                                                                                                                                                       |    |
| July 25 | Drove to Pacific Grove with George Myers, Margaret Story, etc. Visited station and spent night with Rolf Bolin.                                                                                                                                                                                        |    |
| July 26 | Went dredging with Rolf Bolin and his class in marine ecology in the early morning. Visited with Dr. Fisher Director of the Hopkins Marine Station.<br>Visited the Pacific Grove Museum.<br>Drove back to Palo Alto via Santa Cruz.<br>Visited with Lionel Wolford and spent the night with the Myers. |    |
| July 27 | Took train to San Francisco and visited with the Roddans. Took 9 <sup>00</sup> P. M. train for Los Angeles.                                                                                                                                                                                            |    |
| July 28 | Arrived Los Angeles 9 <sup>00</sup> A. M. Wandered about town and took 1 <sup>00</sup> train for San Diego. Arrived 3 <sup>30</sup> and put up at Hotel Plaza.                                                                                                                                         |    |

- July 29 Visited San Diego Zoo. Met Dr. Wegeforth and Mr. Perkins. Was driven to La Jolla in P. M. Met Dr. Sumner and Dr. Fox. Visited Tijuana in evening.
- 63 July 30 Spent the A. M. at zoo. Left for Los Angeles on 4<sup>30</sup>. Caught 8<sup>10</sup> for Chicago.
- July 31 En route to Chicago aboard the Golden State Limited.
- Aug 1 En route to Chicago.
- Aug 2 Arrived Chicago 9<sup>30</sup>. Visited the Shedd Aquarium and put up in the building with the Chutes.
- Aug 3 Spent most of the day about the Aquarium. Caught the 12<sup>40</sup> for Sandusky.
- Aug 4 Arrived Sandusky 6<sup>00</sup> A. M. Got the S. S. Chippewa for Put-in-Bay 10<sup>00</sup>A. M. Arrived 12<sup>15</sup> and finally got established on the "Castle" of Gibraltar Island. Mrs. Lagler took us about Put-in-Bay. Visited the Perry Memorial Tower and the Strontium Cove - a kind of over large geode formation.
- Aug 5 Gave lecture on "The Behavior of Fishes".
- Aug 6 Gave lecture on "The Locomotion of Fishes."  
Visited the Toledo Zoo and new Aquarium.
- Aug 7 Gave lecture on "Aquarium operations". Left here with Dr. Baughman. Visited with him at Wooster and then went on the Columbus. Put up at the Stricter Hotel.
- 64 Aug 8 Visited Karl Venard at the University of Ohio. Had a good "bull" session with Dr. Barrows. The Troxels then picked us up and we went into Postoela.
- Aug 9 Left from Newark, Ohio for Pittsburgh at 12<sup>01</sup>. Arrived 4<sup>40</sup>. Put up with Nettings.
- Aug 10 Spent the day at the Carnegie Museum with Netting. Left in the 11<sup>40</sup>.
- Aug 11 Arrived N. Y. 8<sup>35</sup>. Got to Mohawk by 10<sup>30</sup>.

Florida  
1939 (1)

[CALENDAR FOR 1939]

66

- Jan 21 Left Mohawk 9<sup>00</sup> A. M. in Chevrolet with Ethel and Sam Dunton. Route 1. Arrived Alexandria VA about 7<sup>00</sup> P. M. Delayed on account of slippery pavements. Put up at the George Mason Hotel. Turned in 9<sup>30</sup>. 67
- Jan 22 Left 8<sup>20</sup>. Reached Hurtsdale 7<sup>15</sup> P. M. Put up at only hotel there. Heard frogs calling along road before reaching this place.
- Jan 23 Left 7<sup>30</sup> A. M. Reached St. Augustine by 4<sup>30</sup> P. M. Lack of grease in a rear axle ruined a roller bearing. Had to have both replaced. Made Marine Studios by 8<sup>00</sup>. Put up at their hotel.
- Jan 24 Spent the morning at Marine Studios with Count Tolstoy and McBride. There are three porpoises there now. Started west 2<sup>00</sup> P. M. Made Punta Gorda by 8<sup>00</sup>. Put up at the Charlotte Bay Hotel.
- Jan 25 Spent the morning at the Bass Laboratory at Englewood with Bass, Springer, Lummus [?], etc. Left 2<sup>00</sup> for Bokeelia [BOKELLIA]. Hired a boat there and arrived Palmetto Key 4<sup>00</sup>. Found the Bishops well established. Spent the evening getting things to rights. It is very cold here - a north east gale howling and there is little opportunity to do effective field work. 68
- Jan 26 Bishop made a small hand drawn tow from lab dock in a. m. It contained a few larval fish (preserved) and absolutely no fish eggs.  
Went to Boca Grande with Bishop and Powell in the P. M. to get various supplies. This took all the P. M.
- Jan 27 Spent the A. M. fixing up electric lights in the lab.  
In the afternoon got mangrove roots and shells for a habitat tank for the Worlds Fair, on the west side of Palmetto Key. The wind and cold is even worse than yesterday and makes collecting practically impossible.  
Fixed up photographic tanks later in the day.
- Jan 28 Visited the Coggeshalls on Mandango Islands in the A. M. The weather is getting better, light wind and warmer.  
After lunch collected considerable, mostly invertebrate material for photographic purposes. Spent the rest of the day working on it with Dunton except when the Coggeshalls and party visited the laboratory. 69
- Jan 29 Worked on photographic set ups in the A. M. Cloudy. Dunton took shots of laboratory (stills) and scallops swimming. Made Leica shots of *Lutjanus griseus* and *Gobius soporator*. Mr. Morrison came in the P. M. to demonstrate the speed boat he has for sale.  
Mr. and Mrs. Witteman visited and proposed taking us to Sanibel tomorrow.
- Jan 30 Left for Sanibel with Mr. C. L. Witteman in his cruiser Elsie II at 8<sup>00</sup>. Visited Mrs. Perry and had lunch aboard the cruiser. A heavy sea set up with lightning and thunder.

After it cleared visited Dr. Perry's salt pond and caught small tarpon for tagging. Dunton took photographs of the activity. Four tarpon still holding tags were caught and released again for further capture.

Got back by sundown.

Jan 31 Went to Redfish Pass with Mr. C. L. Witteman at 9<sup>00</sup>. Visited Chadwick's pond on the south end of the pass. Seining operations for tarpon were unsuccessful but other fishes were there in considerable abundance. Caught the following specimens:

70 *Lagodon rhomboides* nearly 100  
*Brevoortia* 3  
*Micropogon undulatus* 1  
*Leiostomus xanthurus* several hundred

These were all dead ripe. The largest was 45 cm ♀s. l. and the smallest 39 cm ♂. The males were running milt but the females were not ready to strip. One of them had a deep injury in its back that was completely healed. It was apparently as good as any of the others. This fish a ♂ but not as far developed as many of the others.

In landing Ethel went overboard. Returned home by sundown. Took a few photos of operations and Dunton took many.

The tarpon do not blow like they did here last summer. Note temperature differences - these are probably responsible.

The tarpon retaken yesterday at Sanibel were the following with their growth rates.

| Tag no. | Original date of tag | Length of of fish (total)<br>cm |      | Length of fish of fish Jan 30 1939)<br>cm |      | Diff. |
|---------|----------------------|---------------------------------|------|-------------------------------------------|------|-------|
| 15124   | Aug 23 38            | 73                              | 36.5 | 72                                        | 36   | -0.5  |
| 15137   | Aug 4 38             | 72                              | 36   | 72                                        | 36   | 0     |
| 15136   | July 20 38           | 74                              | 37   | 74                                        | 38   | +1    |
| 15129   | Aug 23 38            | 71                              | 35.5 | 71                                        | 35.5 | 0     |

Feb 1 Spent the A. M. getting invertebrates and helping Dunton take movies of the lab and general layout.

71 A reporter from The Chicago Tribune - Mr. Beeker visited for an interview. Spent the P. M. nearly the same way. Bishop got some young *Querimana* - stage *Mugil* in the late P. M.

Warm and balmy for the first time.

Feb 2 Spent all day on the flats about the island collecting live specimens to send to N. Y. with Dunton. Got 3 octopus among other things. Fair and warm.

Feb 3 Spent the A. M. getting things ready to send Dunton off. Four cans were used as follows.

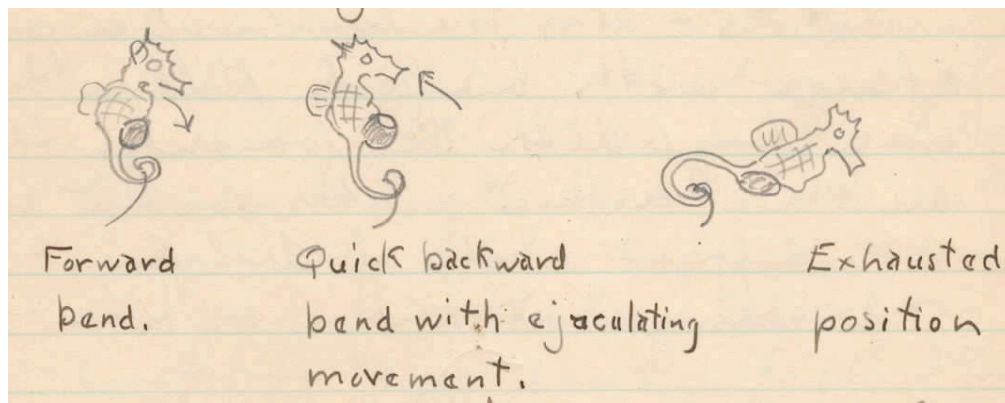
- 2 - Loggerheads hatched Aug. 1938
- 3 - Conchs
- 6 - Limpets
- 8 - scallops
- 4 - sea urchins (red)
- 4 - sea slugs
- 10 - snapping shrimp

4.        7 - *Auchenopterus marmoratus*  
             1 - *Lutjanus griseus*  
             4 - *Lucania parva*  
             20± - *Mugil cephalus* (*Queremana* stage)  
             The octopus died overnight from unknown causes.  
             Took Dunton to Boca Grande and put him aboard the 5:40 P. M.  
             Had dinner there and did some shopping. 72
- Feb 4        Spent the A. M. cleaning up things and straightening out the laboratory.  
                  Spent the P. M. in the east cove looking at sea slugs spawning, etc.  
                  In the evening did some collecting with Bishop. Got a moray with spotted dorsal at lab dock, a short-nosed bat fish at the bathing beach and a variety of mollusks. The sea-slugs are nearly all found in close aggregations of from three to six at night - mating?
- Feb 5        Visited the slug bay and took stills of slugs (and movies) of them in their untouched habitat.  
                  Collected along the shore with Bishop in the P. M. - mostly invertebrates. Got one small octopus.  
                  The laboratory was visited by the Coggeshalls and party and by Colonel Thompson and wife - also Orlando and party.
- Feb 6        Spent the day about the laboratory. In the slug bay there are large holes wallowed out. It may be that tarpon made these? 73
- Feb 7        Went to Ft. Myers to get supplies. This took the entire day. Saw numbers of large snook near Bokeelia [BOKELLIA] and many catfish. It is reported they spawn here. Curlews are common. Saw one diamond back terrapin in the mangroves.
- Feb 8        Spent the A. M. in Pelican Bay flats. Got large numbers of *Auchenopterus*. Three had egg masses. These were disposed of as follows.  
                  Lot #1 - held for development. No fish was captured with these. Some eggs were new - others were eyed. Presumably the male stays with them and the females visit from time to time.  
                  Lot #2 - Taken with one fish. All placed in an aquarium for photographing.  
                  Lot #3 - Taken with two fish. All preserved together.  
                  All three were broken out of the yellow tubular sponge.  
                  Also got four octopus and many snapping shrimp.  
                  Had dinner on Mandango Island with the Coggeshalls, Mr. and Mrs. Anisley and Mrs. R. Strater. 74
- Feb 9        Spent the A. M. working on the blenny eggs. Took photos of them with their eggs and then preserved all three lots. It seems that either too much light or handling was not doing them any good.  
                  Took a bit of a rest in the P. M. and some more photographs. Took a swim.  
                  Saw the complete "parturition" of a male *Hippocampus zosterae*. The young are surprisingly large and well formed considering the small size of the parent. The pouch of the male was so distended as to be practically ball-shaped. In all 8 young were discharged. All but the first swam directly to the surface of the water. The former clung immediately to a bit of sea weed less than an inch away from its father. Here it acted as its parent which it resembled except in being more slender.  
                  At first the tail of one about to be born was thrust out and later withdrawn while another, was actually the first born, came head first.

75

The whole affair occupied about 10 min. amid contractions (labor) of the male confined for most part of a forward bending followed by a more rapid backward bend which distended the brood pouch with the orifice so stretched as to be practically circular in outline. Usually births occurred immediately after such a movement. At intervals the male seemed exhausted bending low on its perch.

After the last was expelled the sac returned to nearly normal proportions in about 3 minutes. Within an hour the sac had completely subsided. This sac seemed to be held open by some kind of muscular action, although it was so thin walled that it seemed impossible for it to house the necessary structures.



An hour later the young were clinging for most part to sea weed or swimming about essentially like adults.

The young averaged 8.5 mm in their uncoiled length. The parent measured 33 mm.

Took photos of parent and young about three hours later.

*Strongylura notatus* exceedingly common about the lab dock. Present in large numbers at night, reacting strongly to lights by violent jumping.

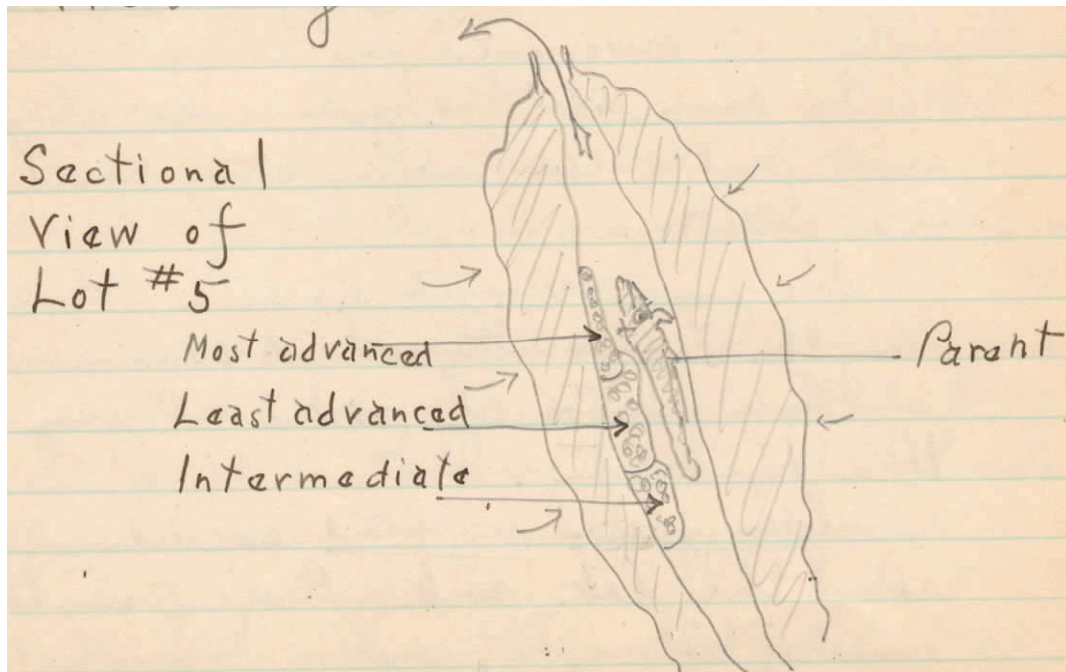
76

Spent most of the morning cleaning the paint off the laboratory windows - 12 in all. It now looks much better.

In the afternoon Bishop collected two more blenny nests. Spent the rest of the day on them.

Lot #4 - In shallow cavity. Two fish taken with it. Both preserved. This nest contains eggs in at least 4 stages of development. It was divided in several parts and placed in petri dishes for study. See notes.

Lot #5 - In the lumen of a yellow sponge with one fish. Held intact in a large dish temporarily. There are three distinct patches evident each in a different state of development. The arrangement here is as follows.



Since these eggs seem to be both light sensitive and have a relatively high oxygen requirement, as based on the difficulty there is in rearing them, together with the fact that they are agglutinated in a flat mass many eggs deep, it would seem that some such special environment as the interior of some fast pumping sponge such as they yellow ones would be necessary for their successful incubation. The species is evidently pugnacious as evidenced by their behavior towards each other in aquaria or even in a collecting bucket. They advance open mouthed with their pectoral fins spread toward each other or for instance a large snapping shrimp and give a sudden lurch forward snapping their jaws which is usually followed by the retreat of the intruder. It would thus seem that the gnarling parent does little more than "guard". A peculiar trick of this species is to walk along the bottom on their delicate ventral fins, alternating them like legs.

Spent the evening taking photomicrographs of *Auchenopterus* eggs and studying their development.

Feb 11

Spent the A. M. working on *Auchenopterus* eggs.

78

In the afternoon went to Flat Creek on La Costa (Cayo Costa) Island. Gathered some coon oysters for food. There are tree snails in the mangroves here. The stream is a very narrow affair but widens out to a pleasant flat inland which is shallow with a hard sand bottom. Here mullet were spawning. They were variously scattered about in small groups. One seen especially well consisted of one female and four males. They were in vigorous pursuit one pressing the female from each side and a third above, in about this position.



The males were smaller and with a more pearly sheen than the female.  
Other fishes present included sheepshead, snook, mangrove snapper and mojarra.

Took some photos of the place and the mullet.

Made a tow net with the  $1\frac{1}{2}$  meter bolting cloth net in Pelican Bay. This yielded eggs of four types. See notes and figures.

79 Bishop collected some more *Auchenopterus* nests in Pelican Bay. Only one of these was in the lumen of a sponge, the rest being in various sponge cavities formed by injury and healing. Evidently the lumen of a sponge is not obligatory, unless great numbers of these nests are doomed to failure.

Spent the evening working over this material.

Used the night light at the end of the dock and got some post-leptocephalus of various species. Dorsal 16. Anal 21. Also some *Synodus* larvae.

Feb 12 Preserved the remainder of the *Auchenopterus* nests intact. They run as follows.

Lot #6 (fish with it preserved separately)

Lot #7 No fish found with this nest.

Lot #8 "

Lot #9 "

Lot #10 "

Lot #11 "

Lot #12 "

Worked on development of Lot #4 in the A. M.

Visited the west beach. It is now covered with armies of a small species of *Uca*.

80 In the afternoon revisited Flat Creek and took further pictures of spawning *Mugil cephalus*. Saw one group of two males and one female. Also two groups of 1 male and 1 female each. Several large milling groups as well. Powell caught a lot of fish with his cast net.

Mullet 130 lbs.

Channel bass 30 lbs.

The latter are not in spawning condition. The mullet in many cases showed body sores and split fins - evidently due to spawning activities.

Bishop caught two *Natrix compressicauda* one in the red phase. Both were coiled up together and were photographed.

Slugs were common and a variety of bottoms and spawning with eggs generously scattered about.

Small fry of various kinds were in considerable evidence. *Fundulus*, *Cyprinodon*, *Gambusia* were noted. Also some large snook.

81 Feb 13 Spent the A. M. working on the *Auchenopterus* eggs. Lot #4 seems to be developing properly. This is a very small group of eggs which probably is the controlling factor.

The rest of the day went to general work, such as net mending, etc.



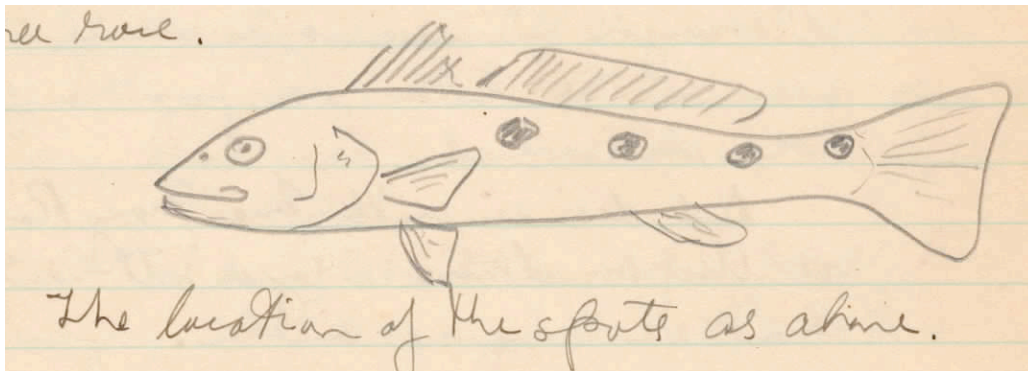
In the evening went to Mandango Island to confer with the Coggeshalls about a conference with anglers on tagging tarpon. On the return towed the silk net for plankton.

- Feb 14           Spent the A. M. gathering mangrove seedlings to ship alive to N. Y.  
Went to Boca Grande to get supplies in the P. M.  
Worked on material in the evening.
- Feb 15           Worked about the laboratory in the morning and examined the site of the pool to be excavated. In it were found the jaws of a truly large crocodilian.  
In the afternoon it rained hard which required indoor work.  
Held a meeting at Useppa in the evening. Bishop and myself spoke and we showed motion pictures. About 100 persons attended.
- Feb 16           Went to Peace River with Mr. Wittemore. We had Joe Washington as a guide. 82  
The nearest town was Ft. Ogden. The river here is quite fresh and several tarpon were seen. Living with them were the usual river fauna. *Gambusia*, *Lucania*, *Lepomis*, *Lepisosteus*, etc.  
Undoubtedly there are large numbers here. The water was too broad at this point for us to make successful use of our rather limited gear.  
Got back by 5<sup>00</sup> and worked in the evening on the development of the *Auchenopterus* eggs which are exceedingly slow.
- Feb 17           Worked on *Auchenopterus* eggs in the A. M. In the P. M. Mrs. Mary Roberts Rinehart visited. She promised a skiff and an outboard motor for the lab.  
Visited the slug cove. All are gone and no egg strings were noted. A few days ago many dead ones were noted on the beach. Perhaps they spawn and die.  
Spent the evening about the lab. Mostly studying the digging habits of ant-lions.
- Feb 18           Collected on Pelican Bay in the A. M. to make up a shipment of specimens for the Aquarium.  
Four cans were used as follows. 83
- |    |                        |    |
|----|------------------------|----|
| #1 | Limpets 12             |    |
|    | Snapping shrimp 12     |    |
| #2 | Red shrimp 12          |    |
|    | Pink pills 5           |    |
|    | <i>Auchenopterus</i> 7 |    |
|    | <i>Bathygobius</i> 1   |    |
| #3 | Black urchins 5        |    |
|    | Red urchins 3          |    |
|    | Starfish 12            |    |
| #4 | Conchs 6               |    |
|    | Blenny (large) 1       |    |
|    | File fish (small) 1    |    |
|    | Mangrove snappers 4    | 83 |
- Sent this off with Powell at noon.  
Spent the afternoon about the lab. Although numerous *Auchenopterus* were seen in the A. M., no further egg masses were discovered.  
Had dinner with Mrs. Mary Roberts Rinehart at Useppa Inn. Stayed till 12<sup>00</sup> talking about one thing and another.
- Feb 19           Went to Murdoc Point creek on La Costa in the A. M. There are pools in this, which has a sand bottom and is very clear that abound with grey snappers. There were also seen

84

*Balistes carolinensis* large - many  
 One of these had a small *Echeneis naucrates* attached.  
*Lagodon rhomboides*  
*Centropomis* sp. (large)  
*Sciaenops ocellatus* (1 very large)  
*Strongylura notata*  
*Mollinesia latipinna*.

Further up the creek opens into tidal flats that are covered with *Zostera* and similar plants. Here *Mugil cephalus* abound and are evidently spawning.  
 These weeds might make a balanced marine aquarium not impossible.  
 Note: In Flat Creek, the other day, one of the *Sciaenops* had four spots on its side. One is usual, two occasional and three rare.



The location of the spots as above.  
 In the afternoon worked about the laboratory as well as in the evening.  
 Planted some of the *Zostera* etc in one of the laboratory aquaria this date.

85

Write letters to  
 Mr. Murry Coggeshall  
 Mr. M. R. Rinehart  
 Mr. C. L. Wittemore  
 All at Useppa.  
 Marine Studios  
 Bass Lab.  
 Bard Powell

Powell states that when *Mugil* jumps in a small skittering leap they are in company of others but when it is a large clean leap they are alone. This has led local fisherman to believe that the leap to "look around and see where they are" which he disbelieved. He says however that it is useful to note the kind of leaps when preparing to fish for them.

In the late afternoon one of those flat bird flies that normally lives between feathers "adopted" me. It was hours before it was finally captured. It could be chased off for a second but immediately flew back.

Feb 20 Spent most of the A. M. packing up and studying *Auchenopterus*. One egg hatched#!

85

In the P. M. continued the same. Took a swim and closed a deal for a speed boat.  
 In the evening paid all bills and prepared for departure tomorrow.

Feb 21 Left Palmetto Key by way of Bokeelia [BOKELLIA]. Stopped for lunch at Punta Gorda. Put up for the night at the DeLand Hotel, DeLand, Florida.

Feb 22           Left DeLand. Lunch at Kingsland, Georgia. Put up at the Hotel DeSoto, Savannah, Georgia.

Feb 23           Left Savannah. Lunch at Manning, S. C. Put up at the Hotel Carolina, Raleigh, N. C.

Feb 24           Left Raleigh. Lunch at Fredericksburg, Va. Put up with Aunt in Phila (10<sup>00</sup> P. M.).

Feb 25           Left Phila. noon. Home at Mohawk 4<sup>30</sup> P. M.

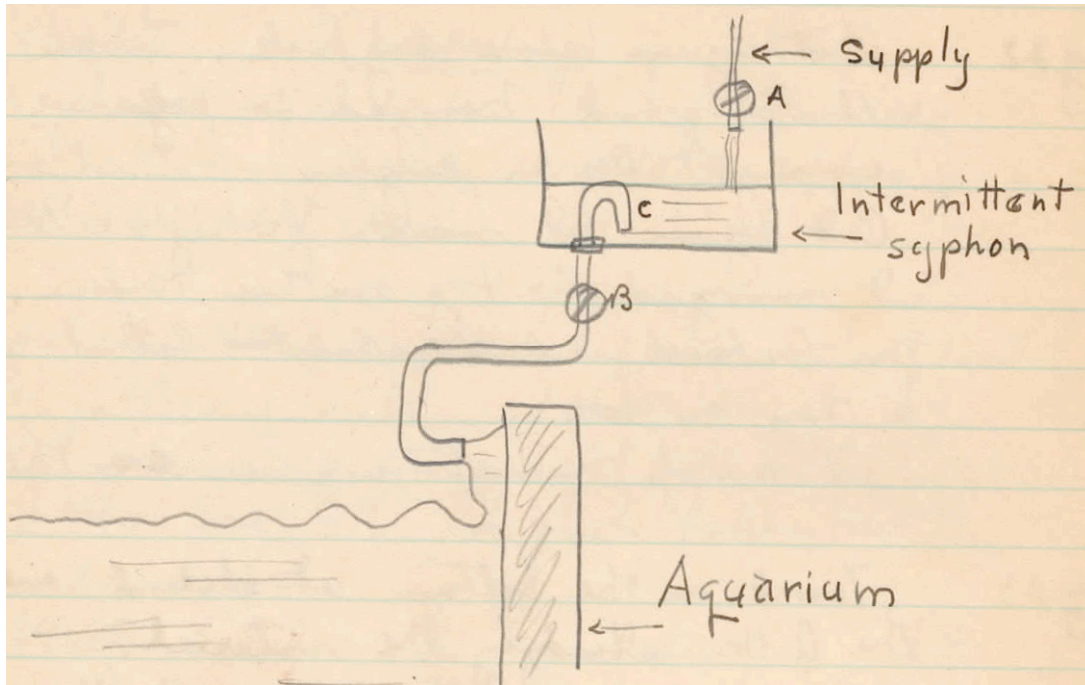
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Florida  
1939 (2)

- May 15 Left N. Y. with S. Dunton 9:45 P. M. train. 87
- May 16 En route.
- May 17 Arrived Boca Grande 10:30 A. M.  
 Photoed a young *Tylosurus raphidoma*?  
 Got to rights shortly as the lab was already open with the Bishops in charge.  
 The young *Tylosurus* placed in a Petri dish simply tried to swim through the edge at one place. A bit of scotch tape placed around it (darkening it) caused the fish to rest quietly in the center, away from the edge.  
 Water in the aquaria have a Sp. G. of about 1.012 at 72°F.
- May 18 *Galeichthys gilberti* with nearly mature eggs. Should spawn soon.  
 The young *Tylosurus* is very dark and matches the floating drift in close approximation in contrast to the Tortugas specimens which were mostly light tan. The black flag dorsal is held horizontally and switched to left or right at will generally associated with turning. The fin is to the inside. If the fin were held erect the fish could not float as near to the surface as it normally does. The dorsal is white edged and the pectorals, ventrals, anal and caudal clear. This specimen measures 40 mm s. l. 88  
  
 There is a group of highly melanotic *Mollienesia* living here in the mangrove roots. Did not know that such a living step to the "black mollies" had been taken spontaneously.  
 Went to Boca Grande Pass in the A. M. took movies of tarpon rolling. Very few however were caught. Bishop took a *Epenephelus morio* and a *E. bonaci*. Leica shots of tarpon rolling.  
 Visited Mr. Babcock at Boca Grande Inn and made arrangements with Mr. Witten for the use of a live car.  
*Strongylura notata* common and exceedingly bright in color about Wittens dock - feed freely on food thrown over board - mannis  
 Returned to island late.
- May 19 Visited the tarpon pool. Bishop angled for some while Dunton photographed proceedings. Dissected an *Albula vulpes*. Unripe ♀. The air bladder is simple with no sign of vascularization as in tarpon. 89  
 Mr. Babcock came in and we had a long discussion of plans. Spent the rest of the day at Boca Grande buying supplies and getting ready for tomorrow.
- May 20 Was at Boca Grande Pass at day break. Mr. Babcock engineered the obtainment of five tarpon from various fishermen. They were as follows.  
 ♂ 51" s. l. nearly ripe  
 ♂ 39<sup>1</sup>/<sub>2</sub> running milt  
 ♀ 50" no evidence of genitals at all !  
 ♀ 52<sup>1</sup>/<sub>2</sub>" nearly ripe  
 ♀ 57" some eggs could be stripped.

- Attempted to fertilize the eggs from the last. A few came freely in the blood. They were apparently not quite mature. The bulk of the gonads contained green eggs like those of the other fish.
- The milt ran freely. Two hours later good milt could be obtained from the male. It lived over an hour on the slide.
- Three hours later, the fish long dead, but hung overboard, still gave up viable milt.
- Mr. Babcock came ashore and discussed further plans.
- Worked around the lab and rested a bit in the P. M.
- 90 No parasites were seen in the fishes above examined. They all seemed exceptionally clean.
- Mr. Ellis of Charleston, S. C., brought in a shark jaw *Carcharhinus* sp. which was photographed for identification. The teeth were finely serrated the upper teeth slightly coarser.
- May 21 The eggs taken yesterday are now floating up - decomposition effects?
- Spent the early morning (before daylight) in the pass - no fish taken that could be used.
- Visited Flat Creek before dinner. It is much quieter than when last seen. One specimen of the red phase of the flat tailed water snake seen. Fish not much in evidence. Spent the entire afternoon tarpon fishing in Boca Grande Pass. Lots of fish were seen rolling but not a single one was hooked by any boat. Caught a few red and black grouper.
- 91 Bishop reports that *Cremnobates* is now to be taken in the grass beds and small ones - this year - are common. Last summer he found them among the red ascidians on the piles. These forms are only present in the summer are quite different fauna being present in the winter on the piles.
- May 22 Out again before day break. Tarpon fishing still not good. Managed to tag one large fish caught by an angler.
- Out again at noon. Fishing still worse but managed to tag another tarpon. Met Mr. Babcock and decided to let it go for a day or so.
- Fixed up the bottom gear in the P. M.
- May 23 Towed on the bottom at Island and spent the A. M. studying the material.
- Bishop made three tows in the P. M. near Boca Grande Pass and the rest of the day was occupied in studying it. There is one egg that might possibly be that of tarpon. Water at dock 86°F and 1.016 Sp. G.
- May 24 Worked on eggs from tow-net.
- Visited Bird Island in the A. M. for Dunton to take pictures.
- Visited Mrs. Coggeshall to pay respects.
- All larvae hatched from eggs died.
- Made another plankton tow off Palmetto Key. Absolutely no eggs could be found in it. Apparently they hatched yesterday when did those in the lab and in yesterday's tow from Boca Grande.
- 92 Plan for a ripple effect in aquaria to simulate that to be found around mangrove roots.



Speed of ripple and wave effect may be regulated by relation of supply to flow through siphon (values A & B respectively) and by height of siphon (length of inlet tube - C).

Pipe fish in lab aquaria are still carrying eggs.

A heavy rain squall about 6<sup>00</sup> prevented evening field work.

- May 25      Towed in Boca Grande Pass around the north point. Here a fine sea weed covers the bottom. A single species of egg was taken - the same as already studied. These eggs all hatched rapidly (see notes on egg development).  
Rain in the afternoon prevented further collecting. 93
- May 26      Larvae still living but looking rather feeble. Figured some before preserving. Mr. Babcock came in for lunch and a discussion of plans. Got word on the P. M. that Gratia Rinehart had died this A. M. Rain.
- May 27      Went to the Pass, 4<sup>30</sup> A. M. but a sea was running that made work impossible and hazardous. Went to Boca Grande for supplies, etc. in the P. M. More rain.
- May 28      Up at 4<sup>30</sup> but a sea again kept us from working the pass. Seined near Captiva Pass in the P. M. Cowfish, young filefish, 1 seabird porgy over a bottom of grass. Rain later in day. Went to Bokeelia [BOKELLIA] in the evening for relaxation.
- May 29      More sea in the A. M. making pass unworkable. Started packing up in the morning. Went to Boca Grande to arrange about leaving and to ship some cans of fish to New York. 94  
Some of the Spearing family visited the island in the evening. More rain and wind.

May 30           Packed up practically everything and made ready for departure tomorrow. Rain  
in the P. M.

May 31           Finished packing and made the 5:30 from Boca Grande. Intermittent rain all day.

June 1           In transit.

June 2           Arrived Newark 8:35 met by Ethel.

Finis



## Urbana, Ill.

- Oct 14 Left N. Y. (Grand Central) 5:15 on the Knickerbocker. 95
- Oct 15 Arrived Indianapolis 10:40. Got train for Urbana, Ill. at 11:30. Arrived Urbana 248. David Thompson met me at the station and we spent the rest of the day inspecting the country, his lab and the new natural history building in construction. Turned in about 11<sup>00</sup>.
- Oct 16 Turned out 7<sup>00</sup>.  
Visited several nearby locations - #1 to 5 on attached map. Collected a variety of darters, suckers, minnows and snakes. Took some photographs of Salt Fork and Rocky Park. Water all turbid. Saw *Labidesthes* for first time - as delicate as marine sp.
- Oct 17 Dixon arrived.  
Went to locality #6 in the morning with Dr. Van Clewes clam class collecting.  
Went to the water works of Decatur and got some fish held there for us. (Locality #7)
- Oct 18 Left for Chester, Ill. in the A. M. About 11<sup>00</sup> Thompson, Schlaemmer, Dixon and the boat captain.  
Arrived Chester, in the Mississippi about sundown. The River is extremely low 96 and there are some beaches on either side. This is fine clean sand - not river mud.  
Put up at the Hotel Grand View.  
Went aboard an old steam paddle boat. The stroke is 9' long. - the over all length of the craft 150'.  
Turned in about 10<sup>30</sup>.
- Oct 19 Turned out 6<sup>00</sup>. Seined in the Mississippi in the morning. Collected young buffalo fish, young drum, young channel cats and *Notropis gelius* [?]. Also river shrimp *Palaemonetes*. (Locality #8). Dixon and the captain visited twelve fyke nets. All that was taken was a single flat-head and a soft-shelled turtle.  
Thompson and I went on south to Cairo and interviewed fishermen along the Mississippi and the Big Muddy. Fishing seems to be very poor.  
Put up at the Hotel Cairo.
- Oct 20 Worked around the junction of the Ohio and Mississippi - got 9 *Scaphirhynchus* and a few blue cats.  
Returned to Chester where the rest of the party had gotten a good collection including 2 *Polyodon*.  
Drove back to Urbana and got the material established in the tank run by 12<sup>30</sup>. 97
- Oct 21 The fish collected yesterday in good shape. Worked around the lab in the A. M.  
Left for Havana about noon. Drove over with Bennett. Dixon, Mrs. Dixon and Thompson came in another car.  
Put up aboard the Sunny boat "Anox".  
Took a short ride up the Illinois River. Ducks are exceedingly numerous. The duck season opens yesterday [tomorrow].  
The air pumps used in the trucks here are powered by generator "power horse" from 1928 Ford.  
The air pump used is a pump spray air pump manufactured by Sears Roebuck. Diaphragm pump.

- Oct 22            Took a short trip up the Spoon River in the A. M.  
                     Rested in the P. M. while Dixon and the others made arrangements for the truck tomorrow.  
                     Took some movies of some Gyrinids near the dock that had slowed down so that they looked as though they were in slow motion.  
98                The duck season opened today with a great many hunters about and much noise.  
                     Write W. F. Carbine for.  
                     Observations on the spawning habits of Centrarchid fishes.  
                     Trans. 4th N. A. Wildlife Conf. 1939:275.  
                     Inst. Fish. Res. Ann. Arch. Mich.
- Oct 23            Packed the collections in trunk for sending to N. Y. It got off about 9<sup>00</sup> P. M.  
                     Dixon following in his car.  
                     Took movies of the loading operations and net liftings.
- Oct 24            Spent the day visiting about the University. In the evening gave a lecture to the Wildlife Club with movies.
- Oct 25            Got the 1:15 for Chicago. Got the 5:00 for N. Y. from there. Arrived Newark 1:55. Met by Ethel.

Finis

## Photographs

|                                            |         |                                                                  |     |
|--------------------------------------------|---------|------------------------------------------------------------------|-----|
| Pack #1 (Agfa)                             |         |                                                                  | 130 |
| 1 Cabbage palm - locality of collection    | Jan. 19 | * Focused at maximum extension from which size may be calculated |     |
| 2 Aolean rocks - Clifton                   |         |                                                                  |     |
| 3 Aolean rocks - Clifton                   |         |                                                                  |     |
| 4 Bright orange butterfly*                 |         |                                                                  |     |
| 5 Coal-black butterfly*                    |         |                                                                  |     |
| 6 Tree snail*                              |         |                                                                  |     |
| 7 Tree snail small colony*                 |         |                                                                  |     |
| 8 <i>Anolis</i> dark colored*              |         |                                                                  |     |
| 9 <i>Anolis</i> red-backed (profile)*      |         |                                                                  |     |
| 10 <i>Anolis</i> red-backed (full face)*   |         |                                                                  |     |
| 11 View of habitat                         | v       |                                                                  |     |
| 12 Wake of "Escape" over marl flats        | Jan. 21 |                                                                  |     |
| Pack #2 (vericrome et sub)                 |         |                                                                  |     |
| 1 Beach at residence of commissioner       |         |                                                                  |     |
| 2 Residence of commissioner                |         |                                                                  |     |
| 3 Sunset over residency                    | v       |                                                                  |     |
| 4 Spongers in Loggerhead Creek             | Jan. 22 |                                                                  |     |
| 5 Spongers in Loggerhead Creek             |         |                                                                  |     |
| 6 Spongers in Loggerhead Creek             |         |                                                                  |     |
| 7 Spongers in Loggerhead Creek             |         |                                                                  |     |
| 8 Spongers in Loggerhead Creek             | v       |                                                                  |     |
| 9 Camp at Madera Grove                     | Jan. 23 |                                                                  |     |
| 10 Freshwater pond in back of camp         |         |                                                                  |     |
| 11 Freshwater pond in back of camp         |         |                                                                  |     |
| 12 Flat field in back of camp              |         |                                                                  |     |
| Pack #3                                    |         |                                                                  |     |
| 1 Madera grove camp site                   |         |                                                                  |     |
| 2 Madera grove camp site                   | v       |                                                                  |     |
| 3 Algae at camp                            | Jan. 24 |                                                                  | 131 |
| 4 Algae at camp                            |         |                                                                  |     |
| 5 Shore at camp                            |         |                                                                  |     |
| 6 The Guide leaving                        |         |                                                                  |     |
| 7 Turkey buzzard                           |         |                                                                  |     |
| 8 Turkey buzzard                           |         |                                                                  |     |
| 9 Small fish in aquaria <i>G. manni</i> ?  |         |                                                                  |     |
| 10 Small fish in aquaria <i>G. manni</i> ? |         |                                                                  |     |
| 11 Small fish in aquaria <i>G. manni</i> ? |         |                                                                  |     |
| 12 Small fish in aquaria <i>G. manni</i> ? |         |                                                                  |     |
| Pack #4                                    |         |                                                                  |     |
| 1 Flash light of camp                      | v       |                                                                  |     |
| 2 Frog in camp                             | Jan. 25 |                                                                  |     |
| 3 Frog in camp                             |         |                                                                  |     |
| 4 Shore at camp                            | v       |                                                                  |     |
| 5 Creek at camp                            | Jan. 26 |                                                                  |     |
| 6 Track to fresh pond                      |         |                                                                  |     |
| 7 Fresh pond                               |         |                                                                  |     |
| 8 Fresh pond                               |         |                                                                  |     |
| 9 Fresh pond                               |         |                                                                  |     |
| 10 Fresh pond                              |         |                                                                  |     |
| 11 Fresh pond                              |         |                                                                  |     |

|     |    |                                 |         |
|-----|----|---------------------------------|---------|
|     | 12 | Seining party at fresh pond     |         |
|     |    | Pack #5                         |         |
|     | 1  | Mr. Bacon                       |         |
|     | 2  | Mr. Bacon                       |         |
|     | 3  | CB                              |         |
|     | 4  | Mangrove "digging in"           |         |
|     | 5  | "Ca" froth wind driven          |         |
|     | 6  | "Ca" froth wind driven          |         |
| 132 | 7  | "Ca" froth on wind driven shore |         |
|     | 8  | "Ca" froth on wind driven shore |         |
|     | 9  | View of camp                    |         |
|     | 10 | View of camp                    |         |
|     | 11 | View of camp                    |         |
|     | 12 | View of camp                    |         |
|     |    | Pack #6                         |         |
|     | 1  | "Ca" froth on wind driven shore |         |
|     | 2  | Mouth of creek at camp          |         |
|     | 3  | Aelean rocks at camp            |         |
|     | 4  | <i>Analids</i>                  |         |
|     | 5  | <i>Analids</i>                  |         |
|     | 6  | <i>Analids</i>                  |         |
|     | 7  | <i>Analids</i>                  | v       |
|     | 8  | Woods at old Forsyth camp       | Jan. 27 |
|     | 9  | Woods at old Forsyth camp       |         |
|     | 10 | Seining party at Forsyth camp   |         |
|     | 11 | Seining party at Forsyth camp   |         |
|     | 12 | "Lizard" egg                    |         |
|     |    | Pack #7                         |         |
|     | 1  | Seining party at Forsyth camp   |         |
|     | 2  | Flower of unknown species       |         |
|     | 3  | Flower of unknown species       |         |
|     | 4  | Orchid on mangrove              |         |
|     | 5  | Collection of "lizard eggs"     |         |
|     | 6  | Blank (pulled in error)         |         |
|     | 7  | Flower of unknown species       |         |
|     | 8  | Flower of unknown species       | v       |
|     | 9  | Milk River above Haul under     | Jan. 28 |
| 133 | 10 | Milk River above Haul under     |         |
|     | 11 | Haul under                      |         |
|     | 12 | Haul under                      |         |
|     |    | Pack #8                         |         |
|     | 1  | Goose River                     |         |
|     | 2  | Goose River                     |         |
|     | 3  | Goose River                     |         |
|     | 4  | Mr. Bacon siesta                |         |
|     | 5  | Flower of unknown species       |         |
|     | 6  | "Spiral" bean pods              |         |
|     | 7  | Goose River                     |         |
|     | 8  | Goose River                     | v       |
|     | 9  | Mr. Bacon                       | Jan. 29 |
|     | 10 | Mr. Bacon                       |         |
|     | 11 | Mr. Huntington                  |         |
|     | 12 | The Pilot                       | v       |
|     |    | Pack #9                         |         |

|    |                                       |        |
|----|---------------------------------------|--------|
| 1  | Mr. Bacon at Pirates Nest             | Feb. 1 |
| 2  | Hermit crabs quarreling               |        |
| 3  | Hermit crabs quarreling               |        |
| 4  | Hermit crabs quarreling               | v      |
| 5  | Scene of high winds on "Pirates Nest" | Feb. 2 |
| 6  | Scene of high winds on "Pirates Nest" |        |
| 7  | Peculiar tree formation               | v      |
| 8  | Fisherman seining off Pirates Nest    | Feb. 3 |
| 9  | Fisherman seining off Pirates Nest    |        |
| 10 | Fisherman seining off Pirates Nest    | v      |
| 11 | Rose Island                           | Feb. 4 |
| 12 | Rose Island                           | v      |

## Second Andros

134

### Pack #1

|    |                                       |         |
|----|---------------------------------------|---------|
| 1  | already used                          |         |
| 2  | already used                          |         |
| 3  | already used                          |         |
| 4  | Silk-cotton tree - Nassau             | Jan. 18 |
| 5  | Silk-cotton tree - Nassau             |         |
| 6  | Silk-cotton tree - Nassau             | v       |
| 7  | Cloud effects, looking towards Andros | Jan. 19 |
| 8  | Sunset over Golding Cay               | v       |
| 9  | South Bight Lake                      | Jan. 21 |
| 10 | Sponger visiting in Grassy Creek      | Jan. 24 |
| 11 | Sponger visiting in Grassy Creek      |         |
| 12 | Sponger visiting in Grassy Creek      |         |

### Pack #2

|    |                                    |  |
|----|------------------------------------|--|
| 1  | Shore pits in Grassy Creek country |  |
| 2  | Shore pits in Grassy Creek country |  |
| 3  | Shore pits in Grassy Creek country |  |
| 4  | Grassy Creek                       |  |
| 5  | Grassy Creek                       |  |
| 6  | Tide pool with fishes              |  |
| 7  | Tide pool with fishes              |  |
| 8  | Tide pool with fishes              |  |
| 9  | Mouth of Grassy Creek              |  |
| 10 | Mouth of Grassy Creek              |  |
| 11 | Mouth of Grassy Creek              |  |
| 12 | Mouth of Grassy Creek              |  |

### Pack #3

|    |                                |         |
|----|--------------------------------|---------|
| 1  | Mouth of Grassy Creek          | v       |
| 2  | Deep Creek village             | Jan. 25 |
| 3  | Deep Creek village             |         |
| 4  | Deep Creek village             |         |
| 5  | Deep Creek village             |         |
| 6  | Deep Creek village             |         |
| 7  | Deep Creek village             |         |
| 8  | Deep Creek village             |         |
| 9  | Deep Creek village             |         |
| 10 | Bathing beach below Deep Creek |         |
| 11 | Bathing beach below Deep Creek |         |
| 12 | Children on bathing beach      |         |

135

|     |                                 |         |
|-----|---------------------------------|---------|
|     | Pack #4                         |         |
|     | 1 Children on bathing beach     | v       |
|     | 2 Sponger under sail            | Jan. 26 |
|     | 3 Seining tarpon                |         |
|     | 4 Seining tarpon                | v       |
|     | 5 Nassau St. scene              | Jan. 30 |
|     | 6 Nassau water tower            |         |
| 136 | 7 Nassau water tower            |         |
|     | 8 Nassau water tower            | v       |
|     | 9 Hibben                        | Feb 2   |
|     | 10 Hibben                       |         |
|     | 11 View of Island, Pirates Nest |         |
|     | 12 View of Island, Pirates Nest |         |
|     | Pack #5                         |         |
|     | 1 Mr. and Mrs. Bacon            | v       |
|     | 2 Mr. and Mrs. Bacon            | v       |
|     | Rest not used                   |         |

## Formulae

### Dilution

140

Deduct desired percentage from actual and add that amount of H<sub>2</sub>O.

Ex.

96% Alc - on hand

-70% - desired

26 H<sub>2</sub>O to add

Add 26 vols H<sub>2</sub>O to 70 vols of 96% alc. Result 96 vols of 70% alc.

### Formalin

3% Formalin all reps amphibians and fishes.

1 vol 40% Formol

12 vols H<sub>2</sub>O

Eggs use 4% Formol

1 vol 40% Formol

10 vols H<sub>2</sub>O





## Equipment

Shipped to Miami Fla. on Dec. 23, 1931.

145

### Square tank #1

Formalin  
Shells 410  
Shells 22  
Small game getter  
Flash light  
Collecting bags  
Film packs (12)  
Rubber bag  
Net bags  
H<sub>2</sub>O sample bottles (9)  
Field glasses

### Square tank #2

Alcohol  
Formalin  
Hypodermic  
Cheese cloth  
Labels  
Water sample bottles (3)  
Thermometer  
Colored pencils  
Universal indicator  
Dissecting instruments

### Milk can

Copper sulphate  
Adhesive tape  
Overboard light  
3-in-1 oil  
Aquaria glass  
Shirts  
Pants  
Oilcloth bag  
Sneaks

### Trunk

Mosquito bar  
Mosquito bar supports  
Game getter (large)  
Machettes (2)  
Vials  
Seine  
Canteens (3)  
Bottles (medium)  
Tent lines  
P. jacket

### Bundel

Cots (3)  
Tent (1)  
Dip net

## Equipment - Second Trip - 1933

146

### Square tank

Formalin  
Alcohol  
Shells 410  
Shells 22  
Game getter - short  
Labels  
Film packs (10)  
Field glasses  
Cheese cloth  
Tape (adhesive)  
Cement (metal)  
Thermometer  
3-in-1 oil

### Trunk

Tent canvas  
Clothes  
Copper sulphate  
Game-getter long  
Machette  
Vials  
Dip nets  
Aquaria glass  
Emergency kit