Proceedings of the 1st Joint Symposium on the Natural History and Geology of The Bahamas

June 12-16, 2015

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Gerace Research Centre
San Salvador, Bahamas
2017

ISBN: 978-0-935909-40-1

Cover image - Patch reef near the wall off Grotto Beach (photo by Lee Florea).

The current status of Lucayan archaeobotany

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Archaeobotanical studies reveal that the Lucayans used native and introduced plants for food, transportation, utensils, fuelwood, perishable technologies, mortuary accompaniments, and ceremonial items. These plants were grown or collected in house gardens, fields, or natural habitats indicating that the Lucayans developed an intimate knowledge of local environments and ecologies and transformed natural landscapes into managed spaces. This paper will review what we know about Lucayan plant use, the techniques applied to recover and identify these plants, the roles that they played in Lucayan daily, political, spiritual, and symbolic lives, and the technologies used to prepare fields, process foods, and manufacture objects.

Anthropogenic soil at the Minnis-Ward site (SS-3), San Salvador, Bahamas

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San Salvador is located in the east-central Bahamas where Lucayan settlement has been dated by Berman and others to at least AD 650-900. The Minnis-Ward site has long been known to be an outstanding site with massive quantities of artifacts, evidence for bead-making, a complete sea turtle skull recovered by Winter, and now evidence for at least one Lucayan architectural structure. Most recently, the Minnis-Ward site has revealed the nature of its dark soil to be anthropogenic in nature, with numerous characteristics that make it similar to other "dark earth" sites in other parts of the Americas, especially the Amazon Basin. The size and geographical locality of the site, its access to varied water bodies, and the artifactual and chemical nature of its soil clearly indicate that Minnis-Ward contains anthrosols in association with past human activity (food processing, kitchen midden, and architectural structure). The finding of a post mold or remnant of an architectural support element clearly suggests that the anthropogenic dark soil is associated with past household activities. The structure is estimated to be ca. 4.0-5.0 sq. m in area with a population of 4-5 household members (a number supported by Columbus's observation of 5 people per house). Soil samples indicate high levels of Total N, P, Mg, Mn, Al, Cu, Zn, and As in the midden compared to the lowest non-cultural level ca. 100 cm below surface. Cu and Zn readings suggest two possible habitations of the site, including earlier (ca. AD 650-1200) and later (ca. AD 1200-1520) occupations. Despite the fact that the calcium carbonate nature of the Minnis-Ward soil affects the soil tests to some degree, soils at Minnis-Ward meet at least 14 of the criteria established for "dark earth" sites usually reported for the Amazon Basin.

Near-surface (800 MHZ GPR) imaging of coastal landforms on San Salvador Island, Bahamas: contributions to paleogeography, geoarchaeology, and ichnology

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Despite its small size, the Bahamian island of San Salvador contains a suite of coastal depositional settings, which serve as an archive of past geological processes (erosion, overwash, breaching, progradation, aeolian accretion), animal-sediment interaction (bioturbation), and prehistoric cultures. The island's relative isolation and dominance of accretionary landforms have made it a renowned site for reconstructing the late Quaternary record of coastal change and pre-contact occupation patterns. As part of a multidisciplinary survey effort, > 5 km of high-resolution (800 MHz) ground-penetrating radar (GPR) images were collected in various parts of the island, spanning a variety of landforms and ecosystems. Shore-parallel 2D radargrams along extended sections (>500 m) of baymouth barriers (Sugarloaf, Triangle Pond) yielded signal penetration of up to 3 m and captured several channel-fill sequences with evidence for lateral migration. At north Pigeon Creek, recurved sections of dune ridges associated with a large Lucayan site (SS1) suggest an existence of a prehistoric paleo-inlet. Shallow subsurface ridge-top depressions may be related to past human activities and demonstrate georadar as a vital tool for assessing prehistoric site formation patterns. Widespread crab bioturbation at several topographic levels has the potential to alter the cultural stratigraphy, while aiding surface artifact collection in spoil piles. At several locations in the southwestern (Clear Pond) and eastern (the Tombolo) parts of the island, aeolian invasion into vegetated areas is manifested as interference of high-amplitude diffraction patterns. In contrast, the underlying or exposed lithified Pleistocene/Holocene aeolianite produces a relatively noise-free signal return diagnostic of dune bedding. The sub-decimeter resolution of the GPR is suitable for characterizing not only the large burrow complexes of blue and blackback land crabs, but also those of ghost and fiddler crabs in sediments devoid of saline water. The upcoming field efforts on San Salvador will involve detailed 3D grid surveys of bioturbation structures, as well as characterization of strandplain accretion modes to complement a growing geophysical database from other islands of the Bahama Archipelago.

Bioturbation in engineered carbonate substrates: GPR imaging of rock iguana and land crab burrows on GRC campus, San Salvador, Bahamas

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Active bioturbation at several sites with different substrates on the GRC campus provides an opportunity to assess the viability of ground-penetrating radar (GPR) to discriminate between the electromagnetic signal response to biogenic structures and that of associated man-made features. A series of 800 MHz georadar profiles were collected in the exhibit containing several adults of the critically endangered Bahamian (San Salvador) rock iguana (*Cyclura rileyi*). To minimize disturbance, subsurface images were obtained during morning hours when animals were still in their burrows. The survey design maximized the number of burrow traverses by an integrated grid and circumference layout within an oval enclosure. The dielectric contrast between the carbonate substrate and air-filled burrows was sufficient to identify the majority of 10-15 cm-wide subsurface extensions of the inclined tunnels. Whereas numerous limestone clasts induced interference, it is possible to differentiate their high-amplitude diffractions from those produced by the iguana burrows. At several locations, regularly spaced, inclined reflections at 20-30 cm depth represent cross-bedded lithified aeolianite underlying the burrowed substrate. Signal velocity analysis has the potential of identifying live iguanas within their burrows, although additional experiments are needed to characterize the diagnostic signature of an animal by repeat surveys. Whereas the identification of desiccated animal skeletons in burrows will be difficult due to minimal dielectric contrast, our findings demonstrate the potential of GPR to aid in conservation of these endangered species and to expand our knowledge of the neoichnology of their burrows. At a number of sites around the campus, intensive bioturbation by the blackback land crab (*Gecarcinus lateralis*) occurs both in open settings (lawns) and against man-made structures (low stonewalls and wood fences). GPR images of open and partially filled 3-8 cm-wide oval burrows captured the general orientation of inclined entrance shafts. Differentiation between burrows and subsurface extensions of cemented stonewalls has implications for evaluating the potential for undermining of engineered structures. Geophysical imaging becomes especially important when abandoned burrows are filled and spoil piles are absent. In addition, this research may aid in identification of infilled burrows associated with the natural exposures of lithified limestone throughout the Bahamas.

Coastal morphological and geoarchaeological implications of prehistoric sea turtle nesting in the Bahamian Archipelago

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Sea turtles have played an important role as sources of food, tools, and decorative items, as well as mythological elements, in a number of prehistoric coastal cultures. Recognition of predictable spatial and temporal patterns of nesting were utilized by the Lucayans of the Bahamian Archipelago for purposes such as the collection of eggs and capture of female turtles. Despite the estimated millions of individuals of several sea turtle species inhabiting the region during the late Holocene, there has been no effort to examine the evidence of pre-historic activity and the geological impact of these reptiles on coastal landforms. A number of prograded strandplains (beach/dune ridge complexes) in the Bahamas act as a potential archive of sea turtle nests and associated traces. To date, the lack of field reports of ancient nests in lithified beachrock, aeolianites, and unconsolidated carbonates emphasizes the challenges of visual identification of these structures. Ground-penetrating radar (GPR) is emerging as a successful tool for visualizing the dimensions and internal architecture of modern nests. Several recent studies along the U.S. Atlantic and Gulf Coasts demonstrate the utility of GPR in characterizing the 3-5 m-wide sedimentary architecture of backfilled turtle nests at sub-decimeter resolution, while highlighting the possibility for their misinterpretation as buried storm surge channels. High-resolution (800 MHz) imaging of recent nesting sites in the Bahamas is the first step in establishing the near-surface signatures diagnostic of this biogenic activity. The Wider Caribbean Sea Turtle Network was used to assess the current sea turtle nesting beaches (primarily on Grand Bahama, Abaco, and San Salvador). A compilation is underway of strandplain sites on other islands in order to identify paleo-berm/foredune areas suitable for nesting in the past. Ultimately, the goal is recognition of the patterns of prehistoric sea turtle nesting in the Bahamas so that they can be used in paleogeographic, geoarchaeological, and paleoecological research, as well as in the identification of similar structures in the carbonate rock record.

The storm spawn hypothesis: testing the influence of heavy rainfall on synchronous spawning events in the scaly pearl oyster from the inland ponds of San Salvador Island

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Evidence suggests that heavy rainfall triggers synchronous spawning events in the scaly pearl oyster found in some of the inland ponds of San Salvador Island. Using measured growth rates we estimated spawning dates and correlated these with the continuous rainfall records for the island. Results indicate that each population shows a different degree of correlation between rainfall and spawning. We propose that this is due to each pond's variable ability to buffer against salinity changes depending on turnover mediated by conduits connecting to the sea.

Evolutionary vs. environmental influences on life history traits in the scaly pearl oyster of San Salvador Island, Bahamas

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Scaly Pearl Oysters, (*Pinctada longisquamosa)*, inhabiting two of the many saltwater ponds on San Salvador Island, Bahamas, differ in their life history characteristics. Oyster Pond provides a constant, relatively benign habitat for the oysters. The oysters found in this pond exhibit the common marine bivalve trait of protandrous hermaphroditism. This is when individuals begin their reproductive life male but switch sex to female as they grow larger in order to optimize their reproductive output. The second pond, Six-Pack Pond, provides a highly variable and at times harsh environment. Six-Pack Pond oysters begin their reproductive life with a relatively high percentage of females, and undergo alternating sex reversals, quickly reaching a dynamic 50:50 sex ratio. After analyzing growth and sex determination data from reciprocally transplanted oysters, results suggest that these life history traits differ as a consequence of genetic rather than environmental determinants. This supports our hypothesis that patterns of sex determination in the scaly pearl oyster are being driven by "fast evolution" in response to natural selection

Evolutionary vs. environmental influences on life history traits in the scaly pearl oyster of San Salvador Island, Bahamas

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Scaly Pearl Oysters, *Pinctada longisquamosa*, inhabiting two of the many saltwater ponds on San Salvador Island, Bahamas, differ in life history characteristics. Oyster Pond provides a relatively stable and constant habitat for the oysters. These oysters exhibit the common marine bivalve trait of protandrous hermaphroditism. This is when an individual's initial sex is male but switches to female in order to optimize reproductive output. Six Pack Pond provides a highly variable and at times lethal habitat. These oysters start life with a high number of females, and exhibit a pattern of rapid, alternating sex reversal, quickly achieving a 50:50 sex ratio in the adult population. Juvenile oysters from each pond were reciprocally transplanted. We then analyzed their growth and sex determination profiles. Oysters from each pond retained their life history traits despite being transplanted to a different environment. This suggests that these traits are genetically determined, representing an example of rapid evolution of life history characteristics.

Playing the shell game: the influence of hermit crabs on recent death assemblages

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Dump reef is an ideal site to investigate the influence of both marine (*Clibanarius*) and land (*Coenobita*) hermit crab populations on mollusk shell death assemblages. Populations of both taxa are abundant at the site. Bulk samples of all shells within two 0.75 m^2 sample areas were collected and whole shells were used in the analysis. Frequency values for shell use by the land crab *Coenobita* were determined by collecting crabs in 30 minute intervals in the trail from Queen's Highway to the low tide mark on two consecutive mornings. Frequency values were also collected for the population of *Coenobita* occupying the opening and surrounding vegetation of Dripping Spring Cave between Grotto Beach and Sandy Point. We looked for three signals of hermit crab use in these samples: 1) enrichment of shell assemblages in taxa with elongate apertures, and teeth or folds bordering the apertures; both of these characteristics would indicate not only deterrence against shell crushing predators, but are also features hindering the use of the shell by hermit crabs (Vermeij, 1974); 2) low frequency of shell types used by land hermit crabs; and 3) high frequencies of *Cerithium* shells due to *Clibanarius*' preferential use. *Cerithium* shells provide excellent resistance to thermal stress for these crabs in shallow, near shore, tidal pools as well as good potential for increased clutch sizes and growth (Bertness, 1981). Frequency of *Cerithium* shell use by hermit crabs was greater than 99% for tidal pools at Dump Reef. Frequency data for shell use could detect two signals: 1) source of shells based on the gastropod zonation of rocky shorelines on San Salvador Island and 2) use of land snail species. Clearly, based on the present studies, hermit crabs have the potential to cause some taxa to be over-represented or under-represented in the fossil record.

Species identification and population connectivity of enigmatic cave shrimp from San Salvador Island, Bahamas

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Anchialine pools are inland bodies of water with oceanic connections and are characterized by low species diversity. The few species present are often endemic and listed as endangered. Caridean shrimp are common anchialine inhabitants on tropical islands throughout the Western Atlantic. On San Salvador Island, shrimp from the family Barbouriidae are reported from 21 sites visited between June 2012 and July 2014. Due to their limited range and ecological niche specificity, barbouriid shrimp are considered as species of concern. With this consideration in mind, we collected material using a non-destructive tissue sampling technique, while retaining a minimal number of voucher specimens. Previous examination of these specimens revealed phenotypic hyper-variation among individuals, which confounded species' identifications. In some instances, individuals exhibited characters not prescribed to Barbouriidae (i.e., eyestalk spines). To clarify species' identity and genetic connectivity among anchialine pools we compared sequences of two mitochondrial (16S and COI) and three nuclear (28S, PEPCK and NaK) genes. Our preliminary findings support that these shrimp are a single species (*Barbouria cubensis*), presumably with geographically connected populations. Additionally, we report on the presence of *Parhippolye sterreri* and a newly discovered population of *Naushonia* sp., and propose the need for Next-Generation sequencing to clarify population limits and connectivity.

Stable isotopes of oxygen and hydrogen in surface water and shallow ground water from San Salvador

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Fifteen water samples were collected In January 2014 from lakes, caves, and marine sources on San Salvador. Basic field chemistry (pH, conductivity, temperature, alkalinity titrations) were conducted in the field. Filtered water samples were analyzed for the stable isotopes of hydrogen and oxygen (δ^2H and $\delta^{18}O$). The dataset includes samples from five lakes with near-marine conductivities (Crescent, Wild Dilly, Moon Rock, Small Pond, Pain Pond), for hypersaline lakes (Storrs, South Pond, Reckley Hill, Osprey), one fresh water lake (Fresh Lake), one blue hole (Church), two caves (Crescent Top, Lighthouse), and Graham's Harbour.

δ^2H and $\delta^{18}O$ values are within the ranges expected from marine sources in the low-latitude settings of the Bahamas (-0.88‰ to 3.04‰ and -7.0‰ to 23.2‰, respectively). The local water line (LWL) of the data produces a linear regression with a y-intercept significantly below the global meteoric water and a slope suggestive of progressive evaporation. Clustering of samples on the LWL is such that the near-marine lakes and Graham's Harbour are similar—the result of significant tidal exchange. The pH of these samples ranges between 7.3 and 8.1. Hypersaline lakes and Fresh Pond are greatly influenced by evaporation and are thus enriched in the heavier isotope compared to the other samples. The pH of these samples is higher and ranges between 7.9 and 8.5. The single-point deuterium excess is lowest on average for the hypersaline lakes (-1.6) and reflects significant evaporation. The Blue Hole sample is the most depleted in the heavier isotopes and has the highest pH (8.7); the samples from the two caves hint at a mixture of marine and fresh water and have the lowest pH (7.1).

Algae, fish, and invertebrate survey of Reckley Hill, Crescent, and Oyster Ponds: preliminary findings

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A survey of algae, fish, and invertebrates was conducted in June 2014 in three of San Salvador's inland saline ponds – Reckley Hill, Crescent, and Oyster. Reckley Hill is a hypersaline pond, while Crescent and Oyster are marine ponds with relatively more connectivity to the ocean. Many studies of these ponds have focused on the mollusk populations. The purpose of this study was to conduct a more broad biotic survey in order to compare the assemblages. As has been found in previous work, Oyster Pond had the most marine species even though it is the furthest inland marine pond of this survey. Reckley Hill had the fewest species, which is expected because it is hypersaline. The unexpected finding is that even though Oyster Pond had the most species, Crescent Pond had the most macroalgal species. The diversity of macroalgae, mostly green algal species, might be explained by the salinity of the pond which has been reported to be 35.5 ppt, very close to the 35 ppt of surrounding open ocean. There were two organisms that have not been identified – a sea cucumber and a red algae – both found in Oyster Pond. Further investigations will focus upon identifying the unknown species and conducting additional macroalgal surveys because this seems to be the least studied group of organisms in the inland saline ponds.

The role of the Cuban crocodile and the Caribbean monk seal in Lucayan lifeways: not eaten, not forgotten

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Lucayans have depicted the Cuban crocodile (*Crocodylus rhombifor*) and the Caribbean monk seal (*Monachus tropicalis*) in wood, shell, and limestone. To date, archaeological investigations in the Bahama archipelago have not recovered any osteological remains of these extinct species linked to Lucayan diet. This paper will explore the symbolic and economic significance of the Cuban crocodile and the Caribbean monk seal as a component of Lucayan communities of ecological practices.

Origin of the enigmatic tubular fossils from the Cockburn Town Member (Pleistocene, Grotto Beach Formation), San Salvador Island, Bahamas

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The Sangamonian reef to beach deposits of the Cockburn Town Member (Grotto Beach Formation, San Salvador, Bahamas) bear enigmatic mm-scale, tube-shaped fossils of undetermined origin. These fossils were initially noted by White et al. (1997) associated with an MIS 5e coral reef. Although suggestive of encrusting skeletal fossils in some exposures, our field and petrographic examination reveals that these tubular fossils are actually trace fossils in beach and inter-reef sand facies. The dominant trace fossils in this limited assemblage consist of horizontal to sub-horizontal, meandering, simple 1-2 mm diameter tubes (resembling spaghetti) that are preserved in peloid-ooid grainstone and display no discernable internal structure. The trace fossil assemblage forms a variety of interconnected patterns, largely due to false branching (overlapping and intersecting simple tubes as well as successive trace paths). Although identification of the component ichnotaxa is complicated by the interference of component trace paths, potential tracemakers and trace behaviors are individually considered based on comparison of trace morphology and modern analogs. There are strong similarities between the tubular traces found at Cockburn Town and *Macaronichnus*, an intrastratal trace thought to result from opheliid polycheate burrowing. Although *Macaronichnus* has been identified in Permian to Holocene nearshore marine to marginal-marine sand facies from cool- to cold-water temperate settings, the trace has also been identified from Miocene-Oligocene tropical clastics of Venezuela (Quiroz et al., 2010). However, this would be the first acknowledged occurrence of *Macaronichnus* in tropical carbonates.

Although concentrated on the upper surface of lithified reefrock and beachrock with intraclasts, the traces are also preserved along seaward-dipping planar-stratified calcarenite beds that overlie trough cross-bedded calcarenite. The highest concentrations of these trace fossils (up to 68% of exposed surfaces) were in part the result of prior reef and beachrock cementation that created an impenetrable substrate below blanketing nearshore/shoreline sands. Apparent convex epirelief of these traces likely resulted from sand bioturbation, followed by selective early cementation of traces due to their high permeability. Subsequent erosion of less lithified surrounding sand exhumed the erosion-resistant trace fossils.

An exploration of competitive ant interactions at baits on San Salvador Island, The Bahamas

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The ant fauna of San Salvador Island has been well described but little is known about interactions among those species in the different habitats found on the Island. During June of 2014 we examined the behavior of ant species recruited to bait (tuna mixed with Pecan Sandy) across three habitat types (Blacklands, Plantation, Palmetto) on the Island. We found a total of 21 ant species at our baits. At least 50% of these species have been introduced to the island by humans. *Dorymyrmex antillana* (native) recruited quickly in Palmetto, although displaced if *Solenopsis invicta* (introduced) or *S. geminata* (introduced) was present. *Paratrechina longicornis* (introduced) was found in all three habitats and most abundant and often dominant in Blacklands. The ants capable of displacing all other ants at a bait, were *S. invicta*, and the tiny *Monomorium ebeninum* (native). We were unable to determine which of these two ant species was more dominant due to lack of overlap at baits. However, in some Blackland sites *P. longicornis* formed massive colonies and no other foraging ants were detected in such sites. Each habitat type had a different subset of the total ant diversity on the island. The Blacklands had the most native species (7) followed by Palmetto (5), although Palmetto also contained the most introduced species (7). Plantations sites were frequently dominated by introduced fire ants (*S. invicta*, *S. geminata*) and only three native species were observed at baits in such areas.

Pollen and charcoal analysis of a 2 meter sediment core from Shad Pond, Eleuthera, Bahamas

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In 2012, a transect of cores was recovered from Shad Pond on Eleuthera Island. The longest core was 254 cm and contained a peat layer near the bottom. Samples from the longest core were processed for pollen and charcoal analysis. Pollen and charcoal were counted at 10 cm intervals to reconstruct the vegetation and fire history around Shad Pond. Sediments from 250 cm, dating to ~5000 yBP, contain pollen from red mangrove (*Rhizophora mangle*) and buttonwood (*Conocarpus erectus*) in roughly equal amounts with small amounts of black mangrove (*Avicennia germinans*) pollen also present. At 230 cm, the lower part of the peat, red mangrove pollen becomes overwhelmingly dominant with small amounts of buttonwood and black mangrove pollen still present. Numerous small roots in the peat and the abundance of red mangrove pollen suggests that Shad Pond was a shallow red mangrove-dominated swamp between ~4800 and 3700 yBP, when the peat layer ends. At 180 cm, just above the peat, red mangrove pollen falls to low levels and buttonwood becomes the most common mangrove pollen, however, pollen from palms becomes dominant along with lesser amounts of pollen from rockland and coppice species. Palm pollen continues to be dominant with buttonwood and other hardwoods also present until 60 cm depth. By 50 cm depth, palm pollen all but disappears and pollen from disturbance species increases while buttonwood pollen remains similar to that in the lower levels. Coincident with the dramatic drop in palm pollen and rise in disturbance pollen is a spike in charcoal particles. Charcoal had been fluctuating between 300-500 particles per cc in lower levels but spikes to over 6000 particles per cc at 50 cm depth. A depth-age model for the core suggests the 50 cm level is ~1500 cal yBP, somewhat early for, but in the range of Lucayan occupation of Eleuthera. Palm pollen remains scarce and pollen from disturbance species higher until near the top of the core when palm pollen recovers somewhat. The sudden decline and later recovery of palm pollen suggests heavy exploitation of palms by Lucayans after settlement followed by recovery after European contact.

Crab pen survey and harvest analysis of the land crab, *Cardisoma guanhumi* Latrielle (Decapoda: Gecarcinidae), fishery in The Bahamas

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Land crabs, including *Cardisoma guanhumi* (Decapoda: Gecarcinidae), are harvested throughout the Caribbean, Central America, and Northern South America where they are an important fishery resource. Harvest pressure during the seasonal migration and habitat loss for all stages of the life cycle are universal issues through the range and decisions must be made regarding the best way to manage these wide-ranging populations. Andros Island is known to support the largest population of land crabs in The Bahamas though few formal studies are available to provide stock assessment data for the fishery. Additionally, there are no regulations in The Bahamas for this species and little is known regarding the size and age structure of the harvested land crabs. This project aims to analyze sex ratios and size data for *C. guanhumi* harvested during the 2014 season on North Andros Island and Abaco Island, The Bahamas, as a means to understand current harvest trends during the spawning migration. These data will be utilized for the establishment of meaningful dialogue between land crab fishery stake holders in The Bahamas.

Oil in The Bahamas

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The Bahamas is currently (2015) preparing legislation for both the issuing of licenses and permits for oil exploration, and regulations for environmental safeguards covering the production of oil or gas, should it be found. In view of this, the existing extensive oil installations in The Bahamas, and the related propensity for oil spills associated with these, mainly in Grand Bahama and New Providence, are identified and examined.

In the light of the recent comprehensive search for oil in the southern Bahamas, a review of the previous drilling efforts spread over the whole country, from the Blake Plateau in the north to the Cuban border in the south, and in adjacent Florida, is offered. The particular geological structures identified by the Bahamas Petroleum Company (BPC) are illustrated, and the relevance of the 2012 drilling of several unsuccessful wells in Cuban waters is considered.

Finally, as BPC anticipates drilling its first test well in the next year or so, the likelihood of success, and the impact such success would have for the Bahamas, is discussed in the context of the abundant oil and gas reserves now being exploited throughout North America.

Population genetics and behavior of the crazy ant, *Paratrechina longicornis* (Hymenoptera: Formicidae), on San Salvador Island, The Bahamas: can the crazy ant help us understand competitive interactions and biological invasions?

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During the 2014 field season we sampled locations across San Salvador Island and found *Paratrechina longicornis*, an invasive ant from Asia, has the broadest distribution across habitats on the island. The behavior of this species at baits was intriguing: *P. longicornis* would sometimes recruit massive numbers of foragers dominating all baits in an area and in other instances have very poor competitive abilities with other species regardless of apparent nest density or local abundance. Therefore, we are investigating the behavior and genetic diversity of these ants. We are currently collecting *P. longicornis* from as many locations on the island as possible, along with behavioral data, and examining the cuticular hydrocarbons and DNA micro-satellites. We anticipate these three measures will identify whether San Salvador Island has a closely related population of *P. longicornis* or multiple distinct genotypes. The identification of an "invasive genotype" within *P. longicornis* may be useful in controlling these pest ants and offer an interesting biological system for understanding what makes one species invasive and other introduced species non-invasive.

Encrusting foraminifera at Cat Island, Bahamas

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Benthic foraminifera that are cemented by calcium carbonate or are otherwise firmly fixed to hard surfaces are commonly known as encrusting foraminifera. They have received relatively little attention as paleoenvironmental indicators when compared to free species. They are very sensitive to environmental variables such as ambient light and water energy and are abundant in their preferred habitats. Because encrusting foraminifera are fixed in place, they are more likely to stay in the original habitat; their tests remain in place after death, leaving a post-mortem history.

Distribution of dragonflies (Odonata) in the Bahamian archipelago

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As a Caribbean archipelago whose islands span multiple latitudes, the Bahamas have differing precipitation levels and vegetation types in the northern islands and the southernmost islands. The environmental conditions combined with a unique geologic history of eustatic sea level changes and the existence of three distinct bank systems separated by deep ocean trenches have shaped the natural history of these islands. These features have been recognized as factors shaping insect distributions throughout the archipelago and may influence the distribution of dragonflies (Odonata) throughout the Bahamian islands. To test this theory, dragonflies were sampled from 13 islands spanning the entire island chain for five non-consecutive years between 1994 and 2002. A total of 20 species were collected with individuals in the families Libellulidae and Aeshnidae. Statistical analysis of these data suggests that the distribution of dragonflies in the Bahamas is homogenous with regard to overall species richness on different islands and on different bank systems of the archipelago, suggesting that species distributions are not strongly impacted by the bank systems. However, there are patterns in the data that could indicate noteworthy differences in species distribution when looking at the archipelago as a whole and when taking more environmental variables into account. Our data suggest that certain species have localized distributions on only one or a few islands as opposed to some that are found throughout the Bahamas. This data and all analyses are preliminary and are meant to serve as an initial look at how dragonfly species are distributed throughout the archipelago and what spatial and environmental factors influence potential patterns of dispersion.

If you go out in the woods of San Salvador, you will be surprised!

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Over the years, 35 to be exact for one of us, exploring the woods of San Salvador has become an obsession. We continue to be amazed at the variety of features that San Salvador hides from us. This report mentions some old and new items from our research. Bushwhacking has revealed the existence of an inland fossil reef system hidden from view on the eastern side of San Salvador to three historic buildings on the John Weir property grant near the southern edge of Sandy Hook. Careful observations even revealed a broken but rare beer bottle from the GEO. W. OTTO brewery of Philadelphia, which was produced from 1881 to 1884. A cracked metal flower vase made by Würtemberzische Metallwarenfabrik (WMF) was found in the woods and dates from 1909 to 1914. These are just a few of the items found in the hidden woods.