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J. BARRY LOMBARDINI: EDITOR

LOUISIANA'S AVERY ISLAND AND ITS ENIGMATIC BUTTERFLIES

GARY NOEL ROSS, Ph.D.

Fig. 1. FRONTISPIECE. ***Avery Island #5.*** **An original 36" x 36" oil-on-canvas painting from the** ***Avery Island Series*** **by Samuel Joseph Corso of Dufour/Corso Studios, Ltd., Baton Rouge, LA. First exhibited October 1-31, 2019 in Baton Rouge Gallery. Image was inspired by two oaks at entrance to island in Fig. 7. Photo used with permission of the artist.**

Fig. 2. Historic aerial view of Avery Island, 1976. Island is a family owned ancient salt dome that has been extruded above the surrounding coastal wetlands of south-central Louisiana, Iberia Parish. Weeks Bay and Vermilion Bay on the horizon empty into the Gulf of Mexco. Photo courtesy of Avery Island Archives.

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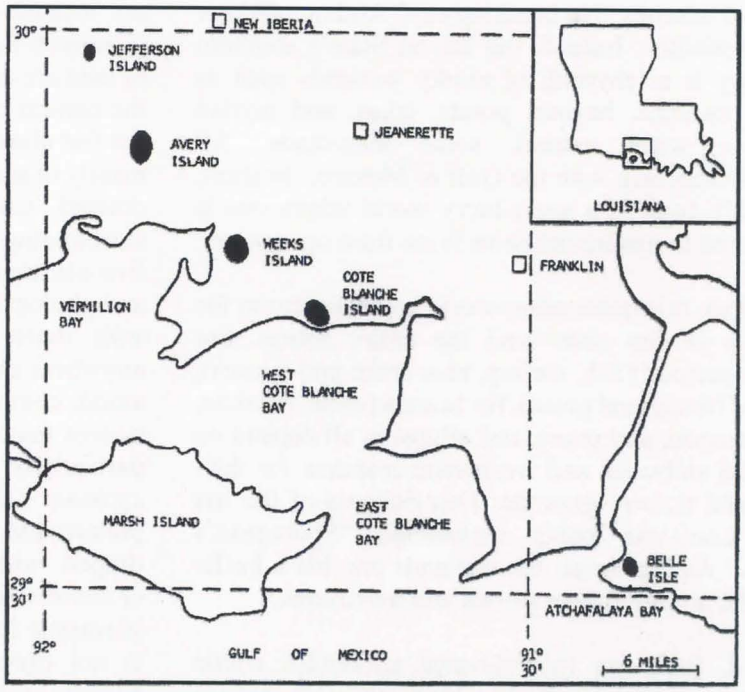


Fig. 3. Location map: "Five Islands" of Louisiana. From Reese and Thieret (1966).

Fig. 4. Avery Island looms 165 feet above Louisiana's coastal marshland. Native American lotus (*Nelumbo lutea*) often accents the dominant grasses and reeds. Photo from an earthen levee separating marsh from sugarcane field in Fig. 5. June 12, 2019.

INTRODUCTION

Louisiana's Gulf Coast is like no other. There are no sugar-sand beaches. No breaking surf. And no offshore craggy monoliths. Instead, the Bayou State's southern topography is a labyrinth of murky wetlands such as marshes, swamps, bayous, ponds, lakes, and myriad channels — some natural, some man-made. All eventually interface with the Gulf of Mexico. In short, Louisiana's coast is a topsy-turvy world where one is hard-pressed to distinguish terra firma from open water.

Nonetheless, this quasi water-world is paramount to the economics of the state—and the entire nation. For example, seafood (fish, shrimp, blue crabs and oysters), waterfowl (ducks and geese), fur bearers (mink, muskrat, nutria, raccoon, and otter), and alligators all depend on the coastal saltwater and freshwater marshes for their feeding and nursery grounds. This richness of life has led to Louisiana being nicknamed "Sportsman's Paradise." As lagniappe, the wetlands provide a buffer against the not infrequent storms and hurricanes.

That said, there are two elevated anomalies within Louisiana's coastal lowlands. First, cheniers. French *chênière* for "oak place," these are ancient beach ridges that were formed when sea level was different. Cheniers are located only in the southwest sector of the state (Cameron Parish and Vermilion Parish). These slivers of land are oriented in an east-west direction, paralleling the current coastline. The dry land rises no more than ten feet above the surrounding marsh. Soil is composed mainly of sand and fragments of shell, alkaline, and well drained. Cheniers stand out dramatically from their surrounding marshlands because of the presence of lofty live oak trees (*Quercus virginiana*). [To quote author and photographer William Guion, "Louisiana is blessed with more beautiful and splendid live oaks than anywhere else in the country."] Noted for their dense wood, compact mushroom canopy, and extensive root system that often emerges above ground, live oaks are particularly stable in hurricanes—common summer cyclones along the Gulf coast. Live oaks are picturesque, too. Their long, heavy limbs are often draped with thick festoons of gray Spanish moss (*Tillandsia usneoides*), an epiphyte ("air plant") in the pineapple family (Bromeliaceae). And where the moss is not prevalent, limbs often support thick mats of another epiphyte known as resurrection fern (*Pleopeltis polypodioides*), a true fern. Both plants have become emblematic of the South.

Fig. 5. Field of sugarcane on mainland opposite marsh in Fig. 4. Cane is harvested in late autumn through early winter. October 21, 2018.

Both the oaks and their piggy-back epiphytes were of inestimable value to settlers. The dense wood, for instance, was perfect for the construction of houses, barns, fences, tools, and boats, whereas dried Spanish moss provided stuffing for mattresses and pillows. Prior to the 1830s Congress had designated the huge stands of oaks on Cameron's cheniers as "naval reserves" for future ship building. But in the mid 1800s, an amendment was passed to free these lands for private ownership. While a bonanza for locals, the new law proved disastrous for the oaks. Due to decades of human exploitation exacerbated by destructive hurricanes, cheniers are mere shadows of their former glory. Nevertheless, because cheniers are at the state's coastal border, the unexpected dry woodlands create suitable habitat for species of plants and animals that typically have a more northern distribution. [See my Burroughs award-winning "Butterfly Wrangling in Louisiana," *Natural History* May 1995 and my Louisiana Wildlife Federation award-winning "The Monarch butterfly," *Louisiana Wildlife Federation*, special issue, November-December 2001.] Additionally, because of sand and shell composition, chenier soil drains well and thus is an excellent medium for xerophytic plants such as yucca and prickly pear cactus (*Opuntia*). In spring, wildflowers such as tickseed (*Coreopsis lanceolata*) and Indian blanket (*Gaillardia pulchella*) can form massive displays in disturbed places such as roadsides and abandoned homesteads and pastures.

The second example of an enclave of dry land in coastal Louisiana is referred to as Louisiana's "Five Islands." These carry the following names: Avery Island, Jefferson Island, Weeks Island, Cote Blanche Island, and Belle Isle. All are circular in shape with diameters of less than three miles; elevations range between 16 and 165 feet above sea level. These discordant topographies are located in the extreme south-central parishes of Iberia and St. Mary, and south of the urban centers of Lafayette, Abbeville, and New Iberia. The so-called islands differ from cheniers in origin, physiography, soil, and except for being dominated by live oak trees, plant communities as well.

[NOTE: South-central Louisiana resonates with American history. For example, in the mid nineteenth century, the American poet and storyteller Henry Wadsworth Longfellow (1807-1882) referenced the south-central coastal area of what is now Iberia Parish and St. Martin Parish in his *Evangeline: A Tale of Acadie*. The poem, an American high school classic, popularized and immortalized the lives of

Fig. 6. Bayou Petite Anse is a natural watercourse that skirts the northern and western margins of the salt dome. The bayou is a popular recreational site.

French-speaking Acadians, who were displaced by the British beginning in 1755 from what is now the Maritime Provinces of Canada. Descendants of those early French settlers in coastal Louisiana—along with new European immigrants, Afro-Caribbean slaves, and local French-speaking Creoles (native-born colonists)—eventually became known as "Cajuns," their homeland, "Acadiana."]

Although termed "islands," the dry mounds are not islands in the traditional sense, that is, elevated land surrounded by water. Although each is elevated, circular, and separated from a mainland, the dry ground is not encircled by the Gulf of Mexico. Instead, the "islands" are surrounded by a contrasting environment of flat wetlands such as marshes, swamps, bayous, and canals. Put simply, Louisiana's Five Islands are emergent dry land in a very wet place. Ergo, Louisiana's Five Islands are not unlike the "Sky Islands" of southeast Arizona (massifs surrounded by grasslands and deserts) or the table-topped tepuis (high mesas surrounded by tropical vegetation) of Venezuela and the Guianas of South America.

Louisiana's five islands are considered geologic oddities. Technically, they are prehistoric upthrust salt domes. Defined as a circular mass of subterranean evaporative salt (chemically, sodium chloride) that had been compacted into rock salt (the mineral, halite). Louisiana's salt domes were preceded by a primordial inland sea that covered what now encompasses the states of Texas, Louisiana, and Mississippi. The water-world dates to the late Jurassic Period: 165-139 million years ago, commonly referred to as the middle of the "Age of Dinosaurs."

But first the water had to evaporate. That left behind residual layers of fine crystalline salt. As time passed, the salt was overlaid with hundreds to thousands of feet of alluvium washed down by water courses such as the incipient Mississippi and Atchafalaya river systems that were draining surrounding lands. With increased weight, the original low basin sank either further. Eventually, deep geologic pressures compressed the mud and sand into sedimentary rock (sandstone, shale), and the evaporative salt into today's rock salt. But because salt in any form is less dense than surrounding sediments, the mineral was further compressed and

Fig. 7. Bridge across Bayou Petite Anse at entrance to island. In 2018, 15 West Indian manatees were sighted in freshwater courses in south Louisiana. Although a resident in Florida, manatees sometime migrate westward along the Gulf coast. July 11, 2018.

squeezed upwards as a plume (technically, a diapir). Upward movement was facilitated by cracks (faults) in the surrounding layers. Encountering even less resistance near ground surface, the upper portion of the plume expanded both in height and width, causing the upper portion carrying a mantle of soil, to bulge. If one could peel back the soil mantle and view the entire dome in vertical section, one would see a mushroom shaped intrusion rising from a depth of six to seven miles (approximately 40,000 feet) and surrounded by underground accumulations of oil and natural gas, reserves now exploited by the petroleum industry. According to prevailing theory, the landmass that constitutes Avery Island as we know it today, dates back only to the Pleistocene Epoch (referred to as the "Ice Age") that began about 2.6 million years ago and ended 11,700 years ago.

STATISTICS AND HISTORY

General

Avery Island (A.I.) was originally named Île Petite Anse (French for "Little Cove Island"). The landmass is located at 29° 54' 12" North latitude, 91° 54' 37" West longitude in Iberia Parish (=county). This is in the heart of Louisiana's "Acadiana"—originally a French-speaking south-central sector of the state. The island is about 130 miles west of the metropolis of New Orleans, 92 miles southeast of Baton Rouge, and 30 miles south of Lafayette. Annual rainfall is 61.6 inches, average July temperature, 90.6 degrees F., and average January temperature, 41.7 degrees F. Of the Five Islands, Avery is the largest: 2,200 acres (3.4375 square miles, 890 hectares), and approximately 2.5 miles in diameter. For comparison, this area is roughly equivalent to twice the area of City Park in New Orleans and three times the area of Central Park in New York City. The island boasts the highest elevation (165 feet) of the Five Islands according to a 1931 National Geodetic Survey. Thus Avery Island is distinguished as the highest land on the entire Gulf Coast between Brownsville, Texas, and Key West, Florida.

The nearest metropolis is New Iberia, population of 30,617 (2010 U.S. census). Serving as the political seat of Iberia Parish, the small community is located eleven miles north of the island on the mainland at 16 feet above sea level. From New Iberia, A.I. is accessed by LA Highway 14 (west) followed by a seven mile stretch of LA Highway 329 (south). State maintenance then ends at a low bridge over Bayou Petite Anse and the

Fig. 8. Entrance to Avery Island. All visitors receive a free pass at the kiosk that is manned 24/7. In the past, a nominal toll was charged to assist with road maintenance.

northern edge of Avery Island. Beyond is private property owned by Avery Island, Inc. Traffic must gain clearance from an attendant in a kiosk with boom gates—originally a "toll gate." Today, all vehicles without an "Avery Island Identification Sticker" are given a complimentary numbered pass for their vehicle. Residents utilize a centrally located post office (area code 70513) for USPS correspondence. The corporation maintains interior roads, security patrol, and volunteer fire department.

Although circular in shape, the island appears on the horizon as an undulating ridge oriented in an east-west direction. As indicated previously, the island is encircled not by open water of the Gulf of Mexico but by wetlands—principally marshes and to a lesser degree, swamps. The width of these wetlands varies. To the north, for example, freshwater marsh spans 1.4 miles before interfacing with dry ground given to fields of sugarcane and small human settlements. To the south, the marsh (now salt or brackish) widens to 3.25 miles before interfacing with the saline water of Weeks Bay—a small cove of Vermilion Bay, which in turn is a basin within the northern Gulf of Mexico. To the east, there is a narrow swath of semi-viable swampland. To the west, marsh dominates before gradating into dry fields of cultivated sugarcane.

The wetlands encircling the island are problematic. The northern freshwater marsh is being invaded by woody shrubs and trees, especially Chinese tallow (*Triadica sebifera*), black willow (*Salix nigra*), Southern wax myrtle (*Myrica cerifera*), and baccharis/groundsell bush (*Baccharis halimifolia*). All absorb water and contribute organic matter. As ecological succession proceeds, the water-tolerant species will yield to woody species that invade the drying ground. In the end, the island will be connected to the mainland by a mesic community with soil enriched by organic deposits from the previous hydric marshland. The fertile land will most likely be cultivated with sugarcane.

In contrast, the marshes and swamps to the east, west, and south are being eroded by the encroaching Gulf of Mexico. Four factors are at play: (1) long-term subsidence of the land due to the weight of sediments from the nearby Mississippi and Atchafalaya rivers, (2) rising sea level due to global warming, (3) sink-holes due to excavations within the salt dome, and (4) death of vegetation and subsequent land erosion

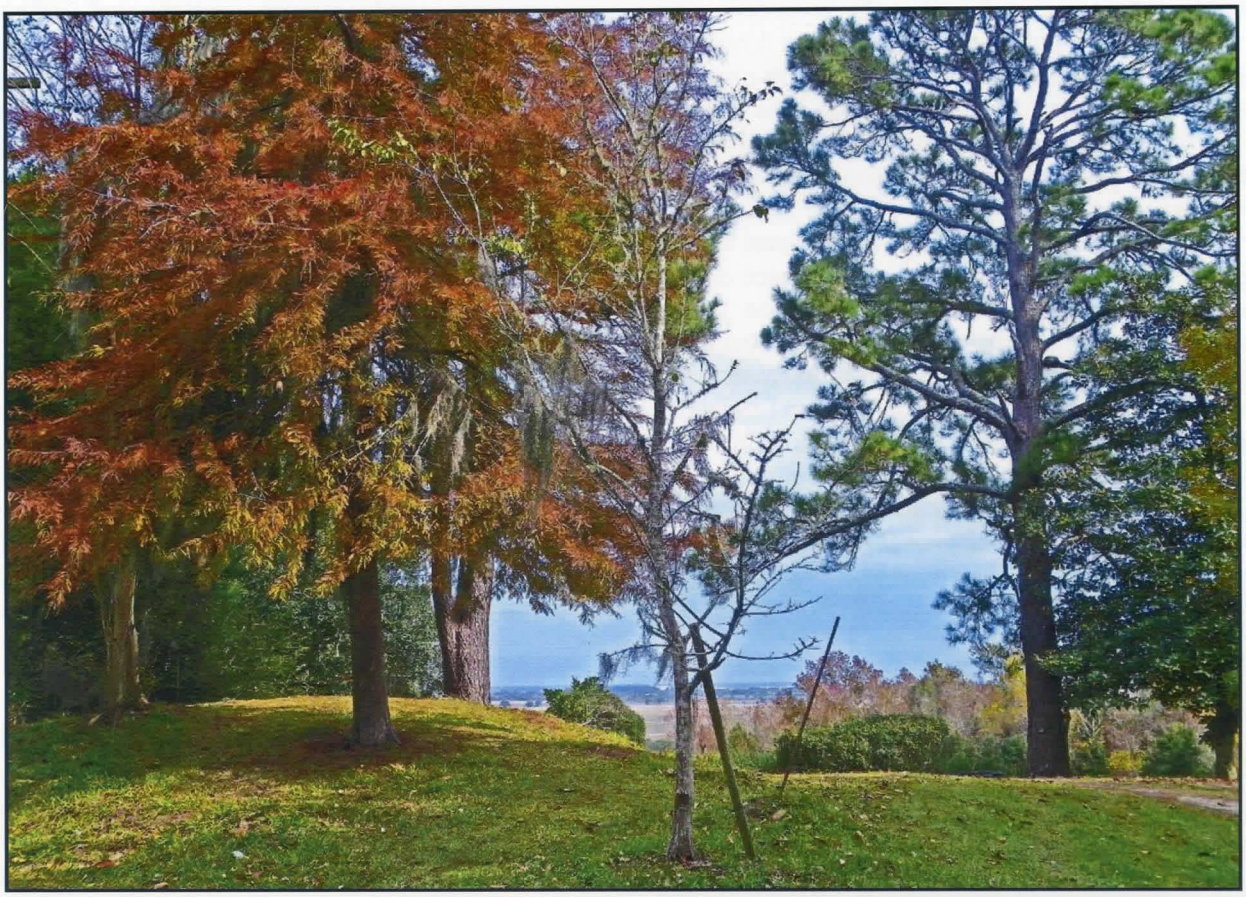


Fig. 9. Autumn coloring on the high point of the island: Prospect Hill, 165 feet. Lowlands of marsh, sugarcane fields, and small residential communities are visible on the clear horizon. November 29, 2018.

initiated by exotic nutria (*Myocastor coypus*) and man-made channels dredged for oil exploration. Which trajectory will trump, is, of course, uncertain.

Northern and western sectors are skirted by a narrow natural watercourse. Named Bayou Petite Anse (French for "Bayou Little Cove"—a small bay into which the bayou originally emptied), the watercourse historically emptied directly into the Gulf of Mexico. But currently, Bayou Petite Anse empties directly into the dredged Avery Canal, which in turn, empties into the Gulf. The bayou is slow-moving and laden with tannins and sediment. Because of its proximity to the Gulf, the bayou is influenced by tides. Absent levees, the watercourse systematically floods and drains the surrounding marshlands.

Although referred to as a dome or mound, Avery Island has no well defined peak or mesa as the words might imply. Over the past millennia, bountiful precipitation in a subtropical climate has eroded the soil cap, creating a terrain of rolling hills and valleys as well as gullies and deep ravines. Some of the ravines are steep sided and approach a depth of 60 feet or more; most are densely wooded, and cooler than their surroundings. The eroded topography does feature, however, three "knobs." Of these, Prospect Hill in the northeast sector is considered the high point; a telecommunications tower camouflaged as a giant pine tree, dominates.

Understandably, A.I. has no flowing surface water. Several deep ravines, however, do hold scanty amounts of water for brief times following heavy rains. Also, there are several permanent bodies of freshwater: Willow Pond, Saline Pond, Blue Hole, Hayes Pond, DeVance Pond. All are rain-filled sinkholes due to the collapse of natural hollows or industrial excavations within the water-soluble subsurface salt.

As with Louisiana's southwestern cheniers, live oak trees dominate Avery Island. On the island, however, the trees are more numerous and display wider canopies than those on the cheniers—probably because of less damage from past hurricanes. Massive trunks are prone to large calluses—gnarly cancer-like protuberances that are products of previous damage. Lower limbs are often weighted with massive cargos of epiphytes such as Spanish moss and resurrection fern. So heavy, these bottom limbs often slump to the ground before resuming vertical growth. This "octopus-esque" caricature reflects the singular pedigree of *Quercus virginiana*. The island's oaks are considered to be the second largest

assemblage of ancient oaks officially recorded. The Live Oak Society under the auspices of the Louisiana Garden Club Federation considers the 1000-plus live oak trees (249 registered) in City Park in New Orleans to be "the largest live oak grove in the world." [NOTE: Some longtime residents note that Spanish moss used to be much more pervasive. But beginning about 1970, there has been a steady decline in numbers and lengths of moss festoons. As the moss dwindled, space on tree limbs became available for the proliferation of the compact resurrection fern. Authorities associate the waning moss along the Gulf coast with the spread of a pathogenic fungus from Florida. In southern Louisiana, the moss is believed to have been further compromised by air pollution from the burgeoning petrochemical industry. Given this double whammy, the charismatic "air plant" could not hold its own.]

Fig. 10. National Geodetic Survey marker (1911) atop Prospect Hill. Lowlands are visible on the horizon.

Other than live oaks, undisturbed lands are characterized by small to medium-size hardwood species. These include, but are not limited to: hackberry (*Celtis laevigata*), water oak (*Quercus nigra*), Southern red oak (*Q. falcata*), southern magnolia (*Magnolia grandiflora*), swamp/pignut hickory (*Carya glabra*), American elm (*Ulmus americana*), winged elm (*U. alata*), sweet gum (*Liquidambar styraciflua*), boxelder (*Acer negundo*), rough leaf dogwood (*Cornus drummondii*), American basswood (*Tilia americana*), ironwood (*Carpinus caroliniana*), and eastern cottonwood (*Populus deltoides*). The highly fertile and invasive Chinese camphor (*Cinnamomum camphora*) is pervasive, especially along the edges of woodlots. The dominating hardwoods are punctuated with an occasional coastal red cedar (*Juniperus virginiana*) and the non-native tall palmetto palm (*Sabal palmetto*). On the slopes of shaded ravines, colonies of the medium-size pawpaw tree (*Asimina triloba*) are localized.

Understory vegetation is congested. Major species include: native palmetto (*Sabal minor*) and immature specimens of Chinese camphor, often so thick that they often develop into shrubbery along the edges of wood lots. In addition, the low-growing Chinese Christmas berry (*Ardisia crenata*) is usually well represented in heavily shaded locales. Native yaupon holly (*Ilex vomitoria*) and Chinese privet (*Ligustrum sinense*) are common along forest edges. Localized colonies of wood fern (*Thelkypteris kunthii*) often form a ground cover.

Archeological research on Avery Island indicates that the dry land was known to pre-history *Homo sapiens*. According to Shane K. Bernard, Historian and Curator for Avery Island, Inc: "Artifacts from Native Americans living on the mainland north of the island have been radiocarbon dated to 2500 BCE, whereas pottery artifacts found on the island itself have been dated only to about 500 to 1500 AD." Native Americans ostensibly exploited surface seeps of brine (salt) on a regular basis. A commemorative plaque just beyond the entrance gate to the island is titled FIRST ROCK SALT MINE." The plaque explains how the mine was important during the nation's Civil War.

But human activity on the island traces back even further. There is a published account in 1866 (J. Leidy) that describes bones of the extinct mastodon and ground sloth along side the partial remains of basketry and matting in salt from what was termed "Salt Mine Valley," a seep near what became the dig site for the shaft of the salt mine in 1898. Paleontologists now agree that the finding dates to the late Pleistocene Epoch ending between 12,000-10,000 years ago. Research in the mid 1900s documents the presence of saber-tooth tiger, giant bison, mammoth, and plains horse. Sea level was considerably higher so that the island was not separated from the mainland. Because the pre-historic sites are now on Avery Island proper, the island is an important paleontological and archeological site for North America, particularly because of the seeming concurrence of paleo-Indians and paleo megafauna.

Fast forwarding, Bernard states: "In 1818 John Craig Marsh (1789-1858) settled onto the island—the highest dry land south of what is now New Iberia. The location boasted a sub-tropical climate and fertile, dry

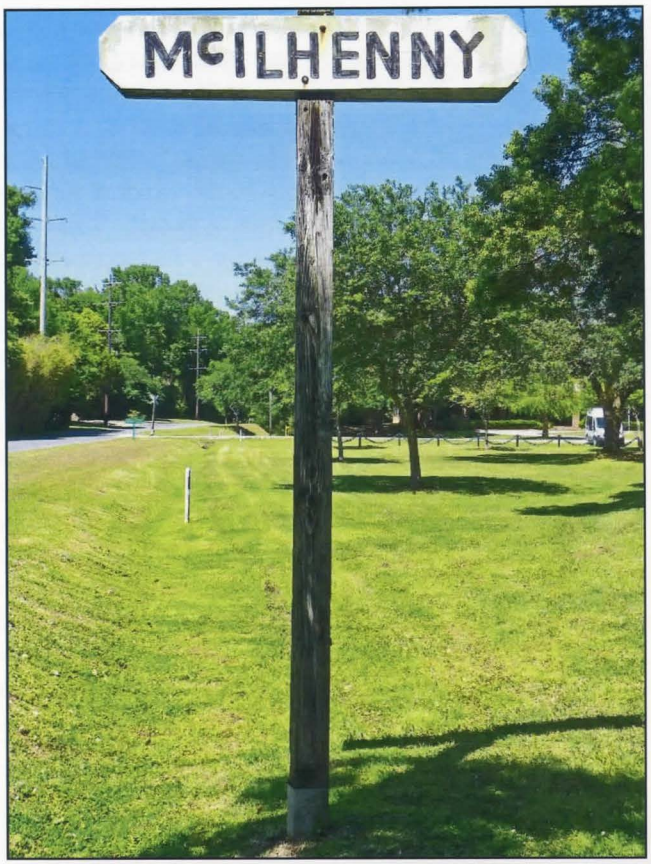


Fig. 11. Sign identifying original train spur. Tracks were removed in 2003. All shipments to and from the island utilize trucks or barges.

Fig. 12. U.S. Post Office (70513) serves all residents and commercial enterprises.

Fig. 13. Plaque identifying Avery Island as an official site on the National Register of Historic Places as of September 2018.

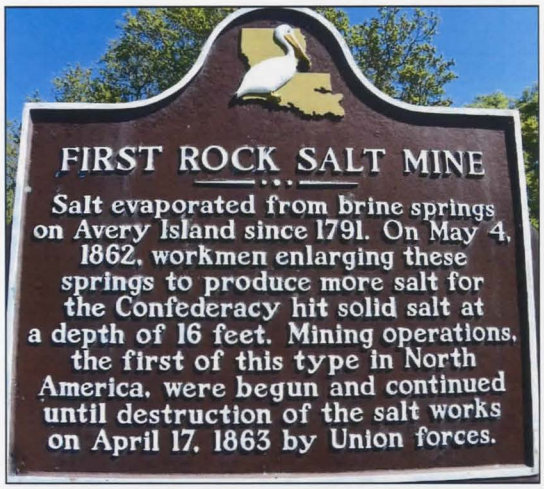


Fig. 14. Sign depicting the history and importance of salt on Avery Island. Visitors no longer have access to the working mine that extends down 1,850 feet.

Fig. 15. Working oil well. Oil and natural gas are commonly associated with salt domes. Although the island's natural gas deposits have been exhausted, oil continues to be extracted.

soil that was conducive for the cultivation of sugarcane, at the time, the nation's primary source of sugar. (Louisiana is currently the nation's second-biggest producer of cane sugar, topped only by Florida.) Shortly thereafter (1820s), the land was sold to Daniel Dudley Avery (1810-1879). Both Marsh and Avery families were of Anglo (British) ancestry." (See **Tabasco, Birds, and Historic Gardens**.)

Following the Civil War, islanders sank a sizable shaft near the original salt seeps. That shaft along with the original steam engine used to run the hoist continues to operate to this day. Over time, the mine has been leased to AKZONOBEL (AKZO) and INTERNATIONAL SALT, and as of 1997, CARGILL. Miles of underground travel-ways move between depths of 500 feet to 1,850 feet and connect large excavated rooms

(averaging 35 feet in height) of 99% pure rock salt. The product, which is shipped by barge and truck, is used to deice roadways although some salt is processed for other commercial uses. Originally a tourist attraction, the mine no longer hosts visitors due to safety concerns.

In 1942, petroleum and natural gas were discovered on the island by HUMBLE OIL & REFINING CO. (ESSO/EXXON). Currently, TEXAS PETROLEUM INVESTMENT COMPANY of Houston, TX, leases land for crude petroleum extraction (natural gas is now exhausted) from Avery Island, Inc. Several extraction wells and storage facilities continue.

Tabasco, Birds, and Historic Gardens

Shortly prior to the Civil War, Edmund McIlhenny (1815-1890)—of Scots-Irish heritage born in Maryland — relocated to New Orleans for much greater business opportunities. Edmund soon married into the Avery family, who in 1865 had begun to live permanently on the island. Imbued with entrepreneurial skills and favored with his in-laws fertile land, Edmund developed a proprietary pepper sauce in 1868 based on seeds acquired from an arguable source. The tabasco pepper plant, *Capsicum frutescens* variety *tabasco*, is a variety of the common chili pepper. The pepper is noted for its "juicy" interior, a trait that makes the ripened peppers ideally suited for rendering into a mash. While the actual origin of Edmund McIlhenny's first pepper seed is uncertain, myths abound. As chronicled by historian Shane Bernard in his coffee-table book *TABASCO®: An Illustrated History*: the word "tabasco" is of Mexican-Indian origin and probably means "land where the soil is humid" or "place of coral or oyster shell," no doubt a reference to Mexico's southern Gulf coast state of the same name. The method of preparing the tasty condiment was patented in 1870 as *TABASCO Brand Pepper Sauce*. That sauce eventually became the hallmark of the company, family, and island. Today, the spicy condiment has become standard fare in the US military's MRE rations as well as an offering on space shuttle flights, and aboard the International Space Station.

Fig. 16. Natural brine seep used by early Native Americans. Pottery shards date back to 500-1500 A.D. April 12, 2018.

Edmund's second son, Edward Avery McIlhenny (1872-1949), "Mr. Ned," was a professional biologist and a consummate conservationist. As a neophyte barely twenty years of age, Mr. Ned served as the official ornithologist for an arctic expedition in 1894. In 1897-1898, he served as a scientist on an expedition to Point Barrow, Alaska to collect specimens for two institutions in Philadelphia.

Perhaps what upended all was Mr. Ned's creation of *Bird City*, a protected communal nesting site, aka, rookery, principally for large wading birds. The project was inspired in 1895 when the scientist son of the McIlhenny family first noticed the spiraling decline of egrets and herons—large, long-legged, showy white wading birds that were using the wetlands surrounding the island as their feeding and nesting grounds. The large birds were being slaughtered wantonly by unregulated hunters for their fanciful plumage then trendy in the millenary trade for stylish adornments on the hats of women. Reacting to the decimation, the young biologist enlarged a small ancient sinkhole (Willow Pond) down the hill from his home now named Mayward Hill. The pond was bordered by low branching trees such as black willow (*Salix nigra*), buttonbush (*Cephalanthus occidentalis*), bald cypress

Fig. 17. Inactive oil well. Because such areas are usually not mowed regularly they are productive habitats for wildflowers and pollinators.

(*Taxodium distichum*), and tupelo gum (*Nyssa aquatica*). All seemed ideal for nesting sites for birds trying to escape ground and aquatic predators. To McIlhenny, the site was ideal for protection and experimentation. In short order, McIlhenny enlarged the pond into a 35- acre lake. In the middle, he constructed an elevated netted flight cage in which he hand-raised eight young snowy egrets (*Egretta thula*)—a major target in the millenary industry. That autumn the scientist released the adult birds so that they could migrate south, but hoping that they would return the next spring. The plan was astute. Each year, the initial cadre of nesting birds expanded exponentially. To accommodate the increase of snowy egrets as well as the nascent population of the larger great egret (*Ardea alba modesta*) — a bird that also had become a target in the plume trade — Mr. Ned increased the bamboo racks in the pond. Both bird species responded positively. Turns out, the lake provided a secondary advantage: the water acted as a mote that protected eggs and nestlings from land predators, especially ubiquitous raccoons.

Fig. 18. Archives Building on main road. Offices of official historian/curator (Shane K. Bernard) and botanist (Garrie P. Landry). Building was originally a school for the island's children.

In 1911 McIlhenny estimated his private watery sanctuary was protecting one hundred thousand birds. That rookery is credited to having revived Louisiana's—and by inference, the nation's—egret populations. None other than the venerable President Theodore Roosevelt (1858-1919), who is acknowledged as the "Father of American Conservationists," validated the work of McIlhenny by lauding *Bird City* as "the most noteworthy reserve in the country." In 1918 the United States Congress under President Woodrow Wilson passed the Migratory Bird Treaty Act, a law that put all migratory bird species under the jurisdiction/protection of the Federal Government. Ornithologists often credit E.A. McIlhenny for being an inspirational figure involved with the new legislation, and for saving at least the snowy egret from extinction.

Mr. Ned continued his zest for wildlife by becoming the first president of the Audubon Society of Louisiana. According to Bernard: "In 1910 a chance meeting with fellow conservationist Charles Willis Ward rekindled Ned's interest in private wildfowl refuges, a concept that Ned had pioneered years earlier with *Bird City*. A wealthy lumberman and horticulturist, Ward partnered with Ned to purchase 54,000 acres of coastal wetlands in Vermilion Parish, which they set aside as a protected wildfowl habitat. In November 1911 they donated 13,000 acres of this property to the state of Louisiana, creating the State Wildlife Refuge. 'This was the first

wildlife refuge in the world privately donated, for the public good,' Ned later recorded." But there was even more. According to Bernard: "Ned and Ward teamed together with Mrs. Russell Sage of the Sage Foundation and John D. Rockefeller of the Rockefeller Foundation to purchase over 175,000 acres of coastal marsh. All were dedicated to wildfowl conservation. And according to headlines in the New Orleans Times-Picayune newspaper, this was the 'GREATEST BIRD SANCTUARY IN WORLD." Today this massive tract of marshland is known as the united "Russell Sage Foundation Marsh Island State Wildlife Refuge."

Fig. 19. Sign on main road beyond entrance to island. A barrel containing a pepper plant (*Capsicum fruitescens* variety *tabasco*) demonstrates the source of the internationally respected TABASCO® Brand Pepper Sauce. Fields for cultivation are off-limits to visitors.

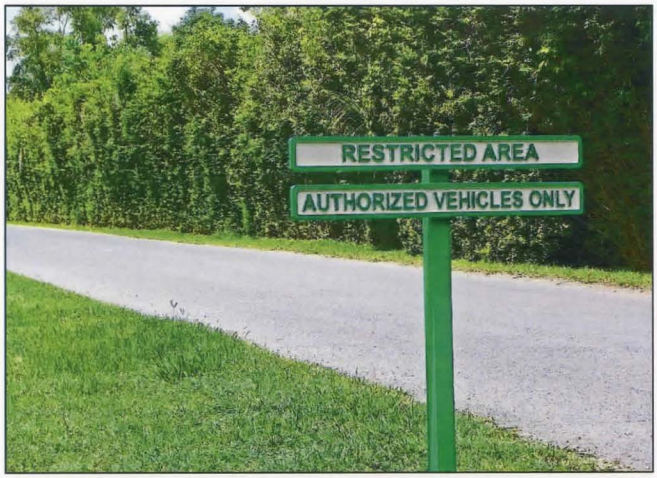


Fig. 20. Roadside sign cautioning that most of the island is off-limits to the pubic.

Another venture of Mr. Ned was christened *Jungle Gardens, Inc.* Opened about 1920 as a wholesale nursery and landscape architect business on the north/west sector of the island, the ambitious project was inspired by the island's subtropical climate and the fertility of dry/rich alluvium deposited by Bayou Petite Anse. Soon, McIlhenny gained the reputation as a "premier horticulturist." The nursery concentrated on the breeding and stockpiling of plants to supply requests for professional assistance with the installation of formal gardens. Examples include: old and new state capitols in Baton Rouge, campus of Louisiana State University, *City Park* in New Orleans, *Bayou Bend* estate in Houston, and an untold number of private residences. Many of the ornamentals were those favored by the wealthy in mid-nineteenth century Europe. The project was facilitated by David G. Fairchild (1869-1954), Chief, Office of Seed and Plant introduction, U.S.D.A., Washington, D.C. and the father of south Florida's famous *Fairchild Tropical Botanic Garden*. Because of a long friendship, McIlhenny was offered second dibs on many early imports from around the world, particularly Asia.

Later in 1935, the horticulture establishment was enlarged and opened to the public as *Jungle Gardens*, a five-mile drive-through garden and tourist attraction. The lush landscape of 170 acres near the islands' northwestern region was highlighted by a vast array of aged live oak trees—woody stalwarts overlooking the surrounding sea of grass. Special attention was given to many of the exotic ornamental plants favored by aristocrats and celebrities in mid-nineteenth century Europe.

Research indicates that *Jungle Gardens* in its prime featured a one-of-a-kind collection of 150 varieties of Japanese azalea, 700 varieties of Japanese camellia, 64 varieties of Chinese bamboo (including the most robust grove of giant "moso" timber bamboo, *Phyllostachys edulis*, outside of China), 1,700 varieties of iris (including hundreds of color nuances of the native Louisiana iris), Egyptian papyrus, Chinese lotus, and rare Chinese and Japanese hollies. Many types of plants were new hybrids created on site through years of personal experimentation. One year later, McIlhenny augmented his alluring gardens with a large wooden Buddha encased in a wooden/glass Asian temple as a focal point. The novel statue, of unknown provenance but attributed to either Chinese or Tibetan origin, is estimated to be 200-300 years old. The historic artwork was gifted in 1936 by two New York City friends, who per chance, discovered it in a Manhattan warehouse.

In 1971, John Stauffer McIlhenny (1909-1997), Mr. Ned's nephew, and who was imbued with what one might call "McIlhenny Grit," donated his personal collection of books and paintings in the name of his famous uncle to the Hill Memorial Library of Louisiana State University in Baton Rouge. Known as the "E.A. McIlhenny Natural History Collection" and housed in the "McIlhenny Room," the collection is recognized world-wide for its particular strength in New World botanical and ornithological illustrations.

Fig. 21. Modern corporate office of McIlhenny Company since 1977.

Fig. 22. Second factory (1905) now part of modern corporate office. The original factory ("Laboratory") operated between 1868 and 1905, but was demolished in the early 1920s.

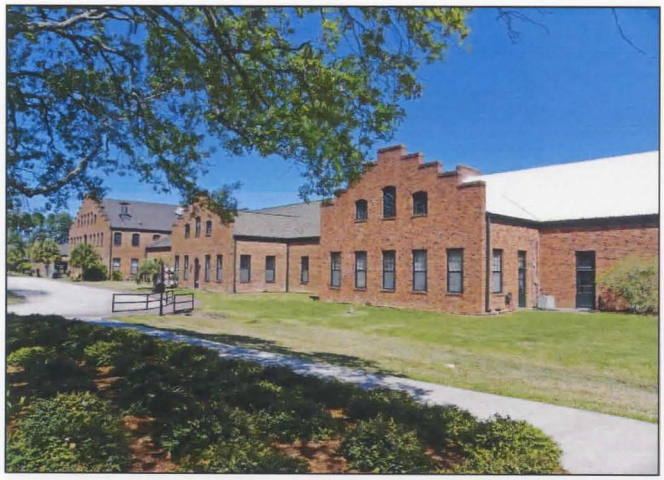


Fig. 23. Current factory for processing sauce (1980); included in visitor's tour.

Fig. 24. TABASCO® Museum. Approximately 100,000 tourists visit each year.

Fig. 25. TABASCO® Country Store. Modern facility offers visitors assorted TABASCO® products and memorabilia.

Fig. 26. Modern restaurant. The name "1868" commemorates the 150th anniversary (2018) of the first marketing of Edmund McIlhenny's TABASCO® BRAND PEPPER SAUCE.

Fig. 27. Field of Tabasco pepper plants. Only a few dozen acres are currently cultivated between April and October on the island's low eastern sector. To avoid a potential natural disaster, most cultivation is outsourced to several tropical countries in Central America and western Africa. Local seeds become next year's international plantings. The practice maintains the plants' original genome from 1868. July 11, 2019.

Fig. 28. Close-up of multicolored ripening Tabasco peppers in late summer.

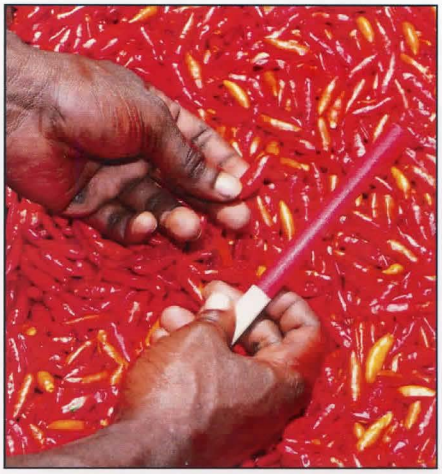


Fig. 29. Harvested peppers. Color gauge is used for determining degree of ripening. Photo courtesy of Avery Island Archives.

Fig. 30. Pepper picking in autumn. Photo courtesy of Avery Island Archives

MODERN DAY

Joining forces with two other private owners of coastal lands along with the National Audubon Society (owners of the Paul J. Rainey Wildlife Sanctuary), in 2011 an alliance was created to restore a significant section of the eroding south-central Louisiana coast. According to *The Advocate* newspaper of Baton Rouge: "The alliance has focused on a multifaceted approach to restoring the marshes, which help to slow approaching storms and protect the island from storm surge." Much of this restoration involves the "planting of cordgrass (*Spartina*) to stabilize soil. Other projects include the installation of several circular terraces a few miles west of Avery Island (to break up wave and wind energy), abandoning oil exploration canals, and burning patches of marsh (to encourage strong re-growth), and hunting feral hogs (that root up and destroy wetlands)." In conclusion, "McIlhenny Co. and the alliance invested about $1 million on a small overflow dam that slows water in a small bayou south of the island."

In September 2018, Avery Island gained listing in the National Register of Historic Places. The entire island is dedicated as a wildlife preserve, ergo, no hunting or collecting is permitted without special permission. All land remains the private domain of the 200-plus year old founding Avery and McIlhenny families. In 2017, the U.S. Census estimated that the island was the home to 295 residents. Of these, approximately 35 are direct descendants of the original two families. All others are employees living in vintage rental houses provided by McIlhenny Co. Most of these modest houses are grouped in close proximity to the Tabasco factory and the island's major road. The quaint neighborhood is known as *Tango Village*.

Only a single road continues to access Avery Island (see STATISTICS AND HISTORY). McIlhenny Co. and Avery Island, Inc. remain private corporations. Family residences are typically organized into a large binary landscape, that is, substantial dwellings are surrounded by expansive manicured lawns, which in turn are punctuated by undisturbed sylvan tracks. Each estate is usually accessed by a meandering, unpaved, (and often unmarked), driveway. The checkerboard landscape is park-like, not unlike the traditional manors or country homes in historic Great Britain.

Fig. 31. Oak barrels of pepper mash being fermented for three years. All peppers are processed on the island. Photo courtesy of Avery Island Archives.

"McIlhenny Deer" (*Odocoileus virginianus mcilhennyi*)—a subspecies of white-tailed deer characterized by smaller size, more massive teeth, and larger nostrils, and endearingly referred to as "Mc I Deer"—are flourishing. But according to a resident, the deer are observably larger than they were in the past—a condition attributed to cross-breeding with mainland deer occasionally displaced by devastating hurricanes. Although originally named for specimens collected on the island, the distinctive subspecies can be found in marsh habitats along the Gulf coast. Deer are easily observed during early morning and evening hours. Several residents even cultivate fodder (grains and turnips) to feed their resident free-roaming "pets."

The relatively new 38-acre Tabasco complex, located just beyond the entrance gate, includes the Tabasco Factory, its related vintage-style *Tabasco Country Store, Tabasco Museum*, and *1868 Restaurant*; all open to the public on a daily basis for a nominal fee. *Jungle Gardens*, which includes a small shop for purchasing tickets and gifts, is open to visitors as well. All other lands are off-limits to outsiders, and there are no overnight accommodations.

Because of its long-standing acumen, McIlhenny Company remains the sole proprietor of the auspicious *TABASCO® Brand Pepper Sauce*. The recipe for production remains unchanged. Although a number of different brands of "hot sauce" have invaded the culinary market, TABASCO® continues as "King of Hot Sauces." The company describes itself as "small business with a large product." During early years, hundreds of acres on the low eastern side of the island, which were extremely fertile due to erosion from higher elevations, were cultivated with the unique pepper plants. But due to concerns about crop devastation by a future hurricane or disease, seeds are now distributed to local farmers in several Central and South American countries, and several sites in western Africa. All off-site peppers are ground into a mash in situ. The mash is then shipped back to the island for in-house processing and aging—a patented operation takes a full three years (from seed to bottled product takes a full five years). In 2018, roughly 15-20 acres of peppers in five adjacent plots were cultivated on the island to produce the following year's seed crop. (Because humans are thought to be the only mammals with receptors for capsaicin, the chemical in chili peppers responsible for the "heat" in chili peppers, all acreage is fenced to protect the plants from nibbling by deer and black bear.) In addition, seed management guarantees genetic purity to what is believed to be "heirlooms," that is, descendants of the original plant cultivated by Edmund McIlhenny in 1868. While in the past, ripe peppers were hand-picked, the company has been experimenting with automated machinery for picking. In the future, hand-picking may become a lost art.

According to Bernard, "Each workday the Tabasco factory produces hundreds of thousands of bottles of sauce, which are labeled in 25 languages and dialects and sold in 195 countries and territories around the globe." Moreover, the company has joined forces with several other well-established companies to market a variety of treats including "Heinz® ketchup, Slim Jim® meat sticks, A.I.® steak sauce, Cheez-It® snack crackers, Vlasic pickles, Tyson® chicken, Oscar Mayer® meat products, Hormel® chili, and SPAM® Hot & Spicy." In addition, Bernard states that the company has licensed its iconic trademark "to restaurants, retail stores, clothing lines, and entertainment and gaming companies (who, for example, manufactured Tabasco-themed slot machines)." And there's more. For instance, the company maintains a "thriving catalogue business in licensed merchandise." Examples include: "Tabasco neckties, aprons, T-shirts, boxer shorts, tote bags, and hand towels."

And those bottles of Tabasco? Each bottle is manufactured of clear glass in order to reveal the bright red contents. A red cap, shiny green collar, and a bold white diamond-shaped label that reads in red and green print "TABASCO® BRAN Pepper Sauce, McIlhenny Co, Avery Island, LA" speak to the iconic brand.

Fig. 32. Iconic bottle of TABASCO®, an international favorite pepper sauce. Label indicates origin: "Avery Island, LA." Photo courtesy of Avery Island Archives.

In 2018, McIlhenny Company celebrated its 150 years of providing what it has called a "world of flavor" to bars, restaurants, and food retailers around the globe with a product based on a simple recipe that has remained virtually unchanged. Because the factory complex is located near the perimeter of the island, the land is low. To guard against devastating floods from future hurricanes, the company has constructed a 17-foot high earthen levee to surround the entire factory complex. Additionally, new large pumps and back-up generators are designed to handle any potential flooding.

And *Jungle Gardens*? Now, over a century since inception, the storied grounds have not escaped damage from weather-related catastrophes. Many of the titan oaks, for example, evidence broken limbs. Additionally, several bamboo groves located in ravines remain congested with fallen stalks. Too, some areas that once displayed specific plantings now have been taken over by aggressive invasive species such as camphor tree, Christmas berry, and Chinese parasol tree (*Firmiana simplex*). Finally, considerable land beneath the spreading oaks that originally hosted extensive plantings of azaleas, is now maintained as lawn.

Patently, *Jungle Gardens* does not manifest as a typical botanic garden. There are no eye-popping seasonal flower displays. No innovative plots showcasing culinary and medicinal herbs. No native wildflowers. No examples of pollinator-friendly plants. And no whimsical topiary installations or avant-garde sculptures. Instead, visitors are treated to a historically significant icon of "Americana"—a living legacy to the vision, passion, and wealth of an iconic pioneer conservationist and landscape architect, E.A. McIlhenny. The descriptors most commonly voiced by tourists exiting the gardens are: "inspirational," "park-like," "peaceful," a "touch of magic," a "fairyland." Since 2016, garden managers have sponsored educational and entertaining celebrations targeting children in an effort to increase the public's exposure to the unique and august setting. Celebrations take place near Easter, Halloween, and Christmas.

In 2016, Garrie P. Landry, a retired university botanist, was employed to document the flora of the gardens and other areas throughout the island. Residents are now more plant conscious. To date, Landry has documented plantings that were lost in history due to overgrowth and low maintenance such as two huge gingko (*G. baloba*) trees. Furthermore, Landry has uncovered four new records: (1) first known hybrid between the Asian sweet gum, *Liquidambar formosana*, and American sweet gum, *L. styraciflua*; (2) the first Louisiana record for Chinese plum/Pauper's tea, *Sageretia thea*; (3) largest Chinese brush-holly, *Xylosma congestum*, for the U.S.; and (4) the largest red buckeye, *Aesclulus pavia*, in LA

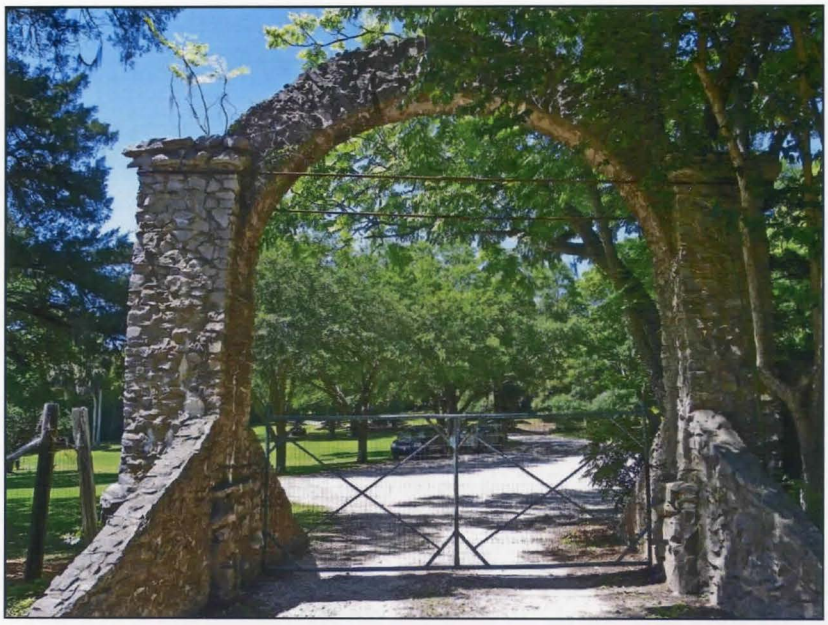


Fig. 33. Original entrance to *Jungle Gardens*. The historic gardens, established in 1935 by Edward Avery McIlhenny, encompass 170 acres on the northern low sector of the island bordered by Bayou Petite Anse.

Fig. 34. Modern entrance to *Jungle Gardens*. Visitors can purchase tickets and browse the Gift Shop. Flowering azaleas border building. March 15, 2018.

Fig. 35. Interior of Gift Shop at *Jungle Gardens* displaying American alligator *(Alligator mississippiensis)*. The specimen measures 18 feet, 3 inches, and is the largest documented alligator taken on the island. Employee demonstrates relative sizes.

and possibly the U.S. Additionally, several other species previously recorded as rare within the state, have proven to be relatively common on the island. [Case in point: the diminutive iris known as prairie nymph (*Herbertia lahue*). The attractive native species was listed as "rare in Louisiana" by C.A. Brown in his *Wildflowers of Louisiana and Adjoining States*. But in March and April, the pale blue flowers usually create massive splashes of color in many private grassy areas.]

"When I am in the field," botanist Landry recently related to me, "I never know what surprise awaits me. After spending the last four years searching for plants on the island, just this past winter (2019-2020) I 'discovered' two new groves of ancient camellias. The gigantic plants had been swallowed up by invasive bamboos and camphor trees. Because the plants were in neat rows, I presume the plantings were purposeful. The bushes were so tall that I couldn't photograph any of the flowers." Landry continued: "Since 2010, Florence Crowder of the Baton Rouge Camellia Society, and who is an expert on antique camellias, has been making periodic forays to A.I. to identify the varieties of these flamboyant Asian plants. Crowder believes that the island may be the last home of one or more antique types that are now rare or non-existent in the United States and possibly anywhere else."

And *Bird City*? While reduced by sedimentation to 7-8 acres or so, the pond remains a haven for nesting egrets and herons—principally the great egret. Numbers, however, are far lower than those in the early twentieth century, most likely because of national protection guaranteeing numerous safe venues for nesting. Alligators are still present, although their size is controlled by the periodic removal of individuals after they reach 6-8 feet. And on private land near the salt mine, a satellite rookery of approximately 2 acres has blossomed. Named "Saline Pond," the swampy habitat is the result of an ancient sinkhole in the salt dome. With its water-tolerant trees such as cypress, tupelo gum, and buttonbush, the site has become an important nesting site for great egrets, cattle egrets, snowy egrets, anhingas, several herons, and as of 2015, the flamboyant roseate spoonbill (*Platalea ajaja*), another wading bird that was at one time considered rare except in extreme coastal southwest Louisiana and was also hunted for its ornate plumage. The Tabasco factory complex, *Jungle Gardens* (including *Bird City*), continue to remain popular destinations for approximately 100,000 tourists each year.

Fig. 36. Live oak (*Quercus virginiana*) in fog. Telephoto lens and low resolution evoke the impression of a painting depicting a mystical fairyland, *Jungle Gardens*. January 7, 2019.

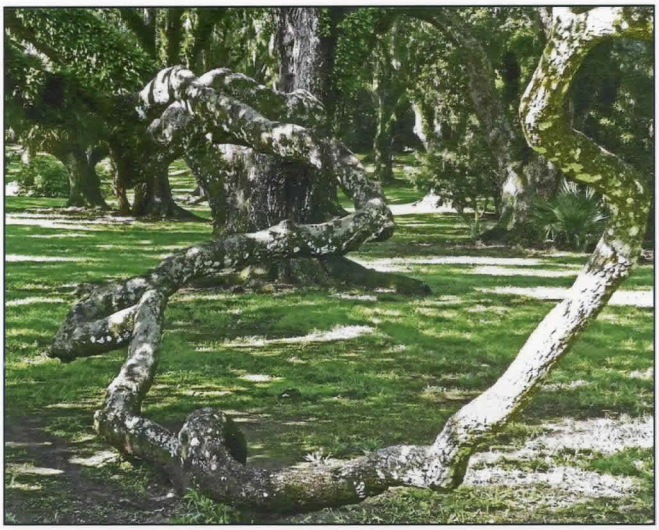


Fig. 37. Live oak with enormous "octopus-esque" limbs in *Jungle Gardens*. Growth habit is a signature attraction for the gardens.

Fig. 38. Live oak with resurrection fern (*Pleopeltis polypodioides*). Fern fronds are unfurled and green only after a rain; when desiccated, the fronds are curled and brown, but not dead.

Because of increasing water intrusion from the Gulf and increasing sinkhole formation, Cargill has decided the mine is too dangerous for continued exploitation. To protect its workforce and to guard against sinkhole formation directly beneath any residence or other building, the company has decided to close the mine within the next few years. Water from nearby channels connecting to the Gulf will be used to flood the cavernous spaces. In theory, pressure from the water will curtail further deterioration both below and above ground.

PERSONAL INVOLVEMENT

My personal odyssey with Avery Island dates back to 1959. As a freshman at Louisiana State University in New Orleans (now University of New Orleans), I and three other students selected biology as a major. All four of us professed a strong interest in wildlife—for me, butterflies in particular and photography in general. In fact, I had just recently purchased my first camera: no, not a 35 mm SLR or even a Kodak *Brownie*. What I purchased was a professional *Bell & Howell* 16 mm movie camera—the kind that was often depicted in the filming of newsreels that accompanied feature movies in theaters at the time. One of the other biology majors, Henry R. Hermann, Jr.—five years my senior, a recent Korean veteran, and also interested in wildlife photography—tried to "best me" by purchasing a professional *Bolex* 16 mm camera. But Henry's most engaging attribute was his 1951 black "Chevy." Because automobiles were unaffordable by most fledgling college kids, having the ability to travel to pursue field trips was tantamount to a ticket to a fabled "WONDERLAND."

Our freshman biology instructor, Stephen M. Russell, was an enthusiastic young ornithologist. Russell had studied ornithology under the tutelage of George H. Lowery, Jr., Director of the Museum of Natural History at Louisiana State University and a renowned ornithologist for his pioneering work with the trans-Gulf migration of Neotropical song birds. Dr. Russell was so impressed with the commitment that Henry and I had made to pursuing wildlife photography that he suggested that we target Avery Island to practice our cinematic skills. The island, he said, was noted for its high populations of nesting egrets and herons as well as a home for Louisiana black bears, bobcats, raccoons, opossums, nutria, otters, armadillos, rabbits, muskrats, giant alligators, and the only known habitat for the McIlhenny deer—all concentrated on a restricted landmass only 130 miles west of our base in New Orleans. The suggestion was enticing, tantalizing. Henry and I were further stoked when Russell stated that he would facilitate our project by asking Lowery to contact his close friend, Walter Stauffer McIlhenny (1910-1985), nephew of E.A. McIlhenny, and current President of McIlhenny Company, to request sanction for our project. The response was swift: "Send the students."

May 30, 1959. McIlhenny Company headquarters, Avery Island. With imaginations aflame, Henry and I met with the affable Walter Stouffer McIlhenny, who in addition to running the company, was a retired Marine General. "Tabasco Mac" was delighted to share his knowledge of wildlife with us. He began with a grand tour of his office building where we viewed a collection of his big game trophies acquired during frequent safaris to East Africa (remember, big game hunting at this time was popular amongst gentlemen of means). Later, our host escorted us through the factory where the famous hot pepper sauce was being processed and bottled. At tour's end, Henry and I were introduced to Pauline Sill McIlhenny Simmons (1902-1980), daughter of E.A. McIlhenny, and our host's first cousin. "Miss Polly" lived at Mayward Hill, her father's original home

Fig. 39. Festoons of Spanish moss (*Tillandsia usneoides*). Heavy loads are not as common today as in the past.

Fig. 40. (INSET to Fig. 39.) Close-up of flower. Healthy sprigs produce solitary, small flowers only in early spring. May 16, 2019.

Fig. 41. Close-ups of seed pod formation. Mature pods are pencil-like (far right). February 25, 2019.

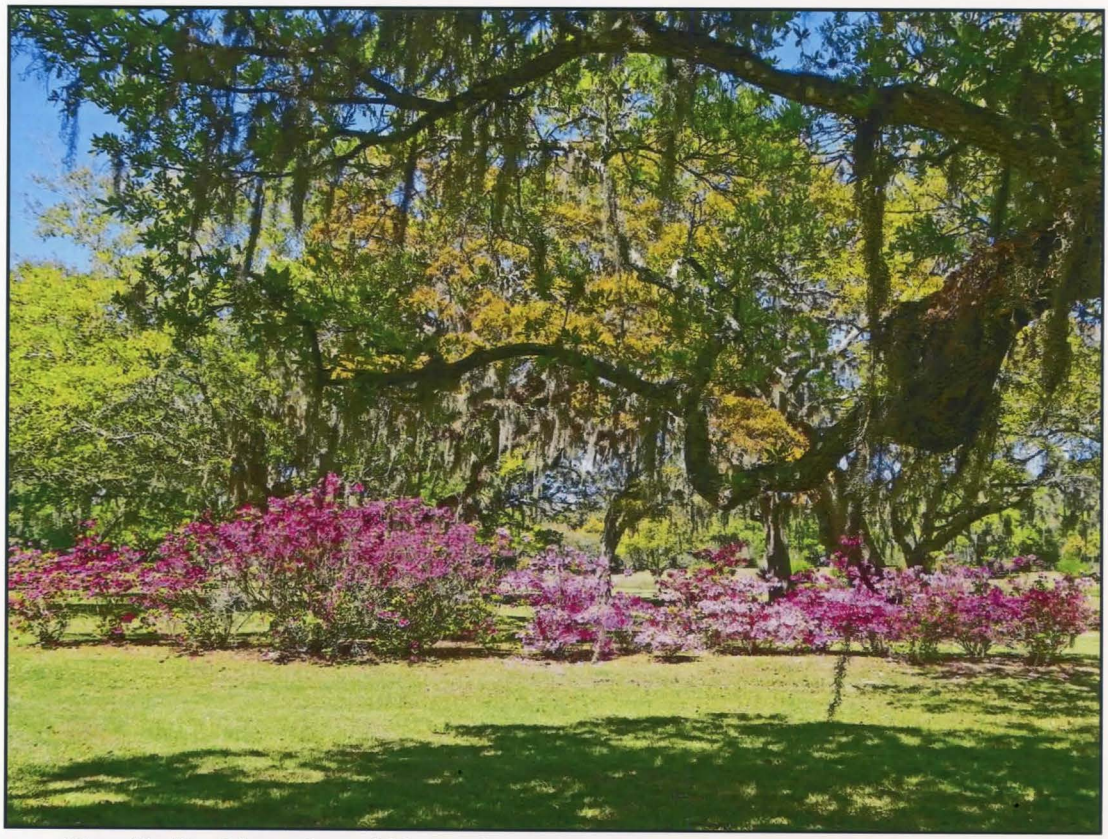
strategically positioned to overlook *Bird City*. Within short order we were offered the family's private skiff anchored at water's edge so that we could paddle through the bird rookery to film the nesting birds at close range. We were cautioned, however, to minimize disturbance, to keep a watchful eye for alligators that lurked in the vicinity of the nesting platforms, and to be careful along the shoreline—favorite basking sites for "gators" and venomous cottonmouth snakes.

Photography went well. We encountered only one alligator—a fairly large specimen that surfaced no more than three feet from our boat, but then quickly submerged. After reporting back to "Tabasco Mac," he arranged a tour of the salt mine.

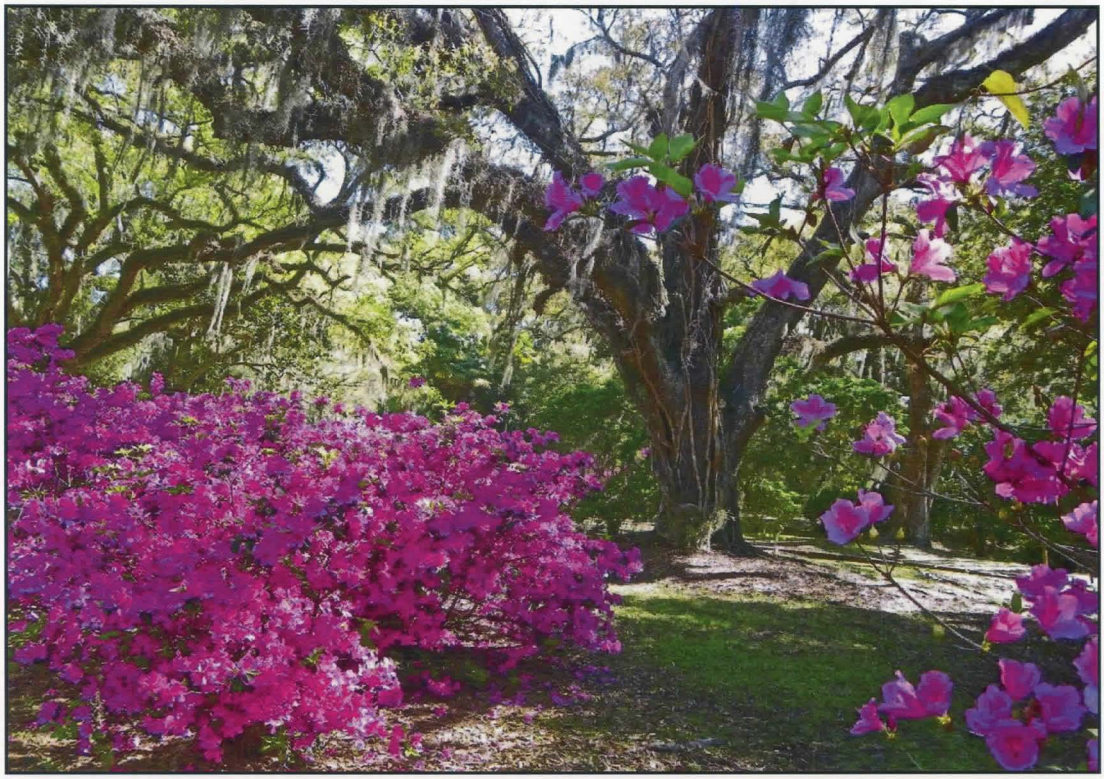
Although I had immersed myself in photography, by afternoon I had time to walk through the gardens to search for butterflies. Turns out, there were few individuals on the wing. I did, however, observe what I deemed an unexpected species: two individuals of the Southern Pearly Eye (*Enodia portlandia*). The butterfly was familiar to me, but only from the borders of shaded hardwood forests in the Tunica Hills, West Feliciana Parish, where switch cane (*Arundanaria*) often forms massive stands. (The Tunica Hills were formed from erosion of deep loess, i.e., wind-blown soil. Today, the region is noted for its hills dissected by deep, steep-sided ravines.) With the Tunica Hills at least 80 miles farther north, Avery Island within its sea of grass seemed a puzzling habitat.

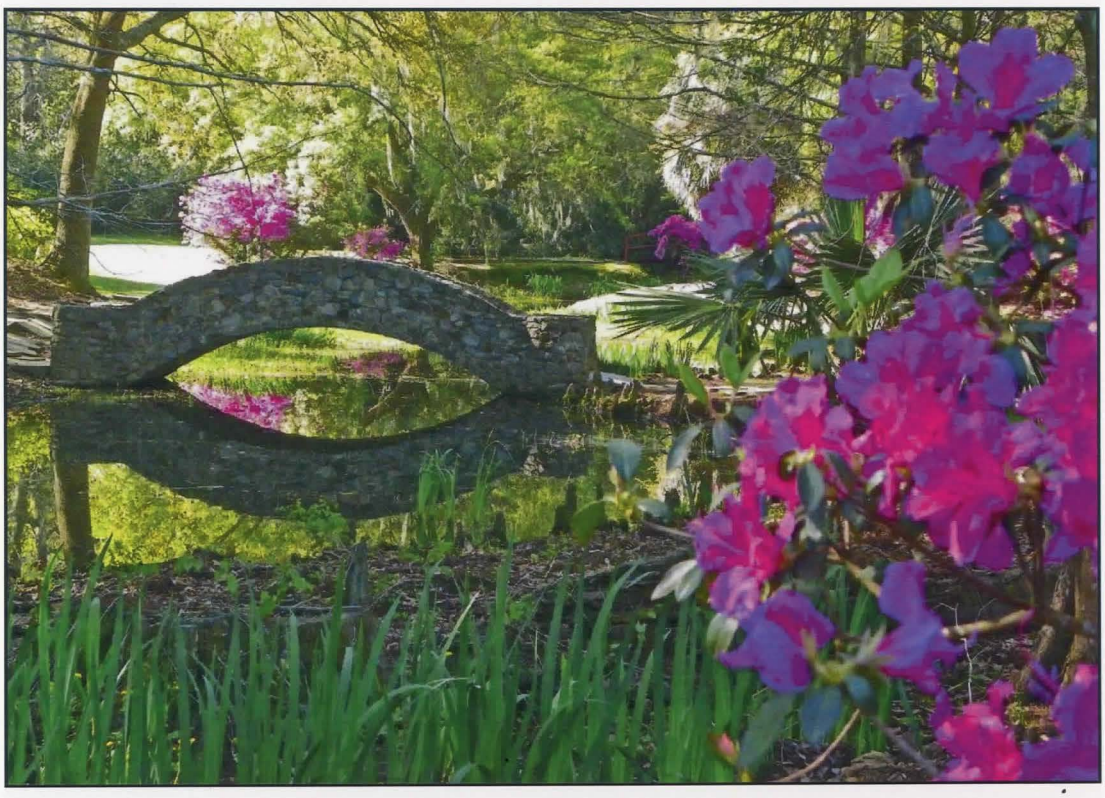
And there was more. While taking a break during the drive about the island ("Tabasco Mac" had given us permission to drive about just as long as we stayed away from the fields of growing peppers), my attention was aroused by a large, black and white butterfly sporting long tails that flew within only a few feet of our vehicle. The butterfly' distinctive coloration and form left no doubt about its identity. My memory exploded: Zebra Swallowtail (*Eurytides marcellus*)! As with the Southern Pearly Eye, I had engaged with the species only within the Tunica Hills where its host, pawpaw (*Asimina triloba*), is a common understory tree. By day's end and having encountered two unexpected butterfly species, I remarked to my friend, Henry: "Avery Island is certainly a curious place." But at the time, I didn't realize just how my casual observations of two apparently enigmatic butterflies would prove so prophetic.

After returning to Baton Rouge and showing our movie footage to Dr. Russell, we were informed that we had filmed a new state record: nesting cattle egrets (*Bubulcus ibis*), a tropical/subtropical immigrant from Africa, that had arrived in the United States via South America in 1941 and then in Louisiana only as recently as 1955. The large white and buff breasted wading birds



Figs. 42, 43. Live oaks and blossoming mature Japanese azaleas in *Jungle Gardens*. March 15, 2018.





Figs. 44, 45. Live oaks and blossoming mature Japanese azaleas in *Jungle Gardens*. March 15, 2018.

Fig. 46. Buddha Temple in *Jungle Gardens*. The wood/glass structure resembles an Asian temple. Japanese azaleas surround what was originally a reflective pond filled with Asian lotus and Louisiana irises. Today, giant salvinia (*S. molesta*), a small aquatic fern from South America, has become invasive. March 15, 2018.

Fig. 47. Close-up of Buddha Temple. The site is often visited by local Buddhists during religious celebrations.

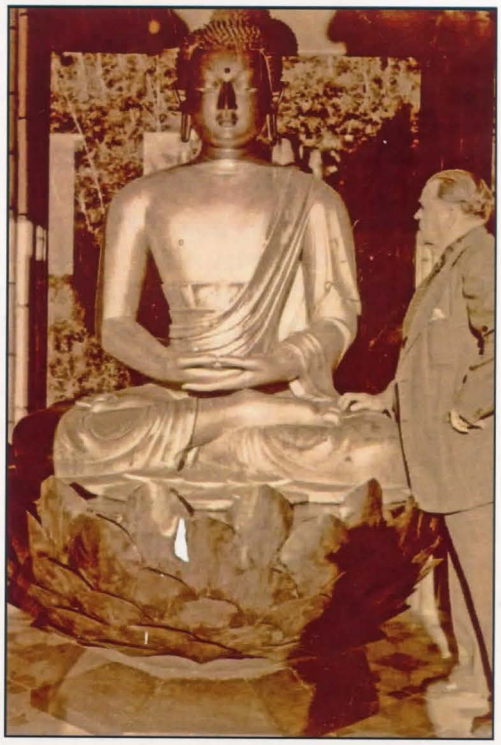


Fig. 48. Close-up of statue of Buddha seated on a lotus flower inside temple. The novel statue is believed to be 200-300 years old and of Chinese or Tibetan origin. The statue was gifted to E.A. McIlhenny (standing beside the statue) in 1936. Photo courtesy of Avery Island Archives.

were occasionally observed in Louisiana's cattle pastures as they tailed grazing cattle, feasting on dislodged grass insects. But until our movie footage, there was no record of the birds nesting. (Cattle egrets today are known to nest as far north as southern Canada.) That October, Henry and I were invited to show our movie films at the annual fall meeting of the Louisiana Ornithological Society, presided over by no other than the eminent G.H. Lowery himself.

Fast forward to March 15, 2018. Local horticulturists were stating that the season was a good one for azalea blooms. Interested in photographing the spectacular plants, and because of, I dare say, a long-term tinge of nostalgia for Avery Island, I decided *Jungle Gardens* should be my immediate agenda. Thus, after a hiatus of 59 years, I returned to what I had originally termed a "curious place." Timing was perfect. Azaleas were indeed in full bloom. In spite of March being early in the season for butterflies, I was able to document the presence of eight species. But to my disappointment, I failed to encounter neither of the two kingpin species—which I had designated my "muses"—from 1959. Most butterflies were fresh and simply flying about; a few swallowtails were showing some interest in azalea blossoms. It was at this point that the germ of a new research project surfaced: a survey of the butterflies of Avery Island. Although several notes on butterflies of *Jungle Gardens* had been published previously (see Marks 2007, 2018), no in-depth inventory of the island's butterflies existed. I understood, of course, that I would have to restrict my activities to the only areas accessible to the public—*Jungle Gardens* and the Tabasco factory complex.

But that quickly changed. During my next visit to the island, mid April, I met with both Shane K. Bernard and Garrie P. Landry, the later the newly appointed Botanist and Herbarium Curator. With offices in the Archives Building (a former school house conveniently located on the main road inland from *Jungle Gardens*), the two specialists suggested that the scientific value of my new research might appeal to McIlhenny Company and Avery Island, Inc. Officials were immediately enthusiastic. I was granted special permission to extend my surveys throughout the island with but a few exceptions to ensure the continued privacy for family residents.

To summarize: Between March 2018 and June 2019 I revisited Avery Island on sixteen different occasions for a total of 58 days, 386 field hours; each visit spanning one to six days. The only month not visited was December 2018 due to exceptionally cool/wet weather and the Christmas-New Year holiday period. Except for March 15, 2018, I relegated time to both *Jungle Gardens* and non-public lands. After each visit, I created a report of my findings that I submitted to *Southern Lepidopterists' News*, reported under "Reports of State Coordinators." In each, I separated *Jungle Gardens* from non-public venues in order to identify specific habitats. Below are the codified data. Report numbers refer to previous publications in *SLS News* (see REFERENCES for specific issues):

REPORT 1: Thursday March 15, 2018; 9 AM-3 PM CDT (1 day, 6 hours)
REPORT 2: Wednesday April 11-Friday April 13, 2018; 9 AM-4 PM CDT each day (3 days, 21 hours)
REPORT 3: Wednesday May 30-Friday June 1, 2018; 9 AM-3:30 PM CDT each day (3 days, 19.5 hours)
REPORT 4: Wednesday July 11-Sunday July 15, 2018; 9 AM-3:30 PM CDT each day except May 12 (1 hour only due to vehicle trouble) (5 days, 27 hours)
REPORT 5: Tuesday August 21-Sunday August 26, 2018; 9 AM-4 PM CDT each day (6 days, 42 hours)
REPORT 6: Wednesday September 19-Sunday September 23, 2018; 9 AM-4 PM CDT each day (5 days, 35 hours)
REPORT 7: Tuesday October 16-Sunday October 21, 2018; 9 AM-4 PM CDT each day (6 days, 42 hours)
REPORT 8: Monday October 29-Tuesday October 30, 2018; 9 AM-4 PM CDT each day (2 days, 14 hours)
REPORT 9: Thursday November 29, 2018; 9 AM-5 PM CST (1 day, 8 hours)
REPORT 10: Monday January 7, 2019; 9 AM-5 PM CST (1 day, 8 hours)
REPORT 11: Monday January 29, 2019; 8 AM-5 PM CST (1 day, 9 hours)
REPORT 12: Friday February 22-Tuesday February 26, 2019; 10 AM-4 PM CST each day (5 days, 30 hours)
REPORT 13: Tuesday March 19-Sunday March 24, 2019; 10:30 AM- 4:30 PM CDT each day (6 days, 36 hours)
REPORT 14: Sunday April 21-Wednesday April 24, 2019; 10 AM-5 PM CDT each day (4 days, 28 hours)
REPORT 15: Wednesday May 15-Sunday May 19, 2019; 10 AM-4:30 PM CDT each day (5 days, 32.5 hours)
REPORT 16: Wednesday June 12-Saturday June 15, 2019; 10 AM-5 PM CDT each day (4 days, 28 hours)

TOTAL NUMBER OF DAYS: 58 (42 nights)

TOTAL HOURS IN FIELD: 386

Fig. 49. Wisteria Arch. Originally introduced into New Orleans in 1885, these vines were soon introduced into *Jungle Gardens*. Vehicle-friendly arch displays aged, thick, gnarled vines that produce pendulous lavender flowers in early spring. March 19, 2019.

COMMENTS ABOUT FIELD WORK

In general, field work was not difficult except during July and August when temperatures and humidity were high, and deer flies (*Chrysops*), horse flies (*Tabanus*), biting gnats, and mosquitoes—particularly alongside marshlands—were unrelenting. Spraying with "OFF" deterred gnats and mosquitoes but did little to discourage deer and horse flies. Fortunately, the flies tapered off in late summer. Ectoparasites such as chiggers (Trombiculidae) and ticks (Ixodidae) were non-existent.

Snakes, too, were virtually non-existent. Although I frequented locales I considered prime habitats, I observed only two serpents: eastern ribbon snake (*Thamnophis s. sauritus*) and southern black racer (*Coluber constrictor priapus*); both were adjacent to water. I observed no roadkill. Botanist Garrie Landry relayed to me that during his two years of work in *Jungle Gardens* and elsewhere on the island, he had never observed any snakes. However, a fulltime gardener for one of the island's residents assured me that he had killed during the 2018 summer season, two copperheads (*Agkistrodon contortrix*). Additionally, several residents and company employees with whom I spoke mentioned that they occasionally see copperheads in wooded areas, particularly in ravines.

A possible clue for this unusual paradigm was offered by a friend, Mc Cauley O. Bullock, III. "Mac" owns 3,000 acres of Mississippi River bottomland hardwood forest in Tensas Parish (northeast LA, and noted for its low human population but high concentration of Louisiana black bear, which in 2016 was unlisted from the category of "Threatened" under the U.S. Endangered Species Act). The land in question is managed for timber and wildlife, principally white-tailed deer. When purchased in 2011, the landscape harbored numerous snakes—especially the venomous cottonmouth (*Agkistrodon piscivorus*—and a few feral pigs. Each subsequent year, however, the land has witnessed a drastic decline in snakes contrasted with a steady increase in pigs. In addition, Mac stated that the omnivores were aggressive and uprooting every living thing (including snakes) in their path. For the landowner, there is an unequivocal correlation between increasing swine and decreasing snakes.

Recently, state scientists in Louisiana reported that research has documented that the bellies of dead feral hogs from across the state contain turtles, rabbits, nutria, turkey eggs, turkey babies, salamanders, shorebirds, earthworms, baby trees, acorns—and snakes.

Yet Heath Romero, land manager for McIlhenny Co., recalls that snakes were never numerous on the island, even before the first sighting of feral hogs in 2002. In an effort to mitigate land disturbance caused by swine, McIlhenny Company instituted a trapping program in 2009. Success has been limited; hogs continue to damage habitats. Conclusion? The explanation for low density in serpents on A.I. remains elusive. In the meantime, it is sobering to know that fieldwork on the island is not stymied due to high populations of venomous snakes.

(text continues on page 45)

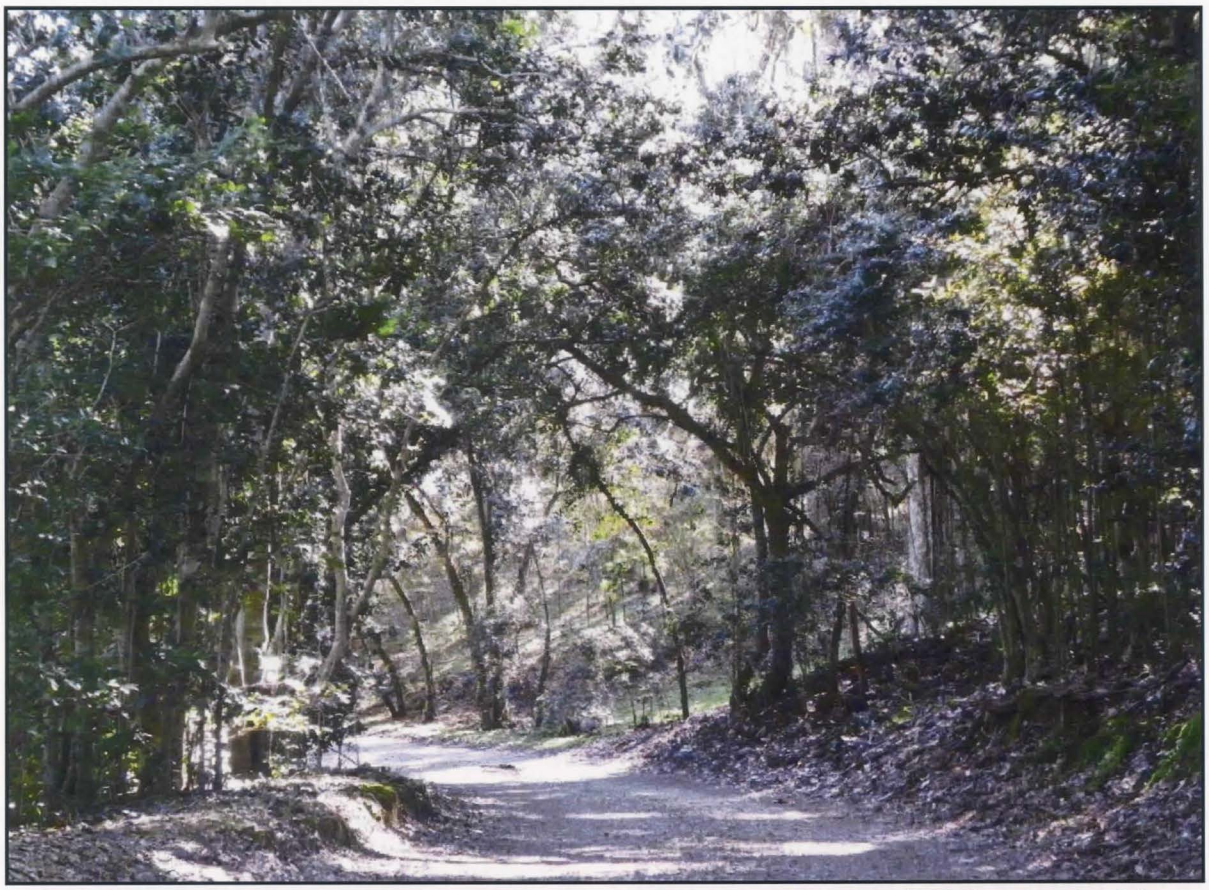


Fig. 50. Holly Arch in early morning light and haze. Plants dating back to 1908 line a quaint drive through *Jungle Gardens*. Several specimens of *Ilex rotunda* rise 20-40 feet into the air and represent some of the largest specimens known. January 28, 2019.

Fig. 51. Grove of golden bamboo (*Phyllostachys aurea*) in *Jungle Gardens*. The gardens originally displayed 64 varieties of bamboo imported from China in the early 1800s. Photo was shot with a telephoto lens. March 15, 2018.

Fig. 52. One of several "Sunken Gardens" in *Jungle Gardens*.

Fig. 53. Mayward House opposite *Bird City*. The original home of E.A. McIlhenny. Built around 1900, the structure subsequently burned, but was rebuilt in 1924. Today the house is a private residence closed to the public.

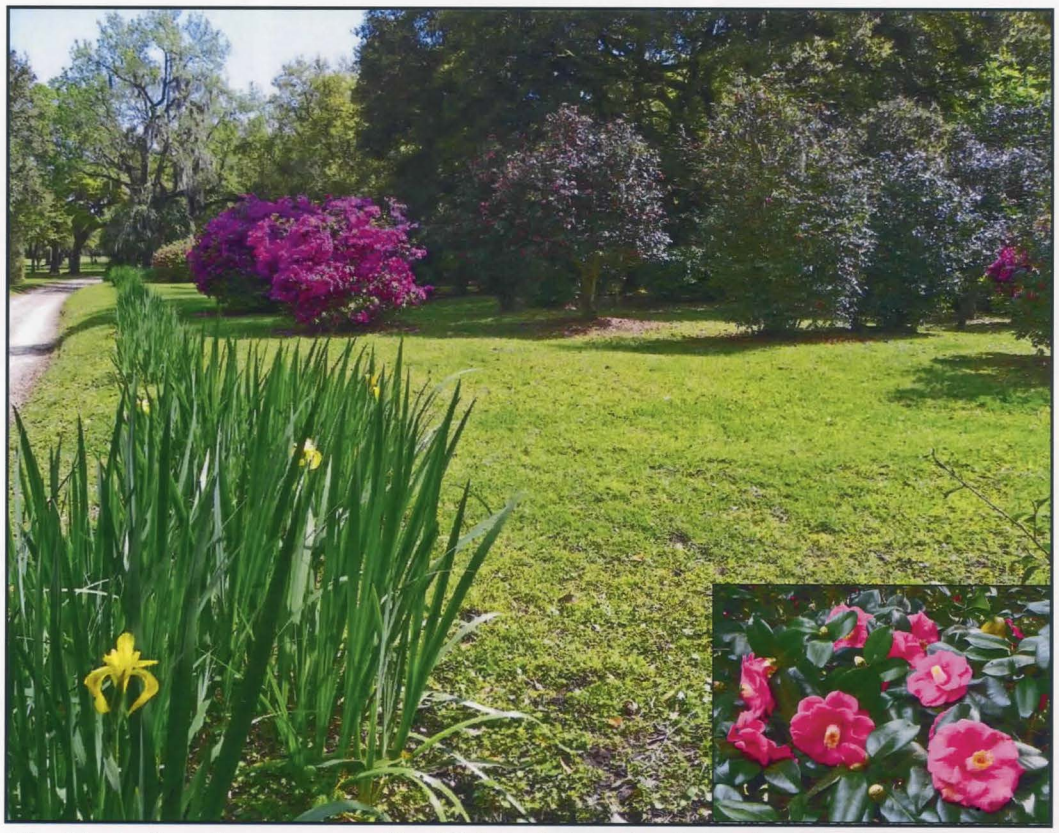


Fig. 54. Antique Japanese camellias (*C. japonica*) in *Jungle Gardens*. Antique azaleas and exotic yellow-flag iris are nearby. At one time, the gardens were home to 700 varieties of camellias. Foliage is glossy and evergreen. February 22, 2019.
Fig. 55. (Inset to Fig. 54.) Multiple blossoms on single stem.

Fig. 56

Fig. 57

Fig. 58

Fig. 59

Fig. 60.

Fig. 61.

Fig. 62.

Fig. 63.

Fig. 64.

Fig. 65.

Fig. 56-65. Portraits of blossoms of antique camellias. Plants bloom from late winter (January) through early spring (March). Some individuals are tree-size and can be found nowhere else in the U.S. Volunteers from the Baton Rouge Camellia Society are currently inventorying and labeling specimens. Pollination is by bees. March 15, 2018/February 22, 2019.

Fig. 66. Sasanqua camellia (*C. sasanqua*). A variety with less flower petals and an earlier blooming period (late fall through early winter) than *C. japonica*. The gardens are home to many antique types, many of which are tree-size due to a century or more of growth. November 29, 2018.
Fig. 67. (Inset to Fig. 66.) Close-up of flower.

Fig. 68. Chinese parasol trees (*Firmiana simplex*) form a yellow backdrop for an ancient live oak on a misty morning. Although invasive throughout *Jungle Gardens*, parasol trees provide rich golden hues in autumn. November 29, 2018.

Fig. 69. Chinese Christmas berry (*Ardisia crenata*) is a low-growing, invasive species that often dominates the ground in shaded areas of *Jungle Gardens* and elsewhere. Red berries persist throughout most of the year and are attractive to birds and other wildlife. January 28, 2019.

Fig. 70. Camphor tree (*Cinnamomum camphora*) is the most common tree on the island. The Chinese native is invasive and often grows as a shrub along woodlots. The tree is the island's host (breeding plant) for the Spicebush Swallowtail butterfly (*Papilio troilus*). Leaves are evergreen, glossy, and aromatic.

Fig. 71. Seedlings of the highly fertile camphor tree along the edge of a woodlot.
Fig. 72. (Inset to Fig. 71) Fallen glossy black berries.

Fig. 73. Snowy egret (*Egretta thula*). Originally hunted nearly to extinction for its fanciful courtship plumage to satisfy the millenary trade, this species triggered the creation of *Bird City* in *Jungle Gardens* by E.A. McIlhenny around 1895. Today the "snowies" have recovered in large part because of McIlhenny's efforts. Photo from the original plate in John James Audubon's "The Birds of America" (1827-1838). Courtesy of the National Audubon Society, public download.

Figs. 74-76. Aerial views of *Bird City*. This is the current status of E.A. McIlhenny's iconic late nineteenth century rookery in Willow Pond, an enlarged natural water-filled sinkhole that has become a major tourist attraction in *Jungle Gardens*. Bamboo racks are refurbished each winter from stalks of local bamboo. The racks make excellent predator-free nesting sites for large wading birds, especially egrets. In 1911, the rookery supported upwards of 100,000 nesting birds. Birds begin arriving in mid-February and depart in late June. The sturdy visitor observation platform highlighted in Fig. 79 is visible here in the upper right of Fig. 74. Water surface is green due to the proliferation of several species of small, floating aquatic plants such as *Azolla, Lemna, Salvinia, Spirodela, Wolffia, and Wolfiella*. Photos from a drone operated by Bernard Patout and assisted by author. June 14, 2019.

Fig. 77. Close-up of great egrets (*Ardea alba modesta*) in their nuptial plumage and coloration (green hue at base of bill). April 21, 2019. Image was the cover photo in the March 2020 issue of *Natural History* magazine. Article is titled: "Avery Island: An Ark Amidst a Sea of Grass."

Fig. 78. Close-up of a family of great egrets. Green color on bill (see Fig. 77) has faded due to post courtship. The species now monopolizes the bamboo racks.

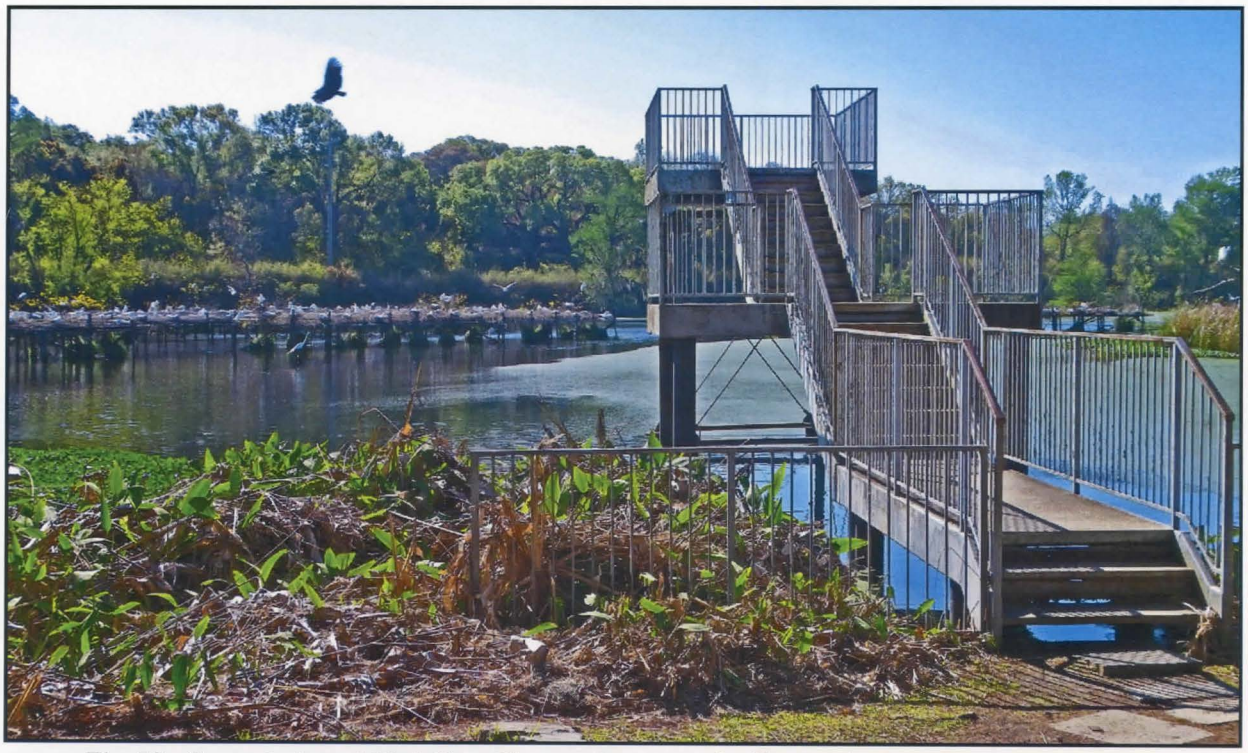


Fig. 79. Ground view of *Bird City*. Observation tower facilitates viewing. Bent alligator-flag (*Thalia geniculata*) is beginning to put on spring growth at the platform's base. The species is related to canna lilies; both serve as hosts for Brazilian Skipper (*Calpodes ethlius*).

Fig. 80. Northern edge of *Bird City*. Because the edges of the pond are manicured less frequently than other areas due to soggy soil, the area is good habitat for water-tolerant wildflowers and pollinators. October 16, 2018.

Fig. 81. Louisiana iris (*Iris gigantacaerulea*). A pale form is often found along the edges of ponds. April 22, 2019.

Fig. 82. Buttonbush (*Cephalanthus occidentalis*). Common along the margins of most ponds such as *Bird City*. Flowers are exceptionally attractive to butterflies. May 30, 2018.

Fig. 83. (Inset to Fig. 82.) Male Eastern Tiger Swallowtail (*Papilio glaucus*). June 1, 2018.

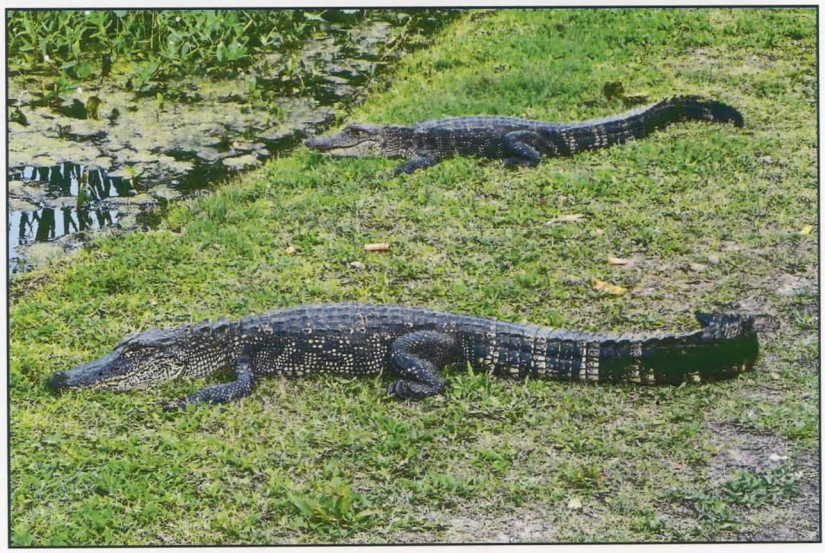


Fig. 84. Two juvenile American alligators (*Alligator mississippiensis*) basking in lagoons in *Jungle Gardens*. Larger 'gators are trapped and relocated to nearby marshlands because of safety concerns. In 1935, E.A. McIlhenny wrote a treatise chronicling the life of the reptile on the island. The seminal work was reprinted in 1976 and 1987.

Fig. 85. Saline Pond. A natural two-acre sinkhole on private property that has become a secondary rookery for wading birds, important because the great egret has monopolized the bamboo racks in *Bird City*. Alligators are common.

Fig. 86. Snowy egret (*Egretta thula*), the original species that precipitated the creation of *Bird City*, currently is a common nester in Saline Pond. Photo courtesy of Pam McIlhenny.

Fig. 87. Cattle egret (*Bubulcus ibis*) in Saline Pond. The species, native to parts of Africa, Asia, and Europe, was first reported in Louisiana in 1955. In May 1959, author and companion college student photographed a pair nesting in *Bird City*. The 16 mm movie photographs became the first documentation of the bird's nesting in the state. The species today nests as far north as southern Canada. June 1, 2018.

Fig. 88. Roseate spoonbill (*Platalea ajaja*). Photo of the original drawing in John James Audubon's "Birds of America" (1827-1838). Courtesy of the National Audubon Society, public download.

Fig. 89. Roseate spoonbill. Originally rare in Louisiana, the flamboyant species has been a common nester in Saline Pond since 2015. Birds usually nest at same time and in the same locals as cattle egrets, May-July. June 1, 2018.

Fig. 90. McIlhenny Deer (*Odocoileus virginianus mcilhennyi*), a subspecies of small white-tailed deer named in 1928 for the population on the island. Today this same small variety is known to occur in wet habitats throughout the Gulf Coast. July 11, 2018.

Fig. 91. Orphaned McIlhenny fawns at feeding station created by E.A. McIlhenny, circa 1930. Photo courtesy of Avery Island Archives.

Fig. 92. Young orphaned Louisiana black bear cub being bottle-fed by E.A. McIlhenny, circa 1930. Photo courtesy of Avery Island Archives.

Fig. 93. Waxleaf privet (*Ligustrum japonicum*) beside the road that separates Venetian Lagoons from Bayou Petite Anse in *Jungle gardens*. Flowers in mid-late April attract honey bees (*Apis melifera*) and 'Southern' Oak Hairstreak (*Satyrium f. favonius*). The butterfly, a rarity for the state, has but a single-generation per year. Hosts are oak trees. April 22, 2019.

Fig. 94. (Inset to Fig. 93.) Honey bees visiting flowers.

Fig. 95. Close-up of 'Southern' Oak Hairstreak on privet. Photo courtesy of Jeff Trahan (Shreveport).

Fig. 96. A colony of hives of local honey bees. Company maintains five active colonies on the island. Colonies are moved about to accommodate seasonal flowering.

Fig. 97. Raw honey from the island's hives is outsourced to a local apiary on the mainland for processing and bottling under the "McIlhenny Farms" label. The product is popular with tourists visiting the TABASCO® Country Store (Fig. 25).

Fig. 98. Garrie Landry, official botanist, standing beside the confirmed state champion red buckeye tree (*Aesculus pavia*). Landry "discovered" the specimen in 2018 growing close to original entrance to *Jungle Gardens*.

Fig. 99. Close-up of flower head of red buckeye tree. Individual flowers are deep-throated, a good nectar source for hummingbirds. New vegetative growth occurs only in spring so that trees are very slow growers. May 16, 2019.

Fig. 100. (Inset to Fig. 99.) Seed pod with seed. January 28, 2019.

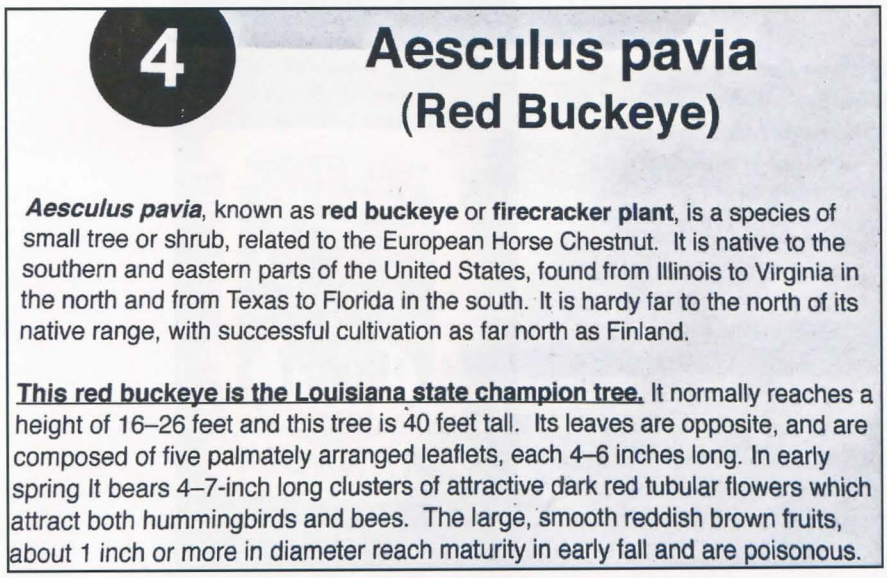


Fig. 101. Plaque identifying champion red buckeye.

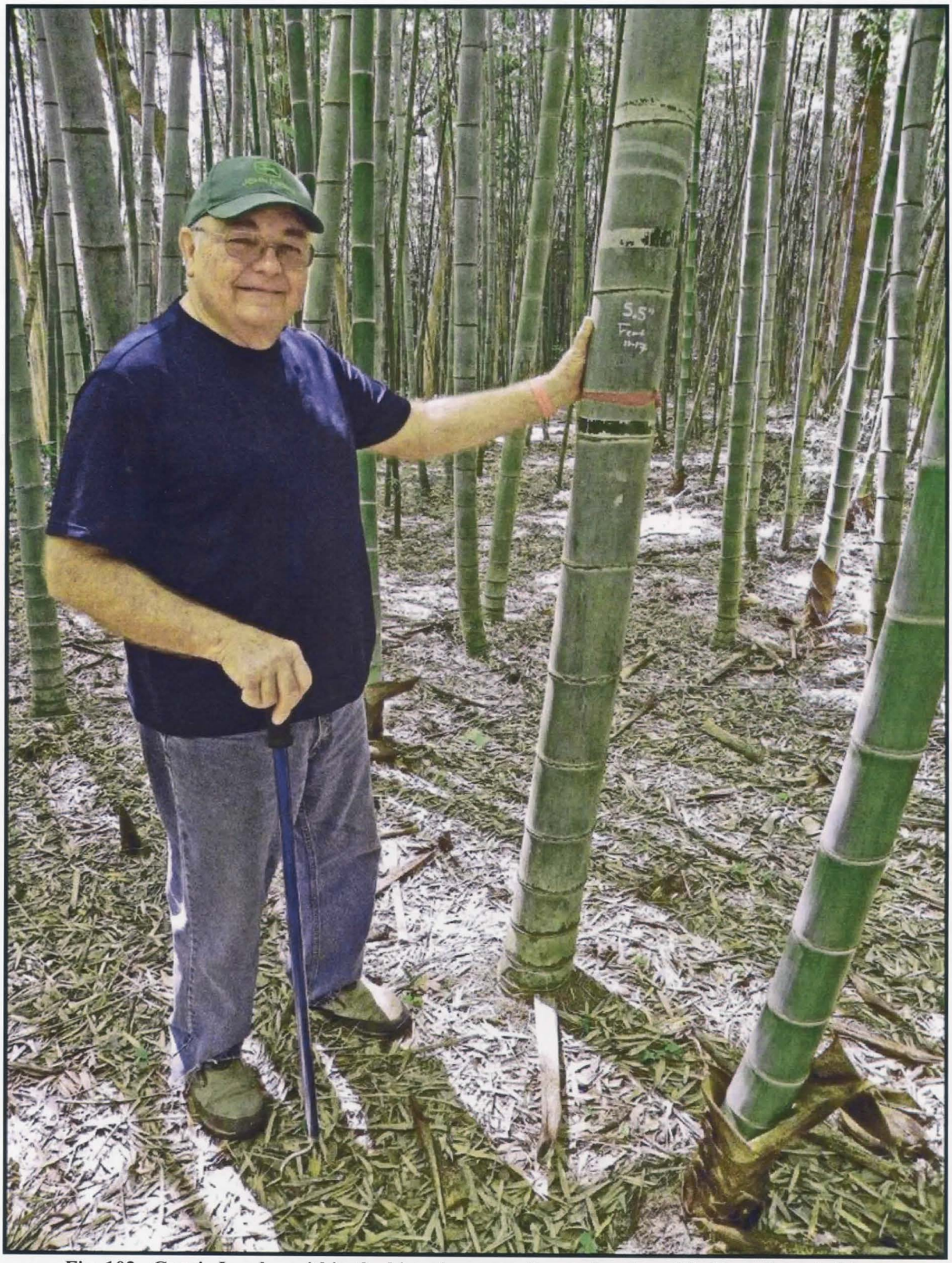


Fig. 102. Garrie Landry within the historic grove of moso bamboo (*Phyllostachys edulis*), a giant timber bamboo from China. A rhizome was initially planted in the early 1900s to learn if the species would thrive in south Louisiana as a possible substitute for lumber. Today the planting has produced a grove of approximately 1-1.5 acres. The largest cane (culm) so far measured is 5.5 inches in diameter with a height estimated at 60-70 feet. May 30, 2018.

Fig. 103. Canes of moso bamboo. Bluish-gray color is distinctive. At one time, the grove was considered the largest outside China. Image was captured with a telephoto lens for drama.

←

Fig. 104. Scientific herbarium sheet with dried/pressed specimen of the hybrid American sweet gum (*Liquidambar styraciflua*) and the Chinese sweet gum/Formosan gum (*L. formosana*). In 2018, botanist Garrie Landry discovered two specimens of the hybrid in *Jungle Gardens*, the first for the United States.

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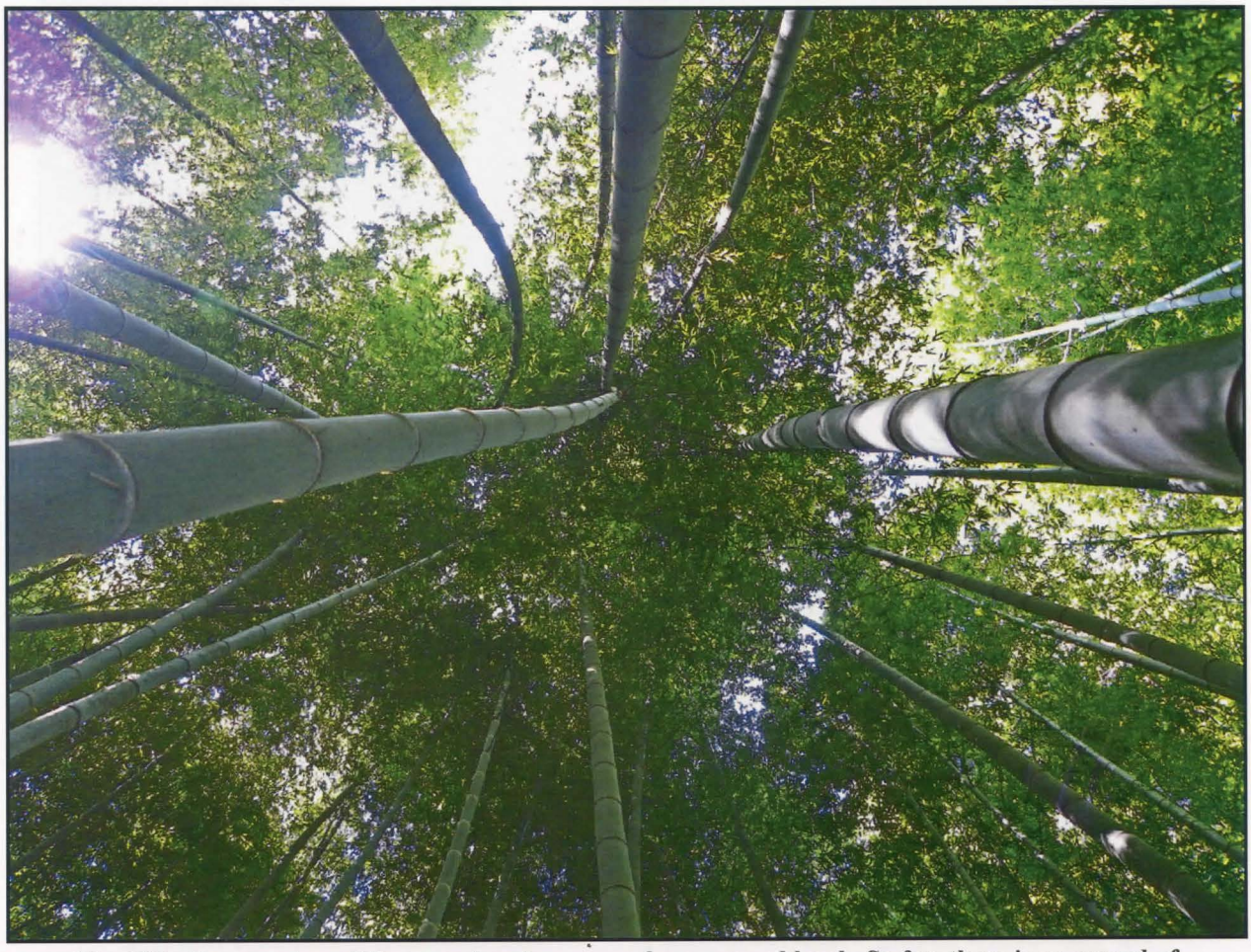


Fig. 105. Canopy view of the moso bamboo grove from ground level. So far, there is no record of flowering—desirable since canes die afterward.

(text continued from page 28)

BUTTERFLIES

Identifications were made by direct observation and occasionally with a pair of close-focusing binoculars: "REGAL" 8 X 42 (CELESTRON®). In addition, several species were netted for close examination but then released.

The following is the list of the **57 species** of butterflies (56 residents, 1 vagrant) that have been officially reported to occur on Avery Island. Two of the 57 were recorded not by me but by Craig Marks (2007, 2018). Of the 57 total species, only **38** were observed in *Jungle Gardens*, **seven** exclusively so. **Eleven** are parish (=county) records from published literature; these species are indicated in **bold** type. The letter **"P"** denotes **Private (Residential/Commercial) Sectors**, the letter **"G"** denotes public ***Jungle Gardens***. Species reported in other/personal communications are indicated by **author's name in parenthesis**. The two species I did not personally observe are indicated with an **asterisk (*)**. This list is not meant to be definitive. I could not possibly sample all microhabitats in the allotted time. Understandably, those microhabitats that were sampled could not be checked thoroughly across all seasons. The list establishes a baseline for the island's butterfly fauna. In the future, other researchers will most likely add a few additional taxa—particularly within the family Hesperiidae.

Checklist and Distribution

(Taxonomy follows NABA 2002 and Lamas 2004)

Family Papilionidae (Swallowtails)

Subfamily Papilioninae (Swallowtails)

1. Pipevine Swallowtail (*Battus philenor*)—P, G (G in Marks 2018, 2019 - personal communication)
2. Zebra Swallowtail (*Eurytides = Protographium marcellus*)—P, (P in Ross and Lambremont 1963; repeated in Marks, 2007)
3. Black Swallowtail (*Papilio polyxenes*)—P, G
4. Giant Swallowtail (*Papilio=Heraclides cresphontes*)—P, G, (G in Marks 2007)
5. Eastern Tiger Swallowtail (*Papilio=Pterourus glaucus*)—P, G, (G in Marks 2007)
6. Spicebush Swallowtail (*Papilio troilus*)—P, G, (G in Marks 2007)
7. Palamedes Swallowtail (*Papilio palamedes*)—P, G, (G in Marks 2007)

Family Pieridae (Sulphurs and Whites)

Subfamily Coliadinae (Sulphurs)

8. Cloudless Sulphur (*Phoebis sennae*)—P, G, (G in Marks 2007)
9. **Orange-barred Sulphur (*Phoebis philea*)**—G (single stray male)
10. Little Yellow (*Eurema=Pyrisitia lisa*)—P
11. Sleepy Orange (*Eurema=Abaeis nicippe*)—P

Family Lycaenidae (Gossamer-wing Butterflies)

Subfamily Theclinae (Hairstreaks)

12. 'Southern' Oak Hairstreak (*Satyrium f. favonius*)—G, (G in Marks 2007, 2018, 2019 pers. com.)
13. *'Olive' Juniper Hairstreak (*Callophrys g. gryneus*)—(P in Marks 2007, 2018)
14. Gray Hairstreak (*Strymon melinus*)—P, G, (G in Marks 2007)
15. Red-banded Hairstreak (*Calycopis cecrops*)—P, G, (G in Marks 2007)

Family Nymphalidae (Brushfooted Butterflies)

Subfamily Libytheinae (Snouts)

16. American Snout (*Libytheana carienta*)—P, G, (G in Marks 2007, 2019 pers. com.)

Subfamily Heliconiinae (Heliconians and Fritillaries)

17. Gulf Fritillary (*Agraulis vanillae*)—P, G, (G in Marks 2007)

Subfamily Nymphalinae (True Brushfoots)

18. Silvery Checkerspot (*Chlosyne nycteis*)—P
19. Phaon Crescent (*Phyciodes phaon*)—P, G
20. Pearl Crescent (*Phyciodes tharos*)—P, G, (G in Marks 2007)
21. Question Mark (*Polygonia interrogationis*)—P, G, (G in Marks 2007, 2019 pers. com.)
22. *Mourning Cloak (*Nymphalis antiopa*)—(G in Marks 2007, 2018)
23. American Lady (*Vanessa virginiensis*)—P, G, (G in Marks 2007)
24. Painted Lady (*Vanessa cardui*)—P, G, (G in Marks 2007)
25. Red Admiral (*Vanessa atalanta*)—G, (G in Marks 2007, 2019- personal communication)
26. Common Buckeye (*Junonia coenia*)—P, G, (G in Marks 2007)

Subfamily Limenitidinae (Admirals and Relatives)

27. Red-spotted Purple (*Limenitis arthemis astyanax*)—P, (G in Marks 2007)
28. Viceroy (*Limenitis archippus*)—P, G, (G in Marks 2007)

Subfamily Apaturinae (Emperors)

29. Tawny Emperor (*Asterocampa clyton*)—P, G, (G in Marks 2007)

Subfamily Satlyrinae (Satyrs)

30. Southern Pearly Eye (*Enodia portlandia*)—P, G, (G in Marks 2007)
31. **Creole Pearly Eye (*Enodia creola*)—P**
32. Carolina Satyr (*Hermeuptychia sosybius*)—P, G, (G in Marks 2007)
33. **Little Wood Satyr (*Megisto cymela*)—P**

Subfamily Danainae (Monarchs)

34. Monarch (*Danaus plexippus*)—P, G, (G in Marks 2007)

Family Hesperiidae (Skippers)

Subfamily Pyrginae (Spread-wing Skippers)

35. Silver-spotted Skipper (*Epargyreus clarus*)—P, (G in Marks 2007)
36. Long-tailed Skipper (*Urbanus proteus*)—P, G
37. **Southern Cloudy Wing (*Thorybes bathyllus*)—P**
38. **Juvenal's Duskywing (*Erynnis jevenalis*)—P, G**
39. **Horace's Duskywing (*Erynnis horatius*)—P**
40. **Zarucco Duskywing (*Erynnis zarucco*)—G**
41. Common Checkered Skipper (*Pyrgus communis*)—P
42. Tropical Checkered Skipper (*Pyrgus oileus*)--P

Subfamily Hesperiinae (Grass Skippers)

43. Clouded Skipper (*Lerema accius*)—P, G
44. Least Skipper (*Ancyloxypha numitor*)—P, G
45. Southern Skipperling (*Copaeodes minimus*)—P, G
46. Fiery Skipper (*Hylephila phyleus*)—P, G
47. Southern Broken-Dash (*Wallengrenia otho*)—G
48. **Sachem (*Atalopedes campestris*)—P, G**
49. Delaware Skipper (*Anatrytone logan*)—P, (G from Marks 2019-personal communication)
50. **Aaron's Skipper (*Poanes aaroni*)—P**
51. Broad-winged Skipper (*Poanes viator*)—P
52. Palatka Skipper (*Euphyes pilatka*)—P, G, (G in Marks 2018)
53. **Duke's Skipper (*Euphyes dukesi*)—P**
54. Dun Skipper (*Euphyes vestris*)—P
55. Twin-spot Skipper (*Oligoria maculata*)—P
56. Brazilian Skipper (*Calpodes ethlius*)—G
57. **Salt Marsh Skipper (*Panoquina panoquin*)—P**

Annotated List of Species (NOTE: all are not illustrated)

Comments below are based on field work documented in Ross (2018a-h; 2019a-j; 2020a) and Ross and Harris (2020). Several reports were amended due to subsequent research.

Level of abundance is indicated as follows:

R (Rare)—only one individual
U (Unusual)—from two to five individuals
C (Common)—five to twenty individuals
A (Abundant)—more than twenty individuals

New parish records and new earliest/latest sightings are in bold type.

1. Pipevine Swallowtail (*Battus philenor*). A rarity on the island, most likely because of the absence or rarity of its host, species of pipevine (*Aristolochia*). I observed one fresh male and one fresh female feeding on bull thistles in Miner's Village on April 22, 2019. Worn females can easily be confused with females of Spicebush Swallowtail (#6), and so I may have overlooked other individuals. **U.**

2. Zebra Swallowtail (*Eurytides=Protographium marcellus*). This is one of the two keystone species that initially captured my attention in 1959. *E. marcellus* is emblematic of the enigmatic nature of Avery Island. I identified three separate woodlots containing sizable groves of pawpaw (*Asimina triloba*), the only host plant. I failed to note any butterflies or pawpaw trees in *Jungle Gardens*. On February 25, 2019, I observed two individuals in copula along the margin of a wooded ravine across from the small boat dock on Hayes Pond. Regrettably, I could not locate eggs or larvae on the host; I did, however, observe one female demonstrating an interest in a pawpaw tree with fresh, supple leaves. Also, I did not observe any adults feeding—even on buttonbush (*Cephalanthes occidentalis*), which during the summer is in bloom along Hayes Pond. Although *E. marcellus* is reported to produce multiple broods, I observed no individuals between mid summer and autumn. **U, local, possibly seasonal.**

Fig. 106. Zebra Swallowtail resting on flowering phlox. The enigmatic butterfly has become the hallmark for the island. Photo off-site.

Fig. 107. Zebra Swallowtail, mating pair. Adults patrol dark ravines with pawpaw trees. Flight is usually directional and no higher than 8-10 feet above the ground. February 23, 2019.

Fig. 108. Larva (caterpillar) of Zebra Swallowtail. Photo off-site.
←

Fig. 109. Pupa (chrysalis) of Zebra Swallowtail. Species passes the winter in this stage, emerging in early spring. Photo off-site.
→

Fig. 110. Pawpaw tree (*Asimina triloba*) in spring. Large, light green leaves are distinctive and the exclusive host for Zebra Swallowtail (*Eurytides marcellus*). March 19, 2019.

Fig. 111. (Inset to 110.) Pendulous flower. March 19, 2019.

Fig. 112. Pawpaw tree in autumn. Bright yellow leaves are distinctive. November 29, 2019.
Fig. 113. (Inset to Fig. 112.) Collection of fallen fruits. Taste resembles a blend of mango, banana, and citrus. Photo off-site.

Fig. 114. Black Swallowtail (*Papilio polyxenes*). Typical male on butterfly weed (*Asclepias tuberosa*). Photo off-site.

3. Black Swallowtail (*Papilio polyxenes*). Observed in both *Jungle Gardens* and in private sectors, mainly in early spring. Several individuals were observed seeking moisture from blossoming azaleas. One resident observed larvae in a patch of parsley. In May 2019, I observed a single larva on theadleaf mock bishop's weed (*Ptilimnium capillaceum*), a native in the Apiaceae (=Umbelliferae), the butterfly's host family that includes cultivated parsley, dill, fennel, and carrot. Near the eastern swampy area of the island the majority of males were significantly different from those on the mainland: larger in size with increased amounts of yellow on their dorsal hindwings. This aberration was described in 1942 by renowned twentieth-century lepidopterist F. Martin Brown as "form *pseudoamericus*." Individuals are so large that they can easily be mistaken for *P. palamedes*, also common in the habitat. Marks (2018) reported *pseudoamericus* from Thistlewaite Wildlife Management Area (St. Landry Parish) and Bayou Sauvage National Wildlife Refuge (Orleans Parish); both sites are primarily wetlands. According to Marks: "Although this form may occur anywhere throughout the Black Swallowtail's range, it is rare." Such is not the case on A.I. where *pseudoamericus* dominates. Perhaps wetland habitats that are favored by *P. palamedes* are sparking a mimicry complex with *P. palamedes* serving as a distasteful model with *P. polyxenes* as the palatable look-alike? To date, however, *P. palamedes* is not recorded to be distasteful to predators. This could be problematic, however. Females of *P. palamedes* oviposit on trees within the Lauraceae, a family with aromatic

species such as sassafras (*S. albidum*), redbay (*Persea borbonia*), and bayleaf (*Laurus nobilis*). (Both sassafras and bayleaf are traditional components of Cajun/Creole cuisine in south Louisiana—think filé and bayleaf for gumbos.) Therefore, aromatic chemicals could be easily transferred to butterflies from larval diets. **C.**

Fig. 115. Black Swallowtail (*Papilio polyxenes*). Female on butterfly weed. Photo off-site.
←

Fig. 116. Young larva on cultivated fennel. Photo off-site.
→

Fig. 117. Mature larva on cultivated fennel. Photo off-site.

Fig. 118. Pupa (chrysalis). Resembles dead, rolled leaf. Species passes winter in this stage. Photo off-site.

4. Giant Swallowtail (*Papilio=Heraclides cresphontes*). Observed sporadically throughout the island. Hosts include citrus trees, the herb rue, and native prickly ash tree (*Zanthoxylum*). Several larvae and adults were observed in a small group of grapefruit, satsuma, sweet orange, and kumquat trees in a resident's garden off Pepper Field road. **C.**

Fig. 119. Giant Swallowtail (*Papilio cresphontes*). Adult (sexes are similar) feeding on thistle flower. June 1, 2018.

Fig. 120. Young larva on the leaf of a satsuma tree. Photo off-site.

Fig. 121. Mature larva. Commonly referred to as an "orange dog." Caterpillars often are considered pests in citrus orchards. Photo off-site.
←

122. Adult with pupal case. Photo off-site.
→

5. Eastern Tiger Swallowtail (*Papilio=Pterourus glaucus*). Observed primarily along the borders of *Bird City* and Saline Woods Pond as they secured nectar from buttonbush (*Cephalanthus*). Dark females outnumbered typical females. Scarcity of primary host trees such as ash (*Fraxinus*), tulip poplar (*Liriodendron*), and black cherry (*Prunus*) may contribute to the butterfly's low density. **U.** (See Fig. 83 for photograph of male.)

Fig. 123. Eastern Tiger Swallowtail (*Papilio glaucus*). Typical female. (Male is pictured in Fig. 83.) Photo off-site.

Fig. 124. Eastern Tiger Swallowtail. Dark female. Often confused with Spicebush Swallowtail. Photo off-site.

6. Spicebush Swallowtail (*Papilio troilus*). The most commonly encountered butterfly on the island, and observed throughout the year. This abundance is most likely due to the prevalence of its exotic, invasive, and ubiquitous host, camphor tree (*Cinnamomum*). Native hosts are spicebush (*Lindera*) and sassafras (*Sassafras*), both rare on the island. Larvae use silk threads to roll a leaf for concealment when not feeding. Considering the unlimited availability of camphor, I would expect the species to be more abundant. Adults are addicted to bull thistle (*Cirsium horridulum*). I located only two larvae: one first instar, one final. **A.**

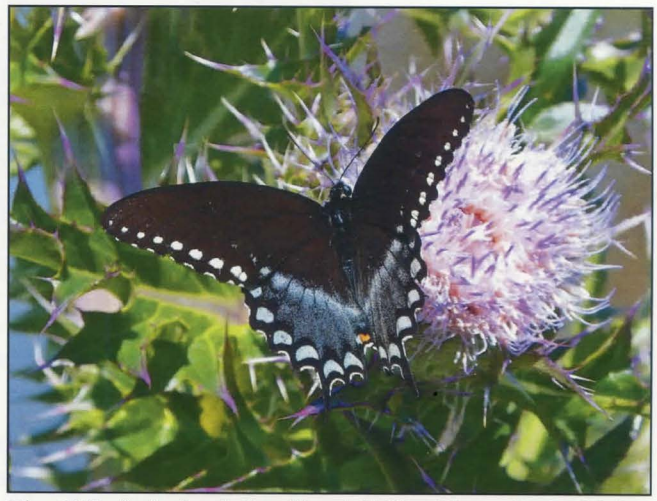


Fig. 125. Spicebush Swallowtail (*Papilio troilus*). Male. Spring thistles are favorite sources of nectar. April 22, 2019.

Fig. 126. Spicebush Swallowtail (*Papilio troilus*). Female. Nectaring on thistle. April 22, 2019.

Fig. 127. Young larva mimics bird droppings. May 16, 2019.

Fig. 128. Rolled leaf is the tell-tale sign of the "nest" of a current or previous larva. May 16, 2019

←

Fig. 129. Pupa (chrysalis). Species passes winter in this stage, emerging in early spring. Photo off-site.

→

Fig. 130. Mature larva. Eyespots are actually on thorax, not head, and are thought to mimic a snake head. June 1, 2018.

7. Palamedes Swallowtail (*Papilio palamedes*). Most common on the eastern sector of the island near the swamp interface. I encountered the species mainly along the shaded short roadways into swamplands off Marsh Header. There, the host, red/sweet bay (*Persea borbonia*) was common. As mentioned under #3, individuals can be easily mistaken for *P. polyxenes* form *pseudoamericanus; P. palamedes* is much more addicted to shade. **C.**

8. Cloudless Sulphur (*Phoebis sennae*). This large sulpur was the most common yellow butterfly on the island and the second most common species in general. Individuals were most observable in early spring following their winter inactivity and in fall when their population peaked. I observed females laying eggs on partridge pea (*Chamaecrista*) and sicklepod (*Senna obtusifolia*)), both most conspicuous in late summer/fall in waste places such as abandoned oil well sites and along margins of woodlots. Although I couldn't identify any hosts in *Jungle Gardens*, the butterfly was a familiar sight, particularly in spring when individuals were attracted to moisture in blossoming azaleas. Individuals have high, erratic flights. **A.**

Fig. 131. Cloudless Sulphur (*Phoebis sennae*). Male on thistle flower. Common throughout the year, hibernating as an adult. April 19, 2019.

Fig. 132. Cloudless Sulphur. Female on cardinal flower (*Lobelia cardinalis*). Photo off-site.

9. Orange-barred Sulphur (*Phoebis philea*). I consider the single male of this species that I observed on September 21, 2018 to be a stray from either Texas or Florida. In the past, this sulphur was occasionally observed in south Louisiana, even breeding on ornamental cassia such as *C. alata, C. corymbosa*, and *C. splendida*. The butterflies, however, are intolerant to freezes, and therefore are killed off during most winters. The male was unmistakable as it flew approximately ten feet above the ground through Venetian Gardens in *Jungle Gardens*. Parish record, although considered a stray. **R.**

10. Little Yellow (*Eurema=Pyrisitia lisa*). Observed only in early fall when the host, partridge pea (*Chamaecrista*), was in bloom. All observations were along the Marsh Headland behind Pepper Farm Road. Butterflies keep low to the ground. **U, seasonal (autumn**).

11. Sleepy Orange (*Eurema=Abaeis nicippe*). As with *E. lisa* above, this proved a to be a fall species when its host, *Chamaecrista*, blooms. Only a handful of individuals were observed, all along the Marsh Headland behind Pepper Farm Road. Butterflies keep low to the ground. **U, seasonal (autumn).**

Fig. 133. Sleepy Orange (*Eurema nicippe*). A low-flyer localized around partridge pea plants (*Chamaecrista*) in autumn. October 30, 2018.

12. 'Southern' Oak Hairstreak (*Satyrium f. favonius*). I observed only one individual of this single-brooded species on May 15, 2019. The butterfly was nectaring on the nearly spent flowers of Japanese/waxleaf privet (*Ligustrum japonicum*) bushes along Bayou Petite Road skirting the bayou and Venetian Gardens in *Jungle Gardens*. On April 27 of the previous month, Craig Marks reported 21 individuals in this same place (personal communication), and in Marks' book *Butterflies of Louisiana* (2018), he reports "The colony at Avery Island numbers in the hundreds in late Apr and early May" in the same venue. Ironically, I was on the island between April 21 and 24 but did not observe any individuals on the privet. The heavy thunderstorm that occurred the following day, April 25, most likely triggered the mass emergence from the adjacent live oaks (host species) that Marks was fortunate enough to witness two days later. Marks states that individuals from A.I. and from several other south Louisiana locations have "more red coloration on their ventral hindwings than individuals in northern LA." For Marks, the A.I. specimens represent the nominate southern subspecies, *S. f. favoniua*, rather than *S. favonius ontario*, the more common northern subspecies. **C, localized and only in spring when they are addicted to blooming *L. japonicum* in *Jungle Gardens*.** (See Fig. 95 for photograph.)

13. 'Olive' Juniper Hairstreak (*Callophrys g. gryneus*). Neither I nor Marks observed this species. The report is cited in Marks (2018) as originating with a friend who "had once discovered a colony of Juniper Hairstreaks at Avery Island." No details were included, but because the single host, Eastern red cedar (*Juniperus virginiana*), occurs most commonly along the main paved road between the Tabasco factory and the salt mine, and in several restricted areas (especially Prospect Hill), I attribute the sighting to the island's private sector rather than to *Jungle Gardens*. *C. g. gryneus*, is a single-brooded spring emergent—as is #12. Familiar with the report by Marks, I searched during March/April 2019 for the butterfly in habitats with high concentrations of cedars; I observed no individuals. **C, localized, seasonal (spring).**

14. Gray Hairstreak (*Strymon melinus*). Found throughout the island, but dependable only near Miner's Village where snout bean (*Rhynchosia minima*) was abundant, and in the pepper fields where arrowleaf sida (*Sida rhombifolia*) was an invasive weed between the rows of pepper plants, particularly in mid September 2018. Both plants are hosts—as well as numerous others in the pea family (Fabaceae) and mallow family (Malvaceae). **A, localized.**

Fig. 134. Gray Hairstreak (*Strymon melinus*). Dorsal. October 16, 2018.

15. Red-banded Hairstreak (*Calycopis cecrops*). Not uncommon, but encountered only as single individuals in a variety of habitats throughout the growing season. Individuals were nectaring on Japanese/waxleaf privet (*Ligustrum japonicum*) or perched on low greenery bordering woodlots. Host is Southern wax myrtle (*Myrica cerifera*), an abundant invasive and water tolerant shrub. I observed no more than two individuals during any given survey. **U.**

16. American Snout (*Libytheana carienta*). Found sparingly throughout the island. Nectars on Japanese/waxleaf privet (*Ligustrum japonicum*) in spring. Two were observed in late afternoon as they basked in the last sun rays of the day on leaves of camellia plants in the "Old Nursery" of *Jungle Gardens* in summer. Host is hackberry (*Celtis*). My record on January 28, 2019 is a new early sighting. **U.**

Fig. 135. American Snout (*Libytheana carienta*), a swift flying species that frequents flowering waxleaf privet (*Ligustrum*) and wet soil. June 1, 2018.

17. Gulf Fritillary (*Agraulis vanillae*). Observed only in late summer through autumn everywhere on the island—including *Jungle Gardens*. Host is passionvine (*Passiflora incarnata*), a trailing species with large attractive blooms that occurs in several venues particularly Miner's Village, near salt mine, and atop Prospect Hill. In spite of the abundance of the host, I encountered only one larva. Adults have exceptionally good memories and long lives, which enable them to return repeatedly to favorite flowers and host. **C, seasonal (late summer/autumn).**

Fig. 136. Gulf Fritillary (*Agraulis vanillae*). Male nectaring on lantana. Females are darker. October 29, 2018.

Fig. 137. Gulf Fritillary. Male (ventral side) nectaring on Brazilian vervain (*Verbena braziliensis*), an exotic wildflower well established in waste places, and an excellent source of nectar for many butterflies. October 29, 2018.

Fig. 138. Passionvine flower (*Passiflora incarnata*). Native host for Gulf Fritillary. Vine is common throughout the island, particularly near the salt mine and atop Prospect Hill. Blooms throughout warm months. June 12, 2018.

139. (Inset to Fig. 138.) Mature larva of Gulf Fritillary. Spines are only a visual deterrent to vertebrate predators. September 20, 2018.

Fig. 140. Fresh Gulf Fritillary with pupal skin. Reflective silver spots on underwings provide camouflage. Photo off-site.

18. Silvery Checkerspot (*Chlosyne nycteis*). I logged in only three specimens. Two were behind Saline Pond, one near a woodlot opposite Hayes Pond. All observations were in mid-October 2018 when the hosts, Virginia crownbeard (*Verbesina virginica*) and yellow crownbeard (*V. helianthoides*), were in full bloom. No larvae were located. All three butterflies were resting on low vegetation near their hosts. **U, seasonal (autumn).**

19. Phaon Crescent (*Phyciodes phaon*). Locally abundant near its host, frogfruit (*Phyla nodiflora*). Because the plant is colonial and can tolerate frequent mowing and soil sogginess, frogfruit thrives even in *Jungle Gardens*, particularly near the ponds in Venetian Gardens. Other important locales include Skeet Range Road and along eastern road cuts from Pepper Field Road. Butterflies are addicted to feeding on the flowers of the host. Male coloration is not as vibrant as with mainland populations, ergo, they can be easily mistaken for *P. tharos* (see # 20). **A, localized around host plant.**

Fig. 141. Phaon Crescent (*Phyciodes phaon*). Usually common near its host, frogfruit. September 22, 2018

20. Pearl Crescent (*Phyciodes tharos*). Like its cousin above, the species was localized around its fall blooming host, willowleaf aster (*Symphyotrichum praealtum*), common in various infrequently mowed waste places such as abandoned oil well sites and in Miner's Village. These butterflies frequently nectared on frogfruit (see #19) and scaleleaf aster (*S. adnatum*), the latter an upright species found sporadically in Miner's Village and along Bear Corridor Road off Pepper Field Road. Individuals are slightly smaller than those on the mainland; as such, the species can be confused with *P. phaon*. **C, local**.

Fig. 142. Pearl Crescent (*Phyciodes tharos*). Often addicted to nectar of the frogfruit, particularly in late summer through fall when its hosts, various asters, are in bloom. July 14, 2018.

21. Question Mark (*Polygonia interrogationis*). Observed occasionally at rest in sunny spots in dirt roads dissecting wooded areas, but particularly along a service road connecting Saline Woods Pond with Prospect Hill. One individual was on a gravel road in *Jungle Gardens*. Adults often bask in sunlit patches of ground in otherwise shaded habitat, particularly in early morning. Because adults can survive cold, the butterfly can sometimes be observed on sunny days in winter. Hosts include hackberry (*Celtis*), elms (*Ulmus*), and nettles (*Urtica*). **U**.

Fig. 143. Question Mark (*Polygonia interrogationis*). An energetic species that can be found throughout the warm season. February 23, 2019.

22. Mourning Cloak (*Nymphalis antiopa*). This is the second species I did not encounter (see #13). The citation is from Marks (2018) in which he reports: "a fresh male at Avery Island in mid-Apr." I presume the spotting was in *Jungle Gardens*. In spite of searching for this species in wooded areas in the gardens and elsewhere, I failed to encounter a single individual. Host plants are hardwood trees such as hackberry (*Celtis*), cottonwood (*Populus*), ash (*Fraxinus*), willow (*Salix*), American basswood (*Tilia*), ironwood (*Carpinus*) and elm (*Ulmus*), all of which occur on the island. Adults survive winter. **R**.

23. American Lady (*Vanessa virginiensis*). Only four individuals were observed: three in *Jungle Gardens*, one off a side road to Marsh Headland on the eastern side of the island; all were between March and May 2019. In the gardens the butterflies were feeding on white clover (*Trifolium repens*) in an intensely mowed lawn beside a pond in Venetian Gardens (*Jungle Gardens*). A second individual was being eaten following capture by a dragonfly, "yellow-sided skimmer" (*Libellula flavida*). The dragonfly was resting on a blade of grass along pond's edge in *Bird City*. Hosts include pearly everlastings (*Anaphalis*) and several other composites (Asteraceae). **U, seasonal (spring only).**

24. Painted Lady (*Vanessa cardui*). This butterfly was surprisingly uncommon. Due to the species' tendency to engage in mass migrations in fall, I expected to witness large numbers on the island. But to the contrary, I observed only two individuals, both between late August and mid September, 2018; one was flying near the ponds in *Jungle Gardens*, the other along the main road near the post office. Major hosts are thistles (*Cirsium*). **U, seasonal (autumn).**

25. Red Admiral (*Vanessa atalanta*). Another uncommon species, observed only in *Jungle Gardens*. One individual was nectaring on Japanese/waxleaf privet (*Ligustrum japonicum*), March 2019, and one on buttonbush (*Cephalanthus occidentalis*) in *Bird City*, July 2018. Adults often survive winter, flying on sunny days. Primary hosts are nettles (*Urtica*). **U.**

26. Common Buckeye (*Junonia coenia*). This species was first observed in mid-October, 2018. In 2019, however, individuals were more common between October 2018 and January 2019. Butterflies were observed in waste places near abandoned oil wells as they rested on limestone substrate. Localities commonly include mowed areas in which willowleaf aster (*Symphyotrichum praealtum*) and broadleaf plantain (*Plantago major*) have re-sprouted. The latter is a known host. **C.**

Fig. 144. Common Buckeye (*Junonia coenia*). Courting pair near host plant, great plaintain (*Plantago major*). October 29, 2018.

27. Red-spotted Purple (*Limenitis arthemis astyanax*). I observed only one specimen as it was nectaring on the blooms of Japanese/wax/leaf privet (*Ligustrum japonicun*) located on a private homesite. However, Marks (2007) reported the taxon from *Jungle Gardens*. Because hosts such as elm (*Ulmus*), willow (*Salix*), American basswood (*Tilia*), and ironwood (*Carpinus*) are common, I would have predicted the butterfly to be common. **R.**

28. Viceroy (*Limenitis archippus*). Unlike the previous admiral, this species was common, particularly along Marsh Headland and adjacent road cuts, and at the Skeet Range—all of which have good concentrations of black willow (*Salix nigra*), the butterfly's host. A few individuals were also encountered near the ponds in *Jungle Gardens*, and along the border of *Bird City*, particularly in late summer and autumn. Brazilian vervain (*Verbena braziliensis*) was a favorite source of nectar. **C.**

Fig. 145. Viceroy (*Limenitis archippus*). A mimic of the Monarch. Host is black willow (*Salix nigra*), common along margins of sunny ditches and ponds. March 19, 2019.

29. Tawny Emperor (*Asterocampa clyton*). Most individuals were observed near the community dump behind the pepper fields from spring through autumn. In addition, the butterfly was seen along the edge of *Bird City*. Butterflies are skittish and difficult to observe. Host is hackberry (*Celtis*). **C.**

30. Southern Pearly Eye (*Enodia portlandia*). This is the second keystone species that I first identified on the island in 1959. From April through November solitary individuals could be encountered in *Jungle Gardens* near groves of exotic bamboos. The largest population, however, was in the historic grove (planted in 1911) of moso bamboo (*Phyllostachys edulis*) near Prospect Hill on private property. Individuals of this medium-size satyr (family Nymphalidae, subfamily Satyrinae) can be easily disturbed by walking through the grove. Flight is rapid and direct. Previously, I reported (see Ross 2019a,i,j; 2020a) on how the annual thinning of the moso grove provides windfall benefits for the butterfly: (1) additional sources of food in the form of fermenting sap accumulating in cut canes (culms), (2) increased uncluttered space for flight, and (3) fresh bamboo leaves for breeding sites. Thus, man's interference within a historic exotic plant community favors the reproduction of this native, enigmatic butterfly. **A, localized colonies near bamboo in *Jungle Gardens* and elsewhere, especially the grove of moso bamboo near Prospect Hill.**

Fig. 146. Southern Pearly Eye *(Enodia portlandia*). Male resting on ground debris. A shade-loving, low-flying satyr, Pearly Eyes normally utilize native switch canes (*Arundanaria*) as hosts. On Avery Island, the butterfly finds exotic bamboos, especially the historic grove of moso bamboo near Prospect Hill, more to its its liking. March 19, 2019.

Fig. 147. A damaged female Southern Pearly Eye. Specimen was discovered on the ground near suckers of moso bamboo, apparently having fallen from its pupal case prior to drying. March 19, 2019.

Fig. 148. Two Southern Pearly Eye males feeding from fermenting bamboo sap, water, and organic material accumulated in the remains of a cut cane. The butterflies prefer plant exudates over plant nectars. The alcoholic "cocktail" also attracts flies, bees, wasps, harvestmen, and pill bugs. March 19, 2019.

31. Creole Pearly Eye (*Enodia creola*). Less common than its cousin, #30. Only a single male was positively identified in the moso bamboo grove near Prospect Hill on April 11, 2018. The individual was resting on a leaf, but soon became alarmed, took flight, and was not seen again even though I remained in the grove for another hour or so. During my survey on January 28, 2019, I am fairly confident that I observed two males as they took flight upon my approach. I hypothesize that this species and the former are competitors for bamboo hosts. To lessen interactions, *E. creola* probably emerges from its pupal hibernation early in the season ahead of *E. portlandia*. Parish record. **R, seasonal (April), localized in bamboo groves**.

32. Carolina Satyr (*Hermeuptychia sosybius*). A denizen of wet, shady habitats, particularly in road cuts off Marsh Headland where it is abundant. Strangely, these satyrs are only marginally abundant in *Jungle Gardens* even though appropriate habitats are rampant. Because grasses are hosts, and butterflies are sedentary, individuals are easily approached. **A.**

Fig. 149. Carolina Satyr (*Hermeuptychia sosybius*). A shade-loving species that spends most of its time resting on ground debris. March 21, 2019.

33. Little Wood Satyr (*Megisto cymela*). This satyr was a single-generation spring emergent, and therefore, rare. I discovered the species only during my survey on March 19-24, 2019. One month later, April 21-24, I failed to observe a single individual even in previous localities. The butterfly is colonial: five outposts scattered about the island (including atop Prospect Hill). No colonies were sighted in *Jungle Gardens*. Populations were located along the edges of damp woods where a species of tussock-type sedge (*Carex* sp.) was common. Recorded hosts are various grasses, especially cock's foot/cat grass (*Dactylis glomerata*), a naturalized species known to host several species of butterflies both in the U.S. and Europe. (Another possible host on A.I. is naturalized centipedegrass, *Eremochloa ophiuroides*). Each butterfly cohort consisted of a dozen or so individuals. Flight is "bouncy" and never more than a foot or so above the ground. Parish record. **U, seasonal (March) and colonial.**

Fig. 150. Little Wood Nymph (*Megisto cymela*). A spring-brooded species that shuns sunlight and a resident in only a handful of woodlots containing tussock grasses. March 21, 2019.

34. Monarch (*Danaus plexippus*). See discussion (page 64) under "Migratory Monarch Butterflies and their Louisiana Connection." **A, seasonal (spring/fall).**

35. Silver-spotted Skipper (*Epargyreus clarus*). A spread-wing skipper (Hesperiidae: Pyrginae). Only three individuals were recorded: one in Miner's Village, one at a residence behind the post office, and the third near the known host, black/honey locust (*Robinia pseudoacacia*) along Marsh Headland. All butterflies were resting on leaves in dappled sunlight during late summer/early autumn. **U.**

36. Long-tailed Skipper (*Urbanus proteus*). This large, tailed species was most often observed feeding on naturalized lantana ("ham-and-eggs") in Miner's Village, on willowleaf aster (*Symphyotrichum praealtum*) near the community dump behind the pepper fields, and on larger bur marigold (*Bidens laevis*) along the major margin of *Bird City*. All sightings were in fall 2018 and January 2019. Hosts include herbaceous legumes. My record on January 7, 2019, is a new early sighting. **U, seasonal (autumn/winter).**

37. Southern Cloudy Wing (*Thorybes bathyllus*). Only one individual was spotted. It was nectaring on a massive naturalized "ham-and-eggs" lantana on October 17, 2018. The plant was growing in an overgrown/wet trail bordered by thick woods near the Cargill barge loading dock. Mature Chinese privet (*Ligustrum sinense*) was in the same area. Hosts are herbaceous legumes (Fabaceae=Leguminosae). Parish record. **R, seasonal (October), local.**

38. Juvenal's Duskywing (*Erynnis juvenalis*). Four individuals were flying on March 20, 2019, in a grassy area near a residence off Sugar Mill Road. Since this is usually an early spring species, I assume I had missed recording other individuals the previous month. Hosts are various oaks (*Quercus*). **U. seasonal (spring), local.**

39. Horace's Duskywing (*Erynnis horatius*). Only a single fresh individual was seen on March 24, 2018, in a grassy area along Sugar Mill Road. This species usually follows its closely related sister species, *E. horatius*, in emergence, appearing on the wing in summer through autumn. Presumably, this single adult heralded the beginning of the new flight period for the species. Hosts are various oaks (*Quercus*). Parish record. **R, seasonal (spring), local.**

40. Zarucco Duskywing (*Erynnis zarucco*). One individual was recorded on July 11, 2018, and another on August 21, 2018. Both were nectarng on frogfruit (*Phyla nodiflora*) growing in a highly manicured lawn bordering *Bird City*. Hosts include legumes, especially black locust (*Robinia pseudoacacia*). Parish record. **R, local.**

41. Common Checkered Skipper (*Pyrgus communis*). See under DISCUSSION (Residential/Commercial). This was the most common spread-wing skipper. **A, local.**

Fig. 151. Common Checkered Skipper. (*Pyrgus communis*). Male, ventral. October 16, 2018.

Fig. 152. Common Checkered Skipper, female, dorsal. October 16, 2018.

42. Tropical Checkered Skipper (*Pyrgus oileus*). See under DISCUSSION (Residential/Commercial). **A, local.**

Fig. 153. Tropical Checkered Skipper (*Pyrgus oileus*). Male, dorsal. October 16, 2018.

43. Clouded Skipper (*Lerema accius*). The most common member of the Hesperiidae: Hesperiinae—grass skippers. Not a surprise since the species is well distributed through much of the state. The butterfly's small size and dark color punctuated with several white specks are distinctive. Individuals fly during most months (March-December), particularly in unmowed habitats such as in Miner's Village and throughout Marsh Headland. Individuals frequently perch on blades of grass where they display characteristically: forewings vertical, hind wings, horizontal. While perched the butterflies can be easily flushed, but soon settle elsewhere. Males frequently chase each other with rapid, erratic flights. In *Jungle Gardens* I found the butterfly attracted to flowers, especially climbing hempvine (*Mikania scandens*) along water's edge in *Bird City*. Hosts are grasses, especially Johnson grass (*Sorghum halepense*), Indian grass (*Sorghastrum nutans*), and St. Augustine grass (*Stenotaphrum secundatum*). **A.**

Fig. 154. Clouded Skipper (*Lerema accius*). The most common grass skipper on the island. June 1, 2018.

44. Least Skipper (*Ancyloxypha numitor*). This small grass skipper was consistent along the watery edge of *Bird City*. The butterflies could be easily flushed from the bordering grasses. In addition, I found colonies in several grassy areas near the community dump, along Marsh Headland, and a massive colony (50 plus individuals) near the Skeet range. Individuals are addicted to the flowers of frogfruit (*Phyla nodiflora*). **A.**

45. Southern Skipperling (*Copaeodes miniumus*). The tiny grass skipper, as with its sister species above, was a denizen of the grasses bordering *Bird City* and throughout Marsh Headland. *C. minimus*, however, was never as numerous as *A. numitor*. **A.**

46. Fiery Skipper (*Hylephila phyleus*). Another grass skipper found in a mowed area bordering *Bird City*, and in a similar habitat containing rejuvenating willowleaf aster (*Symphyotrichum praealtum*) near an active well site along Skeet Range Road. Individuals were far less common than on the mainland. Hosts are various species of grasses, including those favored for lawns. **U, seasonal (summer-autumn), local.**

47. Southern Broken Dash (*Wallengrenia otho*). A single individual was spotted (May 16, 2019) nectaring on a newly planted dwarf yellow lantana (*L. camara*) on the peninsula between the lagoons in *Jungle Gardens*. Grass hosts include St. Augustine. **R, seasonal, local.**

48. Sachem (*Atalopedes campestris*). This medium-size grass skipper was seen along the border of *Bird City*, near an active oil production site near Saline Pond, and near the salt docking facility in Miner's Village. Two individuals were perched on leaves, and one was nectaring on "Ham-and-Eggs" lantana. Grass hosts include Bermuda grass (*Cynodon dactylon*). Parish record. **U, seasonal (March/April), local.**

49. Delaware Skipper (*Anatrytone logan*). A grass skipper with bright orange hindwings, easy to identify. Adults are addicted to late summer/fall flowers such as Virginia crownbeard (*Verbasina virginica*) and yellow crownbeard (*V. helianthoides*), both common along the edges of woods. Usually only one or two were seen at any given time. Most common locations were Miner's Village and near Hayes Pond. Hosts are reported to be various grasses. **U, local.**

50. Aaron's Skipper (*Poanes aaroni*). Six individuals were observed (October 16-21, 2018) feeding in a patch of rejuvenating flowering willowleaf aster (*Symphyotrichum praealtus*) growing near a capped oil well off Skeet Range Road; marshland was within a hundred feet or so. The species is previously recorded from only two parishes: Cameron and Vermilion. Hosts are especially smooth cordgrass (*Spartina alternifolia*) and saltgrass (*Distichlis skpicata*). Parish record. **U, seasonal (autumn), A in colonies.**

51. Broad-winged Skipper (*Poanes viator*). A single individual of this relatively large grass skipper was discovered on July 11, 2018, along a shaded road cut dominated by grasses and sedges off Bear Corridor Road behind Marsh Headland. The road cut dissected a swamp that gradated rapidly into a marsh. Hosts are especially giant cutgrass/water millet (*Zizaniopsis miliacea*) and possibly sedges. **R, local, seasonal (summer).**

52. Palatka Skipper (*Euphyes pilatka*). This species is reported from only three parishes in the state: Cameron, Iberia, and St. Tammany. Because of its rarity, the species was listed for Louisiana in 2015 as a Tier II, S1 (critically impaired) ranked SGCN (Species of Greatest Conservation Need). Not surprisingly, *E. pilatka* occurs on A.I. I found individuals localized near the lagoons in *Jungle Gardens* and in Miner's Village. In the gardens, I and others (Marks, 2018) recorded individuals resting on blades of grass near water's edge in *Bird City*. In Miner's Village, I noted two individuals nectaring on Virginia crownbeard (*Verbesina virginica*) near a freshwater canal. However, on March 20, 2019, I witnessed a mass emergence (50 plus individuals) along a damp, wooded road cut leading to a freshwater canal intersecting Marsh Headland. The road was carpeted with butterweed (*Packera glabella*) in full bloom. Butterflies were attracted to the wildflower for nectar. During my next survey, April 21-24, I could locate only a handful of individuals. The host is recorded to be saw-grass (*CladiumX jamaicensis*), a tall sedge (*Cyperaceae*). **U, but A in local colonies.**

Fig. 155. Palatka Skipper *(Euphyes pilatka*). Rare but colonial in spring when individuals are attracted to the nectar of butterweed (*Packera*). March 20, 2019.

53. Dukes' Skipper (*Euphyes dukesi*). Same wet habitats as for Aaron's Skipper. Only one individual feeding on *Aster adnatus* on October 20, 2018. Hosts are sedges (Cyperaceae). **Parish record. R, seasonal (autumn).**

54. Dun Skipper (*Euphyes vestris*). Found in the same habitat as that for *E. pilatka*; at least a dozen individuals were nectaring in the same colony of butterweed. Butterflies were very skittish. As with *E. pilatka*, a revisit to the area the following month failed to produce any individuals. Marks (2018) states that he encountered the species "at numerous locations around the state, flying from Apr. until Oct." Hosts are sedges (Cyperaceae). My record from Nov. 29, 2018, is a new late sighting. **U, local, seasonal (March).**

Fig. 156. Dun Skipper (*Euphyes vestris*). Rare but colonial in spring when individuals are attracted to the nectar of the abundant butterweed (*Packera*). March 20, 2019.

55. Twin-spot Skipper (*Oligoria maculata*). Only two individuals of this small grass skipper were noted (October 16-21 survey). Both were feeding on Virginia crownbeard (*Verbesina virginica*) near the salt dock in Miner's Village. **U, seasonal (autumn), local.**

56. Brazilian Skipper (*Calpodes ethlius*). The largest of the grass skippers was recorded only from *Bird City*. In July and September 2018, several individuals were resting on the leaves of bent alligator-flag/fire-flag (*Thalia geniculata*) growing at the ground base of the observation platform. This naturalized butterfly from South America uses various species of ornamental canna lily and the related Gulf-coast native, fire-flag, as hosts. Larva is named "larger canna leafroller" because of its habit of folding a leaf over and securing with silk to create a hiding place. During the night, caterpillars emerge to feed, often causing severe cosmetic damage. The more common and smaller "lesser canna leafroller" (*Geshna cannalis*), a species of grass/snout moth in the family Crambidae, exhibits similar behavior. But because of the moth's greater abundance and wider distribution, it is the bigger pest. **U, local.**

57. Salt Marsh Skipper (*Panoquina panoquin*). Only a single individual was observed on July 11, 2018, in a grassy area bordering a brackish marsh at the end of Bear Corridor Road (behind Marsh Headland and Pepper Field Road). The reported host is saltgrass (*Distichlis skpicata*), common in the marshlands bordering the island. Parish record. **R, local.**

Migratory Monarch Butterflies and their Louisiana Connection

Light in weight (about the same as a U.S. dollar bill cut in half), and flashy orange and black with flecks of white, the Monarch butterfly has become the heralded "poster child" for the conservation movement as well as the de facto national insect for the United States. The paradigm for this one-of-a-kind life cycle goes something like this: Each autumn (mainly September/October), millions of Monarchs (in the past one billion-plus) from the eastern United States and eastern Canada undergo hormonal changes that cause them to suspend their reproductive imperative. Instead, the virgin butterflies migrate southward into Mexico where they spend the ensuing cooler months. The following March/April, those aged international travelers mate and begin winging their way back northward. En route, females deposit eggs on milkweed plants (*Asclepias*), and then, like their male counterparts, die. Hatchling caterpillars grow, molt, and eventually metamorphose into a new generation of adults. These butterflies continue the northward movement, lay eggs, and quickly die. By early autumn—four to five brief generations removed from the aged generation that exited Mexico—the butterflies suspend reproduction and begin tracking southward. Within twelve months, therefore, Monarchs fulfill their unique destiny.

Fig. 157. Monarch (*Danaus plexippus*). Portrait of male (top), female (bottom). Photo off-site.

October 1959. During a visit to the cheniers of Cameron Parish I discovered that Monarchs were nectaring on the exuberance of wildflowers. The favored plant was the white/yellow native perennial known as spiny aster (*Chloracantha spiosa*), common along the poorly groomed roadsides and grazing lands. At dusk, the butterflies would congregate on the branches of the ancient oak trees to roost. During subsequent years, I often revisited the cheniers both in April and October for the meetings of Louisiana Ornithological Society. During April visits, I always was able to locate Monarch caterpillars on localized green antelopehorn milkweed (*Asclepias viridis*) and during fall, adult Monarchs roosting in the oak trees. But until I retired from teaching in 1991, I didn't have time to investigate further.

In late 1990, a note in *News of the Lepidopterists' Society* claimed that Monarchs were observed "On the 17th and 18th of October, every year for the past 18-19 years, monarch butterflies in immense numbers alight on and rest on an off-shore oil production platform out in the Gulf of Mexico."

With my curiosity piqued, I contacted Union Oil Company of California (UNOCAL) and Petroleum Helicopters, Inc. (PHI). Thanks to their generosity, each October between 1991 and 1995, I was able to reside aboard a large man-made gas production platform located 72 miles south of the community of Cameron. Officially registered as West Cameron Block 280 (WC-280), the platform served as my base for monitoring any butterflies that were observed over the northern Gulf of Mexico. (These experiences are detailed in Ross, 2010).

To summarize: During five consecutive autumns, I documented that Monarch butterflies were sighted on 52 manmade structures—all south of the coastline of southwest Louisiana, principally Cameron Parish and Vermilion Parish. The data confirm that the butterflies were using the man-made structures to rest, "pit stops." The butterflies would descend near dusk, spend most of the night, and then depart near dawn. The most cogent point of origin was the cheniers. The elevated land offered safe night roosts and a profusion of high-octane wildflowers in both spring and fall for fuel. Once launched over open water, the butterflies would take advantage of the artificial structures in much the same way as the migrant Neotropical songbirds—a phenomenon proven in 1945 by George H. Lowery, Jr., and further documented by Sidney A Gauthreaux; Jr. in 1971. An analysis of my pinpoint data indicated that Monarchs track a consistent over-water flyway that is approximately 90-100 miles wide stretching 400 miles from the southwest coast of Louisiana and eastern Texas, and by extrapolation, to the northeast coast of the Gulf coast state of Tamaulipas, Mexico, approximately

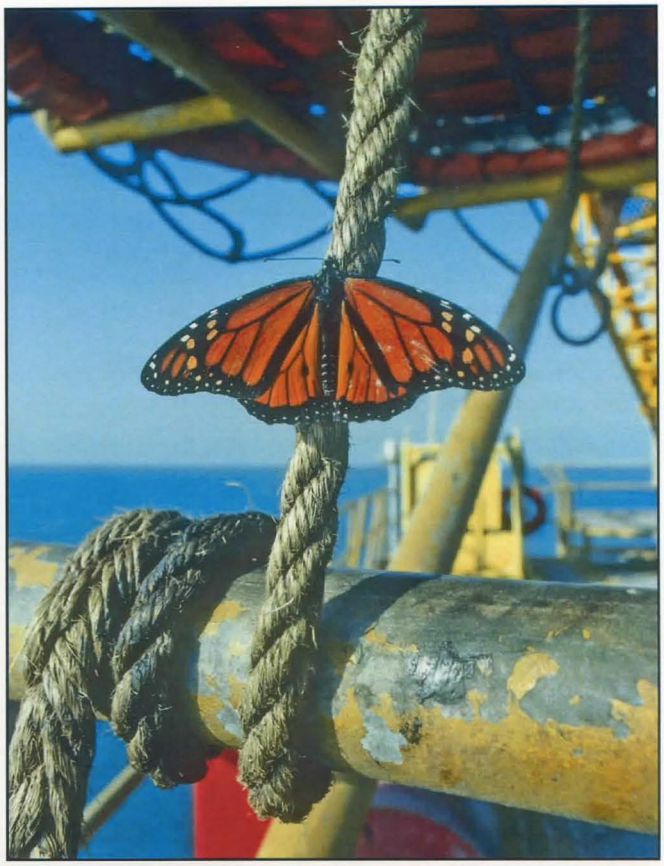


Fig. 158. Migrating Monarch resting on a rope aboard UNOCAL gas production platform WC-280, 72 miles south of Cameron in the northwestern section of the Gulf of Mexico. Monarchs often rest for the night aboard offshore platforms during their autumn and spring migrations. Author has christened the Gulf crossing the "Monarchs Trans-Gulf Express." October 29, 1993.

400 miles away. After encountering the shore, the butterflies theoretically can access a series of known passes that dissect the eastern Sierra Madre and the Central Plateau to reach their target—the cool highland forests of central Mexico. As a result of the research, I christened the Gulf's "highway-in-the-sky," the "Monarch's Trans-Gulf Express." (See Mather, 1990; Ross and Behler, 1993, Ross 1993, 1996a, 2001b, 2009a, 2010, 2016.) A spin-off of the theory was that Monarchs can and do fly over large bodies of water, and sometimes even during darkness.

My interest in Monarch migration was rekindled in April 2018. During my second visit to Avery Island, I observed a sizable number of adult Monarchs in both *Jungle Gardens* and in an overgrown area known as Miner's Village—an area that is infrequently mowed and that was supporting a sizable population of the large bull/yellow/spiny thistle (*Cirsium horridulum*). Flower heads were attracting a variety of pollinators: bumblebees, honey bees, and butterflies — especially swallowtails and Monarchs. The Monarchs were weather-worn: wings were tattered and significantly

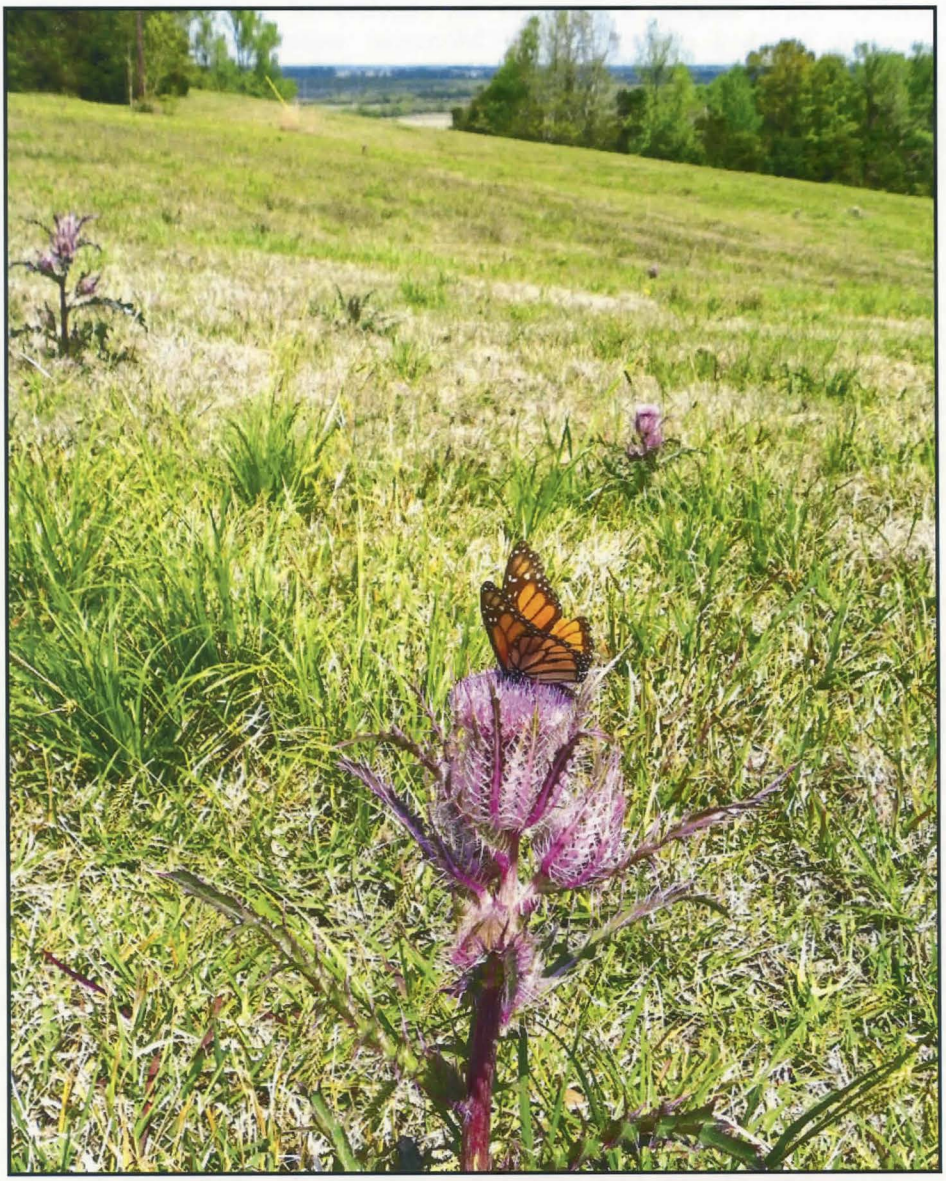


Fig. 159. Monarch nectaring on bull thistle (*Cirsium horridulum*) atop Prospect Hill. Thistles are often considered obnoxious weeds by homeowners and farmers/cattlemen, but are excellent sources of nectar and pollen for many insects and hummingbirds. Note lowlands on the horizon. April 21, 2019.

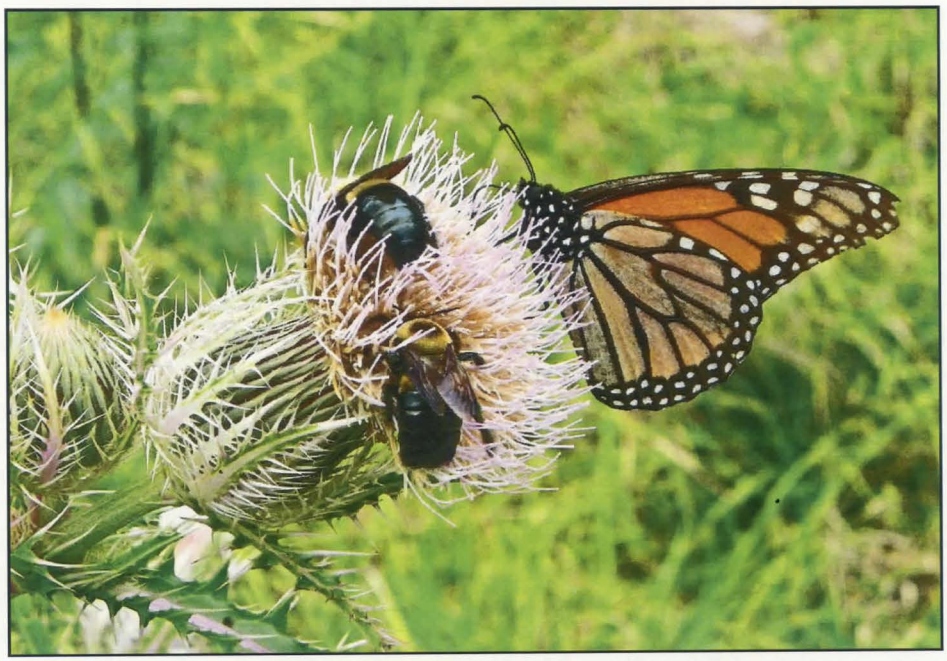


Fig. 160. Monarch. Close-up of the flower head of a bull thistle with a Monarch and two bumblebees clambering for the abundant nectar. Worn wings is evidence of migration (probably trans-Gulf) from overwintering sites in central Mexico. April 12, 2018.

faded, and bodies were emaciated—clues that the butterflies were relatively old. And after mentioning to the island's official botanist, Garrie Landry, that I had noticed the Monarchs, he indicated that during the previous year (2017) he had discovered a patch of un-reported green antelopehorn milkweed in a resident's extensive lawn.

We immediately visited the site of the milkweed. Unfortunately, the expansive one-acre lawn had been mowed the previous day. Still, a large number of milkweed stems were evident. And against all odds, a sizable Monarch caterpillar was wandering on the ground near my feet! I quickly relocated the individual to a milkweed stem that still retained a few leaves. The caterpillar began to feed. Then a question: Vis-à-vis the Monarch's trans-Gulf migration, could the cheniers of Cameron Parish and Avery Island both play an important role?

On two occasions in mid to late October 2018, I searched for clusters of Monarchs in oak trees; I failed to locate any. I did, however, notice several dozen Monarchs scattered about the island. All were fresh, indicative of southern migrants, and I did not observe any eggs or larvae on any of the milkweed plants, an indication that the adults were in sexual diapause.

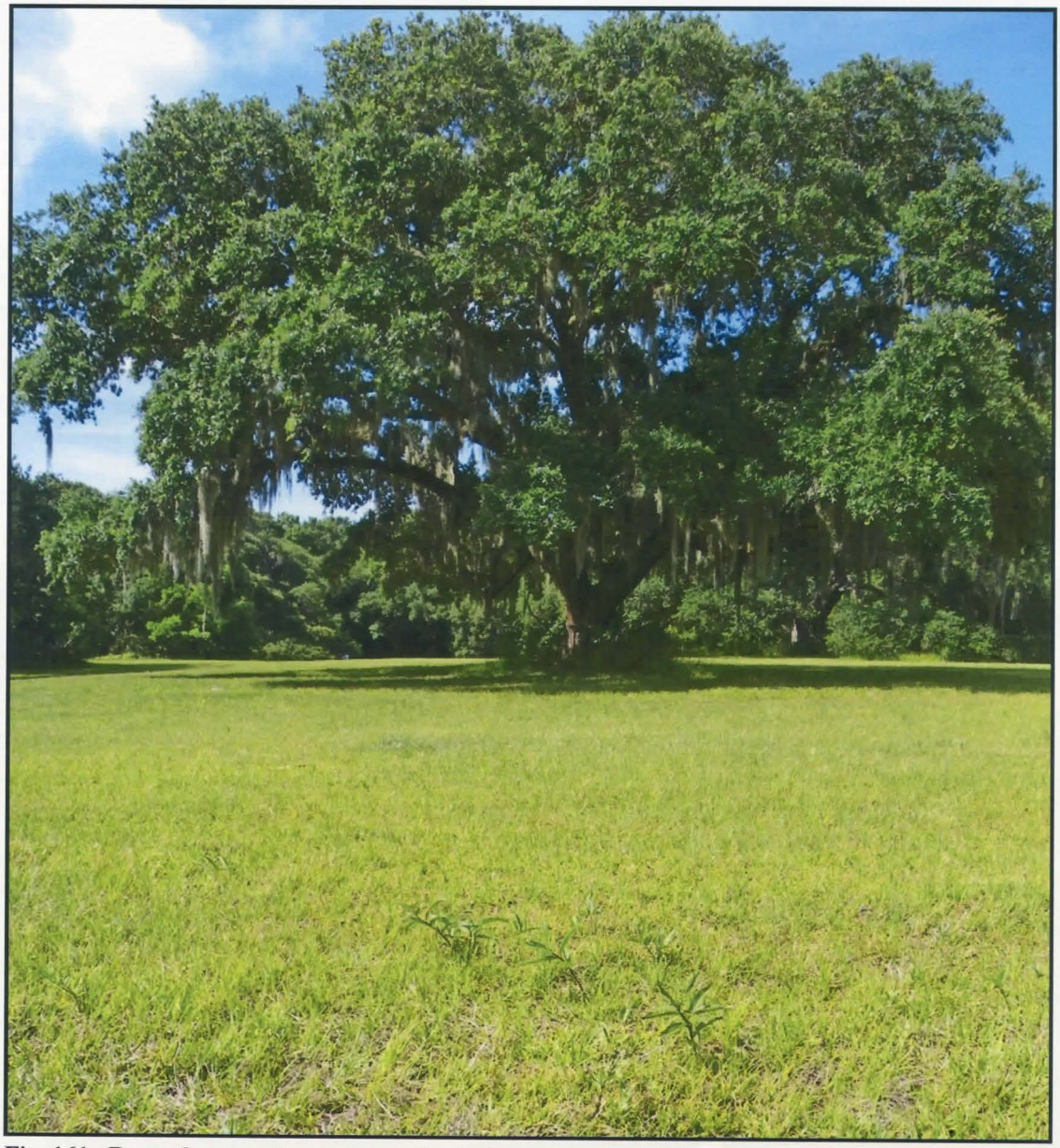


Fig. 161. Recently mowed grassy area featuring upwards of 100 rejuvenating native green antelopehorn milkweed (*Asclepias viridis*) plants. Several milkweeds are in lower-middle of photograph. April 12, 2018.

In April 2019, I reaffirmed the presence of Monarchs, primarily atop Prospect Hill where a crop of bull thistle was in full bloom thanks to delayed mowing. Here, too, a substantial cohort (at least 100 individuals) of green antelopehorn milkweed was in flower and seed. I could locate no eggs or caterpillars although I did observe several small circular/semicircular holes in tender leaves—telltale evidence of feeding by early instar Monarch larvae; I surmise that predators had vanquished the tiny caterpillars.

Fig. 162. Native green anteloopehorn milkweed bordering a private drive. April 12, 2018.

[NOTE: In an effort to practice environmental stewardship, in 2018 a resident with several small specimens of green antelopehorn milkweeds on their property, flagged the plants and after locating a substantial colony nearby, constructed a wire pen around the group. In addition, this same resident transplanted several milkweeds from a neighbor's field into a cordoned off plot on their land. As of mid 2019, the pens were intact and milkweeds were flourishing.]

Fig. 163. Native milkweed inside a wire pen constructed by a conservation-minded resident to protect from mowing. April 12, 2018.

All in all, I theorize that Avery Island and the cheniers in Cameron Parish are indeed important to migrating monarchs. Specifically, in autumn these elevated dry lands bordering the Gulf of Mexico function as staging grounds for an over-water launch. In spring, these same elevations serve as landing sites, welcoming the butterflies to refuel and jumpstart their first generation on a native milkweed. Now, with assistance from residents, Monarch butterflies in the future may utilize Avery Island even more.

Fig. 164. Native milkweed staked to protect from frequent mowing. Seed pods are usually in pairs, hence the name "antelopehorn." April 13, 2018.

Fig. 165. Monarch larva (caterpillar) in recently mowed lawn punctuated with an abundance of green antelopehorn milkweed plants. Larva is evidence that migratory monarchs exploit the island for breeding in early spring. April 12, 2018.

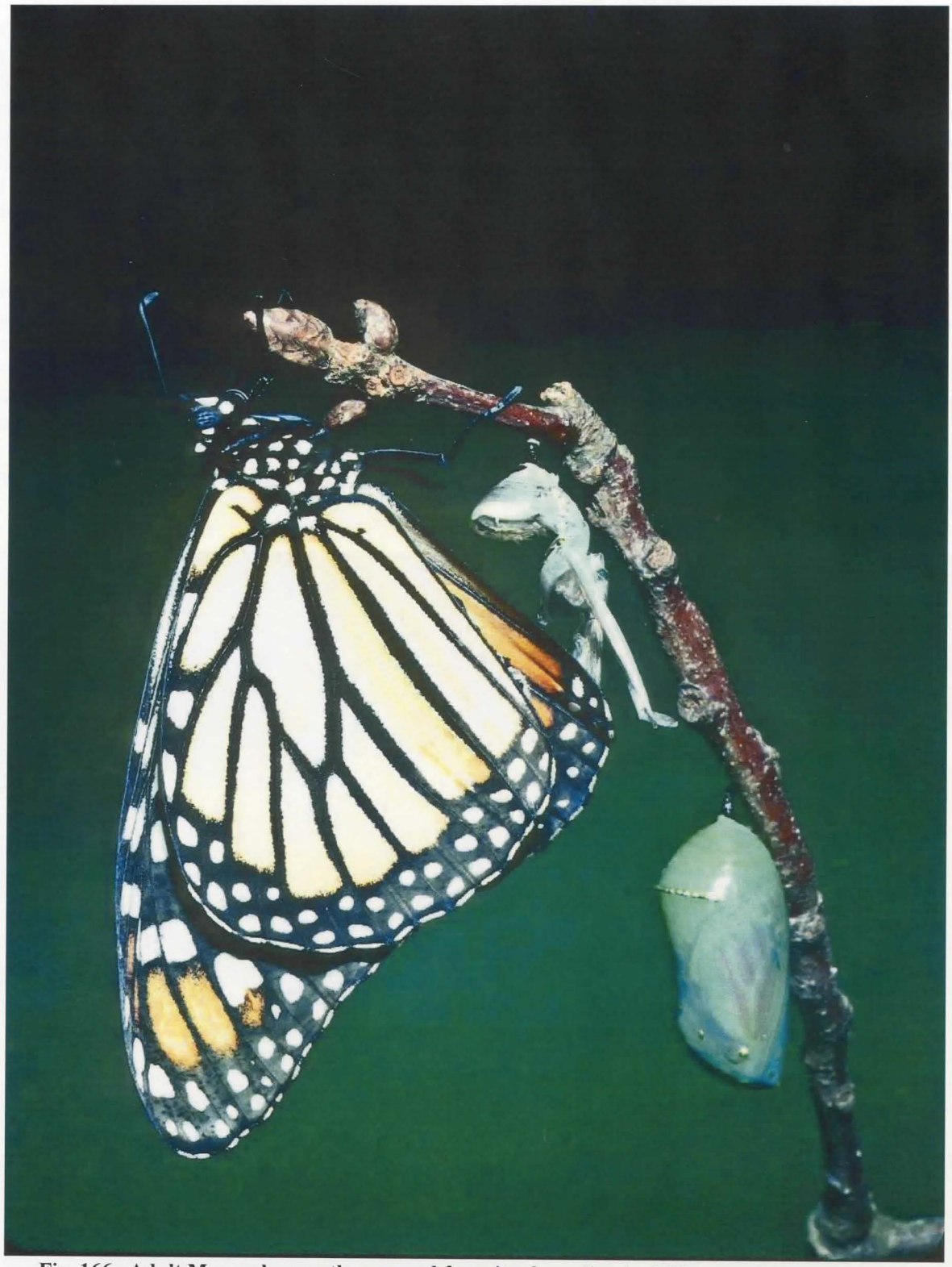


Fig. 166. Adult Monarch recently emerged from its chrysalis. A viable second green chrysalis remains. Developing butterfly inside the chrysalis is visible. Photo off site.

DISCUSSION

As of this study, 57 species of butterflies have been documented on Avery Island; in *Jungle Gardens* the number is 40. For comparison, as of April 1, 2020, Louisiana has logged in 156 species of which 130 are residents (see Marks, 2018, 2019b, 2020); Florida, 181; United States and Canada, 717; and Britain. 60. When considering total species for A.I. (57) and Louisiana (156), the percentage for A.I. is 37. But when considering resident species for A.I. (56) and Louisiana (130), the percentage for A.I. is 43. Moreover, one species, Palatka Skipper (#52), is listed by the state as critically impaired. No endemism was evident. (Little is known about the island's nocturnal moth populations.)

Data indicate that Avery Island is not a butterfly oasis. The number of resident taxa on the island is definitely limited. And population densities of all species are minimal. I suspect the latter is a reflective of the severely limited microhabitats available for nutrition and reproduction. Put simply, the island does not have sufficient land to support large populations. Couple this with either no or limited movement of individuals from the mainland where habitats are far more expansive, low populations are easy to explain. In fact, virtually all small islands have restricted populations and low population densities—except on those islands were lack of predation has increased breeding potential and species richness. Such habitat loss and fragmentation is termed by biogeographers as the "small island effect."

But then a conundrum: Spicebush Swallowtail (#6). The species is known to habitually utilize camphor trees as its host and lantanas as a favorite source of nectar. Both plants are invasive and abundant on A.I. Therefore, one would expect the butterfly to be abundant. Candidly, such is not the case. More often than not, I have witnessed butterflies disregard camphor plants displaying new growth and lantanas in full bloom.

Fig. 167. Bull/yellow thistle (*Cirsium horridulum*) in Miner's Village. Because of irregular mowing, area is good habitat for wildflowers throughout the year. April 12, 2018.

What's going on? I posit the following possibilities: First, perhaps the insular nature of the island alters the typical predator-prey paradigm between butterflies and their enemies so that predators (including microbes) are disproportionately high, rendering butterflies significantly disadvantaged? (Evidence centers on the inordinate abundance of dragonflies (odonates) on the island, possibly because of low populations of freshwater fish—primary predators of aquatic immature odonates—that are controlled by high alligator populations. On many days, dragonflies dominated the air, pursuing anything small. On one occasion I observed a dragonfly consuming a butterfly (see #23). Second, perhaps the soils are heavily infused with brine thus altering composition and pH? (Brine might alter nectar production and/or the appropriate phytochemicals that normally trigger egg-laying by female butterflies.) Finally, perhaps the mosquito abatement program is not designed to be butterfly/caterpillar friendly?

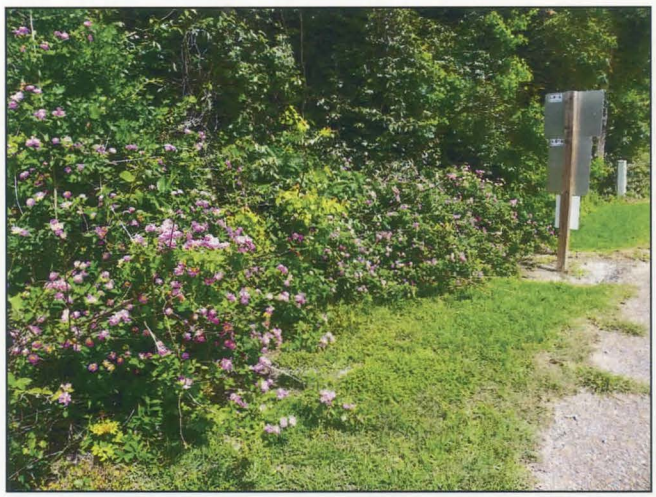


Fig. 168. Roadside lantana near salt mine. During mild winters, the pants do not die back. April 21, 2019.

Jungle Gardens. As discussed previously, the extensive drive-through gardens represent a historic and eclectic collection of plants, not a typical botanical garden in which rotational displays of seasonal flowering plants are featured. Because the gardens lack plants noted for producing nectar (hybridized camellias and azaleas are not noted for nectar production), there are few butterfly-attracting plants. And because all roadsides, walkways, and edges of waterways lack floral diversity due to intense grooming, few wildflowers ("weeds") thrive. (The schedule of maintenance is driven by tourism: to reduce hiding places for dangerous snakes and alligators to allow visitors to approach water's edge.)

But *Jungle Gardens* is not devoid of butterflies (40 species). In spring, azalea blossoms act as magnets for honey bees, bumblebees, and swallowtail butterflies (the latter most probably attracted to moisture within the flowers' corollas). In April, blooms of native Louisiana

Fig. 169. Lantana and Chinese privet (*Ligustrum sinense*) near salt mine. Both species have become naturalized invasives that are good nectar sources for pollinators. October 17, 2018.

irises (*I. gigantacerulea*) and Asian yellow flag irises (*I. pseudacorus*) attract bees as well as an occasional butterfly — presumably for moisture, not nectar. In May, spider lilies (*Hymenocalis occidentalis*) blossom and attract bumblebees. Plant species that are the most productive for butterflies are non-native Japanese/waxleaf privet (*Ligustrum japonicum*) and Chinese privet (*Ligustrum sinense*). (The former was originally planted to line the roadway separating the ponds of Venetian Gardens from Bayou Petite Anse.) White clover (*Trifolium repens*) in mowed venues can attract a few butterflies.

In mid-summer through fall, the most productive area for butterflies shifts to the margins of *Bird City*. The blooms of buttonbush (*Cephalanthus occidentalis*) are an excellent source of nectar for swallowtail butterflies. Because of summer rains, the margins of the pond often become too soggy for weekly maintenance. Consequently, floral diversity increases. Small species such as anglestem primrosewillow (*Ludwigia leptocarpa*), climbing hempweed (*Mikania scandens*), larger bur-marigold (*Bidens laevis*), and creeping spilanthes/spot flower (*Acmella repens*) are visited by bees and a few butterflies, especially grass skippers and Gulf fritillaries. Other examples of angiosperms that seem tolerant of soggy ground and heavy maintenance include frogfruit (*Phyla nodiflora*), and white clover (*Trifolium repens*).

During April 2019, two species of dwarf lantanas ("Gold Mound" and "Purple Trailing") as well as chaste tree (*Vitex agnus-castus*) were planted en masse by grounds personnel on a narrow peninsular between ponds within Venetian Gardens. The purpose of the plantings was to

Fig. 170. Yellow crownbeard (*Verbesina occidentalis*). A common autumn bloomer that is not as attractive as its cousin, *V. virginica*. October 18, 2018.

Fig. 171. Goldenrod (*Solidago* sp.) and eastern baccharis (*B. halimifolia*) in autumn bloom along a service road adjacent to the pepper fields. While these species typically attract butterflies, this was not the case on the island. October 18, 2018.

reduce weed maintenance, to add summer color, and to introduce potential nectar sources for pollinators. Plantings were heavily mulched with shredded pine bark, which turns out, attracted female red-eared slider turtles (*Trachemys scripta elegans*) for egg-laying. When I last checked in April 2020, approximately 99 percent of the plants were thriving.

Private (Residential/Commercial) Sectors. Outside *Jungle Gardens*, conditions throughout the spring months are not favorable to pollinators, either. While it is true that nearly one half of the island remains undeveloped to any appreciable degree, much of that land is maintained as lawns adjacent to the homes of residents. In addition, roadsides and hedgerows are also controlled in order to discourage the return of congesting vegetation. That said, there are areas that are not so routinely cut because they are maintained as privacy barriers between residences. Additionally, there is a poorly maintained area known as Miner's Village, an abandoned site near the salt-loading dock. The "village" originally provided rental housing for employees of the mine. Although no structures currently exist, concrete foundations remain, creating obstacles for mowing equipment, and hence too hazardous for routine mowing.

Throughout March and April, I found few plants blooming in the private sectors of the island with but the following exceptions: bull/yellow/spiny thistle (*Cirsium horridulum*), butterweed/yellowtop (*Packera glabella*), Carolina jasmine (*Gelsemium semperverens*), and clumps of Chinese privet. In addition, the attractive herbertia or prairie nymph (*Herbertia lahue caerulea*) formed massive, localized colonies. (This is a species of dwarf iris that is reported to be typical of the dry prairies of Texas. In Louisiana, the species is recorded to be a rarity in the prairie and grassy areas within the western longleaf pinelands.) While *Packera* and *Herbertia* are primarily pollinated by bees and flies, *Cirsium horridulum* proved to be a magnet for both bees and swallowtail and Monarch butterflies, particularly in the area of Miner's Village and Prospect Hill. Throughout the summer, lantanas (*L. camara* var. "Ham and Eggs" and "Spanish Flag") were locally common. But except for Miner's Village and several other venues near residential property, lantanas bordering woodlots were regularly trimmed to control intrusiveness; consequently, the plants did not produce a wealth of flowers—except during the spring of 2019. Passionvine (*Passiflora incarnata*) was common in Miner's Village and atop Prospect Hill; the vines were being exploited by the Gulf Fritillary in late summer and autumn. During summer, too, the low-growing frogfruit was abundant in many wet areas. This species is not only the host for the Phaon Crescent, but a good source of nectar for several species of grass skipper.

Alternately, October and November witnessed a resurgence of flowering species in select habitats. Of particular note were: goldenrod (*Solidago* spp.), baccharis/groundsell bush (*Baccharis halimifolia*), Virginia crownbeard (*Verbesina virginica*), yellow crownbeard (Verbesina helianthoides), white snakeroot (*Eupatorium rugosum*), and willow aster (*Symphotrichum prealtus*)—all especially plentiful near Miner's Village and along road cuts from Pepper Field Road. In several low but dry areas bordering the marshlands, Brazilian vervain (*Verbena brasiliensis*)

was reasonably common, attracting butterflies. Too, lantanas in fall produce many more blossoms than in spring/summer. Partridge pea (*Chamaecrista fsciculata*), sicklepod/Java-bean (*Senna obtusifolia*), and scaleleaf aster (*Symphotrichum adnatum*) were noticeable particularly along borders of wooded areas accessed by Pepper Field Road, and as "miniatures" in intensely mowed areas. Because pierid butterflies such as Cloudless Sulphur, Little Yellow, and Sleepy Orange routinely reproduce on *Chamaecrista* and *Senna*, these butterflies were now noticeable. One other habitat proved productive: vintage oil sites. There, the ground surrounding the rusting wellhead are usually not mowed frequently. Often, low growing broadleaf plantain (*Plantago major*) and scaleleaf aster were common; the former is a host for Common Buckeye, the latter, a host for Pearl Crescent.

But trumping all was the actual pepper fields now ablaze with fruit in all stages of ripeness. Surprisingly, arrowleaf sida (*Sida rhombifolia*) had exploded in the furrows between the raised rows of repening peppers. The luxuriance of the native wildflower was likely a result of exceptional nourishment from fertilizer and water runoff from the cultivated pepper plants. Absent herbicides or physical grooming, Common Checkered Skipper and Gray Hairstreak had invaded, taking advantage of windfall hosts. (Tropical Checkered Skipper occasionally reproduces in the fields, also, but is more common in the weedy areas with sida behind the peppers.) Candidly, Avery Island's fields, also, pepper fields are analogous to the corn fields in the Midwest where inter-row milkweed plants (hosts for Monarch butterflies) thrive or used to thrive prior to the GMO revolution.

Due to the relative abundance of flowering species during fall, my butterfly surveys in September and October were exceptionally noteworthy: twenty-three species in September, thirty-one in October.

[NOTE: While not rampant with flowering plants, Avery Island does support five active colonies of honey bees. In late winter/early spring, for example, wildflowers such as butterweed (*Packera*), Pennsylvania fleabane, (*Erigeron*), prairie nymph (*Herbertia*), evening primrose (*Oenothera*), wild onion (*Allium*), wild garlic (*Nothoscordum*), white clover (*Trifolium*), Japanese honeysuckle (*Lonicera*) as well as ornamental camellias, sasanquas, and azaleas provide pollen and/or nectar especially for honey bees breaking their winter hibernation. Later, other native and naturalized "weeds" such as lantana, crown beards (*Verbesina*), goldenrod (*Solidago*), baccharis, snakeroot (*Eupatorium*), and Brazilian vervain (*Verbena*) replace the spring cache. Hives are routinely moved about the island to take advantage of seasonal/localized blooms. Extracted honey is marketed with an AVERY ISLAND label in the Gift Shop associated with the Tabasco factory complex.]

Fig. 172. Virginia crownbeard (*Verbesina virginica*) in autumn. A common perennial bodering many woodlots. Flowers are attractive to butterflies and other pollinators. October 18, 2018.

Fig. 173. (Inset to Fig. 172.) Migratory Monarch (*Danaus plexippus*). October 18, 2019.

Fig. 174. Arrowleaf sida (*Sida rhombifolia*) growing in furrows between tabasco peppers. Because no herbicides are employed, these "weeds" proliferate in autumn. Sida is the reproductive host for Common Checkered Skipper (*Pyrgus communis*), Tropical Checkered Skipper (*Pyrgus oileus*), and Gray Hairstreak (*Strymon melinus*).

Species Notably Undocumented

When considering the list of butterflies, there are some puzzling deficiencies. These include the following:

Falcate Orange-tip (*Anthocharis midea*)
Orange Sulphur (*Colias eurytheme*)
Great Southern White (*Ascia monuste*)
Dainty Sulphur (*Nathalis iole*)
Great Purple Hairstreak (*Atlides halesus*)
Little Metalmark (*Calephelis virginiensis*)
Zebra Heliconian (*Heliconius charithonia*).
Variegated Fritillary (*Euptoieta claudia*)
Texas 'Seminole' Crescent (*Anthanassa texana seminole*)
Eastern Comma (*Polygonia comma*)
Hackberry Emperor (*Asterocampa celtis*)
Gemmed Satyr (*Cyllopsis gemma*)
Whirlabout (*Polites vibex*)
Eufala Skipper (*Lerodea eufala*)
Ocola Skipper (*Panoquina ocola*)

SUMMARY

Avery Island with an area of just 3.4375 square miles, harbors at least 43 percent of those butterfly species recorded as residents in a state that encompasses 43,566 square miles spanning two USDA Plant Hardiness Zones (Zone 8 A,B and 9 A,B), and that has been researched for over a century. I find the figure to be impressive.

There remains a basic question: How did these species locate the island?

Avery Island in its present form is relatively young, dating back only to no more than 12,000 to 10,000 years ago. Back then, climate was cooler, and sea level lower—the latter important for movement of organisms from the mainland southward onto the island. Analysis of the island's vegetation indicates it is derived from elevated areas north of the current marshlands. For butterflies, the situation seems to be the same. As such, the island's biota represent relic/disjunct populations, that is, species that were once widely distributed on the mainland but now are confined to the island—a diaspora. Examples include *Eurytides marcellus* (host, pawpaw), *Enodia portlandia* and *E. creola* (hosts, switch cane/exotic bamboos), *Callophrys g. gryneus* (host, eastern red cedar), *Satyrium f. favonius* (hosts, oaks), and *Nymphalis antiopa* (hosts, numerous hardwood trees—especially elm, hackberry, cottonwood).

Fig. 175. Freshwater marsh at the western margin of the island. An excellent habitat for grass skippers, but difficult to access.

Fig. 176. Swamp forest on eastern sector of island. Palamedes Swallowtail (*Papilio palamedes*) is a common species in the vicinity, and can be confused with *Papilio polyxenes asterius* form *pseudoamericus*.

Fig. 177. Butterweed (*Packera glabella*). This is a prolific spring bloomer in virtually all wet localities throughout the island. Blossoms attract bees and several grass skippers—including the rare Palatka Skipper (*Euphyes pilatka*). March 20, 2019.

Yet there are alternative paradigms. In more recent times, for example, some species may have wandered onto the island from the mainland, or even blown onto the island during a past hurricane or other strong wind event. Consider: Because the island is separated from the mainland dominated by sugarcane plantations and 1.4 miles of marshland, one might suspect the island to be a closed biological system. Put simply, the surrounding lowlands serve as a de facto death trap or at least a deterrent for fragile butterflies. But lepidopterists know that such barriers are not always absolute. Many butterfly species are capable of flights that span short and even extensive distances. And let us not forget that since at least the late 1700s some type of trail/road has connected the island to the mainland. That corridor, while intended to serve humans, would easily have served as a passageway for other biota as well. Finding suitable nectar and host plants in the virgin habitats, the immigrants began to reproduce, establishing the ancestors of the populations that we see today.

Another possibility is that some species arrived on the island in an immature stage (egg, caterpillar, chrysalis) by hitchhiking in cargo such as horticultural plants—particularly when E.A. McIlhenny was actively engaged in developing *Jungle Gardens*.

All gambits seem highly plausible. Meanwhile, global warming is escalating the melting of the world's crucibles of ice. In turn, sea levels are rising. Because the marshlands surrounding Avery Island are not irrevocable, the Gulf of Mexico may once again become a significant player in the saga of Louisiana's unique "ark." Will a higher water level further isolate the island, thereby prompting evolutionary divergence through natural selection, so that they will warrant new subspecific epithets? Will some species be extirpated because their specific microhabitats become too limited to support viable populations? Will on-site pathogens become more virulent and alter predator-prey relationships? The answers, of course, are beyond our knowing. Whatever, Avery Island in the future will most likely be unrecognizable to us.

(text continues on page 83)

Fig. 178. Service road through hardwood forest near Propect Hill. Low growing bush pictured in right foreground is a young camphor tree. Various species of naturalized Asian bamboo are often found in such areas; several serve as hosts for Southern Pearly Eye (*Enodia portlandia*) and probably Creole Pearly Eye (*E. Creola*).

Fig. 179. Woodlot in low, wet area near the salt mine. Fan-like leaves characterize this common and native dwarf palmetto (*Sabal minor*).

Fig. 180. Cabbage palmetto (*Sabal palmetto*) was first introduced into *Jungle Gardens* in the early 1900s. The species has become naturalized in many low wet areas around the island.

Fig. 181. Deep ravines resulting from eons of erosion are common in the upper hardwood forests. Such dark habitats often serve as refuges for rare ferns and relatives.

Fig. 182. Garrie Landry, official botanist and herbarium curator, photographing a colony of prairie nymph (*Herbertia lahoe*), a miniature iris common in manicured areas throughout private sectors. Species is considered rare, documented previously from only a few localities in western Louisiana.
Pollinated by bees and flies. April 11, 2018.
Fig. 183. (Inset to Fig. 182.) Close-up of flower.

Fig. 184. Frogfruit (*Phyla nodiflora*), a mat-forming species common in wet areas, even in those heavily manicured. Plants host Phaon Crescent *Phyciodes phaon*) but are important nectar sources for other small butterflies, including the similar Pearl Crescent (*Phyciodes tharos*). Flowering is throughout the warm months. September 20, 2018.

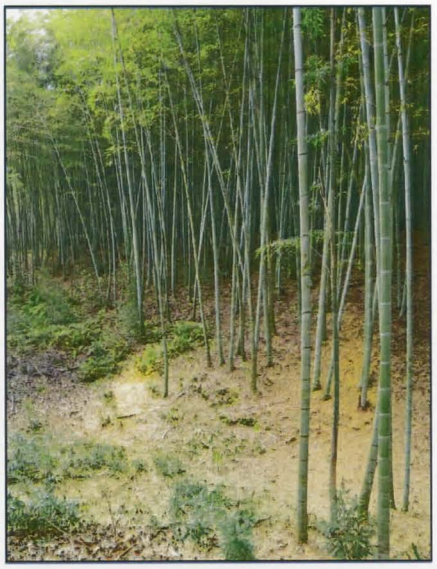
Fig. 185. (Inset to Fig. 184.) Close-up of flower.

Fig. 186. Scaleleaf aster (*Symphyotrichum praealtum*). Often found as dwarf plants in frequently mowed areas. Flowers are particularly attractive to grass skippers, Pearl Crescent, and Phaon Crescent. October 17, 2018.

Fig. 187. Partridge Pea (*Chamaecrista fasciculata*). Common around woodlots in autumn but persistent as a dwarf form in heavily mowed areas. Host for many sulphur butterflies. October 17, 2018.

Fig. 188. Cut canes. The grove is thinned each February by volunteers of the Louisiana Gulf Coast Chapter of the American Bamboo Society. The annual thinning encourages new growth and facilitates walking by invited visitors. February 23, 2019. ←

Fig. 189. Moso bamboo grove immediately after thinning. →



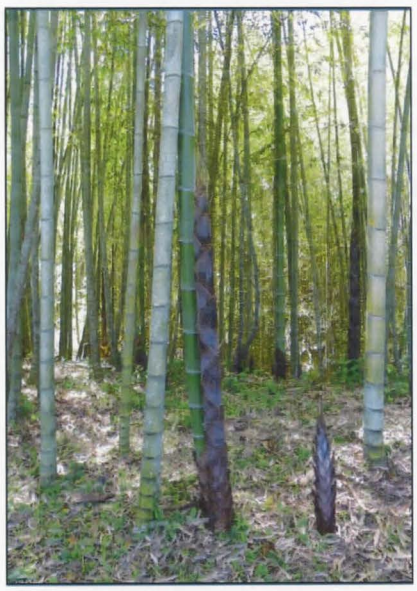


Fig. 190. New bamboo shoot emerging in April following February thinning. Girth of the emerging cane remains constant throughout life. April 22, 2019. ←

Fig. 191. Suckers from underground rhizomes. Photosynthesis of non-cane forming sprigs provides additional nutrients for major canes. Suckers are probably the breeding sites for the Southern Pearly Eye (*Enodia portlandia*) and Creole Pearly Eye (*E. creola*), hallmark residents of the grove. April 22, 2019. →

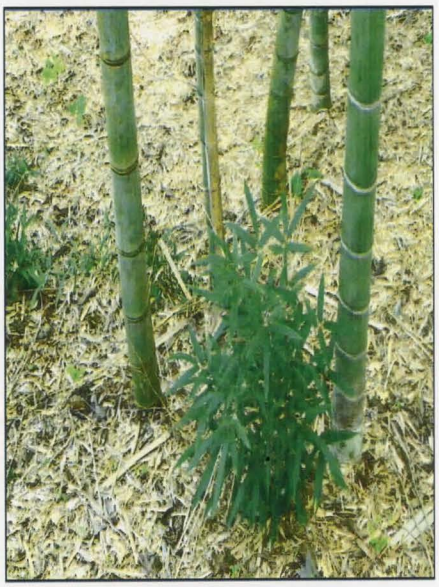


Fig. 192. Cut canes are shredded and blown throughout the grove to provide organic fertilizer and mulch.

Fig. 193. Class of Master Naturalists (Lafayette) in *Jungle Gardens*. Herpetologist Brad "Bones" Gloriosa, founder of Louisiana Amphibian and Reptile Enthusiasts (L.A.R.E.), demonstrates diagnostic features of a resident turtle. May 18, 2019.

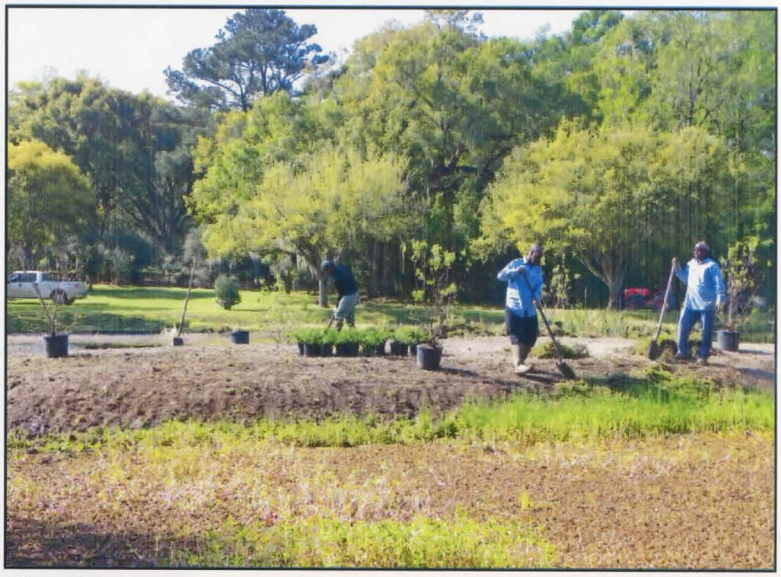


Fig. 194. New planting of dwarf lantana ("New Gold" and "Purple Trailing") along with several chaste trees (*Vitex agnus-castus*) on a peninsula of the Venetian lagoons in *Jungle Gardens*. Planting was initiated to discourage weeds and to provide nectar sources for pollinators. March 19, 2019.

Fig. 195. Close-up of completed new planting of lantanas and *Vitex* in *Jungle Gardens* (see Fig. 194). Rains during the summer and autumn of 2019 were sufficient to maintain growth. The venue is accessible by foot from a nearby road. March 21, 2019.

Fig. 196. Red-eared slider turtle (*Trachemys scripta elegans*), the most common turtle in the lagoon digging a nesting site in the fresh mulch on the peninsula (Figs. 194 and 195). March 21, 2019.

(text continued from page 77)

RECOMMENDATIONS

A long-standing tenet in the biological sciences is that butterflies and plants are inextricable, i.e., butterflies thrive only where plants crucial for food and reproduction also thrive. Practically speaking, to strengthen the island's butterfly fauna, I suggest:

1. Reduce the frequency of grass cutting—even if only slightly—in non-visitor venues. It is well accepted that a non-austere grooming practice for lawns and roadsides increase (1) biodiversity by increasing the availability of feeding and reproductive habitats for invertebrates, (2) fosters seed production by plants, (3) reduces insect pests by encouraging predators and microbes, and (4) saves time/money/wear on equipment. Of course areas subject to high tourism require meticulous grooming. But in other venues, mowings could be reduced—ideally once or twice a year. This more frugal schedule would give non-grassy species that produce nectar and pollen, and that often serve as hosts for butterflies, a chance to seed and proliferate. That in turn would provide all pollinators with additional habitats.

2. Install a pollinator exhibition garden in *Jungle Gardens*. The new installation could be located in a sunny area near the picnic tables behind the current Ticket/Gift Shop at the entrance to the gardens. In addition, the garden could contain samples of "heritage" or "heirloom" plants: plants that were mainstays in early colonial home gardens for use as food, medicines and seasonings (herbs), fiber (brown cotton), and dyestuff (indigo). This addition would probably have to be elevated and fenced to protect from browsing wildlife. With detailed signage, the addition would provide both an aesthetic and educational element that would not seem out of place but would instead continue to honor E.A. McILhenny's beliefs and practices.

3. Transplant several small pawpaw trees into a shaded area of *Jungle Gardens*. This would encourage the establishment of a breeding colony of Zebra Swallowtail butterflies. Because the butterfly has such distinctive markings and is what I like to call a "signature/keystone species" for the island, visitors would be treated to another unique experience.

4. Encourage residents to plant pollinator-friendly gardens. Varieties should include a citrus tree or two, a pawpaw tree, fennel/dill/parsley, passionvine, dwarf lantanas, cosmos, zinnias, and native milkweeds. Here again, the garden would have to be protected from deer although lantanas and zinnias are relatively "deer-proof."

5. Contact the administrators of the island's Mosquito Abatement Program for data on their spraying protocol. Ask if this could be tweaked (droplet size, timing) to minimize impacting day-flying insects such as bees and butterflies, and foliage feeding caterpillars that are active both day and night. This is the case for East Baton Rouge Parish.

6. Establish wildflower plantings in either small patches or as extended swaths along sunny roadsides accessing *Jungle Gardens* and the Tabasco factory complex. There could even be a small display garden near the entrance gate. Seed blends suited for south LA are available from commercial sources. Mixtures should include healthy proportions of tickseed (*Coreopsis*) and Indian blanket (*Gaillardia*), two species that are common during spring along the roadsides in Cameron Parish. Playing "Devils Advocate," I understand that this project would be expensive due to labor for installation and periodic maintenance. Cost, therefore, could be prohibitive. And not to be overlooked, the resident deer that could render the project impractical. If successful, the plantings would service butterflies and develop into an additional attraction for tourists.

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NOTE: All images—except those from a drone or provided by others—were taken by author with a PENTAX X70 digital camera (12 mega pixel, 24 X, F 2.8-8) or a Cannon AE-1 SLR 35 mm film camera.

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Fig. 197. Small pollinator garden. Flower bed is elevated to protect from rabbits. Pollinator gardens can be sized to fit any situation. This garden accents the entrance to a subdivision in Baton Rouge. Plants include "Tidal Wave Silver" petunias and dwarf "Zahara" zinnias. June 2018.

Fig. 198. Low-grade pasture on Grand Chenier, Cameron Parish. As in Fig. 199, yellow tickseed (*Coreopsis lanceolata*) dominates although Indian blanket (*Gaillardia pulchella*) is also showy. Dried twigs are the winter remains of indigo (anil) bushes (*Indigofera suffruticosa*), the Mexican-West Indian species that formed the basis of indigo dye produced in southern Colonial America. Relic plants persist on several cheniers in Cameron Parish. Feathery new growth is evident at the bases of some plants. April 1991.

Fig. 199. Grand Chenier, Cameron Parish. Roadsides in spring usually are ablaze with nectar and pollen bearing wildflowers such as tickseed (*Coreopsis laceolata*), Indian blanket (*Gaillardia pulchella*), and several additional smaller annual composites. (The yellow-blooming species pictured here is *C. lanceolata*.) The annuals reseed naturally because of infrequent mowing and good drainage from a soil derived from sand, shells, and bits of partially decomposed organic marsh vegetation. April 1991.

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GARY NOEL ROSS

CONTACTS

Gary Noel Ross, Ph.D.
6095 Stratford Ave.
Baton Rouge, LA 70808
E-mail: GNRoss40@yahoo.com

Jungle Gardens, Inc.
P.O. Box 126
Avery Island, LA 70513

McIlhenny Company
General Delivery
Avery Island, LA 70513

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Fig. 200. EPILOGUE PHOTO 1: "Cleveland Oak." This massive live oak is the most photographed tree in *Jungle Gardens*. The picturesque spceimen was named for President Grover Cleveland, who served for two terms (1885-1889, 1893-1897). Cleveland visited the McIlhenny family and the gardens circa 1891. Tree is estimated to be over 300 years old. Several major limbs were lost during past hurricanes. A blooming variety of antique Japanese azalea provides a colorful background. .March 15, 2018.

Fig. 201. EPILOGUE PHOTO 2. Section of E.A. McIlhenny's original CAMELLIA STUDY GARDEN now part of *Jungle Gardens*. Visitors can access on foot or by vehicle. Peak bloom is late winter. Historically important varieties of camellias are still being rediscovered by company botanist in nearby overgrown woodlots. In many cases, the specimens are so tree-like that their blooms can barely be seen from ground level. February 22, 2019.

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The Southern Lepidopterists' News is published four times annually. Membership dues are $30.00 annually. The organization is open to anyone, especially those with an interest in the Lepidoptera of the southern United States. Information about the Society may be obtained from Marc Minno, Membership Coordinator, 600 NW 34 Terrace, Gainesville, FL 32607, E-Mail: mminno@bellsouth.net, and dues may be sent to Jeffrey R. Slotten, Treasurer, 5421 NW 69th Lane, Gainesville, FL 32653.
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SOUTHERN LEPIDOPTERISTS' SOCIETY
c/o J. BARRY LOMBARDINI, THE EDITOR
3507 41st Street
Lubbock, Texas 79413