

LIFE HISTORY OF THE BANANAQUIT OF TOBAGO ISLAND

BY ALFRED O. GROSS

IN a six-week period, January 8 to February 21, 1957, I had an excellent opportunity to observe the nesting and behavior of Bananaquits (*Coereba flaveola luteola*), locally known as "Sugar Birds", on Tobago, British West Indies. Tobago is a relatively small island, 27 miles long and 7½ miles wide, with an area of 114 square miles; it lies 18 miles northeast of the larger island of Trinidad. Tobago has a population of about 3300 human inhabitants, and much of its coastal area is characterized by extensive coconut and cocoa plantations. The higher mountainous portion includes a main ridge which runs almost the entire length of the island, and is covered with a lush tropical rain forest. During January and February the scarlet-colored blossoms of the many giant mountain immortelle (*Erythrina micropteryx*) trees add beauty to vistas in the enchanting mountain fastness.

Tobago and Trinidad are near the northern coast of South America; in fact a promontory of Trinidad is only four miles from the mainland of Venezuela. As one might expect, the avifauna of these islands, especially Trinidad, resembles more closely that of northern South America than that of the Antillean region. For example, such conspicuous species as the Amazon Parrot (*Amazona amazonica*), Swainson Motmot (*Momotus bahamensis*), Red-bellied Trogon (*Trogon collaris*), Rufous-tailed Jacamar (*Galbula ruficauda*), and many others are to be found on these islands, but are absent or rare in the West Indian islands to the northward. Between January 16 and February 20, 1957, Mr. and Mrs. Whitney Eastman identified 97 species of birds on Tobago, which is indicative of the richness of the bird life on this small island.

Without exception the Bananaquit is the most abundant species to be found on Tobago. This bird was given special attention because of its abundance and the fact that many were nesting during the time I spent on the island. Skutch (1954) has published his observations on two subspecies, *mexicana* in Costa Rica and *colombiana* in the Panama Canal Zone, and Biaggi (1955) has written a full life history account of *C. f. portoricensis*, the Puerto Rican form. However, it appears justifiable to present certain observations on the subspecies *luteola*, the most southerly of the West Indian forms which lives on an island remote from areas mentioned above. These will serve to corroborate as well as to augment other information concerning this interesting species, which is represented by no fewer than 35 subspecies (Hellmayr, 1935: 284-314). The range of *Coereba flaveola* includes nearly all the Greater and Lesser Antilles and continental regions from southern Mexico south to northern Argentina.

This prolific, adaptable bird appears to be nonmigratory. In the West Indies, the various populations remain on their respective islands, although in certain instances the islands are only relatively short distances apart. As a result many subspecies have developed in which there are marked differences in plumage coloration, and at least minor differences in behavior associated with their adaptation to local environmental conditions.

The subspecies *luteola* occurs also on Trinidad and in northern Venezuela south to the Orinoco Valley and the foot of the Andes in the Maracaibo basin, and west along the Caribbean coast of Colombia. It is accidental on Grenada (only one record) where the prevailing form is *Coereba flaveola aterrima*.

On Tobago *C. f. luteola* has the upper parts including loreal, suborbital, and auricular regions and sides of the neck sooty black. There is a large lemon-yellow rump patch, a prominent superciliary stripe which extends from the nostril to the nape, and a very conspicuous white spot on the outermost primaries. The malar region, chin, and throat are slate gray, a color which varies greatly among the different subspecies. The rest of the underparts are saffron yellow or yellow-chrome shading to olive on the flanks. The under tail coverts are white and the inner webs of the outer tail feathers are tipped with white. On Tobago I saw no melanistic phases of the plumage such as those present in the subspecies occupying Los Testigos islands and those predominating in populations on Grenada and St. Vincent (Bond, 1936; Devas, 1954), where the normal, yellow-bellied plumage is not common. There were no Tobago specimens examined or birds observed in the field which had the bright crimson rictus often found in other subspecies.

In the different subspecies of the Bananaquit as viewed in the field, the sexes look alike in plumage coloration and markings. However, close examination of skins reveals that the male may be slightly larger and have a more extensive, brighter color on the rump.

GENERAL COMMENTS ON NESTING

I have never encountered more active nest-builders than the Bananaquits on Tobago Island. Within a radius of half a mile of the Bacolet Guest House, located near the sea on the southern side of the island, I found 54 nests during the six-week period. Some were in early stages of construction; others were more advanced or completed. Some contained eggs or young; others were the so-called "roosting" nests. These birds have been reported as nesting on Tobago in every month of the year, with the peak in April and May. It seems remarkable that so many were nesting in January and February. Doubtless many of the nests in that limited area were missed and a thorough search would have revealed more. Through a distance of a quarter mile along the main road between the Bacolet Guest House and Blue Haven Hotel there were

14 nests, eight in a hedge of *Euphorbia* on one side and six in low vegetation growing on the clay embankment of the opposite side. The nests in the *Euphorbia* hedge ranged from four feet to eight feet above the ground. Those on the embankment were situated only two or three feet above the surface of the road and only a foot or two from the soil of the bank. The other 40 nests were in a diversity of vegetational situations varying from weed stalks and small shrubs to locations well up in coconut palms and other tall trees. The highest ones in the Bacolet area ranged from 30 to 35 feet above the ground.

One nest was built in a cornice of the overhanging eaves of the Blue Haven Hotel; two were placed in vines which were trained above the large open window spaces of the main dining room and another was in the Spanish glass chandelier of the hallway. The last mentioned nests were in places where guests of the hotel passed frequently at all times of the day. In spite of the mess produced by the dropping of nesting materials and debris on the rugs and carpets, the hotel management encouraged the birds which provided a center of attraction for the guests. During Christmas week a pair of Bananaquits built a nest in the large Christmas tree located in the main open reception hall of the hotel. A most bizarre if not fantastic structure, this nest was composed chiefly of glistening bits of tinsel and small ornaments which the birds took from the decorations of the tree.

Nest number 44 was another unusual one; it was constructed in a *Bougainvillea* vine growing by the doorway of the hotel and adjacent to a taxi stand where automobiles passed frequently at a distance of two or three feet. It was only four feet above the ground and was constructed of varied, colored strings, threads, bits of cloth and cotton interwoven with plant fibers and vine stems. Red, green and orange strings predominated, making it a most colorful structure. At first the vine holding the nest was bent away from the doorway so that automobiles sometimes brushed against it. The vine was finally tied firmly to the building in such a way that the nest opening was toward and only eight inches from the frame of the doorway. In spite of this change and the continual disturbance to which this pair of birds was subjected, they succeeded in rearing three young. Other individuals were found to use string, cloth, and cotton (especially wild cotton) wherever these materials were readily accessible. On Barbados Island I found a nest near the Ocean View Hotel, Hastings, which consisted chiefly of twine and colored yarn.

There seemed to be no effort on the part of the birds to build nests in concealed locations. In fact almost every nest was in an open exposed place, usually at the terminus of a branch where it was easily seen from a distance. Thus it required no time-consuming effort to locate the many nests found.

On Tobago the Bananaquits and their nests were found at all altitudes. Nest number 24 was built near the tip of a long branch overhanging the water

at the Bacolet bathing beach. At high tide this nest was less than five feet above the surface of the water, and at times fine spray from the breakers would strike it. While there was a greater concentration of nesting birds in the lowlands where there are human habitations and cultivated land, nests were found also in isolated forested areas as high as the top of Pigeon Peak, an elevation of 1890 feet, the highest point on the island. On Trinidad Island I found a nest with three eggs in a solanaceous weed near a trail off the Blanchisseuse road, at an elevation of 2500 feet. On numerous trips to the wooded, mountainous portions of Tobago a great many nests were seen but at no place was the concentration of the birds as great as that at Bacolet in the coastal area. Nests at higher elevations generally were located in trees and were usually a considerable distance above the ground. I saw a dozen nests which ranged from 20 to 35 feet above the ground, in bamboo trees growing at elevations above 1000 feet. There were two occupied nests located among blossoms near the tops of Immortelle trees; their estimated heights were 60 and 65 feet, respectively. One of these was within 15 inches of an active wasp nest. These two nests represented the maximum height above the ground among those observed on Tobago. There is no nesting site that can be said to be typical. Not only do the birds nest at heights above the ground varying from one foot to 65 feet, but they may use any kind of weed, vine, shrub or tree that is capable of holding a nest. In addition to sites already mentioned, nests were found in Oleander and Hibiscus hedges and trees including orange and grapefruit, bread fruit, moringo, banyan, gumbo-limbo, guava, sapodilla, tamarind, poui and "bread and cheese tree" as well as in other trees, shrubs, and weeds that I did not identify.

Some of the occupied nests were very close to each other, and there was not the strong territorialism in the Tobago Bananaquits that is so well developed in many other species. Near Bacolet different pairs occupied two brood nests which were only 10 feet apart in a Euphorbia hedge. Although watched for long periods of time, these pairs displayed no hostility or defensive action. At the Blue Haven Hotel there was a nest of a Bananaquit built in the pendant fruiting stem or "broom" of a bamboo palm which was only 12 feet from a nest of a pair of Mockingbirds (*Mimus gilvus*). These two pairs of birds reared their broods successfully and at no time did I see any hostile action on the part of the Bananaquits. In practically all instances observed, the Bananaquits were passive, noncombative creatures and only seldom did they protest the presence of birds, other animals, or human beings that appeared in the vicinity of their nests. I once saw a Bananaquit, evidently a "stranger" take a bit of nesting material from a nest in which another was incubating eggs. The incubating bird remained on the nest offering no resistance to the intrusion. Almost every bird that I flushed flew directly away from its nest; as a

rule neither the male nor the female made any demonstration. However, I have noted spirited contests between Bananaquits, due, oftentimes, to a triangle involving two males and a female. Such contests did not necessarily relate to defense of a nest or territory. Biaggi (1955) found territorialism strongly exhibited in *portoricensis*, especially toward individuals of the same species.

NEST BUILDING

The construction of three nests, which were observed from the very beginning, was carried out in an essentially similar way.

On January 23, at 10:00 a.m., I saw a Bananaquit flying with a long palm fiber, which was measured later and found to be 23 inches in length. The bird grasped the fiber near the center with the ends streaming back on either side as it flew to the tip of a long branch of a bread-and-cheese tree (*Pithecolobium unguis-cati*), which extended over the water at Bacolet Beach. The site selected was 68 inches above the sand. This first fiber was draped over the leaves and stems without any attempt to secure it in place. For the next hour a substantial mass of rather long plant fibers and vine stems were added to form a crude platform. No effort was made to arrange and secure the first 25 bits of nesting material, but thereafter the bird spent considerable time at frequent intervals in order to arrange and secure the fibers. It would grasp one of the fibers of the platform and reach upward with its body and head extended to secure the fiber as high as it could reach. This was repeated again and again as more nesting material was brought. On several occasions extremely long fibers which hung well below the level of the platform were grasped by the bird in flight and brought up and bent or twisted around a supporting stem. On one occasion I saw a bird make two complete revolutions in flight with the free end of a fiber in its beak as it wound it around the branch, much after the manner of nest building of the Black-tailed Flycatcher (*Myiobius atricaudus*) which I observed in Panamá. The Bananaquits worked industriously until 3:00 p.m. but after that time only four visits were made and all activity ceased at 4:30 p.m. When I arrived at the nest at 6:00 a.m. the next day only a small amount of material had been added, but the birds made 34 visits with nesting material between 7:00 and 7:31. On most of these trips a bird would remain only a few seconds, just long enough to deposit the fibers inside the flimsy framework of the structure. After 7:31 one bird spent considerable time within the nest, arranging the materials previously placed there in a haphazard manner. It repeatedly pulled and tugged the fibers and wove the sides and top of the nest. It frequently thrust its body against the walls to make them more compact. During one visit one of the birds worked with a fiber more than 20 inches long which was hanging from the entrance of the nest. It flew out and grasped the tip of the fiber while on the wing and pulled it part way inside. This was repeated three times before the fiber was neatly woven into the interior framework. Both male and female brought nesting material, and whenever they arrived at the same time one waited patiently at some distance until the mate had deposited its material and departed. One bird, which was probably the male, sang its characteristic song several times between trips to the nest. On January 25 the birds were taking fine coconut-husk fibers through the opening tunnel, which was now lined and formed. The interior of the nest was still large, approximately $2 \times 2\frac{1}{2}$ inches in size. The birds were now bringing nesting materials about every 5 to 10 minutes, and more time was taken in arranging them. While in the nest, a bird could no longer be seen

from my observation post, but its movements could be detected when it exerted pressure against the sides or top of the interior. At times the birds were seen to alight on top of the nest and weave long fibers or pieces of vine into place. Fibers which were hanging down from the outside were pulled up and tucked into the structure. But at this stage most of the nesting material was being added to the inside in thickening the walls. By 4:00 p.m., January 26, the nest (number 24-A) appeared to be completed, having required a little more than three days to build. The interior cavity or nesting bowl was only $1\frac{1}{2} \times 1\frac{3}{4}$ inches in size and was neatly and compactly lined with brown coconut-husk fibers. The entrance, which was at the lower part of one side of the nest, was $1\frac{1}{8}$ inches in diameter. Extending from the entrance to the edge of the interior cavity was a tunnel some two inches in length. At the bottom of the inner end of the tunnel there was a thickened, very compact ridge; this was later to serve in preventing eggs or young from rolling out when the nest was buffeted by strong winds. The exterior of the nest measured $5\frac{1}{2}$ inches in length and $4\frac{1}{4}$ inches from top to bottom.

Neither bird was seen on January 27 but several times I saw an Emerald Hummingbird (*Saucerottia tobaci*) buzzing about, curiously inspecting the nest. Several larger birds and many lizards were seen in the vicinity but none bothered the nest. On January 28 one of the Bananaquits was roosting in the nest at night. On January 29 there was one egg at noon; in the evening there was still one egg and no bird roosting at night. On January 30 there were two eggs at 10:00 a.m., but no bird was seen. On January 31, at 7:00 a.m. a bird was incubating, presumably the female which I flushed in order to examine the contents of the nest. The bird returned in four minutes and dashed directly into the nest opening without even alighting or hesitating. The eggs were incubated until February 5 when, unfortunately, they were taken by some predator. There was a small rounded hole in the rear part of the nest, presumably the work of a Lesser Antillean Grackle (*Holoquiscalus lugubris*), since several of these birds had been seen near the nest on the preceding day. One of the Bananaquits roosted in the nest at night even though the eggs had been taken. On February 8 the Bananaquits were seen carrying materials from this nest, piece by piece, to a new location, which was in a tree about 20 feet above the ground, some 50 feet away. Two days later all but a few fibers (including one 58 inches in length) had been removed from the old nest and incorporated in the new one (No. 24-B). The next day the remaining fibers had also been removed. The second nesting attempt was successful.

On January 8 the beginning of a nest (No. 3) was found near the Blue Haven Hotel. At that time there was only a crude platform of about 25 weed, grass, and vine stems located in a scantily leaved rose bush about three feet above the ground. Later this nest was used for roosting but not for eggs or a brood. Only one bird was seen working on this structure, which was built in the same way as previously described for nest number 24-A. At the time the nest was being built, Mockingbirds, Blue Tanagers (*Thraupis episcopus*), Ground Doves (*Columbigallina minuta*), Lesser Antillean Grackles, and many

lizards were seen near the nesting site but none of them interfered and the Bananaquit offered no objection. The nest was practically completed on the third day but had many small holes through which light could be seen by one looking through the entrance. Later a bird was seen carrying bits of cotton into the nest; these were thrust into the thin places in the sides and roof. More than 30 pieces of cotton were used which served to make the nest (with the exception of the entrance) well-nigh light proof. I visited the nest each day for a week but it remained empty and no birds were seen. On the eighth day after it had been completed, I visited the nest with a flashlight at 9:00 p.m.



FIG. 1. Flashlight photograph of bird roosting in nest No. 3.

and discovered that a Bananaquit was roosting there and no doubt had been doing so since the nest had been completed (Fig. 1). This nest was visited almost every night until the time I left the island on February 21, and invariably the bird was roosting in it. I never saw the bird on the nest during the midday hours, but it came to the nest in the evening about six o'clock while it was still light, before the sun had set. It would remain on the nest until sunrise. In early evening the bird always roosted with its head toward the entrance, but after dark its head was bent back and tucked into the feathers of the scapular region. The flashlight and the flash bulbs of the camera normally did not disturb it, although my playing the flashlight back and forth on the

sleeping bird would cause it to awaken, remove its head from the feathers, and peer toward the opening—an ideal pose for a flashlight photograph (Fig. 1). Similar observations of sleeping Bananaquits have been reported by Skutch (1954:412).

Nest number 15, located near the tip of a long lower branch of a banyan tree near the Bacolet Guest House, was discovered when it was in the process of being constructed. It also proved to be a roosting nest but here both male and female took an active part in building. In addition to the usual plant stems and fibers, the birds used a large number of strips of paper-thin bark gathered from dead limbs of the banyan tree. On January 19 I watched this pair of birds for about two hours, in which time both birds were seen tugging at bits of bark from a dead limb, only about 15 feet from the nest. After each strip was freed, it was carried to the interior of the nest, which at that time was well formed and nearly completed. On three occasions I saw both birds, one at either end of a prized strip, rapidly fluttering their wings and vigorously pulling and tugging in an effort to loosen it. This performance took place within three feet of a Yellow-bellied Elaenia (*Elaenia flavogaster*) perched on the same limb. With its crest well elevated the Elaenia seemed much interested as it peered at the Bananaquits but it was not disturbed and did not move an inch during this exciting event. Although nest number 15 was constructed by both the male and female it was used as a roosting nest by only one of them, probably the male.

Certain nests are built and never used. For example, two nests, one built five feet above the ground in a Euphorbia hedge and another constructed 3½ feet above the ground in a small shrub, were discovered when they were nearly completed. They were excellently built nests, better than the usual structures, and were in good locations. Still, they were never used either as roosting or brood nests. They were visited almost every day (including visits at night) for a period of four weeks. Even if the builders had been killed it seems strange that these nests were not used by other Bananaquits, which frequently use abandoned nests at least as roosting places.

These active, restless birds seem to have an irresistible impulse to build nests, and there seemed to be constant building activity among the birds observed on Tobago Island. One nest was being built in a tall mango tree at a point 12 feet above the ground when first observed on January 25. The two birds worked diligently on January 26 and the nest was completed by the afternoon of the next day. The pair was not seen during the next two days, but on January 30 I saw one, then both, birds taking nesting material from the nest and carrying it to a new site 15 feet up in a sapodilla tree near the main Bacolet building. The pair of birds worked diligently until all of the materials of the first nest, number 32-A, were transported to 32-B and then additional

fibers were collected from the thatched roof of the dining room and added to the interior of the nest. These fibers were collected with a great deal of effort, requiring much tugging, pulling and fluttering of wings, greatly to the amusement of the dining-room guests. Nest 32-B was completed in a little less than four days and was a fine example of Bananaquit architecture. However, this second nest was never used, and after three days it was all taken apart and moved to an orange tree for purposes of building nest 32-C, which was finally accepted as a brood nest. I can offer no explanation for this peculiar behavior since as far as I could determine, the birds never were molested and each site seemed as good as the others. In instances such as these the birds seemed to build nests just for the "satisfaction" of building them.

Sometimes birds started building nests but stopped after a substantial beginning had been made. A fruiting-frond "broom" of a coconut palm was left standing beside a door leading to an apartment at Bacolet Guest House. Much to our surprise a Bananaquit started to build a nest in the frond but later deserted the site after about 50 fibers had been placed. A nest under the eave of our veranda and another in an attractive site in an oleander bush were started but never completed.

TABLE 1
MEASUREMENTS OF EASILY ACCESSIBLE NESTS OF THE BANANAQUIT
IN THE BACOLET AREA OF TOBAGO

| Number of nests | Status when measured | Height above ground in feet (mean and extremes) | Outside dimensions in inches (means and extremes) | | Diameter of entrance, inches (mean and extremes) |
|-----------------|----------------------------------|-------------------------------------------------|---------------------------------------------------|----------------------|--------------------------------------------------|
| | | | Length, front to rear | Depth, top to bottom | |
| 8 | Empty, or used for roosting only | 5.5 (2.5-15.0) | 5.4 (4.5-6.5) | 4.6 (3.2-5.5) | 1.0 (0.7-1.1) |
| 12 | With eggs or young | 5.0 (2.6-8.0) | 5.5 (4.0-7.0) | 4.1 (2.9-5.0) | 1.0 (0.8-1.5) |

Although the nests are small in dimensions (Table 1) a great deal of nesting material goes into their construction (Fig. 2). Four typical nests were dissected to determine the number of pieces of nesting material that were utilized. In these four nests the number of pieces of material varied from 404 to 650 which is indicative of the great number of trips and the immense amount of labor expended by the birds in the construction of a nest.

ROOSTING NESTS

Of the 54 nests observed in the vicinity of Bacolet, eight proved to be purely roosting nests, and others were used as roosting or dormitory nests before the eggs were laid or after eggs or young had been destroyed or young birds had fledged. I was not able to determine the sex of the roosting birds,

but Biaggi (1955) has shown that either sex may be involved in *C. f. portoricensis*. As suggested in Table 1, I did not find any consistent differences in size and structure between roosting and brood nests. Except in two instances, as mentioned below, I was not able to identify a brood nest belonging to a roosting individual. Two nests, numbers 8 and 9, were built in vines that had been trained over the large open windows of the Blue Haven dining room. They were 7½ feet above the level of the floor. Nest number 8 was a brood nest in which three young were reared, and number 9, on the same



FIG. 2. Bananaquit nest No. 43, with two eggs in place, sectioned to show size of interior, thickness of walls and position of entrance. Nest held in the hand to lend an impression of size.

level but 15 feet away, was a roosting nest of the mate, probably the male, which spent the night in it throughout the period in which the eggs were incubated and the young reared in nest number 8. Even after the young left the latter nest, number 9 continued to be used as a roosting nest. A week after the young left number 8, the materials of this nest were removed and transported to a site in a Spanish glass chandelier in the adjoining hallway for the

construction of a new nest. This second-brood nest of this pair was completed just after I left the island, but I have been informed that the birds were successful in rearing a second brood.

On January 31, 1957, I discovered a double-decker nest, numbers 42-A and 42-B, which had been built about 15 feet above the ground near the top of an orange tree. The lower nest was anchored to several small branches of a large limb, and the other was built on top of and slightly forward from the lower compartment. The materials of one nest were continuous with those of the other. When first discovered, the upper compartment contained two nestlings

TABLE 2
DETAILS OF COMPOSITION OF FOUR NESTS OF THE BANANAQUIT

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Nest No. 12, taken January 19, 1957. Outside measurements $6\frac{1}{2} \times 5\frac{1}{2}$ inches. | |
| 180 | weed, grass, and vine stems 6 to 28 inches in length |
| 60 | pieces of thin bark |
| 2 | pieces of string |
| 7 | dried leaves |
| 155 | fine slender fibers (chiefly in lining) |
| <u>404</u> | total number of items of nesting materials |
| Nest No. 23, taken January 23, 1957 when it contained 3 eggs. Measurements $6 \times 4\frac{1}{2}$ inches. | |
| 230 | grass stems, vines, and palm ribs |
| 60 | pieces of bark from coconut palm |
| 20 | leaves |
| 8 | feathers |
| 210 | fine coconut-husk fibers |
| <u>528</u> | total number of items |
| Nest No. 53 taken February 21, 1957 when it contained 2 eggs. Measurements $7 \times 3\frac{1}{2}$ inches. | |
| 96 | weed, grass and vine stems 4 to 18 inches in length |
| 54 | bits of wild cotton |
| 170 | thin flat pieces of bark from bases of young palms |
| 148 | fine threadlike fibers |
| 6 | feathers |
| <u>474</u> | total number of items |
| A brood nest taken February 20, 1957, from wooded section of the island not included in the Bacolet series of numbered nests. Measurements $6\frac{1}{2} \times 5\frac{1}{4}$ inches. | |
| 125 | long vine tendrils: the longest 41 inches, many exceeding 20 inches, and all more than 10 inches in length |
| 251 | pieces of paper-thin bark, the majority $\frac{1}{2}$ inch in width and 1 to 4 inches in length |
| 274 | fine threadlike fibers chiefly from coconut husks (used in lining) |
| <u>650</u> | total number of items |

and the lower was found to be the roosting nest of the mate, or presumed male. After the young left the upper nest, 42-A, the lower nest was occupied for a week, whereupon both nests were deserted. The birds were never seen again about the empty nests.

Nest number 1 was found and observed in December, 1956, by Mr. A. Saltford, and he informed me that two fully fledged young left it on December 28. This nest was located in a small orange tree at a point 5 feet, 4 inches above the ground. When I arrived on January 8, one of the adults was using it as a roosting place and continued to use it as such until January 21 when I found an egg in the nest; there were two eggs on January 22 and a third was laid on January 24. The first egg hatched at 8:00 a.m. on February 4 and the

TABLE 3
MEASUREMENTS OF FIVE EGG SETS OF THE BANANAQUIT

| Nest Number | Date | Egg Number | Length | Width |
|----------------------------------------------------|-------------------|------------|----------|----------|
| 23 | January 23, 1957 | 1 | 17.0 mm. | 13.1 mm. |
| | | 2 | 17.5 | 13.5 |
| | | 3 | 18.2 | 14.0 |
| 43 | February 3, 1957 | 1 | 19.0 | 13.1 |
| | | 2 | 18.1 | 12.4 |
| 41 | February 12, 1957 | 1 | 17.9 | 13.1 |
| | | 2 | 18.0 | 13.4 |
| 45 | February 12, 1957 | 1 | 17.2 | 12.8 |
| | | 2 | 18.5 | 12.9 |
| Nest found on Trinidad Island February 22, 1957 | | 1 | 17.8 | 13.5 |
| | | 2 | 18.0 | 12.7 |
| | | 3 | 17.9 | 13.3 |
| Averages | | | 17.92 | 13.15 |

second by noon the same day. On February 5 the nest was empty, and a round hole through the wall indicated a predator, probably a larger bird of some kind. In spite of the young being taken, the nest was used by one of the birds as a roosting place for 10 days, after which it was found dislodged and on the ground. From these various observations it is obvious that a roosting nest may later be used as a brood nest or a brood nest may be used for roosting after the young leave or when the eggs or young are taken.

EGGS

Of 20 nests containing complete sets of eggs, 12 had 2 eggs each, 7 had 3 eggs, and 1 contained only a single egg which was destroyed after 4 days. The

one egg may not have comprised a complete set. Six nests contained two young and two contained three young when first found.

In shape the eggs vary from short oval to short subelliptical. The ground color is pale olive-buff. The markings are dots and spots of Cinnamon Drab and Light Brownish Drab. A set of eggs collected on Trinidad had much paler markings approaching Light Drab. The eggs are all more heavily marked at their larger ends where the ground color is more or less obscured. In some the markings are heavier forming a broad band near the larger end. One of the eggs from nest number 23 had four heavy line markings of Fuscous Black on the larger end. [The colors were determined by comparing with Ridgway's (1912) color standards.] The eggs of five nests were taken for description and for measurements (Table 3).

TABLE 4
DETAILS OF INCUBATION AT FOUR NESTS OF THE BANANAQUIT

| | | | |
|-------------|-------------|-------------|-------------------------------------------------------------|
| Nest No. 26 | January 28 | no eggs | |
| | January 29 | 1 egg | (Incubation started January 30) |
| | January 30 | 2 eggs | |
| | February 11 | 2 nestlings | Incubation period, 12 days |
| Nest No. 27 | January 22 | no eggs | (Incubation started on January 23 after first egg was laid) |
| | January 23 | 1 egg | |
| | January 24 | 2 eggs | |
| | February 4 | 1 nestling | 5:00 p.m. Incubation period, 12 days |
| | February 5 | 2 nestlings | 4:00 p.m. |
| Nest No. 28 | January 23 | no eggs | (Incubation started January 25 after second egg was laid) |
| | January 24 | 1 egg | |
| | January 25 | 2 eggs | |
| | February 6 | 2 nestlings | Incubation period, 12 days |
| Nest No. 44 | February 8 | not visited | |
| | February 9 | 1 egg | (Start of incubation not observed) |
| | February 10 | 2 eggs | |
| | February 11 | 3 eggs | |
| | February 21 | 1 nestling | 8:00 a.m. and 6:00 p.m. |
| | February 22 | 2 nestlings | 8:00 a.m. |
| | February 23 | 3 nestlings | 8:00 a.m. Incubation period, 12 days |

In the above series of 12 eggs the length ranged from 17.0 to 19.0 mm.; the width, from 12.4 to 14.0 mm. Belcher and Smooker (1937) give the average measurements of 10 eggs taken on Tobago and Trinidad as 17.2×12.8 mm, and the average of 22 eggs from Puerto Rico was 17.5×12.6 mm. (Biaggi, 1955).

The incubation period has been determined by Skutch (1954) and Biaggi (1955) as 12 or 13 days. In four instances in which the time of laying, the start of incubation, and the hatching of all the eggs was observed in *C. f. luteola* on Tobago Island, the period was found to be approximately 12 days (Table 4).

The incubation period may be defined as the interval between the laying of the last egg and the hatching of the last egg. There was some evidence (based on the hatching of two eggs in a set of three) that the incubation period was about 12 days in another nest (number 1). (The hatching time of the eggs of nest 44 was noted by Mr. A. Saltford after I had left Tobago.)

DEVELOPMENT OF YOUNG BIRDS

Daily measurements and descriptions were made of the young of several nests, but only a few stages of one young bird are here presented. The following brief account is of a bird hatched at 4:00 p.m. on January 28, 1957. The second young of the same nest hatched an hour and a half later.

The nestling at the time of hatching is entirely naked without a vestige of natal down. The entire body, including the legs and wings is of a deep flesh color. The eyes are closed but the black pigment of the iris shows through the skin. The gape is a pale yellowish white. No papillae of any of the feather tracts are visible. The measurements are: total length, 32 mm.; extent or wingspread 25; manus of the wing, 10.

January 31 (third day). Papillae of the remiges show faintly through the integument. Total length, 42 mm.; extent, 38; wing, 14.

February 2 (fifth day). There is a slitlike opening between the eyelids. The dorsal and ventral feather tracts are now evident, but the papillae are not yet protruding.

February 3 (sixth day). Developing remiges projecting through the integument for an average length of 5 mm. Total length, 56 mm.; extent, 70; wing, 15; bill, 8. Edges of maxilla pale with dark band along the culmen; mandible white-tipped with yellow; gape white.

February 6 (ninth day). Developing primaries and secondaries 10–12 mm. in length, most of the tips unsheathed for about 1 mm.; sheaths of ventral tract a distinct yellow, not unsheathed. Papillae of capital tract do not project through the integument, but all tracts are now clearly defined.

February 7 (tenth day). Ventral tracts with free feathers from 2 to 3 mm. in length. Lateral parts of ventral tract olive-yellow, median parts bright yellow. Tarsi and toes vinaceous slate in color.

February 9 (twelfth day). Total length of "first" or outermost primary 19 mm., its unsheathed tip, 9 mm.; "fifth" primary 22 mm., its unsheathed part, 16 mm.; tail feathers or rectrices 8 mm., unsheathed at tips for about 1 mm. The wing coverts are now unsheathed to the extent that the bases of the remiges are hidden from view. Maxilla now much darker and mandible with a dusky mid-portion. Total length, 76 mm.; extent, 134; wing, 34; bill, 9. The unsheathing of the feathers is progressing rapidly. The eyes are open. The nestling is active and exhibits fear, offering much resistance to handling.

February 11 (fourteenth day). At the age of two weeks the feathers have become unsheathed to the extent that all apteria are covered, but the pinfeathers on the front of the crown and forehead, auriculars, chin, and throat are not yet unsheathed. The white pinfeathers of the superciliary line are not unsheathed. The outermost primary is 24 mm. long, its unsheathed part, 13; "fifth" primary, 33 mm., its unsheathed part, 24. Tarsi and toes leaden in color, nails black, maxilla black, mandible dark slate, the edges horn color;

gape yellow. Total length, 84 mm.; extent, 142; tail, 12; bill, 9. The bird is now very active and tries repeatedly to escape when being measured, but it is not yet able to fly any great distance. Great difficulty was experienced in keeping the bird in the nest after replacing it.

February 13 (sixteenth day). The young bird left the nest when 16 days old (Fig. 3). It was able to fly considerable distances; from a point near the ground it flew to a perch 12 feet above the ground. It was with great difficulty that it was finally caught for measurements and description. Total length, 93 mm.; extent, 168; wing, 39; tail, 22. (For comparison the measurements of a living adult are: total length, 108 mm.; extent, 179; wing, 56; tail, 32.) The crown, back, and tail of a 16-day-old fledgling are blackish slate.



FIG. 3. Bananaquit 16 days of age photographed after flying from the nest.

The edges of the outer tail feathers are white. The feathers of the rump are tipped with olive-yellow. The edge and forepart of the wing are pale yellow; the chin and throat, gray; the breast and belly, bright lemon-yellow; the tarsi and toes, leaden vinaceous; the nails, black. The white superciliary line which is so conspicuous in the adult is less evident since these feathers are not yet unsheathed.

The young bird did not return to the nest after leaving on the 16th day, but the nest was used for roosting by an adult, presumably by one of the parents.

SONG

There is nothing outstanding in the song of the Bananaquit, and it does not rank high when compared with songs of other passerines. It is high-pitched,

shrill, unmelodious, and unmusical. As Skutch (1954) reports for Central American Bananaquits, "Song appears to be confined to the males;" for the Tobago race I have no evidence to the contrary. Mrs. Whitney Eastman, who has a keen and well-trained ear, interpreted one of the common renditions of *luteola* as *tse-tse-tse sweet*; *tse-tse sweet*; *tse-tse-tse*. This average song varies greatly with individuals and conditions. In some birds the song is very much abbreviated and again there may be as many as 12 syllables. The songs I have heard of other subspecies in Panamá and on Barbados and other West Indian islands tend to differ as much as does plumage coloration or aspects of life history. A single high-pitched note is uttered by the female when attempting to locate her young, and the young respond with a similar but more subdued note.

ENEMIES

On Tobago and Trinidad as well as some of the other islands of the West Indies the natives trap a great many birds which are kept as caged pets. The Bananaquit is a favorite since it readily adapts itself to and seems to thrive in captivity. Although it cannot be classed as a bird excelling in vocal accomplishments, it is a persistent singer. The birds are secured by placing a caged singing bird, evidently a male, in the vicinity of a nesting pair. An improvised perch fastened to the cage is covered with a viscous fluid, "laglee," obtained from the bread fruit. Being attracted by the singing caged bird, (apparently territorial behavior) the victim alights on the perch and in its attempt to free itself the feathers become entangled in the "laglee." The bird is held fast until freed by the trapper. I was informed that a singing Bananaquit or Blue-black Grassquit (*Volatinia jacarina*) readily sells for a price of 15 to 20 dollars, so that it is a very lucrative business for the native trapper. It is only when the birds are nesting that trapping proves successful, with the result that not only are the adult birds removed but also the nestlings are destined to suffer—at least in many instances.

While I was on Tobago and Trinidad during January and February, 1957, the Field Naturalists' Club of Trinidad was making a determined effort to have legislation passed to prohibit the trapping and caging of native birds. Many articles and editorials appeared in the local newspaper, *The Trinidad Guardian*, both for and against the practice. It is doubtful that prohibitive legislation can be secured immediately because of the long-standing nature of this practice. Such progress as is made will be slow and will be achieved through educational methods, just as bird protection has been accomplished in America through conservation education, in which the National Audubon Society has played a major part.

Since there are very few predatory hawks and owls on Tobago, they have little effect on the numbers of Bananaquits. It was only rarely that we saw a Broad-winged Hawk (*Buteo platypterus*) or a Pigeon Hawk (*Falco columbarius*), the only species of hawks observed in the course of many trips to all parts of the island.

Nest predation by other birds, however, was very great and was perhaps the most important factor in keeping the numbers of the prolific Bananaquits under control. Among the Bananaquit nests that were kept under observation, the contents were taken from six nests containing eggs and four containing young, apparently by such birds as Lesser Antillean Grackles, Anis (*Crotophaga ani*), Oropendolas (*Ostinops decumanus*), all of which were often seen in the vicinity of Bananaquit nests. This type of predation was totally unexpected since the nests of the Bananaquit are so well made. They are tightly woven with thick walls and completely covered over except for a small one-inch opening at one side, usually near the bottom. Furthermore, this opening is often concealed by overhanging nesting material. Unfortunately the nests are built in very exposed places where they can easily be seen, and they are thus conveniently situated for such predators. The larger bird does not take its victims through the entrance way but thrusts its beak through the top or sides of the nest to reach the eggs or young. All such robbed nests revealed a forced, rounded opening $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter through which the contents had been taken. I never succeeded in seeing the theft taking place, but in several instances I did see the suspected birds on or near the nest either before or after the robbery had taken place. I never saw a Bananaquit offer any resistance to such an intruder. There was not even a note of protest; rather, the parent bird or birds would fly away noiselessly. This made detection of a robbery very difficult, since it was done so quietly and stealthily. A bit of circumstantial evidence was obtained when I saw a Lesser Antillean Grackle mauling and eating a young Bananaquit about three or four days old. In several other nests the eggs disappeared, but there was no evidence that the nests had been pierced as noted above. Of the many empty nests examined in the course of various trips to all parts of the island, some had a round, pierced opening in the nesting bowl, indicating that the same sort of predation had taken place.

One nest found in an orange tree near Bacolet Guest House contained a dried mass of flesh and bones of two well-advanced young which probably starved when the adults for some reason failed to return. In another nest the bowl was completely filled with a mass of ants, including pupae. Here also were the bones of young Bananaquits, approximately 12 days old, which doubtless had been killed and the flesh eaten by the ants. Ants are very abundant in the tropics, and it would not be surprising to find other broods

that meet with this sort of destruction. One nest was occupied by two giant grasshoppers, and Mr. Thornton W. Burgess informed me that he once found a small murine opossum (*Marmosa* sp.) occupying a Bananaquit's nest. In nest number 47, built in low vines four feet above the level of a paved road but only six inches from the soil of the bank, I found a six-inch lizard which occupied the nest on three successive days, and which ran over my hand when my finger was thrust into the entrance way. While the murine opossum and the lizard may not have been responsible for destroying eggs or young, they undoubtedly kept the rightful owners from occupying the nests.

FOOD

Bananaquits may often be seen searching small branches and leaves for small insects, spiders, and various other bits of food. I have also seen them sip from droplets clinging to plants; these may have been water collected from rain or dew or perhaps sap that had oozed out to the surface of the plant. However, the chief food is the nectar of flowers. The Bananaquit is a bird of the tropics where flowers abound in quantities throughout the year. In fact the presence of nectar-bearing flowers is a factor in determining its distribution and local abundance. Many of the flowers utilized are also visited by various species of hummingbirds, but the manner of feeding is radically different in the two groups of birds. The Bananaquit never feeds while poised in mid-air on its wings as does the hummingbird. Rather it remains perched among the blossoms or grasps the stems of the flowers. On Tobago and Trinidad there are many Hibiscus flowers of various colors which grow in profusion in immense hedges and clusters along the roadsides or in gardens. This flower the Bananaquit approaches from the rear, grasping the supporting stem. On reaching the flower which may be upright or bent downward, the bird thrusts its head between the large petals either from above or below, and with its sharp curved beak and protrusible forked tongue it extracts the nectar stored at the base of the flower. The bird goes from flower to flower, often spending an hour or more at a particular hedge of Hibiscus.

At the Bacolet Guest House, the yellow flower of the vine, *Ipomoea operculina* (Convolvulaceae), which covers some of the Euphorbia hedges and entwines many of the shrubs and palm trees, is a favorite, as is also the yellow flower of the cockrico bush, *Cassia bacillaris*. One morning I saw four Bananaquits taking nectar from flowers of a Moringa tree (*Moringa oleifera*), locally known as the "horse radish tree". On this tree there were numerous clusters of small white flowers mounted on each of 10 to 15 spikes, the arrays of spikes growing out from the ends of the branches. Perched in the midst of the spikes, the birds sipped nectar from the small blossoms by thrusting their beaks directly into each flower, one after the other, before fluttering quickly to the next cluster. The birds were not disturbed by my presence while I watched them from a distance of only eight to ten feet.

A plant extensively cultivated in the gardens of Tobago as well as in other West Indian

islands is the Antigua heath (*Russellia equisetiformis*). This shrub is about two to five feet in height and has bright red flowers, the slender corollas averaging 22–25 mm. in length. While clasping a swaying stem of the heath, the Bananaquit reaches out and thrusts its beak into the outer end of the corolla and pulls it back into such a position that it can easily extract the nectar. Since the beak of the Bananaquit is only 12 to 13 mm. long, the nectar must be collected on the tip of its protrusible tongue.



FIG. 4. Flowers of *Bryophyllum calycinum* whose corollas have been pierced by nectar-seeking Bananaquits.

The small red flowers of *Pedilanthus tithymaloides*, locally known as the “money plant” and in some of the West Indian islands as the “lady zipper plant”, are especially popular with hummingbirds and Bananaquits. There was a row of *Pedilanthus* about 75 feet in length at the yacht club at Hastings, Barbados, where Bananaquits could be seen at any hour of the day. At one time I counted nine Bananaquits and four hummingbirds, all busy at this row of flowers. The red flowers are small and insignificant in appearance but apparently have much to offer these nectar-feeding birds. Wherever the money plant was growing one could reasonably expect to see Bananaquits.

There are certain flowers in which Bananaquits exhibit unusual ingenuity in obtaining nectar which otherwise would not be accessible to them. In flowers with extremely long, fleshy corollas, such as the apricot-scarlet flowers of *Odontadenia grandiflora* and especially those of the common *Bryophyllum calycinum* (the latter known locally as “wonder-of-the-world”, “life plant” or “flopper”), the nectar is beyond the reach of the bird’s bill and tongue. The

Bananaquit solves this problem by piercing the corolla near its base with its sharply pointed beak to extract the nectar (Fig. 4). The flowers wither and drop off soon after being pierced, and the owner of a large arbor of *Odontadenia* complained of the damage done by the Bananaquits. This is the only complaint I heard voiced against these birds.

I have seen stalks of *Bryophyllum* with as many as 40 to 50 of the flowers in which practically all had been so pierced. Although I observed these plants closely for considerable periods I never saw them pierced by any other species of bird. Apparently this is a foraging habit peculiar to the members of the honey creeper group. There were many flowers of other plants, trees, and

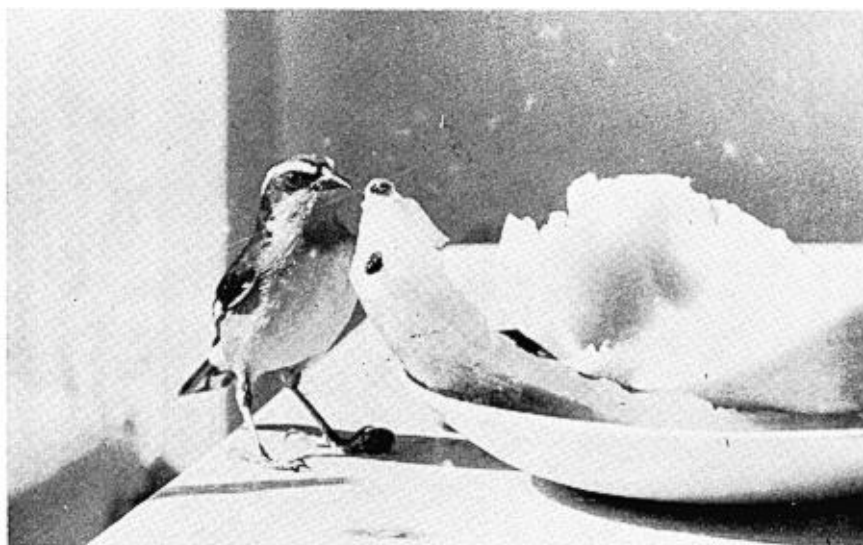


FIG. 5. Bananaquit sampling a piece of papaya. The birds merely sipped the sweet juices and seldom ate bits of fruit.

shrubs which were visited by the Bananaquits; the kinds of flowers utilized must vary considerably in different months of the year. It seems clear that the chief food of these birds is nectar and that insects and other matter constitute but a minor part of the diet.

The Bananaquits have an insatiable appetite for sugar or sweetened water and prefer these to other foods when made available. The confiding, fearless little birds enter the homes of man as well as the open dining rooms of hotels to feed on sugar in sugar bowls or the remaining undissolved sugar left in the bottoms of tea and coffee cups—even when guests are seated at the tables! At the Bacolet Guest House I had one, and sometimes two or three, of the birds feeding on sugar within inches of me but never quite daring to take sugar

from my hands. They would plunge their beaks into the mass of sugar, then extend their long, forked, saliva-covered tongues to which the grains adhered. At times the sides of the beak would become covered with sugar grains which could not be reached by the tongue but which could be shaken off by a brisk flip of the head. On occasions one bird would be perched on the rim of the sugar bowl, another advancing by way of the spoon and a third "standing by", awaited its turn. The Bananaquits were never tempted by bread crumbs or other bits of food. The birds always appeared promptly every afternoon when tea was served at Bacolet. They sometimes brought their young, which would perch on the rim of a sugar bowl with wings fluttering and mouths held wide open, begging for sugar from the adult feeding from the opposite side.

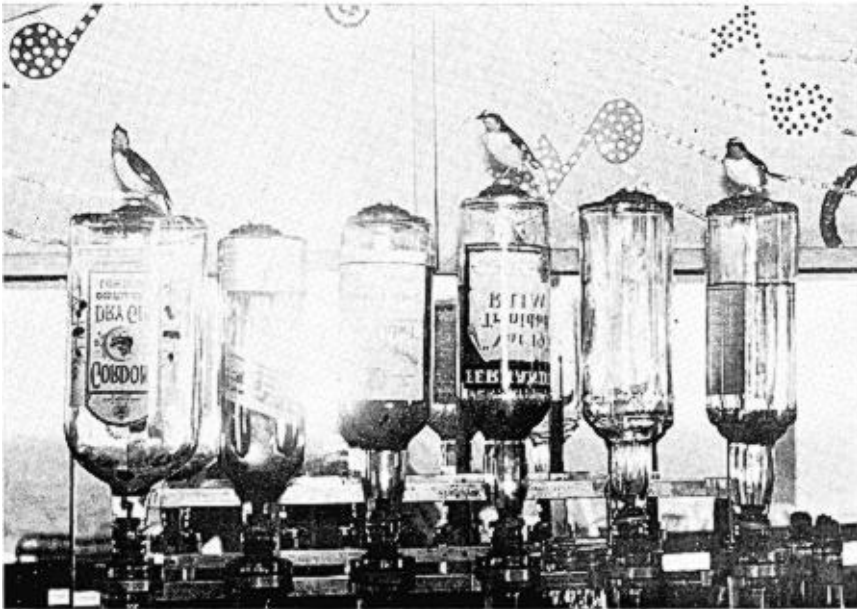


FIG. 6. Three Bananaquits awaiting their turn to sip liqueur from corks of bottles or from glasses on the bar at the Blue Haven Hotel. Two other Bananaquits were on the bar (below) when this photograph was taken.

I always kept sugar, as well as saucers and cups of sweetened water, on the veranda of our room, where there was an all-day succession of Bananaquits. One day one of them took a bath in a saucer of thick sugar water, and as a result its whole plumage was a viscous mess requiring a bath in pure water and prolonged preening of its feathers. I also had fruits such as papaya and over-ripe bananas on the feeding shelf, primarily for mockingbirds. The Bananaquits at times sipped the juices of the fruits but seldom ate bits of the

fruit (Fig. 5). They much preferred the sugar or sweetened water. On Tobago this feeding habit has given rise to the well-merited local name of "Sucrie" or "Sugar Bird". The birds were also seen lapping the corks or tops of opened syrup and honey bottles. Once a Bananaquit was seen, in the middle of a back road, feeding on the juice of a piece of crushed sugarcane. This food-eating habit was also noted in Barbados, where the bird often resorts to sugarcane for food.

At the Bacolet and Blue Haven hotels on Tobago Island there are bars which are open and not enclosed by glass windows or screens. Here the Bananaquits were seen to alight on the liqueur bottles and lick the fluid from the corks (Fig. 6); others visited small liqueur glasses on the bar which had not been completely emptied by the human drinkers. At the Blue Haven Hotel I saw five Bananaquits at one time so engaged and the bartender informed me that the birds visited him at all times of the day to obtain the "exhilarating" fluid. However, I never detected any unusual behavior on the part of the birds after such indulgence.

The hotel management as well as their guests welcome the little "Sugar Birds". Indeed they do all they can to encourage these unique visitors which have proved so droll and interesting. I believe the great concentration of Bananaquits in the vicinity is due in part to this attitude and to the fact that so many hotels and local residents provide them with an abundance of sugar. The great number of flowers which provide the Bananaquits with their chief food, nectar, is also an important factor in maintaining large populations of these birds in many parts of Tobago.

SUMMARY

The Bananaquit is represented on the island of Tobago by the form *Coereba flaveola luteola*. It is the island's most abundant species of bird. Fifty-four nests were found within a half-mile radius of Bacolet Guest House, located on the south shore, during a six-week period, January 8 to February 21, 1957.

On Tobago, the nests of the Bananaquit were built in exposed locations in a great variety of situations at all altitudes of the island, and at heights varying from one foot to 65 feet from the ground. The birds were most abundant in the cultivated lowlands.

The Tobago birds did not exhibit the strong territorialism reported for some of the other races of the Bananaquit.

The manner of constructing the nests is presented in detail. Four nests dissected were found to have from 404 to 650 items of nesting material. The nests are of two kinds: brood and roosting nests which are essentially similar in size, form, and materials. Brood nests may also be used as roosting nests before the eggs are laid or after the eggs or young are destroyed.

Twelve eggs averaged 17.92×13.5 mm. in size, slightly larger than the size reported for other races. The number of eggs per complete set is 2 or 3.

The incubation period in five cases was 12 days. The incubation period of other subspecies of the Bananaquit has been reported to be 12 or 13 days.

The song is reported for other subspecies of the Bananaquit to be confined to the males and there is no evidence to the contrary in the subspecies *luteola*.

An enemy of the Tobago Bananaquits is the native who traps the birds to sell as caged pets. The predation by other birds which feed on the eggs and young of the Bananaquits is considerable. The contents are taken by piercing the top or sides of the nests by means of the predator's beak.

The chief food of the Bananaquits is the nectar of flowers. The method of obtaining the nectar is discussed, with several types of flowers given as examples. The Bananaquits have an insatiable appetite for sugar or sweetened water. Any sweet liquid substance such as honey or syrup is also taken when available. An unusual source of food was the liqueur from bottles and glasses in the bar rooms of the hotels.

The great concentration of Bananaquits in the Bacolet area is probably due to the generous attitude of the people towards these birds as well as the abundance of flowers which supply the birds with nectar during all times of the year.

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