THE ANTILLEAN GREBE AT CENTRAL SOLEDAD, CUBA

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THE Antillean, Saint Domingo or least grebe (*Colymbus dominicus dominicus* Linne) one of the smallest members of the Colymbidae, is a native species of the Greater Antilles and the Bahama Islands. Locally it is variously known as zaramagullon chico, tigua, plongeon, and zambullidor. This little grebe is common in Cuba, but its distribution is localized and its abundance is largely determined by the available number of ponds and lakes which contain adequate food and suitable conditions for its nesting requirements. Much of the island is limestone country with underground drainage; hence, there are comparatively few lakes and ponds that provide the highly specialized needs of this bird.

Colymbus dominicus is represented in continental United States by *C. d. brachypterus* Chapman (1899: 255–256), the so-called Mexican grebe, found in the lower Rio Grande of Texas and southward to Panama, and *C. d. bangsi* van Rossem and Hachisuka (1937: 323), the Bang's grebe found in southern California, Arizona (Phillips, 1947: 121) and northwestern Mexico (A. O. U. Committee, 1944: 442). An allied race *C. d. brachyrhynchus* Chapman occurs in tropical South America. Since these birds differ only subspecifically their life histories and behavior are probably similar in many respects to the Antillean grebe (*C. d. dominicus*) discussed in this paper.

An unusual opportunity was presented to observe the Antillean grebe at the Atkins Garden and Research Laboratory located at Central Soledad about 12 miles east of Cienfuegos, Cuba, during my visit there from December 20, 1947, to January 19, 1948. I am indebted to Dr. Arthur G. Kevorkian, Director of the Laboratory, who made the arrangements for my visit. I am especially grateful to Mr. Frank Walsingham, Superintendent of the Gardens who provided me with every facility for my work and comfort during my stay at Harvard House. Mr. Walsingham not only acquainted me with the interesting plants and trees of the garden collected from all parts of the world, but also had an active interest in the birds, especially the grebes which nest in the artificial ponds of the Botanical Garden. He is responsible for observations made prior to and after my visit to Soledad.

The grebes were found nesting in three of the ponds. A pair nesting in one of the smaller ponds located near the greenhouse was chosen for detailed study partly because of its accessibility, but primarily because Mr. Walsingham had carefully observed the activities of this

one pair of birds since the July preceding my arrival in December.

The Antillean grebes, according to Mr. Walsingham, first appeared in the pond about 1941 after it had been dredged and deepened. Photographs taken in 1936 show this pond completely choked with a very dense growth of water plants, chiefly *Nelumbo lutea*, and totally unsuited to the specialized needs of the grebes which require ponds with more or less open water. When I arrived on December 20, 1947, there was a typical floating nest containing four eggs of the grebe located among a small growth of rushes (*Juncus* sp.?) and within five feet of the northern shore of the pond. Around the rushes was a fringe of water grasses and *Nelumbo*, commonly known as the American lotus, which was again invading the area. The leaves of the lotus, which lay on the surface of the water at spaced intervals, ranged from six inches to more than a foot in diameter. Some of the newly formed leaves were held aloft on their stems well above the level of the water. On the banks and on a small island in the center of the pond there were numerous palms and bamboo creating a truly tropical setting for the home of this grebe. In addition to the Antillean grebes, the American egret, *Casmerodius albus egretta* (Gmelin), yellow-crowned night heron, *Nyctanassa v. violacea* (Linnaeus), little green heron, *Butorides v. virescens* (Linnaeus), little blue herons, *Florida c. caerulea* (Linnaeus), and many Florida gallinules, *Gallinula chloropus cachinnas* Bangs, shared the excellent fishing and other food provided by the pond. In May, 1948, a pair of jacanas, *Jacana spinosa violacea* (Cory), with their brood of four downy young were seen skipping over the lotus leaves. A pair of pied-billed grebes, *Podilymbus p. podiceps* (Linné), which appeared soon after my arrival proved to be the source of much trouble in the domestic affairs of the little grebes.

The nesting record of this pair of Antillean grebes, during almost a year, is of special interest since it reveals an extraordinary productivity and a rapid succession of the laying of different sets of eggs, each set laid soon after the previous brood had been hatched. Mr. Walsingham who observed this pair of birds frequently during his daily visits to the garden from July onward informed me that the female had laid five sets of eggs up to the time of my visit. Three broods of five each were reared from eggs laid in a nest built among a growth of water grass near the center of the pond. When this nest became unusable because of being water soaked and flooded, the second nest was built among the rushes where two more sets of four eggs each were laid and hatched. When I arrived on December 20 the fifth set of four eggs was being incubated and the four young (three weeks old) of the fourth brood were being fed and cared for by the adults. There

were ten immature birds of the second and third broods in a distant arm of the same pond. The members of the two broods could be readily distinguished by the relative progress of their juvenal plumages and especially by the color of the eyes. The color of the iris of downy young is an olive brown; as the bird grows older it becomes whitish and then goes through different shades of yellow to the orange-yellow of the adult iris. The striping of the back and head so marked in the downy young also disappears as they grow older. The two broods comprising the ten older young were allowed to shift for themselves, but nevertheless, the male took time off, from his active duties at the nest and with brood number four, to make them occasional visits and to deliver food to these older young. The five members of the first brood had left the pond prior to my visit, according to Mr. Walsingham. Young in well advanced juvenal plumage and completely independent were seen in one of the adjacent ponds of the garden without an adult attendant, but there was no way of determining whether they were the first brood of the pair under consideration.

On December 21 a blind of bamboo and covered with building paper and palm leaves was built close to the nest containing the four eggs of set number five, to facilitate observations and photography at close range. The overall diameter of the floating mass was 13 inches at the water level, and the nesting cavity occupied by the incubating bird was only six inches in diameter and three-fourths of an inch deep. The nest was made chiefly of stems and leaves of water plants mixed with some mud which always appeared soggy and damp. The entire floating mass was easily tipped or slightly moved with a stick but was held in the same relative position by the stalks of rushes. The depth of the water in the vicinity of the nest was two and one half to three feet. The eggs were a pale greenish white or buff in color and averaged 3.71 by 2.51 centimeters in size, somewhat larger than the average (3.39 by 2.34) given by Bent (1919: 37) for 49 eggs of the Mexican grebe.

When I approached the pond on the morning of December 22 the incubating bird hurriedly covered the eggs with vegetation picked from the edge of the nest, slid off, dove and came up about 20 feet away. None of the birds observed in Cuba were seen to fly when disturbed at their nests. Miller (1932: 9) noted that the Mexican grebes at Lake Olomega, El Salvador, Central America, readily took wing. This may be due to a difference in the nature of the nesting sites. It was not unusual at times when they were suddenly frightened, for the older juveniles to rise above the water by a rapid flapping of their wings; after a few yards they would strike the water and dive.

The rate of progress of these birds under water was surprisingly great and a horizontal progression of 75 to 100 feet was not unusual for these expert divers.

The adult on leaving the nest joined the mate which was with the four young of brood number four. As I went closer the adult which I took to be the male became very much excited and uttered sharp piercing calls *eep-eep-eep* or *yeep-yeep-yeep* followed by a prolonged rapidly-uttered, rattle-like call which may be crudely represented by *ye-ye-ye-ye-e-e-e-e-e-e-e-e-e-e-e.* As I neared the blind all the grebes dove in a wild splash on this signal of the male. A few minutes after I entered the blind their suspicions of danger had subsided and their activities continued in an apparently normal way. The young which were about three weeks old swam about leisurely, frequently spreading their wings and preening their feathers to assist in the unsheathing process. Sometimes they would lie completely on one side on the surface of the water to groom the growing feathers of their breasts. The male was seen to dive and then come up with a beak full of food which one youngster snatched; it raced away pursued by the three others until the coveted meal was gulped down. At other times all four picked at large masses of food which had been brought up and held firmly in the beak of the adult. After 15 minutes the two adults swam cautiously toward the nest to make a casual inspection. They soon returned to their young which were dozing in the sun among the lotus leaves. Several times the young as well as the adults were seen to capture insects including a number of dragonflies. No attempt was made to incubate the eggs during the four hours I was in the blind. It was a warm day and it was evident that incubation was being continued without the aid of the parent bird. The eggs, well covered by warm soggy vegetation, were in an excellent artificial incubator. However, on cooler days and always at night the eggs were incubated by either the male or the female, both taking their turns at this task. While one was incubating the eggs the other adult remained with the four young, supplementing the food acquired by their own efforts. Most of the food was dark in color, chiefly decayed vegetable matter, algae and mud mixed with worms, larvae and aquatic insects. At times the adults captured crayfish and other shrimp-like crustaceans which were present in considerable numbers in the pond. These were highly prized as food and at one time the adult came up with a wriggling crayfish about three inches long. All four young scampered over the surface of the water to get the delicacy. The crayfish was snatched from the parent's beak and then from the beaks of successive young until one youngster gulped it down

with much effort and writhing of its neck. Both male and female busied themselves with the task of diving for food which they either ate themselves or more often allowed the gluttonous young to snatch from their beaks. Two Florida gallinules which regularly fed along the shores and in the pond sometimes approached within a few feet of the grebes, but their presence did not cause the least bit of disturbance and excitement. Neither did the herons bother them in any way. Ani birds, *Crotophagi ani* Linné, lizard cuckoos, *Saurothera merlini* D'Orbigny, and a red-bellied woodpecker, *Centurus s. superciliaris* (Temminck), were frequent visitors to the palm trees and bamboo, but their curious and diverse calls made no impression on the grebes. The pond was full of turtles of various sizes. One of the large turtles with a carapace no less than 12 inches in length swam by with his head projected out of the water. He came within inches of one of the adult grebes, but apparently it was not noticed. Frequently I saw smaller turtles basking in the sun on top of floating lotus leaves. The grebes paid no attention to them even when they plunged into the near-by water with a splash.

During the early morning of December 22 I approached the pond and entered the blind quickly before the bewildered grebe had a chance to cover her eggs properly. In about ten minutes both adults came swimming toward the rushes frequently retreating but coming ever closer to the nest containing the partially covered eggs. Both birds uttered alarm calls. One of the birds, which I assumed was the male because of his size and general relations to the family, swam close, with his breast pushed snugly against the floating islet. Then with a vigorous back stroke of his lobate feet he mounted the nest which moved and teetered under the impact of his body. The bird "nervously" picked up material from the edge of the nest and placed piece after piece over the exposed eggs. After they were completely covered, the material was trampled down firmly; no one would suspect the presence of the four eggs. With this task performed the male slipped off the nest, joined his mate waiting near by in the rushes, and together they swam back to the four young. I had not been in the blind long before I heard the loud characteristic call of a pied-billed grebe. A pair of these birds had invaded the pond, when and how I do not know, but they were to play an important role in the life of the Antillean grebes, which thus far had progressed smoothly and peacefully. The calls of the pied-billed grebes greatly excited the little grebes. Apparently they were at once recognized as competitors and enemies. It doubled the responsibilities of the male who in addition to taking his turn at the nest and feeding the brood of growing young, must now definitely

defend his territory. For the first hour nothing was done other than the exchange of warning calls with the pied-bills. However, the male Antillean grebe exhibited considerable "nervousness," rapidly fluttering his wings against the sides of his body. The wing of one side alternated with the movements of the other wing. This curious performance was usually accompanied by prolonged, high-pitched calls which I interpreted as *yē-yē-yē-yē-yē-yē- ē-ē-ē-ē-ē-ē-ē-ē-ē-ē-ē*. The pied-bills finally approached the fringe of vegetation, but when they were within 40 feet of the nest the male Antillean grebe left his family, dove and came up within two feet of the challenging birds. He dashed at his nearest antagonist, thrusting out his beak and furiously fluttering his wings; with much splashing of water he drove the pied-bill well beyond the bounds of his established territory. This territory was roughly a radius of 40 feet from the nest. The pied-billed grebes were never allowed to come into that area without a battle. The little male grebe defended this territory throughout the remainder of the nesting season.

When I entered the blind on the morning of December 27 there were only three eggs in the nest which had been left uncovered. The two adults were about 20 feet from the nest in a group with the four older young. At first I saw no sign of the newly hatched young but did note that the axillar feathers were uplifted and arched over the back of one of the adults, presumably the female. As the sun rose higher and it became warmer a little striped head appeared through the feathers and uttered faint, but highly pitched *peeps*. It was evidence that the first young of brood number five was successfully launched. Later the youngster stretched out its neck and held its wide open mouth along the side of the mother's neck as if soliciting food. As it emerged further it lost its balance and fell into the water. Immediately it swam to the rear of its parent and apparently with little effort hopped onto her back and completely disappeared in the downy bed beneath the uplifted contour feathers. An unusual disturbance among a group of herons on shore caused the male and four older young to go into a dive but the female and her downy cargo remained afloat.

The appearance of the downy young caused a change in the behavior of the male. He seemed "jittery and excitable and acted impulsively" on the least provocation. His attitude toward the pied-billed grebes was also more antagonistic, and his attacks were more vicious whenever the larger grebe came close to the area of the now sharply defined territory.

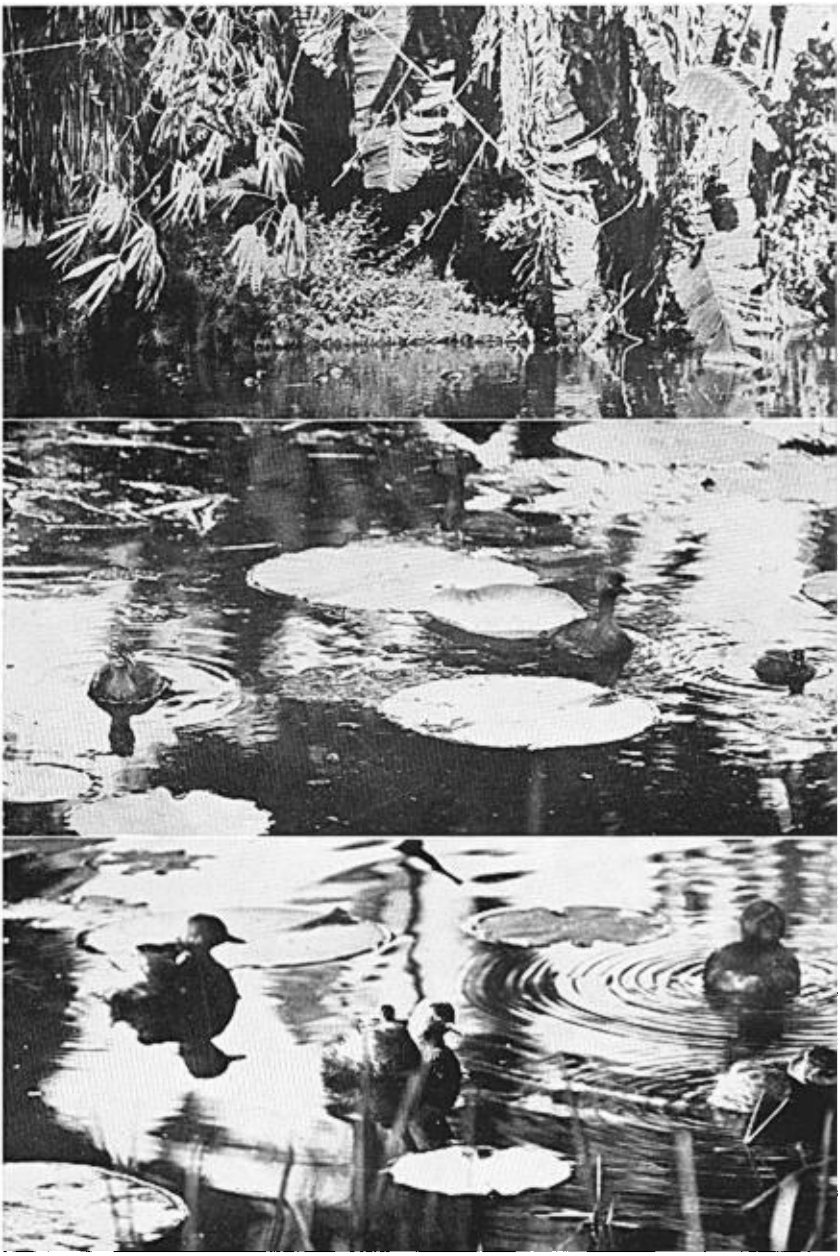
There still were three eggs in the nest when I left at noon, but one

was pipped. At 2 p. m. there were only two eggs, and each parent was carrying a downy young on its back. At 3 p. m. the male, still carrying one of the young, came to the nest and carefully covered the remaining two eggs. As he hurriedly left the nest the youngster tumbled into the water. The male, apparently startled by a noise inside the blind, swam on, leaving the youngster to climb back into the nest. This provided an excellent opportunity to see the striped markings of the head and the narrow longitudinal stripes and variegated mottlings of the back of the young. In the center of the crown was a reddish brown patch which stood out in marked contrast to the duller colors of the surrounding down. At first the little fellow seemed to be contented to be alone but later started a peeping which summoned both parents. As the male came alongside the nest he uttered a series of faint notes to which the youngster responded by jumping, sliding and finally tumbling into the water. As soon as he regained his poise he entered the feather thatched room on the back of his parent by the rear entrance as usual. The two adults each with its cargo of downy young joined the four older young about 25 feet from the nest. They then carried on their usual activities of feeding and preening with intervals of dozing. This was interrupted at 3:30 p. m. when the pied-billed grebe again attempted to invade the forbidden area. The male Antillean grebe was very much excited, uttered his battle cry, shook off the young he was carrying and scurried over the water toward the pied-bill who was routed and forced to retreat from that part of the pond. The youngster left swimming in the water went to the female to share the downy bed of his sibling.

The older young were fed frequently with crayfish, smaller crustaceans and miscellaneous vegetable matter, but up to this time no food was seen to be delivered to the newly hatched young. At 4:45 p. m. the female carrying the two young came to the nest to incubate the remaining two eggs. The young were not brooded in the nest but remained in the down beneath the arched feathers of her back. The male as well as the four older young spent the night in the rushes close to the nest.

By 9 a. m. December 28 the third egg had hatched, the shell was still in the nest, but the youngster was with the other two downy young on the back of the female. The egg shell was later removed from the nest by the male. The female was seen to dive with her cargo and, after coming up to the surface, all three heads popped out simultaneously from the feathers, as if seeking a breath of air after their plunge. The male was busily engaged in guarding his territory, but the four older young did not seem to be much concerned; they

ANTILLEAN GREBE: (*Top*) BLIND AT NEST NUMBER TWO CONTAINING THE FOUR EGGS OF SET NUMBER FIVE. DECEMBER 23, 1947. (*Middle*) MR. FRANK WALSINGHAM POINTING TO THE NESTING SITE IN THE RUSHES. DECEMBER 20, 1947. (*Bottom*) NEST NUMBER TWO AND FOUR EGGS OF SET NUMBER FIVE. DECEMBER 20, 1947.



ANTILLEAN GREBE: (*Top*) BROOD NUMBER TWO IN THE POND BENEATH THE BAMBOO AND OTHER TROPICAL PLANTS WELL AWAY FROM THE NEST SITE. DECEMBER 30, 1947. (*Middle*) ADULT MALE AND FEMALE BACK OF CENTER, ONE YOUNG OF BROOD FOUR AT LEFT, AND YOUNG OF BROOD FIVE, 17 DAYS OLD, AT RIGHT. JANUARY 13, 1948. (*Bottom*) MALE AND FEMALE, EACH WITH YOUNG OF BROOD FIVE ON BACKS. YOUNG TWO DAYS OF AGE. TWO YOUNG OF BROOD FOUR, AT RIGHT. DECEMBER 29, 1947.

carried on their games as usual, diving and chasing each other playfully and aimlessly about the lotus leaves.

At 8:20 a. m. on December 29 the fourth egg was still intact and was left uncovered in the nest. Both parents were with the older young, and the female carried the three downy youngsters of brood five. The male was seen to feed one of the downy young while it was off its mother's back and swimming in the water. This food was a small bit of vegetable matter which was taken from the bill of the adult by the young. No food was ever seen to be thrust into the open beak of the youngster as is done in the case of many other birds. After the downy young was fed it mounted a lotus leaf and remained in the warm sun for several minutes. Later when it uttered notes of distress the mother came alongside the giant leaf; the youngster hopped off into the water and immediately took his place on her back. Later the male was seen to deliver food to the young as they protruded their heads through the feathers of the back of the female. During the course of 30 minutes the male fed the young eight times. This seemed to be a common procedure during the first three or four days; after that they were fed while floating on the water. Between feedings one of the young was seen to emerge from the feathers at the side of the mother's neck and repeatedly pick at her eye. As this annoyance continued she elevated her head and the youngster in attempting to reach the eye in the raised position tumbled off into the water, but bobbed up like a puffball and quickly got aboard the mother. The young when hungry called incessantly, uttering a subdued *steep-steep* or *stee-stee* and sometimes more like *ye-ye-ye-yet.*

As soon as the sun struck the nest the male covered the single egg and rejoined his family. The instincts of these birds are strongly developed. It seems truly remarkable that, in spite of the blind and my frequent appearance, the remaining egg was not neglected after three young had hatched, one of them more than two days before. The fourth egg hatched during the late afternoon of December 29. According to Mr. Walsingham the eggs were laid over a period of about a week during the first part of December. The date of the start of incubation was not accurately noted and hence the period of incubation was not determined. The hatching of the four eggs completed a remarkable record of five successive broods comprising a total of twenty-three young from July, 1947, to January, 1948. Because of the protection afforded by the garden where all shooting is strictly prohibited and where the birds are never molested, all of the first four broods survived, but unfortunately this last brood was not so successful.

During the days that followed, the grebes were in the water away from the nest. Both adults at times carried the younger brood, but often all four were crowded onto the back of one parent, usually the female. For the first four nights the female or male spent the night on the nest with the four young on its back. The attitude of the adults to the brood of older young changed. When the latter appeared too near the downy young they were chased away by the male and sometimes by the female. Nevertheless when a large crustacean much too large to serve as food for the downy young was caught it was fed to the older ones. According to Mr. Walsingham, the older of any two broods of the season were chased to the farther end of the pond, but the procedure in this case seemed to be modified by the presence of the pied-billed grebes. By January 4 the clashes with the pied-billed grebes became more frequent and more intense. Why the pied-billed grebes were so persistent is not clear, unless they coveted the only good nesting site on the pond. They made desperate attempts to gain control, but it was being just as rigorously defended. The pied-bills even invaded the region of the nest, often emerging from their dives in the midst of the two broods of young which invariably initiated a wild scramble. One by one, three of the downy young disappeared. By January 7 only one of the four members of the fifth brood remained. I have no knowledge of their fate, but I am suspicious of the pied-billed grebes which in my absence may have attacked and killed these young during the numerous clashes.

The two adult Antillean grebes with their one remaining downy young moved to the other end of the U-shaped pond on January 8, leaving the four older young at the mercy of the pied-billed grebes. On January 9 and 10 the pied-billed grebes with no opposition from the adults closed in on the four older young of the Antillean grebes, which were now hiding in the rushes about the old nest. Again and again they were rushed, sometimes forcing them to leave the water and scramble up the steep shores of the pond. At other times they sought cover under the thick mass of palm leaves surrounding my blind. On January 11 three of this brood deserted the old homestead and joined their parents, but one of them was persistent and remained. The male Antillean grebe left his ousted families several times and fought off the larger grebes to aid the last young. Then he expended much effort in chasing this young bird from the old site which was now under the control of the pied-billed grebes. On January 13 and 14 all four young of brood number four and the remaining young of brood number five were with their parents in the other end of the pond. The pied-billed grebes had won the long struggle, but only temporarily.

After I left Soledad on January 20 Mr. Walsingham continued daily observations of the grebes. For about a week the pair of adult Antillean grebes with their several broods of young remained in the distant arm of the pond, leaving the pied-billed grebes in control of the area about the old nests. On January 27 the original pair of Antillean grebes was seen constructing a new nest in a place not more than a few feet from the old nesting site, in spite of the opposition offered by the pied-billed grebes. The Antillean grebe was seen sitting on the nest continuously from January 28 to 30 although there were no eggs. It seemed to be guarding the nest against the frequent raids of the larger grebes. The first egg was laid on January 31. There were two eggs on February first, three eggs on the second, and the set of four eggs was completed on February fourth. The bird incubated the eggs closely from the time the first egg was laid. All seemed to be going well with this sixth set of eggs until February 17, when the nest was deserted because of the constant onslaughts by the pied-billed grebes, which became more intense when the latter started to build a nest of their own only a few yards away. On February 18 the pied-billed grebe's nest contained one egg, on February 19, two eggs, and on February 23 the set of five eggs was completed.

Meanwhile, the Antillean grebes built another nest, their fourth since July, inside a wire netting which had been placed around a large Aroid growing in the water on the opposite side of the pond. Every time the grebes came to or left this nest they were obliged to dive beneath the submerged edge of the netting. On February 25 there was one egg, February 28 three eggs, and the set of four was completed on March 4. Unfortunately this seventh set of eggs in the fourth nest built by this pair of grebes disappeared. Presumably they were taken by turtles which seemed to be the only enemies in the pond which could reach the nest enclosed on all sides by wire netting.

For a time this seemed to be the end of the nesting activities of the Antillean grebes although the adults remained in the pond, feeding and serving as protectors of the various members of their large progeny. On the morning of April 30 Mr. Walsingham was amazed to see this pair of grebes with another brood of downy young. This nest, the fifth, was so well hidden by vegetation that it escaped his notice up to this time. On May 23 Mr. Walsingham wrote that the four young of this sixth brood were in excellent condition and growing rapidly. On May 14 he saw the adults completing a new nest among the lotus leaves near the center of the pond. On May 17 there were over two inches of rain which flooded the pond and submerged the nest. It was not determined whether or not it contained eggs. This was the sixth

and last nest built by this pair of Antillean grebes in the so-called Green House Pond. The little grebes finally deserted this pond, a few weeks later, to go to an adjacent, larger and more open pond better suited to their needs. However, the constant annoyance by the pied-billed grebes was evidently an important factor in causing them to leave the home pond. The pied-billed grebes succeeded in hatching their five eggs and rearing their young and were still present and in complete control of the pond during the middle of September, 1948, when the last report was received from Mr. Walsingham. The pied-billed grebes did not have the succession of many broods which was the dominant feature in the life history of the Antillean grebes.

In the course of a year the female Antillean grebe laid three sets of five and five sets of four eggs, a total of 35 eggs, of which 27 were hatched and two sets of four eggs each were deserted or destroyed. Twenty-four young were successfully reared. This presents a most extraordinary record of productivity. I know of no other case where this record has been achieved by any other wild bird in nature. The nesting of the Antillean grebe in the artificial pond of Atkins Garden was unexpectedly, perhaps abnormally, long and without the usual dormant or resting period we would expect. Mr. Walsingham assures me just one pair of grebes was concerned. This is made reasonably certain by the relation of the adults to the successive broods of young.

Similar conditions of great productivity may be found to be true of the allied races of *Colymbus dominicus* in continental America, when continuous observations have been made throughout the year. It is known that the Mexican grebe, *C. d. brachypterus*, has a long nesting period, and nests of this race have been found from March to December in different localities, but to my knowledge observations on a single pair of birds throughout the year have never been made.

LITERATURE CITED

AMERICAN ORNITHOLOGISTS' UNION COMMITTEE. 1944. Nineteenth Supplement to the A. O. U. Check-List of North American Birds. Auk, 61: 441–464.

BENT, A. C. 1919. Life Histories of North American Diving Birds. U. S. Nat. Mus. Bull. No. 107: 1–245.

CHAPMAN, FRANK M. 1899. Description of two new species of *Colymbus dominicus* Linn. Bull. Amer. Mus. Nat. Hist., 12: 255–256.

MILLER, ALDEN H. 1932. Observations on some Breeding Birds of El Salvador, Central America. Condor, 34: 8–17.

PHILLIPS, ALLAN R. 1947. Records on Occurrence of some Southwestern Birds. Condor, 49: 121–123.

VAN ROSSEM, A. J. AND HACHISUKA, MARQUIS. 1937. A further report on birds from Sonora, Mexico, with descriptions of two new races. Trans. San Diego Soc. Nat. Hist., 8 (23): 321–334.

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