

Nesting of the Agami Heron

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Abstract.—The Agami Heron (*Agamia agami*) is one of the least known species of herons. We report observations on an exceptionally large colony in French Guiana. The estimate of approximately 900 nests exceeds by ten fold the largest colony previously reported. Herons arrived at and departed from the colony and fed young only at night. The characteristic “Gr” call, which was recorded and analyzed, was used a contact-call, which ceased on disturbance. Timing of nesting was highly asynchronous. Nests were over water and in deep shade. Adults shaded young from the sun. Birds appeared to forage individually, possibly at long distances from the colony site. Received 14 July 2003, accepted 27 November 2003.

Key words.—Agami Heron, *Agamia agami*, Ardeidae, breeding, Cocoli Heron, colonies, coloniality, French Guiana, Great Egrets, herons, Kaw Marsh, nesting, nocturnal activity, vocalization.

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The Agami Heron (*Agamia agami*), one of the least known herons, is characterized by an elongated morphology exceptional among herons. Moreover, recent evidence suggests it may be rather distantly related to other extant herons, perhaps a sole survivor of an otherwise extinct heron lineage (Kushlan and Hancock, in press). If so, observations on its biology take on additional value. It is known to be a solitary forager and to nest in small colonies, alone or near other species (Hancock and Kushlan 1984). But little has been published on its feeding or breeding biology. In this paper, we describe the largest nesting colony of the species reported to date, in French Guiana, along with other observations of its biology and behavior during nesting.

METHODS

The study was conducted between 12-15 May 2002. The study site was inaccessible by foot or car, and people and materials had to be transported by helicopter. Observations were made from a floating platform (4 m × 6 m), constructed in front of the colony, and from a 2-m long rowing boat, the use of which was limited by the number and size of Black Caimans (*Melanosuchus niger*) present. The colony site was accessible only from the north side, as dense tall vegetation made passage along the other sides impossible. Within the colony, nests are inspected for adult presence and stage of nesting. We documented interactive behavior and recorded behavior and calls with a video camera. Calls were analyzed using Canary 1.2 software developed by the Bioacoustics Research Program of the Cornell Laboratory of Ornithology.

Estimating the numbers of nests was challenging. After two days of day and night observation, we found that birds only returned to the colony at night and that flight paths were restricted to one part of the colony site's perimeter, thereby facilitating an estimate of birds flying into and out of the colony. An observer standing on the boat in front of the northern, 150-m, edge of the colony, between 18.30 h and 01.00 h counted birds flying in and out across 10% of that edge. Qualitative observations suggested that flights over the remainder of the quadrant were similar to that being counted. Flying birds were easily seen because of their contrast with the light gray sky. No birds were seen arriving at the colony from quadrants other than the northern one. The count ended when birds stopped entering the colony coincident with heavy rainfall. During the day, 75% of the 122 nests examined were unattended by adults and the remainder had only one adult present. So the number of nesting pairs was calculated as follows: the net number of birds returning to the colony along 15 m (N) was extrapolated to the full 150 m colony edge (10N). Of these, 25% were considered to represent single parents returning and 75% both parents. The estimated number of nests was $(10N \times .75) / 2 + (10N \times .25)$. If only one parent of a pair returned or birds entered the colony elsewhere, the numbers estimated would be understated.

STUDY SITE

The study was conducted in the Kaw Marshes, an 110,000-ha national reserve in French Guiana (4°36'N, 52°07'W), located 40 km southeast of Cayenne. The reserve, situated between the coastal mangrove forest and interior rain forest, consisted principally of waterlogged savanna with intermittent patches of palm swamp forest. The savanna vegetation was sedge (*Rhynchospora corymbosa*), fern (*Blechnum serrulatum* and *Thelypteris interrupta*) and moucou-moucou (*Montrichia arborescens*). The swamp forest, established on peat 1-3 m thick (de Granville 1986), was dominated by Coco Plum (*Chrysobalanus icaco*) and Mauritia Palm (*Mauritia flexuosa*).

The colony was under the palm swamp forest canopy, covering a kite-shaped area 150 m × 126 m × 210 m

× 100 m, or about 2 ha (Fig. 1). Nests were distributed in the forest that surrounded four small ponds connected by small under-cover channels. Other species at the site were Black-crowned Night Heron (*Nycticorax nycticorax*; nesting, no estimate of numbers), Great Egret (*Ardea alba*; 50 nests inspected), Boat-billed Heron (*Cochlearius cochlearius*; 30 nests counted), Cocoi Heron (*Ardea coccoi*; 20 pairs building nests), Anhinga (*Anhinga anhinga*; 5 pairs displaying, one pair building a nest), and Hoatzin (*Opisthocomus hoazin*; more than 30 individuals, some nesting). The Striated Heron (*Butorides striatus*) visited the colony but was not found nesting.

RESULTS

Nesting was in the rainy season. Nests were in bushes and trees over water and under the dense cover of the canopy. They were 0.5–4 m above the water, averaging 2.15 m. Nests averaged 15 cm in diameter and 8 cm high. Eggs were light blue (one egg: 48 × 38 mm, 35 g). Agami Herons nested asynchronously. We inspected 122 Agami Heron nests during daylight hours. Of these, ten were empty or held an unattended egg, 15 had one adult in attendance incubating or tightly brooding small chicks, six had one adult with larger young, and 81 held young with no adult in attendance. Black-crowned Night Herons appeared to have nested earliest, then the Hoatzin and the Agami Heron, fol-

lowed by the Great Egret and the Boat-billed Heron, and lastly the Cocoi Heron, and Anhinga, which were in a courtship phase during the study.

There was no change in the parental attendance of Agami Herons during the whole of daylight. No adult Agami Heron arrived or departed the colony during daylight, and chicks were not fed during the day. Feeding herons departed to their feeding areas and returned to the colony in the dark, flying 2–5 m above the ground. Most returned from 19.30 h through 12.00 h, arriving singly or in small groups. Once they began to arrive, they did so in a regular pattern. In 30 minute periods from 18.30 h to 00.30 h, the numbers counted arriving and departing (-) were: 0, 1, 14, 14, 13, 14, 13, 16, 10, 15, 18 (-2), 1, 1 (-3). Nocturnal vision did not seem to be exceptionally developed, as some birds nearly collided with the bamboo pole to which the boat was tied. Adults started to leave the colony about midnight and all departing birds had done so by 06.30 h. Based on a count of 140 birds arriving at the 15 m perimeter sample, we estimate that the colony contained 1,800 adult Agami Herons which represents about 900 pairs and nests.

When arriving at the colony, adults made a short loud call and chicks give a high-pitched answer, the “Chup” call. The characteristic call of the species, a low-pitched rattling called the “Gr” call (Kushlan and Hancock, in press), was given by adults within the colony throughout the day. The birds did not call in the colony at night. The “Gr” call was described by Slud (1964) as a pig-like, low-pitched, rattling “krurr”. Analysis shows this vocal signal is a repeated strophe of seven elements between 500 and 850 Hz, having a duration of 0.2 to 0.3 seconds and separated by periods of silence lasting 0.6 to 0.8 s. The noise coming from the colony ceased when a raptor was over the colony and when the colony was approached by boat, starting again when we stopped the boat and sat quietly.

During daytime, adults shaded the young on the nest and even after they left the nest. We observed a fledged chick that had already left its nest standing alone on a perch in the sun. It was joined by an adult, which

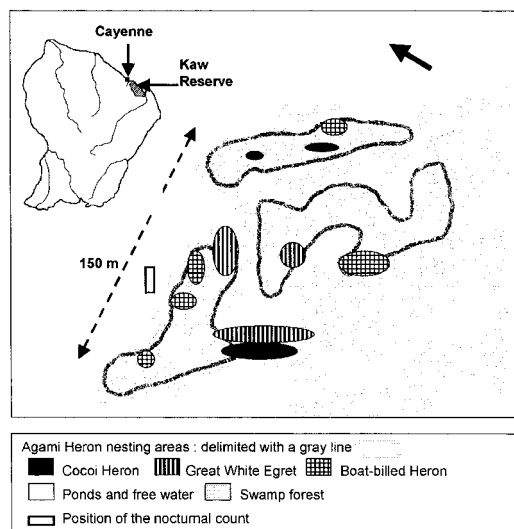


Figure 1. Map of the heronry in the Kaw reserve showing the repartition of the nesting places of the waders, from the 1997 aerial picture of the area. The location of the study area in French Guyana, South America is shown in the insert.

stretched out its wings, providing shade. Bill duels were common between chicks, between juveniles and chicks, between juveniles and adults. In one instance, an adult and a juvenile fought a prolonged bill duel in the colony under story for over 50 minutes, thrusting and fending off bill thrusts as many as ten times in rapid succession. They periodically flew at each other, and also moved about slowly to achieve a better position for attack.

DISCUSSION

Scattered observations in the literature suggest colonial nesting is typical of the Agami Heron, but most reports are of colonies of a few pairs or a few pairs associated with larger colonies of other species (Michener *et al.* 1964; de Vries 1968; Ramo and Busto 1982; Marin 1989; Haverschmidt and Mees 1994). Recently, a colony in Belize was reported to contain over 80 nests (Jones 2002). The number of nests we investigated greatly exceeds this number and the overall estimate, of as many as 900 nests, is exceptional. The Agami Herons we observed nested with other species, and so may be more inclined to use mixed species colonies than previously thought. This observation suggests the desirability of searching for this species in mixed colonies elsewhere. The degree of nesting asynchrony also should be noted in other situations.

The Agami Heron is reported to feed solitarily, along overhung river banks and wooded passage ways within swamps (Hancock and Kushlan 1984). We saw no evidence of aggregative foraging. Birds left and returned to the colony individually, and only during darkness. Our observations of flying and feeding birds suggest that they fed north of the colony in the swamp and savannas between the coastal mangrove forests and mountain forests, a zone 5 to 15 km wide and 100 km long, covering in total about 1,000 km². Although we cannot prove that birds we saw feeding throughout the zone were from the study colony, we know of no other colony in the area, and given the size of the colony, it seems unlikely another colony would exist.

The bird's late arrival, quick turnaround, and early departure are consistent with long foraging flights. If these observations were correct, these herons may be flying as far as 100 km from the nesting site to feeding sites.

What was special about this site that it had so many Agami Herons? Certainly a high availability of food is a requirement for the presence of so many herons, and research on feeding habitat quality are in progress. But another factor may be the isolation and protection of the site. Inaccessible by road, foot, or boat, the colony site is located 10 km from the nearest road and 20 km from the nearest village, and is situated deep within a highly protected reserve. The large number of Black Caiman, a species sought after by poachers, is also evidence of the site's inaccessibility. The heron's activity cycle and behavior within the colony also suggest site security is important. Agami Herons did not enter or leave the colony during day light, nor were chicks fed then. The "Gr" call (long considered a distress call) appears to function as an "all-is-well" call, its cessation informing the colony of an episode of disturbance.

Observations on the behavior of the species suggests fertile ground for further study. The species' night arrival behavior is particularly intriguing, given evidence that it is otherwise strongly diurnal. The relationships between nocturnal ability and nocturnal activity in this species merits further study. As far as is known, the species feeds only during the day. It appears to have modest nocturnal vision. In addition to our observation of near collisions of birds flying at night, we have observed a bird roosting, reluctant to move when disturbed, even when spotlighted. As a species that spends most of its time solitary, coloniality may bring special challenges. Extensive dueling, and the long duration of bouts implies a high degree of intolerance among birds brought together within the colony. The extent to which adults shade the young is also intriguing. This is a species that habitually lives in shade in the understory of tropical forests and the nests were all placed well under dense cover. All of which adds to the developing suggestion that this may a species quite different from other herons.

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