

THE CONDOR

VOLUME 47

MAY-JUNE, 1945

NUMBER 3

LIFE HISTORY OF THE ALLIED WOODHEWER

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The Allied Woodhewer (*Lepidocolaptes affinis*) is one of the relatively few highland representatives of a predominantly lowland family. It ranges from southern Mexico to western Panamá, and like most highland species of similar distribution, it has differentiated into several races, whose distributional limits are determined by gaps in the mountain system at the Isthmus of Tehuantepec and in southern Nicaragua. The nominate race, *L. a. affinis*, ranges from southern Mexico to northern Nicaragua; in Guatemala it occurs from about 5000 to 10,000 feet above sea level, and over most of this altitudinal zone it is the only member of the Dendrocolaptidae, one of the non-oscine families of passerines. It is fairly abundant in the mixed forests of pine, oak, alder, arbutus, and other broad-leaved trees that cover much of the more elevated portions of the Guatemalan highlands, and it is not rare even in the nearly pure stands of cypress (*Cupressus benthamii*) on the mountain tops between 9000 and 10,000 feet. An anomaly among members of a heat-loving family, the Allied Woodhewer dwells in a region where severe nocturnal frosts occur over a large part of the year. In Costa Rica and adjacent Panamá, the race *neglectus* has a rather similar vertical range, extending high up on the volcanoes. In this highland area where indigenous conifers are represented by the single genus *Podocarpus*, the Allied Woodhewer dwells among the mossy, epiphyte-burdened forests composed of oaks, alders and other dicotyledonous trees of many kinds. From the woodlands it wanders out into adjoining clearings with scattered trees, in which at times it nests.

As a family, woodhewers are readily recognized by their slender bodies, the brown tones of their plumage, and their habit of climbing up the tree-trunks in an upright position, using their spine-tipped tail feathers as props in the manner of woodpeckers. Both in general aspect and mode of foraging, they much resemble the Brown Creeper (*Certhia familiaris*) so widespread in northern lands, but most woodhewers are considerably bigger. To distinguish the species of woodhewers in the field is often a perplexing problem, to be solved largely by giving attention to size, the length and form of the bill, the cast of the brownish plumage (whether more rufous or more olivaceous), and the kind of plumage markings (whether streaks or spots). Among members of the Dendrocolaptidae, the Allied Woodhewer is of medium size, being about seven inches in length. Its body plumage is chiefly olivaceous brown, with light buff spots and streaks on the crown and hindneck, whereas over most of the under parts the buffy streaks are longer and broader and edged with black. Its wing and tail feathers are chestnut-brown, thus being much brighter than the body plumage. Its slender black bill is of moderate length and slightly curved. As with other woodhewers, the sexes can not be distinguished by appearance. The recognition of the Allied Woodhewer is simplified by the fact that over most of its range no other member of the family is found, or if present, the related species is of a distinctly different type.

From its lowland congener, the Streaked-headed Woodhewer (*Lepidocolaptes souleyetii*), it may be distinguished by the absence of conspicuous streaks on the back, but far more readily by voice. Whereas the Streaked-headed Woodhewer utters a beautiful, soft, clear trill, the notes of the highland species are weak and sad. The song of the Allied Woodhewer I can describe only as a faint, melancholy attempt to produce a trill. Its plaintive call-note is something between a whistle and a squeak.

In the Guatemalan highlands, above 7000 feet, I found the Allied Woodhewers in pairs throughout the year. During the seasons when they did not nest, they wandered through the woods of oak, alder and pine in company with other small birds, both residents and winter visitants. During the months of the northern winter, Townsend Warblers (*Dendroica townsendi*) formed the nucleus of these flocks, which were joined by other migrants and a variety of the birds that nested locally, including Hartlaub Warblers (*Vermivora superciliosa*), Kaup Redstarts (*Myioborus miniatus*), Russet-collared Flycatchers (*Mitrephanes phaeocercus*), Hutton Vireos (*Vireo huttoni*), and at times Black-eared Bush-tits (*Psaltriparus melanotis*). There was scarcely ever more than one pair of woodhewers in a single mixed flock, a situation which suggested that they maintained a territory and drove off rivals even during the winter months.

FEEDING

Like other members of its family, the Allied Woodhewer subsists chiefly if not entirely upon insects, spiders, and other small creatures that lurk in chinks and crevices in the bark of trees, or amid the moss and lichens that in the cloud-bathed mountain forests cover trunks and boughs with great profusion. I cannot recall ever having seen one of these birds eat a fruit. Its method of hunting is deliberate and methodical. It clings upright to the bark, with three of its toes directed forward and held rather close together, the fourth pointing straight backward. The shafts of the stiff tail feathers end in sharp, down-curved projections which make contact with the bark and give the climbing bird additional stability. With this scansorial apparatus, the woodhewer ascends the tree with the same ease as a woodpecker, its rapid movements baffling the eye and confusing any attempt to explain how it changes its position on the upright surface without falling off. As it creeps up the trunk, it peers into the crevices in the bark and removes food with the tip of its sharp bill. Upon reaching the upper limit of profitable hunting on one tree, it darts gracefully downward to near the base of a neighboring trunk and repeats the operation. Sometimes the bird creeps out along the thicker branches, and if these droop earthward, it may follow a downwardly inclined course. Once, in the Guatemalan highlands, I saw an Allied Woodhewer work its way up the trunk of a tall tree in the usual manner, then, when near the top, it turned and retraced its course for a few feet, descending head downward. It is extremely rare to see a woodhewer in this position, which is so characteristic of the nuthatch. In approaching its nest, the woodhewer may alight on a higher portion of the trunk and hitch down tail first, maintaining its upright position, as woodpeckers so often do; but while hunting it rarely if ever proceeds in this fashion.

The bill of the Allied Woodhewer is not a wood-carving tool, like that of the woodpecker, and it is not employed for digging out grubs deeply embedded in the trunk. Chiefly, it is a probe for extracting insects from the fissures where they lurk; but sometimes the bird will pry off a loose flake of bark or will pull the moss from trees. At high altitudes in Guatemala, I have watched the Allied Woodhewer and the Brown Creeper foraging through the same woodland—an amazing zoögeographical conjunction—and I was impressed by the great similarity of these unrelated birds, not only in manner of

hunting, but also in general aspect (apart from size), and even in the plaintive quality of their voices.

SLEEPING

Woodhewers sleep in such cavities in trees as they use for their nests. While woodpeckers usually retire into such cavities at an early hour when they may be seen plainly, the secretive woodhewers remain abroad until the daylight is far spent, then steal into their hidden nooks when there is scarcely sufficient illumination to reveal their dark forms as they creep up the dusky boles of the trees. Happily for the bird-watcher, they are often quite noisy just before they retire; and their voices help to reveal their positions when visibility is poor. In the morning, they emerge with the earliest light, while woodpeckers, wrens and toucans are still in their roosting chambers. Considering the difficulty of following them as they go to rest, I hold myself fortunate to have discovered the manner of sleeping of five kinds of woodhewers. All slept singly in their crannies.

During the year I devoted to the birds of the Guatemalan highlands, I saw much of the Allied Woodhewers, but tried in vain to learn how they slept. In the Costa Rican mountains, where the species is equally well represented, I had better luck. One evening in July, soon after my arrival at Vara Blanca in the Cordillera Central, I saw an Allied Woodhewer fly to a low, barkless stub standing in a pasture near the edge of the forest; it slipped into a narrow natural cavity near its top. On the evening of July 27, it retired at 5:50, carrying a small fragment of bark in its slender bill as it went into the hole. The next morning it suddenly flew out at 5:10. At the same season, a Hairy Woodpecker (*Dryobates villosus*) went into her dormitory in a neighboring stub at times varying from before 5:20 to 5:45 p.m., according to the weather, but always before the woodhewer. A female Costa Rican Woodpecker (*Piculus rubiginosus*) retired as early as 5:10, forty minutes before the woodhewer. Both of the woodpeckers habitually lingered in their holes later in the morning. The Allied Woodhewer continued to sleep in the same cavity until toward the end of the following March, a period of eight months.

On an evening in early July of the following year, after the close of the breeding season, I saw a woodhewer steal into a large cavity in a badly decayed stub standing in a neighboring pasture. The entrance to this cavity was about two feet long and half a foot in width, while the hollow itself seemed to occupy much of the interior of the thick trunk. The chamber was so open that the woodhewer, after it had settled down, saw me as I walked in front, and flew out. This was a surprisingly exposed cavity for a bird so fond of snug secrecy. I surmised that its occupant was one of a brood reared in a neighboring nest, which had not yet been able to find a more suitable dormitory. By the end of the month it no longer slept here.

NEST AND EGGS

During my year on the Sierra de Tecpán in the Guatemalan highlands, I found only one nest of the Allied Woodhewer. It was at an altitude of about 8500 feet in the stump of an oak tree which had apparently been cut down many years earlier. From the top of the stump had sprung a number of erect shoots which in time grew and thickened to form massive upright branches that pressed close together, leaving narrow crevices between them. The woodhewers had built their nest in a cranny in the midst of the branches, reached by a sort of chink between two of them, so narrow that I could not insert my hand turned sideways. It was only five feet above the ground. At the end of April, I could hear the shrill cries of nestlings through the cleft, but I did not attempt to reach them, for the nest was at the edge of a woods beside a path much used by the Indians and to have enlarged the aperture might have doomed the nestlings to destruction.

At Vara Blanca, Costa Rica, I found three occupied nests in April, May, and June, 1938. All these were in decaying trunks standing in clearings not far from the forest, between 5000 and 6000 feet above sea level. The first was situated eighteen feet above the ground in a thick trunk, nearly consumed by fire and rot, which was standing in a maize field close to a forest. The spacious cavity had apparently resulted from decay, but possibly it had been cleaned out by the woodhewers. Only the hard, resistant bark of the tree separated the front of the chamber from the outer air. The other walls were rough and irregular; in the back wall there were chinks through which light penetrated from the hollow center of the trunk, which was rotten to the core and open along one side. In placing a ruler within to obtain the measurements of the chamber, I inadvertently knocked several small chunks from the excessively decayed inner walls. In depth below the entrance, the cavity measured eleven inches; from front to back it was six inches; from side to side, a measurement more difficult to take with accuracy, it was about nine inches. The bottom was covered with small, thin flakes of hard bark, upon which, with no softer lining, the eggs rested. Although the nest chamber was far more spacious than necessary, the gap in the bark through which the birds entered was barely large enough for them to squeeze through. It measured $2\frac{1}{8}$ inches in height by a bare inch in width, and to pass through the woodhewers were forced to turn sideways.

The second Costa Rican nest was twenty-six feet above the ground, in an old hole made by the Prong-billed Barbet (*Dicrorhynchus frantzii*) in a slender dead trunk in a narrow, forest-bordered pasture. A small, fat bracket-fungus, overgrown with moss that hung in loose strands from its edges, stood immediately above the narrow, round doorway and, bulging out below, constricted the orifice somewhat, making the opening difficult to detect from the ground and entirely shielding it from above. The floor of the deep, regular chamber was likewise covered with flakes of bark, taken in by the woodhewers, for barbets do not line their nests.

The third nest was twenty-three feet above the ground, in a natural fissure in a badly decayed trunk standing in a pasture. The entrance was a narrow vertical cleft about as long as the woodhewers. I did not attempt to examine the interior of this chamber. Five feet higher in the same trunk was a nest of the Blue-and-White Swallow (*Pygochelidon cyanoleuca*). The woodhewers and the swallows were feeding nestlings at the same time. It is unlikely that any of these cunningly concealed nests would have been discovered had we not chanced to surprise the owners in the act of entering or leaving.

The first Costa Rican nest contained two eggs when found on April 19. The following day they hatched. The second nest held two eggs when first examined on May 10; the third, an unknown number of nestlings on June 16. Thus, the breeding season in the Costa Rican highlands extends from early April to late June. So far as known, only a single brood is reared each year. The eggs are pure white and equally blunt at the two ends.

INCUBATION

Seated on a fallen log in the pasture a short distance in front of the nest in the old barbet hole, I devoted six hours to studying incubation behavior of the woodhewers. Although neither by appearance nor voice could I distinguish the male from the female, I saw them change about so often that there was no doubt that both took substantial shares in covering the eggs by day. Ten completed sessions of both parents ranged from 6 to 47 minutes, with an average of 26.7 minutes. Usually each member of the pair remained in the nest until relieved by the other, but at times, for reasons which were

not clear, it flew away after sitting for only a short period, leaving the nest unattended. On one occasion, late in the morning, the eggs were left uncovered in this fashion for 31 minutes continuously; but during the entire six hours there were only four such periods of neglect, totalling 58 minutes. Thus the two birds together kept the eggs covered 82 per cent of the time. Once the incubating bird, hearing its mate call in the neighboring forest, answered with its melancholy trill from within the hole; but usually it sat in silence. During the night a single woodhewer, of undetermined sex, slept in the nest.

The shift in occupancy of the nest was usually effected in silence. The bird who had been sitting seemed to become aware of the arrival of its mate by the slight noise made as it flew against the trunk. It could distinguish this sound from that made by other kinds of birds alighting upon the trunk. A pair of Costa Rican Tityras (*Tityra semifasciata*), building their nest in a hole higher up, frequently came to rest on the top and sides of the trunk, yet the woodhewer that was incubating never came out of the nest when they did so. But when the mate alighted upon the trunk, usually several yards below the nest, the other woodhewer, unless it had very recently begun to sit, promptly came out. It always pushed through the doorway head first. The fungus projecting in front of the entrance made it necessary for the bird to emerge head downward; but as soon as it had cleared the doorway it turned about, by a movement so rapid and deft that the eye could scarcely follow, and came to rest clinging upright below the entrance. Then, sometimes after climbing higher up the trunk, it flew off. The mate would approach the doorway, stick its head inside once or twice to make sure that all was well within, then squeeze through. Although the woodhewers are very slender birds, far more slender than the barbets which carved out the hole, the bracket-fungus above the doorway constricted the opening, making it more difficult for the present tenants to enter and leave. I did not once see the pair in the hole together, as I did at another, more spacious nest.

Often the woodhewers brought a piece of bark in the bill as they returned to the nest. At times one of the birds would come with two pieces, one carried behind the other in its long, slender bill. They not only brought material to their nest, but also threw things out of it. Once a piece of bark about an inch long, and several times dusty matter, probably debris of decaying wood from the bottom, were ejected through the doorway while the woodhewers incubated. On the afternoon when I came with a boy to help raise the long, heavy ladder against the trunk, we found both members of the pair actively carrying in flakes of bark broken from neighboring dead trees. On this date incubation had been in progress for about ten days. They brought such material several times while we watched them; and one slipped into the nest while we were in the act of raising the ladder against the trunk. The other was more shy and would not enter until we had retired a short way off, although it did so while we still stood in plain view. This great activity in taking material into the hole in the early afternoon interested me especially, because I had already found that a pair of Streaked-headed Woodhewers worked at building their nest chiefly at this time of day. But two days later this pair of Allied Woodhewers did not bring bark between one and three o'clock in the afternoon more actively than they had done during the morning of the preceding day. These woodhewers continued to take bark into the hole throughout the period of incubation; I last saw them do so on May 15, the day before the eggs hatched. In view of the fact that both sexes brought material to the nest in the course of incubation, it is almost certain that both help to line the bottom of the cavity before the eggs are laid. With the Streaked-headed Woodhewer, the nest, as I have seen more than once, is also built by both sexes.

In their preoccupation with nest materials while they attend the eggs, the Allied Woodhewers resemble the Carriker Dendrocincla (*Dendrocincla anabatina*), the Pigmy Wedgebill Woodhewer (*Glyphorhynchus cuneatus*), and numerous ovenbirds (Furnariidae) and becards (Cotingidae) that build large and elaborate nests or fill a natural cavity with a loose accumulation of litter. With the Wedgebill, both sexes alternate at keeping the eggs warm; but at two nests of Carriker Dendrocincla, I have never seen more than a single bird in attendance, whether while building, incubating, or feeding the nestlings.

At times the Allied Woodhewers, when incubating or brooding, sit with such constancy that loud hammering against the trunk will not even bring them to the doorway to look out. Such secretive behavior makes their well-hidden nests very difficult to discover. At other times, however, the bird in the same nest may be brought into the open by a slight tapping at the base of the trunk, or they may appear even as one walks heavily toward the tree. Possibly the character of the response to such disturbance depends upon the interval already spent by the bird in the nest; possibly also male and female of the same pair differ in the steadfastness with which they sit. While I watched the pair of woodhewers incubate in the old barbet hole, a Hairy Woodpecker, by tapping upon a ladder I had placed against the trunk, caused the woodhewer to leave the nest.

Since none of my nests of the Allied Woodhewer was found before the eggs were laid, the incubation period could not be determined. It is probably about fifteen days, which is the incubation period of the related Streaked-headed Woodhewer.

NESTLINGS

Nest 1.—On April 20 the eggs hatched in nest 1, in the maize field. The two nestlings were pink-skinned. Their eyes were closed tightly and they had a fairly abundant, dark natal down of the usual passerine type. I could not remove them from the nest for closer examination, but viewed them in a tiny mirror inserted into the top of the chamber, which was illuminated by a small electric bulb. The parents promptly disposed of the empty shells.

On the following morning, April 21, I watched the parent woodhewers attend their day-old nestlings. Both parents shared the duties of feeding and brooding; but since they were quite alike in appearance, I could not tell how equally they divided the work. While with the pair incubating in the barbet hole, the new arrival never entered until its mate had come out, at this more spacious chamber the bird arriving with food frequently went inside before the one which had been brooding emerged. Hence, it was not possible to learn whether the woodhewer arriving with food regularly replaced its mate in covering the nestlings. But occasionally the one that had been within departed when it heard its mate alight upon the outside of the trunk. Then the new arrival pushed in to feed the nestlings, and sometimes lingered to warm them. During the first two and one-half hours in the morning, the two nestlings were fed twelve times, chiefly with morsels too small to be identified; but once I saw a small green larva in a parent's bill as it entered the hole. The droppings were carried from the nest in the bills of the parents.

The doorway of this chamber was so narrow that the woodhewers were obliged to turn sideways to pass through. Before entering, they always peered in through the bottom of the doorway while clinging to the trunk below it; they then moved to the right side of the opening and turned so that the left wing was toward the ground and the right toward the sky. Upon leaving, sometimes they passed through the doorway with the right wing upward, sometimes with the left. Like their neighbors in the barbet hole, this

pair of woodhewers was almost fearless of me and went calmly about their nesting duties while I sat on the open slope about twenty-five feet from their nest.

On April 28, when eight days old, the nestlings bristled with long, conspicuous pin-feathers, and their wing feathers were just breaking through the ends of their sheaths. As they grew older, they were fed with great frequency. During an hour and a half of observation on May 3, the two parents together brought food to the nest twenty-two times. I recognized only insects and grubs in their bills. Larvae of various kinds seemed to form the mainstay of the nestlings' diet. One long, slender larva was brought attached to a piece of finely branched, gray lichen. Doubtless the creature had lived upon the lichen-clad branches, and a part of its protective covering had been pulled away along with itself. I wondered whether the nestling would swallow the lichen along with the larva. Grubs were not the only food delivered to the nestlings, for once a parent came with a fairly large insect with transparent, filmy wings, and once a brown forest cockroach was brought.

The parent woodhewers always brought food from the woods to the south, about a hundred feet distant from the nest. Upon reaching the tottering old trunk, they alighted some distance below the doorway and climbed up to it. One of the pair appeared now to be a trifle shy of me. While hesitating to enter the nest, it at times continued to creep upward until it had passed above the doorway. Then, after a pause to look around, it sometimes descended the trunk tail first, with the body in an upright position, until it regained the level of the entrance. Usually it sidled somewhat obliquely downward, but once it hitched straight down for the distance of half a yard, just as a woodpecker might have done under the same circumstances. At the nest in the barbet hole, too, the woodhewers at times continued up above the doorway, then returned to it by climbing downward tail foremost.

The nestling woodhewers now uttered incessantly a weak version of the parents' melancholy trill. While I watched the nest in the maize field, a gray-brown squirrel climbed over the trunk, burying a green fruit in a hole that it dug in the rotten wood at the summit and later uncovering and eating a similar fruit that it had previously stored away lower down. The squirrel passed directly over the doorway of the nest, whose frail covering of bark it might readily have torn off, yet it took no notice of the nest. While the squirrel climbed about, scratching loudly with its claws, the nestlings ceased their tireless calling and were silent for a time.

By May 4, the two-week-old nestlings were well clothed with feathers and, on their upper parts at least, closely resembled their parents, even to their spotted heads. When I looked into the nest, illuminating the interior with the electric bulb, they crouched against the outer wall and it took me a while to find them in their spacious nursery. I now heard their weak, sad trill emanating from the old trunk each time I passed by. This spared me the necessity of climbing up every day to learn whether they were still at home. Since the trunk was on the verge of complete disintegration, I set the heavy ladder upright beside it and risked the climb only at intervals of several days and proceeded with great caution. After the nestlings were feathered, they slept alone through the night, their parents doubtless retiring into separate dormitories at a distance from the nest.

On May 8, the nestlings clung one at a time to the inner wall of the nest, beside the narrow doorway, through which I could from time to time see their brown, light-streaked, slender-billed heads, as they stole shy glimpses of the outer world. The parents now no longer entered the chamber to feed the young birds nor to remove their droppings. Arriving with food, they alighted against the trunk below the nest, climbed

up to the doorway, placed the insect or larva in the ready mouth of the expectant nestling—an almost instantaneous transfer—then continued a short distance up the trunk before flying back to the woodland whence they had come. Since the parents now no longer gave attention to the sanitation of the nest, droppings rapidly accumulated until they quite covered the litter of bark on the bottom. The nestlings now passed much of the day clinging to the walls, and probably slept in this position.

When I returned to the woodhewers' nest late on the afternoon of May 9, I listened in vain for the little trills of the nestlings, and waited fruitlessly for the parents to come with food. The young woodhewers had departed the nest at the age of nineteen days—at least, one of the two had remained this long. I watched until nightfall to learn whether the fledglings or the parents would return to sleep in the nest, but neither came near it.

Nest 2.—The history of the nest in the barbet hole was similar to that of the one in the maize field just described. Because of the uncertain stability of the rotting trunk in which it was situated, I made very few direct examinations of the interior, but learned by watching the behavior of the parents what was happening inside. On May 15 they still took flakes of bark into the hole, but the following day they were bringing insects, indicating that the eggs had hatched. By May 26, when ten days old, the nestlings were calling much as those in the other nest had done. On the night of May 28 to 29 they were not brooded but slept alone, for their growing plumage now must have made the parental cover unnecessary. On June 1, for the first time, I saw the parents pass food in through the doorway, without themselves entering. During the early morning of this day their behavior was in a state of transition, for sometimes they carried the food inside and sometimes passed it to the nestlings through the doorway. It was chiefly the larger insects that were taken in, while the smaller morsels were delivered while the parent clung in front of the doorway. Later in the morning, they passed in all the food, without themselves entering. So long as they went into the nest in order to deliver the food, the woodhewers carried out the droppings; but when they could pass the food through the doorway without going inside, they neglected the sanitation of the nest, which doubtless became as heavily soiled as the first. The tails of both had been sadly damaged by the loss of several of the central feathers of each as a result of the friction they encountered on their innumerable passages through the narrow nest opening. Yet, even with the loss of their longest rectrices, they managed to climb up the trunks with their customary ease, using their lateral tail feathers as props.

The nestlings, like those of the first nest, received spiders and a variety of insects, but never, so far as I saw, any fruit. They flew from the nest on June 4, aged nineteen days, and did not subsequently return to use it as a dormitory. A Streaked-headed Woodhewer, hatched and reared by a Carriker *Dendrocincla* in a hollow palm trunk, into which both kinds of birds had carried nest material, also took wing at the age of nineteen days. These are the only nestling periods of woodhewers known to me.

On July 5, I found, in the vicinity of the now abandoned nest of the Allied Woodhewers in the barbet hole, a young bird of this species following a parent, which I recognized by the condition of its tail as one of the pair that had earlier attended this nest. The young bird, a month from the nest, was becoming independent, for it found food for itself in addition to that which it received from its parent.

Nest 3.—The third Costa Rican nest, found in mid-June when it already contained nestlings too old to require much brooding, was likewise attended by both parents. This nest, as already mentioned, was five feet directly below the nest of a pair of Blue-and-White Swallows, which also were feeding nestlings. At least one of the woodhewers took a great interest in the offspring of its neighbors. After feeding its own nestlings, it would

sometimes climb up the trunk and linger for a few minutes beside the entrance of the swallows' nest. The owners, if within sight, circled around in great agitation, rapidly uttering their melancholy notes of complaint. Sometimes, too, they would dart at the woodhewer, at times swooping so near that the visitor, to avoid them, would drop down several feet, deftly catching itself in an upright position lower on the trunk. But in general it took little account of the swallows' protests and their hostile demonstrations.

One morning, as the woodhewer was approaching the swallows' nest from below, one of the latter darted in directly above its head, passing through the narrow fissure in a manner to excite admiration and wonder. The woodhewer continued to the doorway, looked in, then made a move to enter. The swallow, which I could not see, probably threatened it with wide-open mouth, as I saw this species behave in my roof when a lizard approached its nest. The woodhewer at once drew back, but continued to linger at the doorway, and several times started to enter. Finally, becoming bolder, it stuck its head through the doorway, picked up a white dropping along with a straw from the nest, and flew off with them.

After leaving the nest-hole in which they grew up, the young woodhewers, as we have seen, did not return to sleep in it. Whether the parents lead the fledglings to some other dormitory, or whether the young sleep clinging to trunks in the open until they find individual shelters, I do not know. Possibly the young woodhewers, like the fledglings of the Wagler Woodpecker (*Centurus rubricapillus*), the Mexican Honeycreeper (*Coereba mexicana*) and other birds that occupy their dormitories singly, pass the night exposed to the elements until they succeed in discovering a suitable unoccupied dormitory. The woodhewer already mentioned, which in July slept in a capacious hollow trunk entered through a great gap in the side, may well have been one of the youngsters reared in the neighboring trunk where the swallows also had nested. The fact of its sleeping here suggests that the young woodhewers are left to find their own quarters.

SUMMARY

The Allied Woodhewer (*Lepidocolaptes affinis*) ranges from southern Mexico to western Panamá. In the portion of its range in Central America it dwells in the highland forests, chiefly between 5000 and 10,000 feet above sea level. It ventures into neighboring clearings with scattered trees, in which it frequently nests.

It is largely if not wholly insectivorous, subsisting upon small invertebrates that it plucks from crevices in the bark or from moss-clad limbs. As it hunts over the trees, it habitually creeps upward on the trunks and outward along the branches, using its stiff, spine-tipped tail feathers for support. While foraging, it works head downward only with extreme rarity and for short distances, and it seldom descends the trunk tail first. In approaching its nest, however, it often hitches down the trunk in an upright position, tail first, like a woodpecker.

The birds remain in pairs through the year, and apparently maintain territories.

Adults sleep singly at all seasons in natural crannies in trees. They are among the last of the diurnal birds to retire at nightfall, and among the first to become active at daybreak.

In the Costa Rican highlands, between 5000 and 6000 feet above sea level, the breeding season extends from early April to late June. Apparently only a single brood is raised each year.

Allied Woodhewers nest in existing cavities in dead or sometimes in living trees. Usually they prefer crannies resulting from decay, but they will occupy an old chamber carved by woodpeckers or barbets if the doorway is more than ordinarily well concealed.

The entrance is usually barely large enough for the woodhewer to squeeze through.

The woodhewers cover the bottom of their nest chamber with small flakes of stiff bark which they break from dead trees. Nest-building was not watched; but since both parents continue to bring material to the nest until the eggs hatch, there is little doubt that both collect material for the nest as has been observed repeatedly with the Streaked-Woodhewer.

In two nests, the full set consisted of two eggs. These are white and equally blunt on the two ends.

Both parents incubate, frequently relieving each other through the day. Ten sessions by both members of a pair ranged from 6 to 47 minutes, averaging 26.7 minutes. The eggs are not often left unattended, and then for usually brief periods. A single parent of undetermined sex occupies the nest chamber by night.

While incubating, the woodhewers not only bring many pieces of bark into the nest, but occasionally throw out bark, decaying wood, or the like.

The incubation period was not determined. That of the related Streaked-headed Woodhewer was, in one instance, fifteen days.

The newly hatched nestlings are pink-skinned and blind with dark natal down of the usual passerine type.

Both parents feed and brood the nestlings, whose food consists of insects, larvae, spiders and other small invertebrates. Meals are brought frequently. The parents carry droppings out of the nest, at least until the nestlings are feathered.

From the age of about ten days onward, the nestling woodhewers call with increasing frequency, uttering a weak version of the rather squeaky, melancholy trill of the parents.

At the age of about two weeks, the nestlings are well feathered and already bear a close resemblance to their parents in coloration. Soon after this, they are able to climb up to the doorway to receive their food, and then the parents no longer enter the nest. After they are feathered or nearly so, the nestlings sleep alone. At one nest, the parents ceased to brood by night when the nestlings were 12 days old.

From two nests, the young woodhewers flew at the age of 19 days. This was also the nestling period of a Streaked-headed Woodhewer. After their departure from the nest, the young birds do not return to sleep in it.

A month after departing the nest, the young woodhewer is still partially dependent on its parents for food.

Finca "Los Cusingos," San Isidro del General, Costa Rica, November 28, 1944.