

waxwings is unusual there. The nest was secured, photographed, and is now in the Environmental Biology section of the University of California at Irvine.—ELEANOR A. PUGH, *Prairie Creek Redwoods State Park, Orick, California, 15 November 1965.*

Nesting Activities of Black-backed Woodpeckers.—In June 1963 I had an opportunity to observe two pairs of Black-backed Woodpeckers (*Picoides arcticus*), both of which nested in a border zone between patches of coniferous forest and open lumbered areas by the Second Connecticut Lake in northern New Hampshire. While these observations do not constitute a complete study, they add details to knowledge of the behavior of this species, about which little beyond brief notes have been published by others (see Philipp and Bowdish, *Auk*, 36:36, 1919; Mayfield, *Wilson Bull.*, 70:196, 1958).

Methods of communication. Drumming. Most of the drumming heard came in bursts of about 2 seconds' duration, at intervals of 30 to 40 seconds. The diminution at the end of each burst, as well as the comparatively long intervals between them, made the drumming of *P. arcticus* sound like that of the Pileated Woodpecker (*Dryocopus pileatus*) described elsewhere (Kilham, *Condor*, 61:377, 1959). The rate and duration of the drumming, however, varied with attendant circumstances. *Rapping.* A Black-backed Woodpecker may give single raps with its bill against a tree trunk when nervous, as when about to roost for the night, a behavior pattern also observed for *D. pileatus*. *Vocalizations.* (a) *Chet.* This note, which suggests that of a blackbird or a sparrow rather than a woodpecker, is the commonest one of *P. arcticus* and usually serves either as a location note or to register varying degrees of excitement. One female gave *chets* at a rate of more than 100 per minute when I came close to her nest. (b) *Wreo.* This is a resounding note often given singly when used as a greeting between members of a pair. It is preceded by several shorter syllables such as *si-si-wreo* when given at levels of greater emotional intensity or becomes a sharp *pet-pet-wreo* when used in threat displays against rivals. *Displays.* Members of pairs of Black-backed Woodpeckers occasionally greet each other by raising their wings horizontally, but when facing rivals they raise their wings upward over their backs in full extension. Head feathers may rise up all around the head in association with other displays.

Care of nestlings. The Black-backed Woodpeckers observed would usually fly through woods in direct flight, then glide for the last 10 or more yards to the nest. A parent feeding its young at the entrance would turn its head sideways so that the opened bills of the two birds more or less enclosed each other at the right angles. It was early apparent in these observations that males behaved differently than females in a number of ways. The females at both of the nests, for example, made about three times as many feeding visits as their mates, but the fact that their bills were usually closed as they arrived, with little of the insect prey they carried being visible, indicated that they did not bring much food per visit. Although the males came less often, their bills were generally stuffed with protruding parts of insect prey. The number of visits made by either sex varied with circumstances. Thus after a heavy rain on the afternoon of 29 June, when insect life in the area seemed to be especially abundant, both members of Pair B visited their nest 12 times in 20 minutes. On the other hand neither parent of Pair A visited their nest in the final hour of the day, between 2000 and 2100 on 18 June. It was dusk when Male A arrived at the end of this time to roost for the night, rapping a few times nervously on the side of the nest tree before entering.

Females at both nests were more nervous than their mates. This was shown not only by the rapid series of *chets* made when I came at all close, but also by a peculiar, reflex flashing of their white-edged nictating membranes, readily observed against the background of black head feathers. These behavior patterns were not noticed in either of the two males. An apparent result of the shyness of Female B was that when I stood close by her nest with a camera on 28 June, she refused to come near while her mate paid five visits in 35 minutes, with little hesitation. Another difference in behavior between the sexes was in nest sanitation, which was performed entirely by males in all seven times in which it was observed. A typical situation occurred at Nest A on 19 June. Thus Female A was making frequent visits to the young, at a rate of up to five in seven

minutes, but did not enter the nest. Male A came only once in a period of 23 minutes. On this occasion, however, he entered completely, then emerged with a large mass of feces not inclosed in any recognizable sac.

Resting by the nest. The females not only made more feeding visits, but also spent more time near their nests than did their mates. This was true at Nest B when the young were nearly ready to fly. Female B in something of a routine would feed the nestlings, then ascend an adjacent balsam stub to drum anywhere from two to nine bursts in a leisurely fashion, in the course of preening or scratching her head directly (Kilham, Auk, 76:527, 1959). She would sometimes fly back to the nest, enter, then rest for some minutes inside, with head looking downward from the entrance. She always left when Male B arrived. It was exceptional for either of the males to drum a few bursts by their nests or to rest within them after feeding visits. It thus happened that the two females drummed far more than their mates, not only with more bursts when they did drum but also, as was counted for Female B, in drumming four times as often. It was her persistent drumming that enabled me to discover the location of her nest in mid-June.

Conflicts and greetings. A foreign male which intruded into the territory of Pair B on a number of occasions was attacked by whichever parent happened to be by the nest. The partners of Pair B had similar patterns of agonistic behavior. On 19 June, for example, Female B was resting by her nest when the intruder appeared. She immediately flew to a tree trunk halfway to him, gave a shrill *pet-pet-wree-oo* as she raised her wings in full threat display, then pursued him closely among some balsams (*Abies balsamea*). Male B returned and attacked the rival a little later. Like his mate, Male B gave a *wree* and threat display, then, on coming close, a brief bill-waving dance.

A surprising feature of the way the partners of Pair B greeted each other was that their greeting differed only slightly from their agonistic behavior. The two seldom came at all close. Male B for example, on seeing Female B within the nest as he approached on 29 June, gave a sharp *ki-ki-wree*, spreading his wings horizontally. She flew off immediately. At another time Female B was again resting by the nest when her mate alighted on the same tree. Her immediate response was to swing around, as if to block him off by putting the tree trunk between them, then raise her wings and give a *kick-kick-wree-oo* before flying away. Curiously enough, I was only eight feet from the nest later on when Male B was feeding the young. I was thus able to observe that his head feathers bristled out all around like a bottle brush when Female B appeared at a distance. Several encounters between the two were of a milder nature. Thus on one occasion when they met, they did no more than peck at each other mildly before separating; and on another, Female B gave low *grr-grr* notes when her mate raised his wings. The members of Pair A, in contrast, paid little attention to each other. It is possible that Pair B was excited to some degree by the not-infrequent intrusions of a foreign male.

Hunting. The Black-backed Woodpeckers usually collected their insect prey within several hundred meters or less of their nests. They often moved about as if in frantic haste. On 28 June, for example, I found Female B scrambling along the underside of a fallen spruce, making continuous *chets* as she paused, to extract beetle larvae from the bark with rapid vibratory motions of her head. I found her later high in an isolated living spruce. In spite of being obstructed by a thick mesh of branches close to the trunk, she was vigorously knocking off, then seizing and tossing aside, bits of bark. An additional way in which the woodpeckers sought prey, as noted for Male B on 28 June, was to move in hurried fashion over logs and slash, and over the ground among ferns and other low vegetation in the lumbered area.

Behavior of young. Young in both nests made chittery vocalizations that increased at the approach of a parent, then gradually diminished after the adult had left. The nestlings also made a steady *click-click-click* begging note.

Three young in pin-feather stages were removed from Nest A on 19 June. They made an almost incessant noise, varying from *chet-chet-chet* to *chet-cha-cha*. These vocalizations became harsh with any sudden disturbance. A feature of the behavior of the nestlings was the almost ferocious energy with which they attacked their surroundings, including the forceps with which they were fed, their cage, and later themselves, as if one were trying to swallow another. Young

Red-headed Woodpeckers (*Melanerpes erythrocephalus*) have been the only other nestling woodpeckers in which I had observed such aggressiveness. The young Black-backed Woodpeckers flapped their wings at their sides in begging motions whenever they caught sight of me in early July, while making a steady flow of metallic *chet-chets*. Both had central yellow patches on their otherwise black heads. A surmise that they might be males, however, turned out to be incorrect when both acquired the plumage of adult females in August.

Comparisons with other species. Among the above observations, two points in particular suggested comparisons with what I have been observing over a period of years in the breeding biology of Hairy Woodpeckers (*Dendrocopos villosus*; unpublished data). One was that with both species, *P. arcticus* and *D. villosus*, the females fed the young the most frequently, carrying relatively small amounts of prey with each visit, while the males came less often but with larger or more insects in their bills, and performed all or nearly all of the sanitation of the nest. A second point related to the pair bond. To a human observer the members of pairs of *D. villosus* were devoted to each other, exchanging exuberant, low intimate notes when meeting close by the nest. In contrast, the indifference and at times seemingly hostile behavior of males and females of *P. arcticus* to each other rather confirmed Heinroth's contention (*The Birds*, 1958:51), based on a European experience, that many woodpeckers are not particularly fond of their mates.—
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