

woodpeckers providing holes large enough for Araçari Toucans, among which he includes both the Collared and the similar sized Fiery-billed (*P. frantzii*).

In his experience araçarís only occupied holes after the woodpeckers were through nesting. He describes, however, how a male Lineated guarded its nest at a time when Fiery-billed araçarís were searching for holes in the neighborhood (1969, Pacific Coast Avifauna 35: 428).

Special features of my observations on two species of *Campephilus* woodpeckers, *C. guatemalensis* and *C. melanoleucos* were (1) that they made no effort to either guard or to defend their nests and (2) that the araçari took over the holes at a time when the woodpeckers were copulating and about to lay eggs. It would seem from these observations that araçarís, by disrupting the nesting of the woodpeckers, might be a factor limiting their populations. It may be, however, that the severity of competition between the *Campephilus* woodpeckers and araçarís is related to habitat. Both of the incidents witnessed were in low second growth forest where dead stubs and trees suitable for nest excavations were scarce and the toucans plentiful. In a mature forest at Tikal in Guatemala, in contrast, where I found three pairs of Pale-billed Woodpeckers feeding young in January 1976, suitable stubs appeared to be relatively abundant and Collared Araçarís scarce. I saw none while watching the woodpeckers. It is of interest from this point of view that Skutch (1958) states of Fiery-billed Araçarís that he did not find them "sleeping or breeding in the midst of intact forest."—LAWRENCE KILHAM, Department of Microbiology, Dartmouth Medical School, Hanover, New Hampshire 03755. Accepted 9 July 76.

Some clarifications about *Ramphastos "aurantiiostris."*—The toucan known as *Ramphastos aurantiiostris* Hartert (1925, Nov. Zool. 32: 143) has been considered similar to the sympatric *R. t. tucanus* except that the sides of the bill are light yellowish orange to reddish orange instead of dark red to black. Until 1975 the indicated *aurantiiostris* character had been recorded only from museum specimens taken in eastern Venezuela, the Guianas and northeastern Brazil. In this regard, over some 15 years I have spent several months accumulated time in eastern Venezuela from where specimens that show this character have been collected, but I have never seen a living bird display it. The closest have been individuals of *R. t. tucanus* (identified by voice) with the bill color somewhat dusky scarlet instead of the more usual darker hue. The first published evidence of *aurantiiostris*-like birds in life was recently given by Bourne (1975, Living Bird 13: 102), who reported birds from Guyana with bill "dark cadmium orange" (as a minority amidst birds showing "dark alizarine crimson").

Although most recent publications recognize *R. aurantiiostris*, they usually indicate doubt (of one kind or another) about its status. Recently, Haffer (1974, Nuttall Ornithol. Club 14: 291, 305) indicated his belief that *aurantiiostris* specimens are "merely particular phenotypes of the variably red-billed *tucanus* population of eastern and northeastern Amazonia, which in life may be less distinct than they are as discolored museum specimens." He considered the form taxonomically invalid. Bourne (1975: 103) also considered the orange-billed birds he observed to be only variants of *R. tucanus* as they interbred with red-billed birds.

I hope that the opinions of Haffer and Bourne will be generally accepted, but as *R. aurantiiostris* has shown considerable persistence in the past, I present the following more recent evidence. It documents beyond doubt that the orange bill can also result from postmortem color change and also calls attention to a character that Hartert regarded as more important than the orange-red color.

In July 1975, while showing some visitors the synoptic series of the bird collection of the Estación Biológica de Rancho Grande in Venezuela, I noticed that among the *R. t. tucanus* were two specimens of "*aurantiiostris*." Circumstances prevented closer investigation at the time, but I took color transparencies of these two specimens. Examination in December 1975 revealed the following colors for the normally dark red areas of the sides of the bill of these birds. The colors are approximated from Smithe (1975, Naturalist's Color Guide, Amer. Mus. Nat. Hist.) and are capitalized only when used in direct reference.

EBRG #6986, ♀, 27 Feb 1969, Río Grande (ca. 20 km east of El Palmar), n. Bolívar state, Venezuela. Maxilla: orange washed with very pale gray (a slightly dull, but not dark Spectrum Orange); some scattered mottling of light to medium gray, sparse on the right side, profuse on the left. Mandible: similar except that the distal fifth of the area is dull scarlet, and this color extends posteriorly in a thin line bordering the blackish areas of the tomium and the gonyx.

EBRG #6985, ♂, same date and locality. Maxilla: yellowish orange washed with very pale gray (approximating Buff but somewhat lighter and more orange); some mottling of light to medium gray relatively sparse on both sides. Mandible: yellowish orange so thoroughly masked by dark gray as to result in a yellowed Dusky Brown with only scattered flecks of the pale base hue showing through; in the proximal region on the left side is one large spot of color as on the maxilla.

Inadequate labeling of specimens seriously hampers proper systematic studies and therein lies, no doubt, the main explanation for the history of *R. aurantiirostris*. Fortunately, the preparator of the above specimens, Alejo Ospino B., included a sketch of the bill with the different areas color identified. The area under consideration is marked "vino tinto" for both specimens. Although "red wine" (probably as seen in a glass) allows a fair color latitude, we can be sure that at the time of preparation the bills were within the limits of dark red and blackish red.

The most pronounced color change (specimens collected 1969) may have taken place between January and July 1975. On the former date I had also shown the collection to visitors, and we may have looked at these toucans. Almost beyond question, in the preceding 2 years I had handled them without being impressed by a noteworthy change. Comparison of the specimens in December 1975 with the color (Kodachrome) transparencies taken 5 months before indicated no appreciable further change, except possibly a slight reduction and lightening of the reddish part on the mandible of #6986.

A brief description of the December 1975 condition of the other *R. t. tucanus* specimens in the EBRG collection (some from the same locality) provides a basis for comparisons.

#3829, male, 7 Jun 1965, Río Grande. LABEL: "rojo obscuro vino tinto" (vinous dark red). PRESENT: maxilla dark brownish red (somewhat lighter than Maroon) proximally and distally, blackish maroon medially; mandible approximately as in 6985.

#4922, female, 11 May 1966, Río Grande. LABEL: "rojo obscuro" (dark red). PRESENT: mandible and irregular proximal third of maxilla similar to mandible of 6985 but less heavily masked, hence lighter and yellower; rest of maxilla light orange buff as in 6985 to deeper orange than 6986.

#8688, 8689, males, 19, 20 Apr 1973, Paurai-tepui. LABELS: "rojo obscuro." PRESENT: 8688 maxilla dusky flame scarlet dorso-proximally to "black" ventro-distally; mandible blackish flame scarlet proximally to "black" distally. 8689 similar but slightly less dusky.

#8798, 8799, 8800, males, 6 Jul 1973, Delta Amacuro. LABELS: "rojo." PRESENT: 8798 (the bill size and development and the lack of a broad proximal black band indicate that this specimen is not fully grown) maxilla brownish chrome orange; mandible similar to 4922 but with base hue chrome orange rather than yellowish orange. 8799 maxilla dusky flame scarlet, lighter distally; mandible much like 8689. 8800 maxilla and mandible brownish flame scarlet, lighter than the maxilla of 8799.

Although all the EBRG specimens (with the possible exception of the last three) apparently had in life much the same dark red bill color, they show pronounced differences at present. To some extent the degree of color change is related to the time elapsed since collection, but apparently this is not the whole explanation, as #3829, the oldest specimen, still shows a dark red color.

At this point it is desirable to clarify Hartert's intention with regard to *aurantiirrostris*, for there has obviously been confusion about this. Hartert described *aurantiirrostris* as a subspecies of *R. monilis* [now *R. tucanus*] and stated it was (translation) "similar to *R. m. monilis* but with the sides of the bill unicolored orange-red or fire-red, not dark variegated crimson." Discussion by Hartert (1925: 143, under *R. erythrorhynchus*) makes clear his belief that the absence of blackish spotting or clouding on the light red sides of the bill was more diagnostic of *aurantiirrostris* than the color, for, referring to the bird that is to all practical purposes the "type" of *R. t. tucanus*, Hartert wrote: "the figure of Edwards looks at first glance very much like the form with light-red beak from British Guiana, but the blackish mottling shown on the red of the bill [does] not allow us to accept his bird to be the bird with unspotted light-red sides of the bill from British Guiana."

With regard to the bill color, Eugene Eisenmann wrote me that at the present time the type of *aurantiirrostris* (ex Rothschild Collection, now in the American Museum of Natural History) has the bill "light dull orange yellow." It is thus now rather similar to the present condition of EBRG specimen 6986, described above, and so has apparently undergone color change since the time of its description. At that time it had probably already suffered some fading of the red from its original color, for it was then presumably not less than 25 years old, having been collected by Tennant in the late 19th century (the label bears neither date nor soft part colors).

Red pigments often prove less stable than other colors, but why they should be more fugitive in some *R. tucanus* bills than in others is not now evident. The difference may be due to the age of the bird; old individuals may have the red more fixed. However that may be, the fading of red may occur to the same degree without regard to the presence or absence of blackish mottling or masking. When it occurs it is more striking, because more noticeable, on those specimens having little or no dark masking.

The extent of dark masking may vary considerably, as seen from the EBRG collection. These specimens are relatively recent and the dark masking (which in living and freshly collected birds is less noticeable, or even concealed by the intense red color) is apparently a product of a natural melanic pigmentation rather

than a dusky discoloration. According to Haffer's interpretation (1974: 294–307), this blackish mottling indicates the hybrid nature (between *R. t. tucanus* and *R. t. cuvieri*) of these birds.

In summary, in accord with Hartert's intention it seems best to think of "aurantirostris" as the most unmottled manifestation of *R. t. tucanus*. It is normally red-billed but may show an orange bill color in a few living birds (as morphs, perhaps limited to Guyana), or may pass through such a hue in the process of postmortem fading of the red pigment normally present. The type of *aurantirostris* probably belongs to the latter category. Hartert's name *R. monilis aurantirostris* is best consigned to the synonymy of *R. t. tucanus*.

I am indebted to E. Eisenmann for providing the original Hartert description, for comments about the specimens in the American Museum of Natural History, and for various suggestions.—PAUL SCHWARTZ, *Ministerio de Ambiente y de los Recursos Naturales Renovables, Centro Nacional de Investigaciones de Fauna Silvestre, Apartado 184, Maracay, Aragua, Venezuela*. Accepted 12 July 76.

Hanging behavior in Common Ravens.—During the winter of 1974–75, I studied the behavior of the Common Raven (*Corvus corax*) at a feeding and banding station and watched the following unusual displays. On 26 January 1975, with three other people, I noticed six ravens in a dead white pine on a bluff overlooking the Cornwallis River in New Minas, Kings County, Nova Scotia, close to a dump where refuse from a poultry processing plant attracted many scavengers. When first seen, one of the ravens was hanging beneath an exposed branch by one foot, as if trapped in a snare. The raven then grasped the branch with its bill and released its foot so the weight of the body was supported by the bill. The wings were partly open but motionless, and were not used for support. The bird then gripped the branch with both feet, released its bill and hung by its feet with the wings folded, the mirror image of a raven perched normally above the branch. It then climbed onto the branch with the help of its bill and flapping wings and stood erect with its throat hackles ruffled.

The raven then flew to the same branch from below, grasped the branch with its bill, folded its wings and hung with its body suspended by the bill. After about 10 sec, it pulled itself back on top of the branch using both feet and wings. It then repeated the displays of hanging by 1 foot, by 2 feet, and by the bill alone over a period of 3–4 min, periodically pausing for 15–45 sec while perched on the branch. It was adept at maneuvering itself under the branch and regaining its position above it.

Following this display, the raven flew to a perch higher in the tree. One of the other ravens immediately flew up to the original branch and grasped it with its bill. This bird was unable to support its weight by the bill alone, and flapped its wings to keep from falling. The first raven then returned, croaking loudly, supplanted the second, and hung expertly by its bill. It then alternated between the three types of hanging behavior, occasionally pausing while perched on the branch. Most of the other ravens remained perched in the tree during these displays.

The displays ended after about 10 min when all the birds flew from the pine, apparently following one particular raven that had been perched near the top of the tree. Immediately after they reached some woods to the northeast, we saw a similar display of bill-hanging from the exposed branch of a live white spruce.

Although ravens are known for their wide variety of aerial displays, hanging by the bill or by the feet has apparently not been reported in the literature. Pearse (*in* Bent 1946, U.S. Natl. Mus. Bull. 191, part 1, p. 195) describes the behavior of flying ravens tugging off cones or clipping twigs from branches of douglas fir while in the air, but does not mention their hanging from branches. On several occasions in Kings County, within the last 10 years, ravens have been seen hanging by their feet, although not by the bill (C. K. Coldwell and G. L. Hansen-MacInnis, pers. comm.).

As neither the sex nor the age of the displaying ravens, or of those perched in the tree was known, it is difficult to interpret the function of this behavior. As noted by Witherby (*in* Witherby et al. 1940, The handbook of British Birds, London, H. F. & G. Witherby Ltd., vol. 1, p. 8) aerial displays are a feature of courtship, although they are also performed at other times. As courtship in ravens does occur in midwinter (Bent, *ibid.*), I suggest that the hanging behaviors we saw were the displays of courting males. They appeared to be directed toward one particular raven, presumably a female, which the others followed when it flew from the tree.

To determine the proportion of ravens that are physically capable of supporting their own weight by the bill, 15 were live-trapped on 4 January 1976. A spring scale was used to measure the force the hand-held birds could pull with the bill when hanging quietly below the scale. Ten of these could sustain a force of 2,500 g (twice their own average weight of 1,230 g) for 10 sec, and the others could briefly pull with 2,000 g of force. Nine other ravens supported their own weight for an average of 37 sec (range: 11–78 sec).