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NOTCHED TOE PADS IN CLIMBING OSCINES

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The unusual structural and behavioral features of birds that typically climb on tree trunks or rock walls have attracted much attention (cf. Richardson, Univ. Calif. Publ. Zool., 46:317-368, 1942; Bock and Miller, *Amer. Mus. Novitates*, 1931:1-45, 1959). However, previous authors have not mentioned the small notches in the pads on the toes of certain climbing species. I here summarize observations on the occurrence of these notches and offer functional and evolutionary interpretations.

OBSERVATIONS

Using a hand lens or binocular dissecting microscope, I inspected series of study skins at the Field Museum (Chicago), Yale Peabody Museum of Natural History, University of Arizona, and University of Connecticut.

In most of the more than 400 oscine species that I have examined, the distal most pads on the ventral surface of the toes typically lack indentations when viewed from the lateral or medial side. Climbing species illustrating this most common condition of oscines are *Sitta carolinensis* (toe IV shown in fig. 1A), *Hypositta corallirostris*, and *Rhabdornis mystacalis*. In contrast, certain other climbers have distinct indentations in the distal pad of all four toes: *Certhia familiaris* (toe III illustrated in fig. 1B), *C. himalayana*, *C. discolor*, *Tichodroma muraria*. Generally less conspicuous notches occur on all four toes in *Salpomis spilonota*, *Climacteris leucophaea*, *C. erythroptis*, *C. melanura*, and *Catherpes mexicanus*. Still other climbers have a notch only in the hindtoe, e.g., *Daphoenositta miranda*, *Neositta chrysoptera*, *N. pileata*, *N. leucocephala*, *N. leucoptera*, and *Mniotilta varia* (toe I shown in fig. 1C).

Although I examined mainly oscines, I also noted notches in some of the Dendrocolaptidae; in *Xiphorhynchus flavigaster*, for example, notches are most conspicuously apparent on the three forward toes. A number of common species of North American woodpeckers (Picidae) lack notches, but those species examined represent only a small part of the entire family.

Notches often vary individually in shape and sometimes even in occurrence. For example, in a series of 40 study skins of Black-and-white Warblers (*Mniotilta varia*) examined with a binocular dissecting microscope, four individuals exhibited no detectable notch on one hind toe, and another individual showed no clear indication of notching on either hind toe; all other specimens possessed notches as shown in figure 1C. Whether such individual variations arise

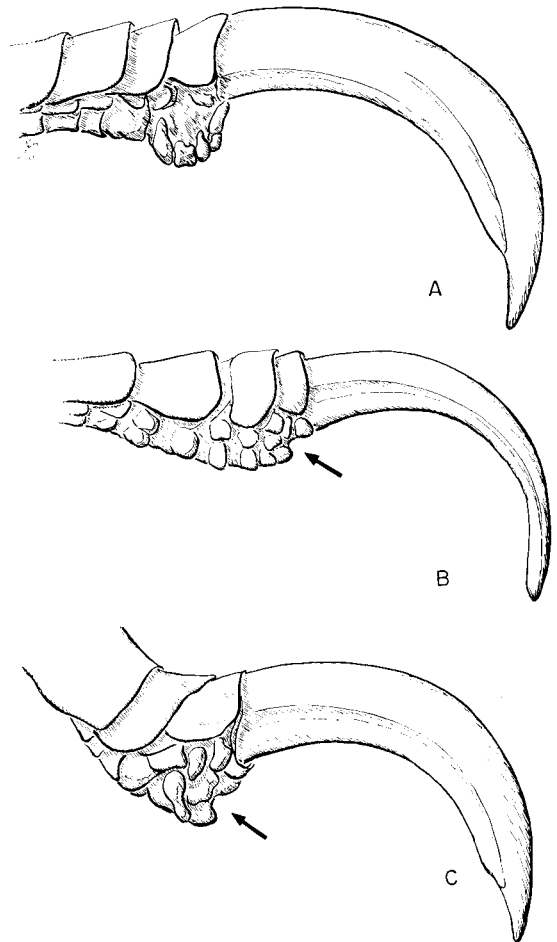


FIGURE 1. Distal toe pads of (A) *Sitta carolinensis*, (B) *Certhia familiaris*, and (C) *Mniotilta varia*. Only the latter two are notched.

during normal development and wear, or through changes during preservation of specimens, remains to be determined in studies of living birds.

The distinction between a roughened pad surface and a notch is sometimes arbitrary where notches are relatively small (e.g., in *Climacteris*). Notches are particularly striking in comparisons of notched species with unnotched ones of the same family as in the Troglodytidae and Parulidae.

DISCUSSION

The taxonomic distribution of notches strongly suggests that they function in climbing. Notches may aid in clinging to vertical surfaces, but studies on living birds are needed to establish the functional

significance of notching. The variation among species in the presence of notched toes might be associated with differences in mechanisms of climbing.

That some climbing species (e.g., *Sitta carolinensis*) lack notches is not surprising in view of the diversity of specializations for climbing in birds. Comparable is the occurrence of stiffened tail feathers in some but not all climbers. Undoubtedly, notching evolved independently in different lineages. It can thus illustrate convergent evolution, such as between the Old World Wall Creeper (*Tichodroma*) and the New World Canyon Wren (*Catherpes*), both specialized for feeding on vertical rock surfaces. The similar notching of *Tichodroma* and *Certhia* may also be due to convergence, for *Tichodroma* is reported to

be more closely related to *Sitta* than to *Certhia* (Vaurie, Amer. Mus. Novitates, 1854:1-26, 1957; Löhrl, J. Ornithol., 105:153-181, 1964).

As most examined species lack notches, and there is no evidence that species with notches are primitive, the occurrence of notching is probably a derived, rather than primitive, condition within both the order Passeriformes and the suborder Oscines.

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NEW DISTRIBUTIONAL RECORDS OF BREEDING MEXICAN DUCKS

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There are few definite records of the Mexican duck (*Anas diazi*) breeding within the United States. Ligon (1961) located a nest with five eggs at Burford Lake, Rio Arriba County, New Mexico, in 1913. He also reported approximately 12 nesting pairs and three broods in the San Simon marshes of Hidalgo County, New Mexico, on 6 June 1935. Lindsey (1946) made an intensive study of nesting Mexican ducks on New Mexico's Bosque del Apache National Wildlife Refuge, Socorro County, in 1944. Between 1947 and 1955, various reports of broods were made at Bosque del Apache and other areas along the Rio Grande as well as in the San Simon Valley (Ligon 1961). However, fewer Mexican ducks have been reported in the United States in recent years. The reasons for this apparent decline in population have been given as heavy stream erosion because of overgrazing, and the advent of large-scale irrigation projects with attendant flood control and lined irrigation ditches (Levy 1964).

Johnsgard (1961) described and mapped the geographic range of the species in both México and the United States. Aldrich and Baer (1970) updated this information. They stated that the Mexican duck had largely disappeared as a breeding bird in the United States by 1968 but that limited local populations could still be found along the Rio Grande in New Mexico and near El Paso, Texas, and in the San Simon Cienega of New Mexico and adjacent Arizona. They also listed possible breeding areas near Van Horn and Pecos, Texas, as well as on the Gray and Slaughter Ranches in extreme southwest New Mexico and southeast Arizona. Hubbard (1971) reported occurrences of the Mexican duck in summer during the late 1960s near Redrock, Grant County, New Mexico.

New information on breeding Mexican ducks has since been obtained. On 2 July 1968, U.S. Game Management Agent Charles Heumier (pers. comm.) located a brood of seven young and one adult female Mexican duck in the Lobo community south of Van

Horn, Culberson County, Texas. He captured a young male and photographed the bird before releasing it. During the last few years he has seen other Mexican ducks in the same general area during spring and summer months.

Heumier also reported that a fellow agent observed a female Mexican duck and five flightless young on Ascarate Lake at El Paso, Texas, on 18 June 1968. Heumier (pers. comm.) believes, but has not confirmed, that Mexican ducks also breed in the Pecos-Balmorhea area of Reeves County, Texas. Ohlendorf and Patton (1971) observed an adult Mexican duck with six small young along Ash Creek on the Babcock Ranch, 16 miles SSE of Alpine, Brewster County, Texas, on 18 June 1969.

On 29 April 1968, two of the authors (Seymour and Jim Levy) saw three Mexican ducks south of Willcox, Cochise County, Arizona. On 21 May 1968, Tomlinson and Seymour Levy returned to the general area and observed 19 adults and a brood of eight young Mexican ducks that were approximately three-fourths grown. Although all of the young birds had just become capable of flight, one immature was caught by hand and examined. The brood probably had been hatched in a shallow, low-profile marsh area created by a seep from the Willcox sewage lagoon.

On a subsequent trip (28 May 1968), the Levys observed 11 adults and another brood of six young in the same general area of the Sulphur Springs Valley. The authors and Bureau of Sport Fisheries and Wildlife biologist Roger Johnson again saw the first brood herein reported at the same location on 26 June 1968. During the same day, four birds that probably were Mexican ducks were seen at Parks Lake, Graham County, and one positively identified Mexican duck was observed at an irrigation pond just north of Bowie, Cochise County, Arizona. Earlier in the day, approximately 110 Mexican ducks had been observed from the air during a 3-hr flight in the Sulphur Springs Valley between Willcox and the Mexican border. During the same flight, eight Mexican ducks were seen at San Simon Cienega. Possibly a few of the birds observed from the air were Mallards (*Anas platyrhynchos*), but only one Mallard was identified on the ground during the 3-day field trip.

On 27 June 1968, Tomlinson observed two broods, each containing three flightless young and an adult Mexican duck, at San Simon Cienega. At this time, New Mexico State University graduate student Vernon Bevill informed Tomlinson that his detailed observations there had yielded a count of 14 young in three broods that year.

¹ Assigned to a field station in Tucson, Arizona.