

monly chase from their territories most kinds of large birds, not only acknowledged predators such as ravens (*Corvus* spp.) and raptors, but also inoffensive herons. Both Western and Cassin's kingbirds (*T. vociferans*) pursue Turkey Vultures at times. The kestrel's reaction may be more significant, for I often have seen Turkey Vultures flying near kestrels in their nest-trees without eliciting any noticeable reaction. In the same parts of southwestern New Mexico I have observed these falcons dive repeatedly upon circling Red-tailed and Gray hawks (*Buteo jamaicensis* and *B. nitidus*). I have also watched a kestrel fiercely attack a flying Black Hawk (*Buteogallus anthracinus*), striking and actually alighting on the latter's back, apparently biting forcefully while being transported a considerable distance by the hawk whose aerial agility nevertheless failed to dislodge the falcon.

One morning I twice saw a low-flying Turkey Vulture startle a mixed flock of migrant birds resting beside a desert rain-pool near Lordsburg, New Mexico. The vulture's initial appearance promptly scattered the assemblage; ducks scrambled into the water, Avocets (*Recurvirostra americana*) flew to the opposite shore, dowitchers (*Limnodromus* sp.) became airborne as a unit and circled several times before realighting. Ten minutes later a vulture appeared as before, producing a similar but weaker reaction: the avocets not taking wing and the ducks and dowitchers moving much less than formerly though remaining alert.

Nor do small mammals altogether ignore Turkey

Vultures. Near Tucson, Arizona, where *Spermophilus harrisi* and *S. tereticaudus* were frequent visitors in front of my photographic blinds, vultures often passed overhead. As I would notice their shadows the squirrels invariably became alerted. They would either assume an upright "picket-pin" position or remain crouched and motionless. Momentary "freezing" also was their usual response to the occasional Red-tailed Hawk or Common Raven (*Corvus corax*) that appeared overhead. But would such attentiveness—merely being alerted to a vulture's presence—detract from the mimicry value of a Zone-tailed Hawk that might appear at rare intervals? In hunting, this uncommon predator often (and I suspect typically) ranges far from its nest. Zone-tails forage over vast areas and a given population of prey animals probably would not encounter them frequently. The ground squirrels I observed invariably remained still until any large overhead bird passed by; but I did not time them, and a split-second's difference in a rodent's reaction time following recognition of a vulture or vulture-mimic as opposed to an obvious hawk, might be significant. To be effective mimicry need not work all of the time. Although I am inclined to accept Mueller's premise, vulture mimicking by the Zone-tailed Hawk remains an intriguing concept and is deserving of consideration by field observers.

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## REMAINS OF PLEISTOCENE BIRDS FROM ISLA DE GUADALUPE, MEXICO

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In the course of extensive field work on Isla de Guadalupe, Hubbs has discovered, and has extensively sampled, a fossil-rich formation that extends intermittently along "two thirds of the eastern shoreline (for about 12 miles) and up the west coast for about 2 miles" . . . . and "occurs consistently from one to five meters above present sea level" (Hubbs, *in Proc. Symp. Calif. Islands, Santa Barbara Botanic Garden, 1967*). The formation is interpreted as of Sangamon Interglacial age because two samples have been isotope dated at about 110,000 and 130,000 yr. BP, and because of the large representation of tropical marine invertebrates: a tropical coral of the genus *Pocillopora* comprises the bulk of the fossils and there are several tropical gastropods that are likewise now confined to the warm waters from near the mouth of the Gulf of California to northern Peru. These tropical elements are intimately admixed with San Diegan (warm-temperate) faunal elements. These fossils occur in a calcareous matrix that has more or less firmly cemented the fine to very coarse debris that had fallen down the precipitous cliffs, in large part after the material had been reworked by the moderate wave action of this coastline (fig. 1).

In April 1970, we, assisted by Robert L. Wisner and Ronald R. McConnaughey, of Scripps Institution, discovered four fragments of avian fossils in a small area of the formation about 30 m from the southeastern tip of what we call "Red Cinder Cone Point," where the eastern coastline turns abruptly southwestward for a very short distance, at 29°00' 50"N., 117°13'10"W. (as measured on H. O. Chart 1688, Survey of 1951; new number N. O. 21661), 8.0 miles northerly from the southeastern tip of the island. The bones were taken from well-cemented material filling some crevices in the rock on a slight bench a little above present high-tide line. Although numerous other exposures of the formation have been worked, here and elsewhere on the island, no additional fossil bird bones have been found. The specimens being reported are the only fossil vertebrates known from Isla Guadalupe, which, being an oceanic island rising from the sea floor, was almost surely never prehistorically reached by amphibians, or by terrestrial reptiles or mammals.

Considering the conditions of deposition it seems remarkable that even these fragmentary bird bones have survived, along with invertebrate fossils typical of the formation. Only two of the four avian fossils can be identified. They represent:

*Puffinus* cf. *puffinus opisthomelas*.—Distal 22 mm of a right humerus (San Diego Nat. Hist. Mus. Paleo. colls. no. 04294). The fragment is worn on the articular surface and is split longitudinally. The shaft is flattened and enough remains to indicate that it represents a small procellariiform bird the size of *Puffinus puffinus opisthomelas*.

*Endomychura* cf. *E. hypoleuca*.—SDNHM no.



FIGURE 1. The fossil-bearing Pleistocene formation at Guadalupe Island cements together rock debris along the eastern coast of the island. Hubbs is sitting at the upper boundary of the formation at the fossil locality.

04295. Longitudinal section through the sternal end (14 mm) of the coracoid, of a small alcid. The element is similar in size and proportions to that of *Endomychura hypoleuca*.

Today, several species of seabirds, including *Puffinus puffinus opisthomelas*, *Endomychura hypoleuca*, *Oceanodroma leucorhoa*, and *Ptychoramphus aleuticus* nest in close proximity under boulders and other debris on islets off the south end of Guadalupe Island. Their remains, as well as those of desiccated chicks and addled eggs, drop into crevices, become lodged among the rubble, and may eventually be preserved. Almost certainly similar colonies occurred on the main island during the Pleistocene—and indeed until the liberation of domestic cats there in the last century. Since the bird fossils (and two other possible avian fragments) were found in a very small area of an extensive deposit, it is pos-

sible that the discovery indicates the site of a former seabird colony.

Pertinent field work on Guadalupe has been supported by several National Science Foundation grants to Carl L. Hubbs, and by general cruise support to Scripps Institution from this foundation and from the Office of Naval Research. Many associates and students have assisted in collecting the Sangamon fossils, and a number of colleagues, including Emery P. Chase and particularly Edward C. Wilson, have contributed to the study and interpretation of the non-avian specimens.

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## FIRST DESCRIPTION OF THE EGGS OF THE CINNAMON BECARD

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Although the Cinnamon Becard (*Pachyramphus cinnamomeus*) is common throughout much of its range from Mexico to Ecuador and Venezuela, its eggs do not seem to have been described. I present here a description of a nest and eggs of this species.

On 10 March 1974 while birding on Pipeline Road, Panama Canal Zone, I found a pair of becards together constructing a nest in a fig tree (*Ficus* sp.). The nest was placed on a very small hanging branch, its bottom almost 5 m from the ground. It was a ball composed of grasses, roots, and dried leaves. Its entrance was on the north side and was concealed beneath some overhanging fibers.

I collected the clutch of three well-incubated eggs