DALY, M. AND M. WILSON. 1978. Sex, evolution, and behavior. Duxbury Press, Belmont, California.

EMLEN, S. T. AND L. ORING. 1977. Ecology, sexual selection, and the evolution of mating systems. Science 197:215–223.

ERCKMANN, W. J. 1983. The evolution of polyandry in shorebirds: an evaluation of hypotheses. Pp. 113–168 *in* Social behavior of female vertebrates (S. K. Wasser, ed.). Academic Press, New York, New York.

FAABORG, J. AND C. B. PATTERSON. 1981. The characteristics and occurrence of cooperative polyandry. Ibis 123:477–484.

GRAUL, W. D., S. R. DERRICKSON, AND D. W. MOCK. 1977. The evolution of avian polyandry. Am. Nat. 111:812–816.

HÖHN, E. O. 1967. Observations on the breeding biology of the Wilson's Phalarope (*Steganopus tricolor*) in central Alberta. Auk 84:220–244.

HOWE, M. A. 1982. Social organization in a nesting population of eastern Willets (*Catoptrophorus semipalmatus*). Condor 84:88–102.

HUSSELL, D. AND G. W. PAGE. 1976. Observations on the breeding biology of the Black-bellied Plovers on Devon Island, N.W.T., Canada. Wilson Bull. 88:632–653.

JENNI, D. A. 1974. Evolution of polyandry in birds. Am. Zool. 14:129–144.

LENINGTON, S. 1980. Bi-parental care in Killdeer: an adaptive hypothesis. Wilson Bull. 29:8–20.

MAXSON, S. J. AND L. W. ORING. 1980. Breeding season time and energy budgets of the polyandrous Spotted Sandpiper. Behaviour 74:200–263.

MUNDAHL, J. T. 1982. Role specialization in the parental and territorial behavior of the Killdeer. Wilson Bull. 94:515–530.

ORING, L. W. 1985. Avian Polyandry. Pp. 309–351 *in* Current ornithology, Vol. 3 (R. F. Johnston, ed.). Plenum Press, New York, New York.

——— AND M. L. KNUDSON. 1972. Monogamy and polyandry in the Spotted Sandpiper. Living Bird 11:59–73.

DIANNE H. BRUNTON, *School of Natural Resources, Univ. Michigan, Ann Arbor, Michigan 34109.* (Present address: *Dept. Biology, Yale University, OML PO Box 6666, New Haven, Connecticut 06510-7444.*) *Received 15 Jan. 1988, accepted 2 May 1988.*

Wilson Bull., 100(4), 1988, pp. 672–675

A hunting technique of the Black-and-white Hawk-Eagle (*Spizastur melanoleucus*).—The Black-and-white Hawk-Eagle ranges from Mexico to Argentina (Brown and Amadon 1968), but its hunting techniques have not been recorded. Wetmore (1965:265) noted that one collected at Chepo, Panama, "came with considerable force through high forest to strike at Araçari toucans that chattered and dashed about in the branches, much excited." The Brazilian name, "gavião-pato" or "duck hawk," suggests that it captures ducks. W. H. Partridge (*fide* Brown and Amadon 1968) reported it hunting Brazilian Mergansers (*Mergus octosetaceus*) and Olivaceous Cormorants (*Phalacrocorax olivaceus*) near Iguaçu Falls, Argentina. Russell (1964) reported a collared Araçari (*Pteroglossus torquatus* and a Scaled Pigeon (*Columba speciosa*) as prey for individuals collected in Belize. Alvarez del Toro (1980:43) added tinamous, chachalacas, guans and other large and wary animals. Sick (1985: 213) listed toads and oropendolas. How the species catches large and fast-moving prey seems to be unknown.

On 29 July 1987, near the headquarters of the Ecological station of Serra das Araras (Macaw Mountains) in southwestern Mato Grosso, Brazil, I observed an individual hunting with a technique that could explain the above observations. The Serra das Araras are parallel mountain ridges, reaching 800-m elevation, and the station headquarters is at a T-fork of the Salobra River, on a long but narrow intermontane plain at 200-m elevation (15°38'S, 57°12'W). Dry riverine woodlands, open campos, and semi-open savannas (cerrado) give way to dry woodlands on the steep slopes of ridges on either side. The top of the ridge to the southeast is in cerrado or dry woodlands, and is a flat-topped narrow remnant of the "chapadas" or mesas of the Brazilian Shield. July is dry, and many trees are leafless. At 06:55 the screeches of a band of small Red-shouldered Macaws (*Ara nobilis*) called my attention to a plummeting closed-winged hawk-eagle, which looked small as a tityra until it alighted near the tight group of fleeing macaws. By circling, I could see the hawk-eagle well, atop a leafless snag of a tree near the clearing. It soon flew 200 m to the top of a tree near the fork of the river, still in plain sight. For over two hours it waited in upright posture, preening the upper back or base of the fairly long tail or upper breast at intervals or turning and looking about and below. At times it stood high and horizontal on long white-feathered legs, especially when it turned 180°. A pair of Purplish Jays (*Cyanocorax cyanomelas*) yelled at it from a distance the first ten or fifteen minutes, but gave up and moved to the clearing. Amadon and Eckelberry (1955) reported similar scolding by Brown Jays (*Psilorhinus morio*) in Mexico.

At 09:07 the hawk-eagle flew off upriver (south) some 500 m, gaining a little elevation, and then turned and glided northwest downriver to a perch out of sight. At 09:23 it took wing again, flapping and soaring to the notch where the Salobra breaks through the ridge to the northwest. It then began to circle and soar on the northwest wind that had just started blowing up the south side of the notch. It quickly soared up past two King Vultures (*Sarcoramphus papa*) already using the updraft, high over the notch. On wide and long wings, it is better adapted to soaring than are *Spizaetus* species, which have broad but shorter wings.

The soaring bird drifted downwind over the plain to at least 400 or 500 m above the ground, as high as the ridge to the east, and 200 m over the ridge to the northwest. It then slightly folded its wings and began a slow drift northwest into the wind, losing little if any altitude, a speck in the sky moving gradually toward the forested ridge to the north of the notch. Once it nearly closed its wings and started to drop, but recovered and resumed the wide "M" folding of the wings and the slow drift upwind. Two minutes later, it folded the wings and plummeted out of the sky, passing the wooded face of the serra at great speed and disappearing through the bare treetops, undoubtedly a stoop after prey. J. M. Thiollay (*in litt.*) saw two unsuccessful dives through the canopy at cotingas, *Ramphastos* spp. and other birds at a fruiting tree in French Guiana, although he did not see the start of the dives.

At 16:00 on 10 January 1988, along the tops of the cliffs just west of the tourist site at the geographical center of the continent (15°30'S, 55°30'W) near Chapada dos Guimarães, two hunting hawk-eagles were using updrafts to soar high over the forest. One hawk-eagle dove suddenly past the face of the mesa, soared upward and dove again to a tree over the abyss. It ran up a limb and looked down for 15 minutes, flew to the center of another overhanging tree, ran out on a limb to an exposed site for five minutes, and finally soared out of sight along the cliff. Active foraging from great heights resembles hunting in the Old World genus *Hieraaetus,* which Amadon (1982) considered morphologically similar to *Spizastur* and possibly congeneric. However, convergence is possible.

Foraging by stooping from great heights probably explains how this hawk-eagle can capture large and alert prey in the treetops or edges of forests. Its wings are too long to fly after prey through the forest in the manner of *Accipiter* spp. or *Spizaetus* spp. Its tail is long enough to be angled for last-second changes in direction after prey fleeing through the branches, but is too long for a bird that hunts by waiting for prey in the manner of many *Buteo* spp. or *Leucopternis* spp. I should note, however, that the Short-tailed Hawk (*Buteo brachyurus*) is also a soar-stoop hawk, soaring 100–200 m up and stooping abruptly past tree crowns at forest edges for small birds; probably it does not need a long tail to change course within the treetops.

This type of foraging also could explain why *S. melanoleucus* often occurs at forest edges. It would have less success detecting and chasing prey in dense, continuous foliage of unbroken forests. Cade (in McFarland et al. 1985:433) indicates that soar-stooping is used mainly by open-country raptors, so that use even at forest edges may be somewhat unusual. It may also be that updrafts at forest edges or along ridges could help *S. melanoleucus* soar upward. The Serra das Araras bird could have roosted atop the serra to make its first stoop of the morning, at an hour when winds were too weak to have carried it upward. It then had to wait almost three hours for its next attempt. Since semi-open habitats are usually settled and cleared very rapidly in the tropics, human interference may be a problem for this species.

The spectacular color pattern of this hawk-eagle perhaps would not alert the prey in time, or could even confuse it in the last-minute chase. I was struck that, when soaring, the hawk-eagle resembled a King Vulture. That species soars high also (Houston 1984), and occurs throughout the range of *S. melanoleucus* in the same habitats. *S. melanoleucus* has an unusual white forward margin atop the wings, well illustrated in a picture by Tony Luscombe (Clinton-Eitniear 1987) and very noticeable in the individuals I have seen. This margin suggests the white upper wing coverts of the King Vulture. Underneath, the two species are white except for relatively dark primaries and rectrices. Being smaller than the King Vulture, it would seem higher and more distant than it really is to an animal that mistakes it for one. Some other accipitrids are white below, however, including young *Hieraaetus* (Amadon 1982).

The young Cayenne Kite (*Leptodon cayanensis*) is colored surprisingly like *S. melanoleucus*, but lacks the white anterior wing margin and has barred black-and-white remiges. If it is a mimic, it perhaps resembles the larger and more dangerous species to avoid close mobbing by small birds or attacks by larger species that take it for a *S. melanoleucus.* I have not seen it soar-stooping, and indeed its prey are mostly small and not very wary species.

Acknowledgments.—I appreciate research support from the Conselho Nacional de Desenvolvimento Científico e Technológico (CNPq) of Brazil, collaboration of Yoshiko Oniki of the Programa Polonoroeste (Universidade Federal de Mato Grosso), help from the Secretaria Especial do Meio Ambiente (SEMA, Brasília) and from workers at the Estação Ecológica da Serra das Araras, and information from D. Amadon and J. M. Thiollay.

LITERATURE CITED

Alvarez Del Toro, M. 1980. Las Aves de Chiapas. Universidade Autonoma de Chiapas, Tuxtla Gutierrez, Mexico.

Amadon, D. 1982. The genera of booted eagles: *Aquila* and relatives. J. Yamashina Inst. Ornith. 14:108–121.

——— and D. R. Eckelberry. 1955. Observations on Mexican birds. Condor 57:65–80.

Brown, L. H. and D. Amadon. 1968. Eagles, hawks, and falcons of the world. McGraw-Hill, New York, New York.

Clinton-Eitniear, J. 1987. Apuntes del estado actual del Aguila Halcon Blanco y Negro, *Spizastur melanoleucus.* Rev. Ecologia Latinoamer., Mérida, Venezuela, 1:25–26.

Houston, D. C. 1984. Does the King Vulture *Sarcorhamphus* (sic) *papa* use a sense of smell to locate food? Ibis 126:67–69.

McFarland, W. N., F. H. Pough, T. J. Cade, and J. B. Heiser. 1985. Vertebrate life. 2nd ed. MacMillan, New York.
Russell, S. M. 1964. A distributional study of the birds of British Honduras. Ornith. Monogr. 1:1–195.
Sick, H. 1985. Ornitologia brasileira. Vol. I. Brasília, Editora Univ. Brasília.
Wetmore, A. 1965. The birds of the Republic of Panama. Part I. Smithsonian Misc. Collections 150:1–483.

Edwin O. Willis, *Departamento de Zoologia, Universidade Estadual Paulista, 13500-Rio Claro, São Paulo, Brazil.* *Received 3 Nov. 1987, accepted 31 Mar. 1988.*

Wilson Bull., 100(4), 1988, pp. 675–677

Post-breeding migration of Oilbirds.—There are few indications in the literature suggesting that Oilbirds (*Steatornis caripensis*) perform a post-reproductive migration, leaving their breeding caves at the end of the breeding season. Indirect evidence comes from the observations of Tannenbaum and Wrege (1978) and Snow (1979). The former two authors visited Cueva de Coy-Coy in western Venezuela in January 1977 and found only two birds from a colony that previously had a breeding population of several hundred birds. During a second visit in March 1977, they found at least 50 birds in the same cave. Tannenbaum and Wrege suspected that birds were beginning to return to the cave in March for their annual breeding. In the Los Tayos Cave in Ecuador, Snow (1979) estimated a population of 170 Oilbirds in July 1976, which declined by August to approximately 13 birds. Snow visited the cave near the end of the breeding season and estimated from the number of chicks harvested by the local Indians, in April of the same year, that the Los Tayos population could have been at least 1500 birds.

The postbreeding exodus from Los Tayos, and possibly Coy-Coy, was in sharp contrast to the behavior of these birds in Trinidad where Snow (1961, 1962) carried out a long-term study of a small colony. There, Oilbirds occupied their nesting ledges throughout the year. Snow (1979) indicated that many birds also are always present at the Caripe Cave in eastern Venezuela. The purpose of the present note is to document a massive postbreeding migration of Oilbirds from their breeding site at the Caripe Cave.

The Caripe Cave or Cueva del Guácharo, the site of Humboldt's (1833) description of the species, hosts one of the largest known Oilbird populations. Although there are no reliable censuses of this colony, estimates of its numbers have been as high as 20,000 birds (De Bellard Pietri 1979). Since May 1985, we have visited the cave at monthly or bimonthly intervals. During the last three breeding seasons, the bulk of egg laying occurred in late April and May, but eggs occasionally were laid as early as mid-March and as late as mid-July. Most nests had nestlings by July and August and fledging occurs from mid-August through early September. Few birds fledged as late as the end of September. This breeding schedule is roughly similar to that observed by Tannenbaum and Wrege (1978) during 1976 in the same cave.

Population density at the Caripe Cave is highest during the breeding period, probably reaching 10,000 birds or more, but we have not found a reliable way to count them at these times. However, we counted the birds at times when their numbers were lower, and observed dramatic declines in density during the nonbreeding season. Birds start leaving the cave at sunset for their nightly foraging and return to it before sunrise. Our population estimates, using hand counters, have been made by counting the birds that leave the cave during the first hour of their departure. Since not all birds left the cave, a walk through the initial 700-m