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# SPEED OF FLAPPING FLIGHT OF MERLINS AND PEREGRINE FALCONS[1]

WILLIAM W. COCHRAN
*Illinois Natural History Survey, 607 E. Peabody Dr., Champaign, IL 61820*

ROGER D. APPLEGATE
*Division of Science and Mathematics, M120, Parkland College, 2400 W. Bradley Ave., Champaign, IL 61821*

*Key words:* *Flight; speed;* Falco peregrinus; Falco columbarius; *migration; flapping flight.*

Flapping flight speed data were obtained for four Merlins (*Falco columbarius*) and six Peregrine Falcons (*Falco peregrinus*) while they were being radio tracked during a migration study. The study involved over 16,000 km of observations of 29 birds and provided copious data on average speed in mixed or unknown flight modes. Merlins and peregrines usually soared during migration and seldom flew steadily on a straight path when hunting (Cochran 1975:33). This behavior severely limited opportunities for measuring speed of flapping flight. The data presented were obtained by a variety of radiotelemetric techniques (Cochran 1972, 1985) and were selected for periods when (1) the flight path was known to be approximately straight, (2) continuous telemetric and intermittent visual observation confirmed a flapping mode of flight, and (3) the birds were in approximately level flight below about 100-m altitude, where winds were measured and taken into account.

Our fastest peregrine speeds (Table 1) were less than most lower limits of speed ranges reported in the literature: 63 to 290 km/hr (Dorst 1974:34), 241 to 322 km/hr (Bent 1938:59–60), and a 100-km/hr groundspeed in level flight (Meinertzhagen 1955). Of course, speeds reported in dives (400 km/hr, Newton 1985) and in airplane chases (287 km/hr, Storer 1952), are not comparable to those of the peregrines we observed in unstressed level flight. The fastest Merlin airspeed, 48 km/hr, is the same as that reported by Bond (1936). We found no other references to Merlin flight speed. Both the mean and the maximum peregrine airspeeds exceed those of the Merlin, but the difference of means was not significant ($P > 0.05$, $t = 0.83$, df = 8). In addition to flapping flight speeds, horizontal gliding airspeeds of one peregrine, in 12-min and 10-min straight tracks, were 64 and 62 km/hr, respectively.

In general, flight speeds reported in the literature have emphasized maximum capabilities; for the peregrine, claimed by some to be the fastest bird in the world, reports may sometimes have been exaggerated. Although maximum speed capabilities of Merlins and peregrines are certainly higher than we show, our data on flight speeds are more typical and probably represent speed ranges providing good aerodynamic efficiency.

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TABLE 1. Average speeds of Merlins and peregrines in flapping flight on straight migratory flights, measured to the nearest 0.5 km/hr.

| Species/age/sex[a] | Duration[b] (min) | Groundspeed (km/hr) | Airspeed (km/hr) |
|---|---|---|---|
| Merlin/I/m | 20 | 48.5 | 48.5 |
| Merlin/I/m | 28.5 | 30 | 30.5 |
| Merlin/A/f | 30.5 | 74 | 44 |
| Merlin/I/f | 40.5 | 30 | 34 |
| | | Mean = 45.6 | 39.3 |
| Peregrine/A/f | 55[c] | 50 | 49 |
| Peregrine/I/f | 83 | 49.5 | 36.5 |
| Peregrine/I/f | 9 | 53 | 53.5 |
| Peregrine/I/m | 9 | 36.5 | 36.5 |
| Peregrine/I/m | 17 | 70 | 50.5 |
| Peregrine/I/m | 129.5[c] | 35 | 36 |
| | | Mean = 48.8 | 43.7 |

[a] A = adult, I = immature, f = female, m = male.
[b] Time interval over which speed was calculated.
[c] Flights in strong cross winds.

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# OBSERVATIONS ON THE BEHAVIOR AND ECOLOGY OF THE MARIANA CROW[1]

DIANA F. TOMBACK[2]
*Department of Zoology and Entomology, Colorado State University, Fort Collins, CO 80523*

*Key words: Mariana Crow; Mariana Islands; Guam; Rota; endangered avifauna; Corvidae.*

The Mariana Crow (*Corvus kubaryi*) is found on the islands of Guam and Rota in the Mariana Islands of Micronesia. An attractive, fairly tame island inhabitant, the Mariana Crow is small with short, broad wings, a green gloss to the black head plumage, and a blue gloss to the black body plumage. Patches of gray feather bases in the body plumage and white feather bases in the neck region are often exposed. The bill and feet are black, eyes are brown, and nasal bristles are prominent. As in other corvids, the juveniles have short, fluffy head plumage. In addition, young Mariana Crows are disheveled in appearance; exposed feather bases on the breast show as light patches, the black plumage has a brown cast, and flight feathers may appear worn at the tips. As suggested by Baker (1951), *C. kubaryi* may be closely related to *C. enca* of the Malayan and Philippine regions. He further speculates that "*C. kubaryi* is an isolated and modified species of crow, which probably has been living at Guam and Rota for a considerable length of time." Features which differ from the candidate ancestral species include small size, slender bill, and dull coloration. Goodwin (1976) believes, however, that aside from the geographic proximity of *C. enca,* any *Corvus* species could be ancestral.

The Mariana Crow is a little-known species whose populations have suffered declines over the past 25 years. In 1975, the crow was placed on the Trust Territory Endangered Species list; in 1984, it was placed on the U.S. Federal Endangered Species List along with the Bridled White-eye (*Zosterops c. conspicillatus*), Guam Flycatcher (*Myiagra freycineti*), Micronesian Kingfisher (*Halcyon c. cinnamomina*), Vanikoro Swiftlet (*Aerodramus vanikorensis bartschii*), Common Moorhen (*Gallinula chloropus guami*), and Guam Rail (*Rallus owstoni*; revised nomenclature, Pyle and Engbring 1985). Although a recovery plan for Guam's endangered avifauna is currently in preparation, much of the anecdotal information available for these species has come primarily through the efforts of J. Mark Jenkins (1983).

I observed the Mariana Crow on Guam and Rota for 15 days during July 1980. Although the study was brief, the observations supplement the information in Jenkins (1983), presenting additional details on the ecology and behavior of the crow.

## STUDY AREAS AND METHODS

The Mariana Islands lie above the Equator, midway between Japan and New Guinea and about 2000 km east of the Philippines; Guam and Rota are situated about 14°N and 145°E. Guam, a United States trust territory, is the largest and best known of the Mariana Islands. Rota, administered by the Commonwealth of the Northern Mariana Islands, lies about 59 km northeast of Guam. For both islands the year-round climate is humid, with daytime temperatures about 30°C or higher. Details concerning the geology, weather, flora, and fauna of Guam are available in Stone (1970), Moore and McMakin (1979), and Eldredge (1983). Plant communities referred to in this report are found on both Guam and Rota and have been described in detail by Moore and McMakin (1979) and Jenkins (1983).

I observed the Mariana Crow on Guam from 4 to 11 and 25 to 27 July 1980, in limestone forest and coastal

TABLE 1. Flock sizes observed for the Mariana Crow.

| | Flock size | No. of times observed |
|---|---|---|
| Guam | 1 | 5 |
| | 2 | 5 |
| | 4 | 1 |
| | 5 | 2 |
| Rota | 1 | 1 |
| | 2 | 10 |
| | 3 | 4 |
| | 4 | 3 |
| | 6 | 1 |

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[2] Present address: Department of Biology, University of Colorado at Denver, Denver, CO 80202.