when I arrived at the nest and the embryonic membranes were dry. The hole in the egg was pointing downward and the shell around it had collapsed inward suggesting that the egg had been slightly crushed. The whole nest was covered with ants (*Tapinoma nicerrimum*) many of them going in and out of the egg. On 16 June the chick had completely broken the shell but still had not emerged, probably due to the very dry membranes strongly adhering to its body. The exposed part of the body was completely covered with ants showing clear signs of having been bitten. I freed the chick from the eggshell. On 17 June the chick was observed ridding itself of ants with its beak or by rubbing itself with nest material. Although the nest continued to be full of ants, there seemed to be fewer on the chick. This chick survived subsequently until fledging.

In a second nest, on 22 June, the first egg of a clutch of two had been hatching for three days, after which the shell was only ⅔ open. It was not in the center of the nest but placed between sticks at the edge of the nest and completely infested with ants (*Crematogaster scutellaris*). A large part of the exposed area (wing, neck, breast, leg and especially the face) was nibbled to expose raw flesh. Twice I saw ants go in and out of the mouth. The egg also appeared to have been crushed and the head of the chick was slightly misshapen. I removed the chick from the egg. It was cold with a moribund appearance. The second egg was also at the edge of the nest, with the shell very scratched, possibly from rubbing against the nest sticks. When I arrived at the nest an adult flew from it, and during the nest check, I saw it circling the nest. On day two, the chick was dead and half eaten by ants. The remaining egg had fallen below the nest, and I did not see any adult near the nest. As far as I know, this is the first recorded observation of an attack by ants on chicks of raptors, at least in a temperate area where these insects are more gatherers and carrion eaters than hunters (W.M. Wheeler 1960, "Ants, their structure, development and behavior," Columbia Univ. Press, New York). It must be of infrequent occurrence as I have only been able to observe these two instances despite following hatchings in 57 Black Kite nests in the same area over two years. Nonetheless, a high proportion of trees with active nests were infested with these ants, especially *Crematogaster*. The unusual weather in Doñana in 1988 could have led to these ocurrences. The spring was exceptionally wet, with rainy and unsettled conditions until June. When these observations were made the days were very hot following a stormy period, and at this time much ant activity could be noted. This suggests the ants might have been more inclined to use food sources not regularly exploited. Also, an abnormal behavior of the parents or chicks on hatching could have had an influence. In the first nest the incubation may have been somewhat irregular, as indicated by very dry membranes. In the second nest the chick took more than two days to hatch, a longer period than the normal 24–48 hours (unpubl. data). Both crushing of the eggshell and the positioning of a hatching egg at the edge of the nest were only observed in these two nests. It is possible that the parents, in order to avoid the infestation, either crouched more against the nest to impede the ants' entry or pushed the egg away from the ants. If so, these actions appeared to be of little use, or, in the instance of the crushing of the shell, were counterproductive and probably made hatching more difficult. Possibly this type of attack can only be successful at the critical time of hatching since soon after hatching the chick appeared able to defend themselves against insect attacks. I thank A.M. Jones for a translation of the first draft and F. Hiraldo and A. Coole for their helpful comments.—**Javier Viñuela, Museo Nacional de Ciencias Naturales, %/José Gutierrez Abascal 2, 28006 Madrid, Spain.**

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THESIS ABSTRACTS

CHANGES IN THE BODY MASS OF AMERICAN KESTRELS (*Falco sparverius*) DURING THE BREEDING SEASON

I monitored the changes in the body mass of adult American Kestrels (*Falco sparverius*) during the breeding season to determine: 1) whether changes in the mass of breeding kestrels occurred, and 2) what factors influenced these changes in mass. I first examined the relative influences of environmental and reproductive factors on the changes in body mass of breeding kestrels. I then examined whether food provisioning by adults was a physiological stress on the physical condition of adults or whether changes in mass could be related to an adaptive strategy of mass loss. I conducted my research on a breeding population of American Kestrels at Besnard Lake, Saskatchewan (55°20'N 106°00'W). In the two years of my study (1988 and 1989), 643 measures of mass were collected by live-trapping techniques from April

through July of each breeding season. I also monitored 35 nests for 877 hr to obtain measures of mass using electronic balances and data on provisioning rates of parents during the brood-rearing period.

The results of my study suggest that environmental factors, such as climate and food availability, may have had a strong influence on the physical condition of adults early in the breeding season. During the brood-rearing period, females with 5-chick broods displayed trends in mass loss that may have been related to increased provisioning rates, while males did not. Parents with smaller broods did not display significant trends in mass related to their provisioning rates, possibly because of the lower stress in feeding fewer young. The stress of foraging on parents may have been further mitigated by the use of nutrient reserves and the combined effort by breeding pairs to feed young.

Although foraging may have caused stress-related mass loss, I also found that the physical condition of parents may influence the subsequent change in mass and the amount of food delivered to offspring. Parents in good condition were more likely to lose mass and deliver more food to their offspring than parents in poor condition. Parents may therefore be balancing their physical condition (good or poor) within the limits of self-maintenance with their level of food provisioning throughout the breeding season.—**William M. Iko. 1991. M.Sc. thesis, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0.**

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FORAGING ECOLOGY OF URBAN-BREEDING MERLINS (*Falco columbarius*)

I studied the foraging ecology of breeding Merlins (*Falco columbarius*) in Saskatoon, Canada, from May to July, 1987–90. I identified 1332 prey items belonging to 36 vertebrate species from prey remains collected near 65 Merlin nests. The principal prey of breeding Merlins was the House Sparrow (*Passer domesticus*), which along with the Horned Lark (*Eremophila alpestris*) were usually taken more frequently than expected from their relative abundance in the environment. Other potential prey species were usually taken in proportion to, or less than, expected.

The proportion of adult House Sparrows in the diet decreased while that of juveniles increased significantly as the Merlin breeding season progressed. During the incubation and nestling periods, the relative abundance of male and female House Sparrows did not differ significantly from rates at which they were consumed. In the fledging period, based on relative abundances, adult House Sparrows were taken less often than expected while juveniles were eaten more often than expected by Merlins.

Twenty-seven Merlins were radiotracked. Mean hunting range of resident (hatched in the city) and immigrant (presumed to have hatched outside the city) males were 6.3 ± 1.3 (SE) km^2 and 33.7 ± 12.1 km^2, respectively. Mean hunting ranges of resident and immigrant females were 6.6 ± 3.4 km^2 and 8.6 ± 1.6 km^2, respectively. Merlins that hunted exclusively in the city used all habitats in proportion to availability. Merlins that hunted both in and outside the city usually avoided hunting in agricultural areas, which were relatively low in prey abundance.

During the incubation and nestling periods, males with more prey birds in their ranges had significantly smaller hunting ranges. Male Merlins with more prey birds in their ranges spent relatively less time hunting and males with larger broods spent more time hunting compared to those with smaller broods. For female Merlins, hunting range was inversely correlated with both body mass and House Sparrow abundance.—**Navjot S. Sodhi. 1991. Ph.D. thesis, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0. Present address: Department of Veterinary Anatomy, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0.**