

in search of these interesting birds that I learned first hand of the paraphernalia of capturing and banding raptors. *Bal-chatri*s were especially captivating for me and, more importantly, for a good number of Harris' Hawks as well. My experience with such devices was nil, and so I quickly became the newest of their many "gabboons," the Hamerstroms' quaint name for apprentices. According to Fran, "gabboon" stems from Africa, where, with a slightly different spelling, the term refers to those of a wretched tribe who are forced into servitude by a more powerful tribe. During the field season in Wisconsin, the Hamerstroms often had a houseful of such volunteer laborers at hand. Tales of the cuisine served to the gabboons, while no doubt enhanced by their repeating, nonetheless stir the workings of one's gastrointestinal system. "Roadkill stew" has since become a staple in my vocabulary, but not—I think!—as an entree on those occasions when I shared a table blessed with Fran and Hammy's cooking.

So off we went one fine day, mentors and new gabboon. Down to Kingsville, then off toward Falfurrias. Harris' Hawk country. The bus clattered, but on it went under Hammy's steady control. Fran was busy boiling water for tea on some kind of stove when Hammy spotted the first bird. Out went the *bal-chatri*; Fran lowered the trap from the moving bus with the same grace as she had descended those stairs so long ago. A quick catch. The bird was quickly immobilized inside a plastic tube—so that was what they were for!—again with the effortless grace that comes with long experience. Another bird along the roadside, this one with a companion nearby. With *bal-chatri* again in place, Hammy gunned down the road, turning the bus around with his own style of creative driving that comes from years of field work on narrow roads. Success again, but this time both birds wheeled to the trap and both were soon hopelessly tangled in the nooses. I'm not sure, but I'd guess that the Harris' Hawk may be the only species in which two (or more?) birds might be captured at once in a *bal-chatri*. In any case, untangling those two unhappy birds was another event etched so deeply in my memory of days long ago.

By now the water was ready, so a tea break was declared, followed by subjecting each bird to careful measurements, some of which appeared in print (F. and F. Hamerstrom 1978, *Rapt. Res.* 12:1–14). What seemed to be an unusual molting pattern, especially in the primaries, was of special interest and a good deal of time was spent examining the wings of every Harris' Hawk caught by the Hamerstroms. They had published a paper on their method of recording molting patterns (F. and F. Hamerstrom and J. Wilde, Jr. 1971, *Inland Bird Banding News* 43:107–108), and diagrams with their most current data now were stacked in the bus in a filing system whose working were known only to Fran.

Tea finished, we searched for more birds. Fran and Hammy were sharp-eyed and could spot a perched hawk of any kind with ease. My education was advancing, albeit slowly. I was to arrange the loops, opening any that had closed and setting them upright, but most of the time I just caught my fingers. The day wore on, with a tally of a few more Harris' Hawks for our effort. My work with the nooses improved, but never really to the satisfaction of Fran, who always was able to locate a misguided loop or two. Hammy just smiled—I suspect he'd witnessed a similar scene more than a few times before. And so it went.

The Hamerstroms' ventures to Texas and Mexico strained their retirement income, or at least that's what they said, so Fran used their long drives as time for writing for profit. At some point, I don't know when, she developed an interest in children's books and drew from her own experiences as a mother for material. "Walk when the moon is full" (1975, Crossing Press, Freedom, CA) was a result of this effort. Other experiences in their eventful lives also served as the basis for delightful stories, among them "An eagle to the sky" (1970, Iowa State University Press, Ames, IA) and "Strictly for the chickens" (1980, Iowa State University Press, Ames, IA). Scientific reports, of course, continued between these and other popular writings.

Hammy's gone now, but Fran carries on. I tried to phone her recently, just to see what she was doing, but I was unable to reach her. No doubt she still watches the prairie chickens dancing in the freshening Wisconsin spring and maybe even finds the energy to search for a few harriers' nests. I hope so. But whatever the case may be, I shall retain the rich treasure of recollections of Fran and Hammy going full force. Those, indeed, were fascinating days.—**Eric G. Bolen, The Graduate School and Department of Biological Sciences, University of North Carolina at Wilmington, Wilmington, NC 28409.**

A KESTREL TO THE SKY

An eagle's stature, of course, is much more impressive than a kestrel's. But, as Niko Tinbergen once wrote to me, kestrels are "sweet." Being highly adaptive in their behavior, these small falcons are distributed all over the World.

I have kept, bred and raised quite a lot of falcons, including European Kestrels (*Falco tinnunculus*) from in

or near the town of Freiburg in southwestern Germany, American Kestrels (*F. sparverius*) caught near Plainfield, Wisconsin, and their descendants.^{1,2}

When my husband, Otto Koehler, and I arrived at the Hamerstrom farmhouse in 1960, there were already five American Kestrels waiting to be taken to Europe on board the S.S. Nieuw Amsterdam—but this would be a story of

its own. There were also a Northern Harrier (*Circus cyaneus*), a Snowy Owl (*Nyctea scandiaca*) and a hand-raised Great Horned Owl (*Bubo virginianus*) that was allowed to come into the sitting room in the evening. The owl played with balls of wool like a kitten and nibbled at our ears, very gently as he probably thought.

We had some wonderful days with Frederick and Frances Hamerstrom. The first evening, Fran took me, more or less blind in the dark unknown environment, to a nearby pond and we bathed, alone under the high vault of the sky except for some turtles plunging into the water. Otto and I learned how to catch kestrels and to keep them in beer cans until they could be weighed and measured. We met Helmut Mueller and other young biologists who netted passerine birds for banding near Lake Michigan. Whatever we found dead at the roadside, squirrels and other animals, was taken home as food for the birds. When I cared for my kestrels Fred watched me silently. At last he said "She has a wonderful hand with them," which I can still hear today.

On 23 August we left for the meeting of the American Ornithologists' Union in Ann Arbor, Michigan. While on a toll highway we had a tire mishap, but Fran mastered the situation calmly smoking her cigarette. Only the kestrels were very much upset.

Next day, in Ann Arbor we met Margaret Morse Nice and her husband, whom we had visited in Chicago, Ernst Mayr, and, for the first time, Amelia Laskey. I had had some correspondence with Amelia Laskey since American ornithologists helped European ornithologists after World War II, a system organized by the Hamerstroms. We participated in the meeting for only one day. We had to go back to New York and board our ship.

In 1991, when Fran came to Freiburg again, on her way to Africa to go hunting with the pigmies, we talked about falcons and she advised me: you must write popular books, otherwise your book will never be written, with all that literature. . . . Therefore, although I still hope to publish at least some of my observations, I dare tell the story of just one of my European Kestrels in an informal paper for this Hamerstrom Issue.

The kestrel was a male named Fridolin whom I kept in an aviary for 6 yr and who afterwards lived flying free for another 7 yr using me as a food resource for himself, his mate and his young. In winter he sometimes stayed away for weeks or even months.

FRIDOLIN'S LIFE

The kestrel was brought to me as a juvenile in February 1973. I do not know his previous history. He was tolerant but not very tame. In summer he lived peacefully with an adult female in a large aviary (6 × 4 × 4 m) in Wittental, a village near Freiburg, Germany. Neither of them courted. The winter months were spent in an aviary at my house in Freiburg, and the kestrels came to Wittental again in March 1974. The male, now in adult plumage, flew

demonstratively to the potential nesting site where he called "zick-zick," but they did not get further.

After the summer of 1974, the pair stayed in Wittental all year. During winter they were allowed to use the three neighboring aviaries (all of the same size), both with and without other falcons. This gave them access to sunshine whenever possible—besides in spring, from 1973 onwards, some artificial illumination which they liked especially for warmth.

In 1975 and 1976 they had seven eggs each year. Four and three young, respectively, hatched and fledged. All eggs were fertile, but some of the chicks were too feeble to hatch. I suspect that the male brooded too long, which is a problem in raptors breeding in captivity (pers. observation). In the wild, the male has to go hunting. He relieves the female about twice every day while she feeds and preens. In the aviary he can just stay and sit until the female wants her turn. But he has no brood patches, and apparently cannot incubate adequately for long periods of time.

When the pair started to breed again in 1977, a marten (*Martes* sp.) found his way into the aviaries. On 2 May the female had disappeared.

Next spring the male courted a female Lesser Kestrel (*F. naumanni*) × European Kestrel hybrid. But when I obtained another adult female European Kestrel at the end of April 1978, he courted her and chased the hybrid. The females looked similar and behavioral differences were subtle, but the European Kestrel is the bigger species and in raptors big females seem to be attractive for males. This female, coming from a small zoo in Waldkirch where she may have been attached to another male, started laying unfertilized eggs the day after her arrival.

Neither repellents nor tasty baits in a trap box allowed me to get rid of the marten. He could no longer enter the cages, but he chased the birds from outside sometimes injuring them. Not having sufficient room for all the birds in Freiburg, I released the European Kestrels near my house at the edge of town. The birds were used to catching live prey, but, in January 1979, there was snow to worry about. None of the birds I had hacked back at the site or elsewhere, young or old, had stayed or come back and neither did the female. The male returned 3 d after release and stayed, with interruptions, for 7 yr to come.

In spring he often cached surplus mice at the wood's edge or in the garden, mostly under roots, logs and bushes, sometimes on the roof or balcony; but never more than one piece in one place. His new mate, an unidentified female to whom he had carried food for a few weeks sometimes came alone to look for his caches. How she found them is unclear. Maybe she searched the most promising structures (edges, corners, holes) which is difficult in the wood. Fran Hamerstrom suggested, he may have left some droppings. At any rate, my kestrel was breeding again, in his first year of freedom, and he did so every following year until he disappeared in February 1986.

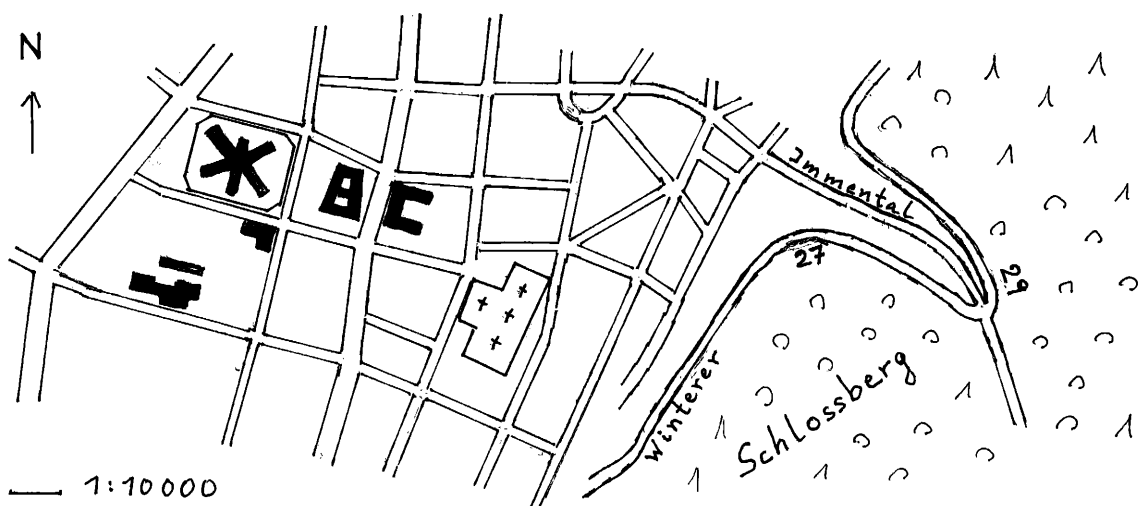


Figure 1. Section of the map of Freiburg city. From right to left: Wintererstrasse 29 (my house), Wintererstrasse 27, old churchyard, gymnasium, Herder Publishers, the jail, north of the campus where the big Chemical—in front of small Zoological—and at the corner the Physical Institute was located.

Since Fridolin always flew in the direction of Schlossberg (Fig. 1) I suspected him to nest there in a hollow tree or on a crow's nest. I searched in vain. At last I followed him by car. He flew along Wintererstrasse up to No. 27, then headed for the city. Sometimes he landed in the trees of the old churchyard, sometimes at the gymnasium or the publisher's. I lost him from my view and though I searched these places I never found the nest. Finally, we gave him a young rat, about twice the weight of the usual mice, and then he flew straight to the jail. There were three young, about 3 wk old.

This was in June 1983. He had probably nested there since 1979 for I knew there were kestrels. At the end of July 1980, I observed a young bird twice near my house and noted: the kestrels at the jail fledged as late as this one, which probably was one of them. I now watched the male carrying white mice to his young and for proof I asked a jailer, since I was not allowed to go in, to collect some pellets: They are white, partly mixed with some gray hair of wild mice and a few chitinous remains of insects.

On 2 July 1983 after the young fledged I saw one of them tumble down and disappear from view. The female flew down toward it. This young survived the fall, but I was told that there were dogs in the yards during the night, a potential danger for fledglings.

In 1984 the kestrel had a second female and two nests on the two sides of one block with the roof between them. The secondary female was a young one.

Trios have been reported several times in European Kestrels (G. Matthäus pers. comm., W. Scherzinger pers. comm., pers. observation) and Lesser Kestrels. ³ Altenburg et al. ⁴ and Hamerstrom ⁵ have studied polygyny in harriers

(*Circus* spp.) and Newton ⁶ lists 11 species of raptors with known cases of polygyny; these apparently depended on favorable environmental conditions, mainly food abundance.

FEEDING

Usually, I offered Fridolin live white mice on the lawn or on one of two balconies, rarely young rats or 1 d old chickens, exceptionally chicken necks or beef heart. When he felt safe, he gripped the mice at once, killed them by biting their forehead between the eyes and ears (not the nape of the neck, this by kestrels is only done with bird prey), then started for his favorite feeding place in a large beech tree. At other times he took only a few bites and carried the rest to the nest site. Sometimes he flew directly to the nest or cached his kill and came back for another mouse, on occasion repeatedly. He also caught what I threw into the air. Sometimes, when his mate or young had followed him, he presented them with food right here.

By his eagerness and the number of prey items Fridolin needed, I could judge whether he had a family. During 2 yr we recorded all items (Fig. 2). The high peak in June 1984 seemed unusual. He then had two females and, unfortunately, the mice I could offer him were small, about half the weight of adults—though this is not unnatural, for in the wild young mice will be easier to catch than experienced ones. The 1985 curve seems to be more characteristic.

One day, Fridolin chased a bird, probably a Robin (*Erithacus rubecula*), nearly colliding with a car. He finally caught the bird and flew onto the roof of the house to feed

He even tasted fried chicken. My dog Mira went out

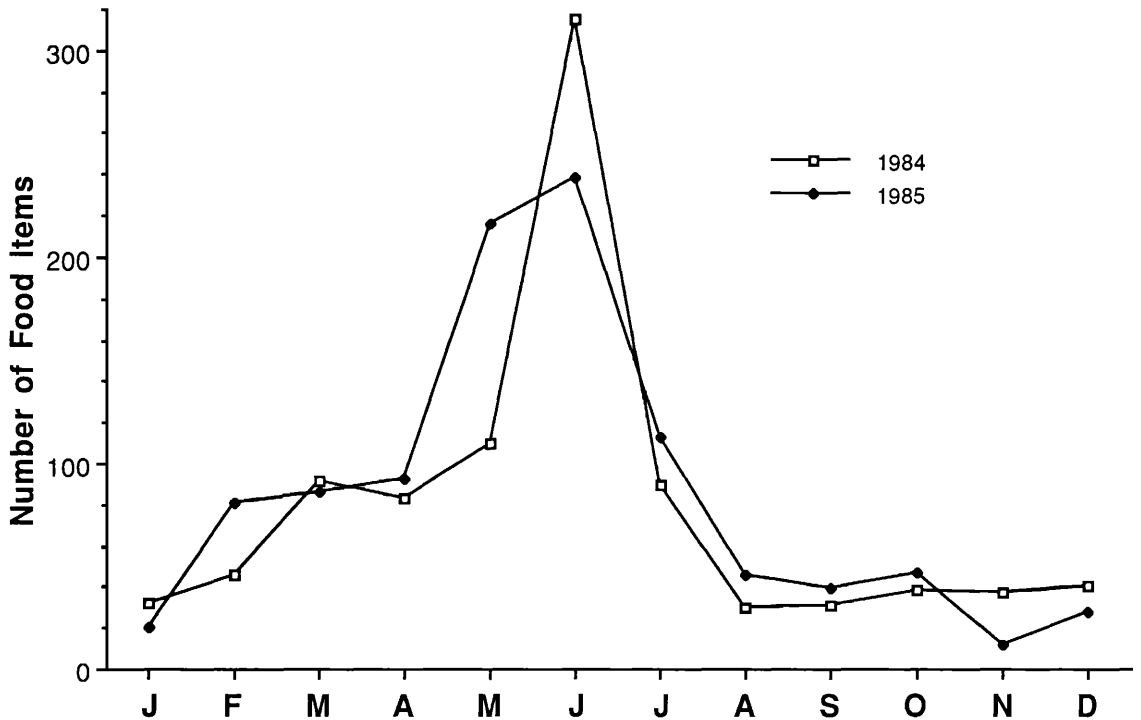


Figure 2. Number of mice and other food items taken per month in 1984 and 1985.

into the garden with part of the carcass (backbone and ribs), some meat and the lungs still adhering. She left it lying on the grass. To my surprise, the kestrel came down from his perch, settled on the chicken bones and fed, evidently enjoying his meal. Having finished, he cached the remains. This did not look similar to anything he had eaten and did not move. Mira had never served him before. How did he know it was edible?

LEARNING AND COMMUNICATION

When Fridolin had to care only for himself, he usually came once or twice in the morning and again in the afternoon, depending on daylight. While he raised young he came once more in the evening, or even throughout the day.

Until September 1984 I had a study room in the Zoological Institute. As it seems, the falcon had learned when he could expect me to be at home. He waited on his favorite perch, the tip of a very high spruce. Often he stayed there until I had come up to the house. At other times he followed me through the garden, and when he was in a great hurry he even came down to the gate, followed me into the wood where I went with the dog or even flew towards the approaching car.

The highest building on the campus is the Chemical

Institute. During courtship the pair often spent several hours a day on its flat roof and the balconies facing my window in the Zoological Institute. Thus, at times, I could keep record of what they did. But, evidently, the male observed me also. More and more frequently we arrived at home at about the same time. He could see me as I left the Institute and went to my car. No doubt he had learned that this meant I would be at home soon, and I am convinced that he sometimes followed my car.

From the roof of the Physical Institute I could watch him flying to the nesting site and back to my house. The shortest time it took him to catch two mice he brought to his mate was 5 min, with a flight distance of 1.5 km one way. He glided up the roofs and sailed to the next ones saving energy for his many flights to and from. Driving home, I sometimes saw him pausing somewhere in Immental street which, as far as I know, was formerly not his route.

Generally, he used visual signals to make me aware of his presence, when he was not able to just sit and wait. Sometimes he uttered an excited "kli-kli-kli," but then, in most cases, there were dogs or crows or something else that disturbed him. It may have been also a sign of impatience, but I doubt that he intended to call me—something my Tawny Owls (*Strix aluco*), coming at night, certainly and successfully do.

COMPETITORS AND PREDATORS

Perhaps attracted by the birds in the aviary, a male kestrel used to catch mice near my house from the end of December 1969 to the beginning of April 1970. He, too, learned to wait for me at certain times and to make me aware of his presence. In later years, there were sometimes young I had raised. Other adult kestrels came only exceptionally. Thus, there was no intraspecific competition.

Red Fox (*Vulpes vulpes*), Badger (*Meles meles*), weasels (*Mustela erminea*, *M. nivalis*), Beech Marten (*Martes foina*) and domestic cats (*Felis catus*) visited my garden. They may have found some caches and this might have caused Fridolin to carry away his prey to some prominent buildings in his nesting area: the jail, the Chemical Institute and Herder Publishers.

Carrion crows (*Corvus corone*) sometimes waited in the trees and tried to steal what he kept in his talons. They were mobbed and chased. Once a jay (*Garrulus glandarius*) killed a mouse running in the grass while the falcon looked at it. The jay seemed to be an experienced hunter.

Blackbirds (*Turdus merula*) attacked the kestrel while they had young and for good reasons he was very cautious with them. They mobbed him furiously. Once a cock hit him so badly that he sat on the ground numb for a few seconds.

Fridolin's most dangerous interaction occurred with a buzzard (*Buteo buteo*). The buzzard had discovered that he could easily catch mice here and it was my fault not to drive him away from the beginning. Once, he stooped down onto the falcon who was attempting to catch a mouse in the grass. The kestrel was quicker and more maneuverable. The kestrel chased the buzzard extensively, but after this fearful experience he never tried to hunt as long as the buzzard was near.

AFTER THOUGHTS

There are several reports of diurnal raptors flying free⁷⁻¹¹ (H.-H. Beecken pers. comm.). All of these birds were kept food dependent. Otherwise, as emphasized by H. Brüll, buzzards and kestrels in their first year will go away with certainty unless they are tethered or caged before they begin to disperse in late summer or autumn.

Fridolin had been caged at that time and he had spent his second winter in an aviary near my house. He may have remembered the area when he was released at this site 5 yr later. But he was not trained and not food dependent. In winter 1980-81 he stayed away for 6 mo; he was capable of supporting himself alone.

When I last saw him on 5 February 1986 he looked healthy. Nevertheless, he may have had difficulty obtaining food. This was a hard winter. Many birds of prey starved, and the buzzard besieged us. I tried many times and trapped him at last after heavy snowfall but, probably, too late to save the kestrel.

Falconers train their birds to hunt with them. In his two-choice experiments with Red-headed Falcons (*F. chi-*

quera) W. Bednarek (pers. comm.) obtained positive results for color vision and pattern discrimination. Fridolin gave me a chance to observe how much kestrels are able to learn by themselves in their natural environment and in contact with other animals, including man. I suppose that the behavioral adaptability of kestrels partly depends on their cognitive abilities.

Similar experiences are reported by Frances Hamerstrom.^{5 12} In her harrier book she writes "We are convinced that the female remembered our car, a tan Chevrolet roadster, and that she remembered it for a year. We visited her nest two or three times a day to empty the crops of her young for food-habit studies. She used to come toward the car when it was still a half mile away kekking her 'displeasure'. The next summer a female harrier came toward our car half a mile from her nest, kekking. When we borrowed Paul Errington's car, a dark Sedan, and drove along the same road, she ignored it. I am convinced this is a case of memory." And when Nancy, the eagle, was to get her freedom, Fran "left by moonlight so Nancy would not follow my car."

ACKNOWLEDGMENTS

Markus Martin gave me the tiercel, lent me the trap and cared for the buzzard. Mr. Biehler gave me the two females. The Forstschutzstelle Südwest allowed me to use an extended pergola of the former countryhouse for building aviaries. The Zoological Institute of Freiburg University provided a study room, the Biophysical Institute and Firma Gödecke lots of mice. Ulrike Kaufmann, Gerda Kopfmann and Vesta Stresemann served the kestrel sometimes while I was absent. Mr. Jäger collected the pellets. Marianne Kirchofer typed the manuscript. Keith Bildstein, Joe Schmutz and Dan Varland helped to "Americanize" the text. I wish to thank all of them.—**Amélie Koehler, Wintererstrasse 29, 7800 Freiburg, Germany.**

LITERATURE CITED

- 1 A. KOEHLER. 1969. Captive breeding of some raptors. *Raptor Res. News* 3(4):3-18.
- 2 ———. 1970. Red-headed Merlins breed in captivity. *Captive Breeding diurnal Birds of Prey* 1(1):16-19.
- 3 F. HIRALDO, J.J. NEGRO AND J.A. DONAGAN. 1991. Aborted polygyny in the Lesser Kestrel *Falco naumanni* (Aves, Falconidae). *Ethology* 89:253-257.
- 4 W. ALTENBURG, S. DAAN, J. STARKENBURG AND M. JIJLSTRA. 1982. Polygamy in the marsh harrier, *Circus aeruginosus*: individual variation in hunting performance and number of mates. *Behaviour* 79:272-312.
- 5 F. HAMERSTROM. 1986. Harrier: hawk of the marshes. Smithsonian Institution Press, Washington, DC.
- 6 I. NEWTON. 1979. Population ecology of raptors. T. and A.D. Poyser, Berkhamsted, U.K.
- 7 H. BRÜLL. 1964. Das Leben deutscher Greifvögel. Gustav Fischer Verlag, Stuttgart, Germany.
- 8 O. KILLIAN. 1975. Das Ausgewöhnen von Habichten und Sperbern. *Deutscher Falkenorden* 1975, 53-54.

- 9 U. BARTELS. 1980. Prägung von Verhaltensweisen. Deutscher Falkenorden 1980, 77-78.
- 10 W. BEDNAREK. 1983. Das Verhalten von Rotkopffalken (*Falco ch. chiquera*) im Freiflug. Deutscher Falkenorden 1983, 74-85.
- 11 D. KURRINGER. 1986. Turmfalke Pepsi. Deutscher Falkenorden 1986, 83.
- 12 F. HAMERSTROM. 1970. An eagle to the sky. Iowa State University Press, Ames, IA.

HAMERSTROM SCIENCE FROM A "Gabboon's"¹¹ POINT OF VIEW

The rewards of scientific work include personal gratification gained from ingenuity, satisfied curiosity, recognition, and financial gain. Recognition by scientists of work by a peer is achieved in at least three ways: by citing a person's published paper, through awards from societies or institutions, and by attributing an idea or approach to a person.²

Frederick and Frances Hamerstrom have fared well in all of these recognition categories. However, because even the most valuable knowledge often is vague initially and not acquired in identifiable blocks, giving recognition can be difficult. Sometimes a "seed" for an idea is acquired but this seed can mature into a slightly different idea after nurturing. Furthermore, subtly different world views or paradigms can be acquired through someone else's influence and these can play an important role in the recipient's future. Because such subtle, conceptual acquisitions often fall through the sieve of the reward system, the purpose of this special "Hamerstrom Issue" of the *Journal of Raptor Research* is to pay tribute to recognizable and subtle contributions that Fran and Hammi³ have made. Such contributions may have been made without the full awareness of the benefactor or Fran and Hammi.

A second purpose for this essay is to examine the Hamerstroms' approach to research from a methodological perspective. I compare what I recognize to be a Hamerstromian style in biological research to other approaches in science. My interpretation will no doubt reflect more of my own perceptions than those of Fran and Hammi, for the same reasons that science "... is not derived solely from what is immediately apparent to the eye and ear, but is also constructed by inference from all manner of other items of information."⁴

Having been in the forefront of a number of movements within ornithology and wildlife management according to some, the Hamerstroms have also been perceived as being on the periphery of mainstream biological science by others. Forefront contributions include, for example, the insightful study of dominance among individually marked Black-capped Chickadees (*Parus atricapillus*)⁵ at a time when only loosely-conceived descriptive studies were commonplace in the ornithological literature. The Hamerstroms have championed bird and mammal trapping, marking and data recording methods; they have saved a population of an endangered subspecies, the Greater Prairie Chicken (*Tympanuchus cupido pinnatus*), from extirpation through innovative ways; and have made several

significant conceptual contributions to conservation and population biology.⁶ Yet, some of their approaches have seemed unconventional, and their abstinence from certain experimental and statistical approaches puzzling. In an attempt to explain this potential paradox, I examine two features of the Hamerstroms' approach to biology: their emphasis on natural history with a reluctance to wax theoretical, and their aversion for using analytical statistics.

In Fran and Hammi's own words, "Speculation (properly labelled) has its place." While conservative with speculation, the Hamerstroms stressed the need for prediction.⁷ However, the tying of observations into a theoretical knot through imaginative speculation was done sparingly by them. Hamerstrom science seems to resemble the approach of a kind of purist. Interpretation was conservatively applied and speculation disciplined. I have witnessed the Hamerstroms' insatiable interest in discussing observations of natural events and patterns in nature. It did not seem to matter whether those patterns dealt with raptor biology or with an attempt to map the location of a human gene on a chromosome, a project my wife carried out. However, I detected comparatively less interest in discussing what predictions would follow from parental investment theory or from evolutionary stable strategies. Why this reluctance to move out on a theoretical limb, when going beyond the collation of individual observations and into the formulation of general statements is an essential part of science?

Despite its considerable power, the scientific method has limitations. According to T.S. Kuhn,⁸ "philosophers of science have repeatedly demonstrated that more than one theoretical construction can always be placed upon a given collection of data." Often no one single method of investigating the unknown is clearly best. Nor should any one method be easily discarded because it has limitations, as an unlucky "carpenter may reject his tools."⁸ However, the most capable carpenter is the one who produces a useful product despite the limitations his or her tools might have. The carpenter who is fully aware of the limitations of the tool and able to compensate for them is likely to be the most capable in the long run. The Hamerstroms' execution of the craft has much to recommend it.

Perhaps the Hamerstroms' conservative approach to theory was because of an awareness of the limitations in the scientific way of knowing. Albert Einstein explained his view of how scientific discoveries are made.⁹ His de-