Other studies on loons indicate the importance of vegetation and invertebrates during the early prefledging period, as well as to a shift to fish. Young Arctic Loon (*G. arctica*) and Pacific Loon (*G. pacifica*) chicks are fed a diet consisting mainly of aquatic insects (Lehtonen 1970, Bergman and Derksen 1977, Sjolander 1978), which shifts to a diet of mostly fish after 40 days (Lehtonen 1970). As Red-throated Loon (*G. stellata*) chicks become older, the parents feed them fewer but larger fish (Reimchen and Douglas 1984). Vegetation may be important for young Yellow-billed Loon (*G. adamsii*) chicks, comprising about 15% of the food items fed to chicks less than about 35 days old (Sjolander and Agren 1976). Observations on Common Loon chicks (Munro 1945, Parker 1988) and Pacific Loon chicks (Bergman and Derksen 1977) indicate that they can be raised on a diet that does not include fish, provided that invertebrates (aquatic insects, crustaceans, and gastropods) are sufficiently abundant. All this suggests that invertebrates may have accounted for a significant proportion of the unidentifiable food items in our study, particularly for young chicks.

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Movement of a nestling between American Crow nests.—Intraspecific brood parasitism by egg moving and egg laying has been reported for 79 avian species (Yom-Tov 1980, MacWhirter 1989). MacWhirter (1989) pointed out that this is a newly reported and little-understood phenomenon. We located no published accounts of transferring nestlings between nests, and we found documentation of only two corvid species, the Black-billed Magpie (*Pica pica*) and the Pinyon Jay (*Gymnorhinus cyanocephalus*), moving eggs (Trost and Webb 1986). We here report evidence of nestling movement by the American Crow (*Corvus brachyrhynchos*).

While conducting a study of American Crows in central Iowa, we visited 59 nests to collect biological information and to band young. One nest was located in an urban woodlot in Ames, Iowa, about 0.5 km west of Iowa State University campus. The nest was situated about 10 m high in an ash tree (*Fraxinus* sp.). When we first climbed to the nest on 1 May 1979, it contained three eggs. Two adults also were present. On 8 May 1979, we again visited the nest and found three young estimated to be five days old based on an aging technique using size, skin color, opening of the eyes, and plumage development (Good 1952). Again, two adults were present. We took blood samples from each nestling by heart puncture. One died from this procedure, and we removed it from the nest.

On 30 May 1979, we visited the nest a final time to take more blood samples and to band the young. At this time, three 4-week-old young were in the nest, and five adults were present. The immigrant nestling must have been placed in the nest either as an almost terminally incubated egg or as a nestling. Because the age difference among the three young appeared to be only one or two days, the latter is likely. It is possible, however, for size and developmental disparities of nestlings of different ages to be minimized by disproportionate feeding (Skutch 1976).

The likelihood that the third nestling could have been a recent fledgling from a nearby nest is not supported for several reasons. During our last visit, all three nestlings stayed in the nest. We never observed a recently fledged crow exhibiting the same relatively passive behavior when approached by humans. Gross (1964) and Good (1952) stated that four-week-old nestling crows may stand on the rim of the nest or even go to nearby branches of the nest tree. At five weeks, they are able to leave the nest and make their initial flight. However, if disturbed, they may flee from the nest before five weeks. Kilham (1989) reported crows from two nests fledging at 37 and 41 days old. Of 38 nests we visited when young were estimated to be $\geq$ four weeks old, 17 stayed in the nest, 13 left when approached, and eight had fledged already. The closest known crow nest to the one on which we are reporting was about 500 m away. None of the three nestlings was capable of flying this distance.

We also do not think that the three additional adult crows engaged in mobbing behaviors during our last visit to the nest were necessarily parents of the immigrant nestling. It is not unusual for neighboring crows to assist one another in anti-predator behavior. We experienced mobbing groups of up to 20 individuals during the nesting season.

Crows are physically capable of transporting young nestlings. Goodwin (1976) and Gross (1964) reported several incidents of crows carrying relatively large objects, including an ear of corn by their feet.

Social aspects of crows also may be important factors allowing or contributing to nestling movement between nests. Cooperative nesting and strong long-term pair bonds have been reported for American Crows (Schaefer 1983, Kilham 1989). Schaefer (1983) even documented a two-year-old crow nesting only 0.5 km from its birth nest. Individuals with close familial ties would be more likely to interact and to exchange nest items than would unrelated birds.

All previous reports of egg moving have concluded that the natural parent bird moved the egg into the nest of a foster-parent-to-be. In this case, we should not exclude the possibility of the foster parent actually taking a nestling from another nest. Crows are extremely gregarious and interact with one another in many ways, including cooperative feeding and nesting (Kilham 1989). Yom-Tov (1976) found that Carrion Crows (*C. corone*) did not distinguish strange chicks introduced into their nests containing nestlings. McGowan (1990) reported an incident of Fish Crows (*C. ossifragus*) adopting a young Blue Jay (*Cyanocitta cristata*) that had gained access to the crow nest by unknown means.

Brown (1984) and Trost and Webb (1986) reported that synchronous nesting of Cliff Swallows (*Hirundo pyrrhonota*) and Black-billed Magpies may have facilitated intraspecific

nest parasitism. The average hatching date for central Iowa crows in 1979 was 1 May (N = 26; range = 25 April to 13 June). Nine of these nests hatched eggs during the first week of May. We consider this pattern asynchronous.

The frequency of nestling movement in crows appears to be low compared to other quantitative studies of intraspecific nest parasitism. Evidence of nestling moving was observed in only one (3%) of 31 nests we visited more than once. Brown (1984) reported that up to 24% of nests in various Cliff Swallow colonies were parasitized by colony members laying eggs in a conspecific's nest. Of 39 Black-billed Magpie nests examined daily, 38% had one to three eggs disappear between laying and the final day of hatching (Trost and Webb 1986). Three nests (8%) also had an unmarked egg appear toward the end of incubation.

Although we found no other report of nestling moving in the literature, its occurrence would be difficult to detect. Large avian nestling predators observed carrying unidentified nestlings probably are assumed to be transporting food items.

Because of its rarity, egg and nestling movements in crows and other species are difficult to study systematically and experimentally. Field biologists must be made aware of these reproductive strategies and be prepared to record incidental sightings.

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