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# HAND-REARED LOGGERHEAD SHRIKES BREED IN CAPTIVITY[1]

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Many continental populations of the Loggerhead Shrike (*Lanius ludovicianus*) have been declining in abundance for a number of years (Robbins et al. 1986, Brooks and Temple 1990, Lowe and Butcher 1990), and the San Clemente Island subspecies (*L. l. mearnsi*) in California is highly endangered (Scott and Morrison 1990). Consequently, biologists have become increasingly interested in using manipulative techniques to study factors underlying the decline and to augment or restore wild populations. These techniques include the release of captive-raised and captive-bred shrikes, the translocation of adults, their eggs and young, and related manipulations (Kuehler et al., in press). It seems worthwhile, therefore, to report some details on the successful breeding of this species in captivity in 1971, especially as the loggerhead has not previously bred in captivity, and the few successful attempts with Eurasian species (*L. collurio, L. excubitor, L. schach,* and *L. vittatus*) have, with one exception (Günther 1904), involved wild-caught, adult pairs (England 1970, 1971a, 1971b; Weischner 1989).

The breeding pair of loggerheads came from a group of eight young shrikes taken from nests in northeastern Colorado in June, 1970, and hand-reared from the age of 8–9 days. These shrikes were transported to Dryden, New York as nestlings and were kept together until late September, when increasing aggression necessitated separation. During this period the birds were trained (Cade 1962, 1967) and allowed daily flights outside their cage as part of a study of the development of their hunting and impaling behavior. During fall and winter, individuals were housed indoors in separate, wire-mesh cages measuring 1.2 m in each dimension. The cages were arranged so that all the birds could see and hear each other. Five birds contracted avian pox and died during the winter; the three survivors were two males and a female.

In mid-April, 1971 one of the male shrikes began a daily routine of singing and displaying in an extreme upright posture, leaning somewhat backward with its beak pointed straight up, and often turning slowly to one side or the other in this extreme upright posture while quivering its wings and singing. The behavior appeared identical to that of captive Northern Shrikes (*Lanius excubitor*) observed previously (Cade 1962).

On 19 April, this bird was transferred to the Behavioral Ecology Building (Hawk Barn) at the Cornell University Laboratory of Ornithology and placed in a chamber measuring 3 m wide by 6 m long and varying from 4.2–6 m high. The room had been provided with several freshly cut, leafless willow (*Salix* sp.) shrubs and hawthorns (*Crataegus* sp.) ranging from 2–3 m high to simulate a natural environment. Some branchlets were broken and sharpened to provide convenient impaling devices. Throughout the breeding season, laboratory mice, nestling sparrows and starlings, and day-old cockerels were provided for food. In addition, some insects (beetles, wasps, flies) entered the room from an open, wired front and were eaten. Later, an old but well-formed nest of the Brown Thrasher (*Toxostoma rufum*) was affixed 1.5 m up against the trunk of a hawthorn, and twigs, dry grass, cotton tufts, and wool yarn were placed on the floor for nesting materials.

In a few days, the male appeared at ease in his new chamber, singing and displaying from several prominent perches. On 27 April, the female shrike was let loose in the chamber. She perched low in the middle of a hawthorn and did not move. The male flew down and hopped all around in branches near her. She did not flee, vocalize, or attempt to fight but sat still in a

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hunched posture. The male then flew up and perched in an upright posture above and to one side of her and began a vigorous bout of singing and wing-quivering. In a few minutes the female began to quiver her wings and utter repeated "*mak*" or "*jak*" calls associated with food-begging. Suddenly, the male flew down to an impaled mouse, tore off a piece in his beak, flew to the female, landed by her side, presented the tidbit to her, uttering "*wuut*" calls. She took it in her beak, held it until the male flew back to his high perch, and swallowed it.

The two birds then appeared to have formed a functional pair-bond. Food-begging by the female and courtship-feeding occurred frequently every day, but copulation was never seen. Both birds perched prominently, often side-by-side. Although both displayed in the extreme upright, head-up posture with quivering wings and uttered various, subdued call notes, the male did most of the prolonged, rhythmic singing.

In late April, the male began carrying twigs about in his beak. He partly dismantled the old thrasher's nest but did not attempt to construct a nest. The female did not participate at this stage or apparently pay much attention to the male's incipient nest-building activities, which continued intermittently for several days. Abruptly on 8 May, the female began visiting the thrasher's nest, removing twigs, and constructing her own nest in another hawthorn. The male joined her, and they dismantled the old nest and built a complete, perfectly formed shrike nest with felting and lining in two days. The female did most of the actual construction, while the male provided her with twigs and some of the lining material. Although Miller (1931) originally stated that only the female builds the nest and questioned reports to the contrary, he somewhat modified this conclusion later (in Bent 1950). Recent observations prove that the male definitely participates (Scott and Morrison 1990; see, also, Sprunt in Bent 1950).

On 15 May the female laid her first egg, and she laid one every day between 09:00 and 11:00 hr for a total of seven eggs. She began to incubate or at least to remain constantly in the nest after the second egg. The male continued to feed her on the nest, but did not incubate. The female was never seen to leave the nest except for brief intervals to defecate or preen. She remained quite tame and stayed on the nest when people inspected the eggs, but the male became extremely aggressive and attacked intruders by diving at their heads and screaming "*jaa*" calls.

The eggs hatched asynchronously: two eggs on 4 June, two on 5 June, and three on 6 June. If the last egg laid was also one of the last to hatch, then the minimum incubation time was 16 days. If effective incubation began after the laying of the second egg, then eggs one to three were incubated 19 days, eggs four and five for 18 days, egg six for 17 days, and egg seven for 16 days. The incubation time for the Loggerhead Shrike has been reported to be 15–16 days or less (Miller 1931, Bent 1950), but more recent records from field studies range from 16 to 18 days (Scott and Morrison 1990, Tyler 1992).

Average incubation time for shrikes nesting in captivity is longer, 18 to 20 days for *L. excubitor* and *L. schach* (England 1971a, 1971b). Weischner's (1989) female *L. collurio* began incubation with the penultimate egg (four of five), and the first egg hatched 19 days later. It may be that 16 days represent a minimum time for last-laid eggs that undergo some acceleration in development relative to earlier eggs. Alternatively, captive shrikes may incubate longer than wild ones. Seasonal variations of 3–5 days have been reported for other passerine birds (Welty and Baptista 1988).

Asynchronous hatching has been reported in wild broods of both *ludovicianus* (Porter et al. 1975) and *excubitor* (Dement'ev and Gladkov 1968; Cade, unpubl. data), although some Loggerhead Shrikes begin incubation with the penultimate egg (Miller 1931). More information is needed regarding why some shrikes begin incubation with the first or second egg, while others wait until the penultimate or last egg.

The female Loggerhead Shrike continued to brood her newly hatched young, but the male did not bring much food to the nest. Few food deliveries were seen in the first post-hatching days. One nestling died or was killed the day after the last eggs hatched; it was found impaled and partly eaten in the chamber. Over the next five days, the other young also disappeared from the nest and their remains were impaled. Observation failed to reveal whether these young died in the nest and were then removed by the parents, or whether one or both parents killed them. The desultory rate of feeding suggests the former.

The pair soon began to refurbish the nest. The first egg of the second clutch of five eggs was laid on 20 June, eight days after the last chick died. Assuming that human entry and disturbance might have caused loss of the first brood, the birds were fed remotely through a chute and observed from outside the chamber through a one-way window. By 16 July, four young could be seen in the nest when the parents brought food. On 20 July when the young were judged to be 11–12 days old, the nest was examined. There were two large young and one runt. The two larger ones appeared normally developed and healthy, and were removed from the nest for hand-rearing. The runt later disappeared.

England (1971a, 1971b) also reported high mortality in the young shrikes hatched in his aviaries, a problem which he attributed in part to unnatural types of food (e.g., fly pupae) and poor nutrition, and in part to inadequate provisioning by the male. Günther's (1904) and Weischner's (1989) pairs of Red-backed Shrikes each reared three young from 10 hatchlings (two sequential broods of five).

After the two hand-reared juvenile shrikes were fully feathered and had been flying for about two weeks, they were released outside the Behavioral Ecology Building in a brushy area adjacent to Sapsucker Woods Sanctuary. Initially, their diet was supplemented with laboratory mice, but they were soon observed taking their own food. They remained in the area and hunted insects and mice daily until late September, when they disappeared.

Limited avicultural experience with five species indicates that shrikes form functional pair-bonds rather easily in captivity and that pairs will readily mate,

produce fertile eggs, and incubate clutches full-term. As with wild shrikes (Bent 1950), the captives will lay again several times after loss or removal of their eggs or young, and after rearing young (Günther 1904; England 1971a, 1971b; Weischner 1989). Unfortunately, while the production of viable eggs and nestlings is not difficult for captive shrikes, few young are successfully raised to fledgling age. This appears to stem primarily from inadequate parental care by the male, which normally feeds the female and nestlings for several days after hatching occurs. Further work with captive shrikes is needed to determine whether this malfunction is related to inadequate types of food available to feed the young in captivity (England 1971a), to aberrant behavior induced by the stress of confinement, or to some other factor.

Meanwhile, for the purposes of practical husbandry and the production of large numbers of shrikes for research, release, and reintroduction, it should be possible to take advantage of the high egg-producing capacity of female shrikes by inducing multiple clutches, artificially incubating eggs, and hand-rearing the young (Scott and Morrison 1990; Kuehler et al., in press). Although more precise information on variables influencing incubation period and normal embryonic development would be useful, the fact that hand-reared Loggerhead Shrikes will breed in captivity and can be successfully released in the outdoors makes these manipulations feasible and potentially useful in both research and conservation.

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