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NORTH AMERICAN OWLS

Biology and Natural History

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Common Barn-owl *Tyto alba* (Scopoli) 1769

Other Vernacular Names:
American Barn-owl; Barn Owl; golden owl; monkey-faced owl.

North American Range (Adapted from AOU, 1983.)

Resident in North America from southwestern British Columbia, western Washington, Oregon, northern Utah, southern Wyoming, Nebraska, Iowa (rarely north to North Dakota and southern Minnesota), southern Wisconsin, southern Michigan, southern Ontario, New York, southern Vermont, and Massachusetts south through the United States and Middle and South America to Tierra del Fuego. Northernmost populations in North America are partially migratory, with some birds reaching southern Mexico. Wanders casually north to southern Alberta, southern Saskatchewan, southern Manitoba, northern Minnesota, southern Quebec, New Brunswick, Newfoundland, and Nova Scotia. Local in the West Indies (Cuba, Hispaniola). Other races occur widely in the Old World. (See Figure 19.)

North and Central American Subspecies (Adapted from AOU, 1957, and Peters, 1940, with some recent additions.)

T. a. pratincola (Bonaparte). Occurs in North America as described above, south to eastern Guatemala and probably eastern Nicaragua.

T. a. lucayana (Riley). Resident in the Bahama Islands.

T. a. furcata (Temminck). Resident in Cuba.

T. a. niveicauda Parkes and Phillips. Recently (1978) described from the Isle of Pines.

T. a. glaucops (Kaup). Resident in Hispaniola and the Tortuga Islands.

T. a. guatemalae (Ridgway). Resident in western Guatemala, El Salvador, western Nicaragua, and Panama to the Canal Zone. Presumably also in mainland Honduras, although both the validity of *guatemalae* and its geographic range are still uncertain (Parkes and Phillips, 1978).

T. a. bondi Parkes and Phillips. Recently (1978) described from the Bay Islands, off the Caribbean coast of Honduras.

Measurements

Wing (of *pratincola*), males 314–346 mm (ave. of 18, 328.6), females 320–360 mm (ave. of 18, 336.9); tail, males 126–152.5 mm (ave. of 18, 138.1), females 127–157.5 mm (ave. of 18, 141.1) (Ridgway, 1914). The eggs average 43.1 × 33 mm (Bent, 1938).

Weights

Earhart and Johnson (1970) reported the average weight of 16 males as 442.2 g (range 382–580), and that of 21 females as 490 g (range 299–580). Mikkola (1983) reported the average of 17 males and 55 females of the Eurasian population as 312 and 362 g respectively. The estimated egg weight is 24.4 g.

Description (of *pratincola*)

Adults. Sexes nearly alike, but females of most populations average darker than males, especially on the underparts. *Average plumage:* Ground color of underparts bright ochraceous-buff or orange-ochraceous, but this overlaid with a delicate mottling of dusky and grayish white, forming a mottled grayish effect, each feather, except remiges and rectrices, with a median streak of black on distal portion, enclosing a small subterminal spot of white; remiges with the darker mottlings condensed into four or five indistinct transverse bands; tail varying from ochraceous-buff to white, mottled with dusky and crossed by about five mottled dusky bands; face white tinged with vinaceous-brown, and with an area of dark vinaceous-brown in front of and narrowly surrounding eye; facial disk soft ochraceous-buff or orange-ochraceous above, deeper ochraceous below, where "ruff" feathers of posterior border are tipped with dark brown or brownish black; underparts white, but this extensively suffused or overlaid by ochraceous-buff and with numerous small black spots or dots. *Dark extreme:* Underparts wholly ochraceous-buff or light ochraceous, speckled with black; upperparts as in average plumage or somewhat darker; face more strongly tinged with vinaceous-brown. *Light extreme:* Face and entire underparts pure white, the latter sometimes immaculate; facial rim white, with tips of feathers orange-buff; remiges and tail sometimes uniformly mottled, or the latter sometimes white, with well-developed bands of

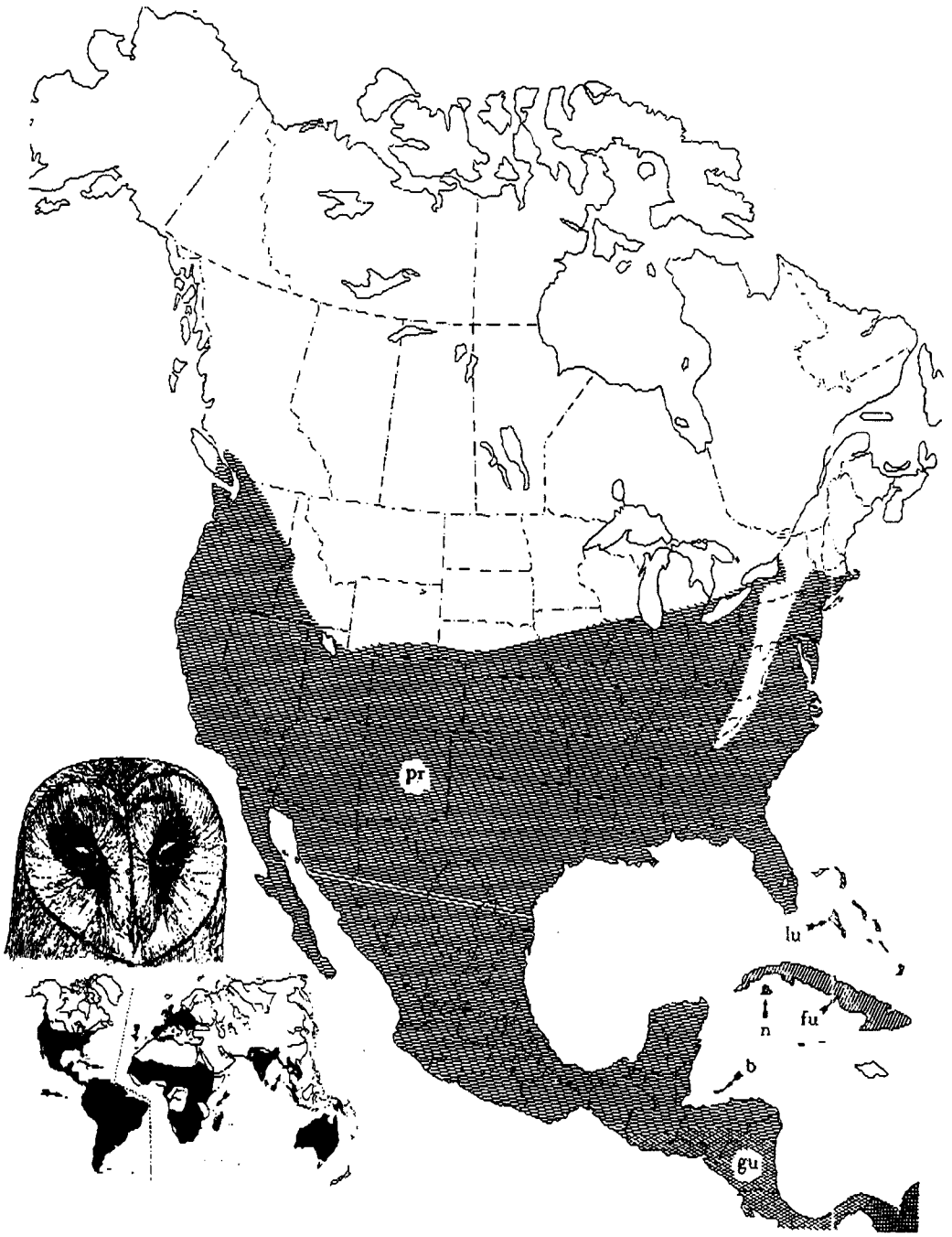


Figure 19. North American distribution of the Common Barn-owl, showing residential ranges of races *bondi* (b), *furcata* (fu), *guatemalae* (gu), *lucayana* (lu), *niveicauda* (n), and *pratincola* (pr). Indicated racial limits of *guatemalae* are only approximate. World distribution shown in inset, with arrows indicating isolated insular populations.

mottled dusky. *All types:* Eyes blackish, bill ivory-colored; feet dirty yellow-brown; claws black. In study skins, adult males usually have clear ivory bills, while those of females have dark side and paler tips. Young males appear to resemble females in this feature (Parkes and Phillips, 1978).

Nestling. Entirely immaculate white in the first natal plumage; a second natal down follows 12–14 days after hatching that is longer, thicker, and buffish creamy. Following the loss of the down immatures are almost identical to adults in plumage (Mikkola, 1983).

Identification

In the field. If seen, common barn-owls are easily recognized by their nearly pure white underparts and the distinctive heart-shaped facial disk surrounding dark eyes. The typical call is a loud screaming *shrreeeee* uttered in flight, which is variably hissing, somewhat gargling-like or tremulous, and usually drawn out to last about 2 seconds. There are also a wide variety of other calls, none of which resembles the hooting sounds usually attributed to owls. Highly nocturnal, and rarely seen during the day unless flushed from a roost or nest.

In the hand. This is the only North American owl with a heart-shaped facial disk, and the only one in which the claw of the middle toe is comblike.

Vocalizations

Sound production in the barn-owl is extremely diverse, as is to be expected in a highly nocturnal species; Bunn, Warburton, and Wilson (1982) described 15 distinct calls as well as tongue clicking and wing clapping modes of sound production. Seven of the vocalizations consist of screaming or screeching calls, of which the screech, often uttered in flight, is perhaps best known. This rather eerie and unpleasant vocalization functions as a "song" in that it serves to proclaim territory, attract unmated females, and sexually stimulate the pair. Both sexes utter it, the female's note generally being more husky. A series of mellow screeches by the male, or "purring," is used to attract his mate, and a similar wailing call, of lower pitch than the screech, is a probable female call. Warning screams are used as an alarm signal, and other screams are used as anxiety, distress, or mobbing signals.

Hissing sounds include sustained and brief defensive hisses, single hisses occurring during courtship or mate-recognition situations, and "snoring," a wheezing or almost whistling hiss that varies greatly but is persistently repeated. It is primarily a call uttered by females and young, mainly during the breeding season. It often is stimulated by hunger, but in females also is uttered during copulation. A variety of chirrups, twitters, squeaks, and similar brief notes occur when young or adults are quarreling or when otherwise excited, as when mates are greeting or one is being preened by the other. During copulation the male utters a more staccato, squeaking call, and a fast, chattering twitter is used during food presentation by adults.

Nonvocal tongue clicking (or "bill snapping") often accompanies defensive hissing, but may occur during courtship or serve as an intimidation signal. Wing clapping, a single loud clap sometimes followed by a softer one, is produced during courtship as the male hovers in front of the female, apparently on the upstroke. Except perhaps for this sound, none of the signals is clearly sex-limited, and most intergrade with one another, making a total count of discrete calls essentially impossible. Further, none of the calls are typical owllike hoots, although defensive hisses sometimes grade into hooting-like sounds.

Bühler and Epple (1980) performed a similar vocal analysis and estimated that the common barn-owl has a repertoire of 18 different calls. These fall into five functional signal categories. Territorial calls consist of screeches, purring notes, and screams. Defensive signals include hissing calls and bill-snapping (tongue-clicking) behavior. Begging and feeding calls include snoring and chittering notes. Social contact calls consist of a variety of twittering and snoring sounds, including copulation calls of both sexes. Finally, various calls of half-grown nestlings were impossible for the authors to assign any particular function. Their analysis did not suggest any obvious vocal homologies between barn-owls and those of typical strigid owls.

Habitats and Ecology

The original habitats of barn-owls may have been quite different from those now utilized; Bunn, Warburton, and Wilson (1982) believed that common barn-owls were probably originally cliff-haunting birds in Britain, where their light plumage coloration closely matched the chalky and limestone backgrounds. However, now the birds are largely associated with countrysides having an abundance of open fields and hedgerows for hunting, and with numer-

ous old buildings (or large hollow trees) used for breeding sites. Generally, low-lying areas of arable land near coasts, which have a mild winter climate and abundant foods, and young forestry plantations with rich supplies of voles in the associated tall grasses, support large populations. Areas of severe cold weather, and with little vegetation, are shunned.

In California, Bloom (1979) reported that abundant populations in the Sacramento Valley are found where grasslands, riparian vegetation, marshes, and oak-sycamore woodlands persist, but have virtually disappeared where the valley has become intensively cultivated. In coastal southern California the birds are variably common but are declining in the face of increasing habitat loss; in most arid areas they are scarce, but more common where marshlands or pastures occur adjacent to arid lands. In favorable hunting habitats nesting densities appear to be limited only by available nest sites. Where prey and nesting sites allow, pairs can coexist with greatly overlapping home ranges and may defend very small territories of only up to about 10 meters in diameter around the nest itself. Thus, Smith and Frost (1974) observed a colony of barn-owls in Utah (numbering 28–38 birds) that nested in an abandoned steel mill and hunted in the surrounding vicinity, up to more than 3 kilometers from the nesting or roosting site. Bunn, Warburton, and Wilson (1982) suggested that in favorable habitats areas of about 2.5 square kilometers are quite adequate to support an adult barn-owl, even when rodents are at fairly low ebbs in their population cycle.

A study by Fast and Ambrose (1976), using a single owl, suggested that it had a prey preference for *Microtus* over *Peromyscus* (41 vs. 17 captures), and for hunting in open-field rather than woods-like habitats (44 vs. 13 successful hunting trips). Various studies (Knight and Jackman, 1984; Rudolph, 1978) suggest that a variety of factors, including behavioral differences such as timing and methods of hunting, and differences in size and identity of preferred prey, may help to reduce competition between the common barn-owl and the great horned owl, although they certainly exhibit substantial habitat overlap and at least local overlap in food-niche characteristics. Great horned owls may also be important predators of barn-owls in some areas, thus affecting their local distribution and abundance.

Movements

A considerable amount of information on local and long-distance movements in common barn-owls has accumulated for Britain and Europe, which has been summarized recently by Bunn, Warburton, and Wilson (1982). These can conveniently be classified as postfledging dispersal movements of young birds, later movements of older birds, and movements brought on by unusually cold winters.

Early postfledging movements, or those that occur up to about three months after the birds have been banded in the nest, suggest a progressive movement away from the nest, with most birds remaining within about 20 kilometers of the nest but a few attaining dispersals of 100 kilometers or more. Dutch and British banding returns for the first 12 months after banding suggest that about 2 percent (Britain) to 10 percent (Holland) of the birds had moved at least 100 kilometers during that period. Of those in the Dutch sample that traveled over 300 kilometers, most moved in a southwestern direction (toward Spain) relative to the point of banding. Generally similar long-distance trends have been observed in German and North American (Stewart, 1952) studies.

In addition to such regular juvenile dispersal, there are some years in which relatively massive barn-owl movements occur, which probably are linked to a combination of high local barn-owl densities and falling rates of prey (small rodent) availability. Most data suggest that birds engaging in these large-scale movements are primarily young. In a Dutch sample, about 6 percent of the birds banded as adults were subsequently recovered more than 500 kilometers away, but none of the more sedentary British sample were found more than 200 kilometers distant (Bunn, Warburton, and Wilson, 1982). In North America there are a number of cases of primarily northerly-nesting adults traveling southwardly during autumn for distances of more than 300 kilometers, and rarely moving more than 900 kilometers (Stewart, 1952; Soucy, 1980, 1985). There are also a few cases of comparable long-distance movements in more southerly-nesting (Texas) birds (Bolen, 1978).

Foods and Foraging Behavior

Over its nearly worldwide range a vast number of studies of common barn-owl foods have been performed, using regurgitated pellet analysis (Bunn, Warburton, and Wilson, 1982). These studies collectively indicate that the species has no innate food preferences, but rather feeds on those animals that are small enough to be easily killed and are susceptible to predation by their

ecologies, periodicities of activities, and the like, namely those occurring in open habitats during nighttime hours. These are mainly rodents, especially microtine rodents such as voles (Cricetidae, especially *Microtus* spp.), with shrews (Soricidae) most commonly serving as a secondary group of prey, the frequencies of these two prey categories often varying in a reciprocal fashion. In Britain the short-tailed vole (*M. agrestis*) and common shrew (*Sorex araneus*) are not only the two major prey species, but also the two most abundant small mammal species in the open habitats that are favored for hunting. In some areas of Europe the Muridae, especially house mice (*Mus musculus*) and rats (*Rattus* spp.), are important components of the diet, especially where nesting occurs around human habitations. However, moles, rabbits, mustelids, and bats are generally rather rarely or only locally exploited in Europe, and birds seem to be taken when regular mammalian prey becomes scarce or where they can be very easily captured, as for example sparrows (*Passer* spp.) or European starlings (*Sturnus vulgaris*) at colonial roost sites. Amphibians are usually taken in small numbers, and even fewer reptiles and fishes have been reported as prey. Invertebrates (insects, earthworms) comprise an essentially insignificant part of the species' diet (Bunn, Warburton, and Wilson, 1982; Mikkola, 1983). A variety of European studies suggest that mice (Murinae) and small voles (Microtinae) collectively comprise about 60–90 percent of the food intake on a percentage-live-weight basis, with shrews contributing 6–33 percent, and larger mammals about 1–33 percent. Birds usually represent less than 5 percent, but reach as high as about 15 percent (Cramp, 1985).

In North America a large number of local studies of barn-owl foods have been undertaken by pellet analysis (e.g., Marti, 1969; Fitch, 1947; Maser and Brodie, 1966), but no comprehensive efforts have been made to synthesize all this information. However, there is little reason to believe that it varies from the general dietary pattern just indicated for Europe; thus Wallace (1948) found that barn-owls in Michigan concentrated on a common species of vole (*Microtus pennsylvanicus*) and a large shrew (*Blarina brevicauda*). In several studies, deer or white-footed mice (*Peromyscus* spp.) are as important as voles in barn-owl diets. Additionally many other rodents such as pocket gophers (*Thomomys* spp.), ground squirrels (*Citellus* spp.), pocket mice (*Perognathus* spp.), and kangaroo rats (*Dipodomys* spp.) are locally significant prey. Bent (1938) stated that nearly every available species of mouse and rat is consumed, plus shrews, moles, and some larger mammals (rabbits, muskrats, skunks), as well as various birds, frogs, and a few insects. The average prey size of barn-owls in four different studies ranged from 27 to 123 grams, or generally lighter than the prey of coexisting great horned owls (Knight and Jackman, 1984).

Hunting is typically done by extended flights over rather open terrain, the flights often beginning about dusk but in some situations before dusk, perhaps to take advantage of diurnal or crepuscular rodent activity and to allow for better visual searching. Foraging is done solitarily, the birds evidently consistently following favored routes, but probably not flying with the wind, in order to avoid flying too fast to locate prey. They probably primarily feed during three general periods, the first at about dusk, the second around midnight, and the third around dawn (Bunn, Warburton, and Wilson, 1982). In some areas the presence of great horned owls, which are significant predators on barn-owls, may restrict the activity periods of the latter to the hours of darkness (Rudolph, 1978). An average daily food intake of about 100–150 grams is probably typical for wild adult birds, although there may be substantial seasonal differences in this figure, and captive birds probably consume only about half this amount (Bunn, Warburton, and Wilson, 1982).

Social Behavior

At least in Britain, where the birds are fairly sedentary, barn-owls often remain on their territories throughout the year, and at least some pairs remain together for extended periods. The birds are essentially monogamous, although at least one confirmed case of a wild male pairing bigamously with females and raising broods with both has been found in England. Some pairs remain at their nest site throughout the year, roosting together and performing mutual preening and other mutual activities that probably help to maintain the pair bond. When one member of the pair succumbs, the remaining bird may remain at the nest site until it is joined by another mate, which sometimes occurs during the same breeding season. On the other hand, a series of barn-owls may use the same nesting site every year for up to 30 years, and in some cases up to 70 years (Bunn, Warburton, and Wilson, 1982). The longevity of wild barn-owls, which only rather rarely attain ages of 10 or more years, would

Tyto alba *(Scopoli) 1769*

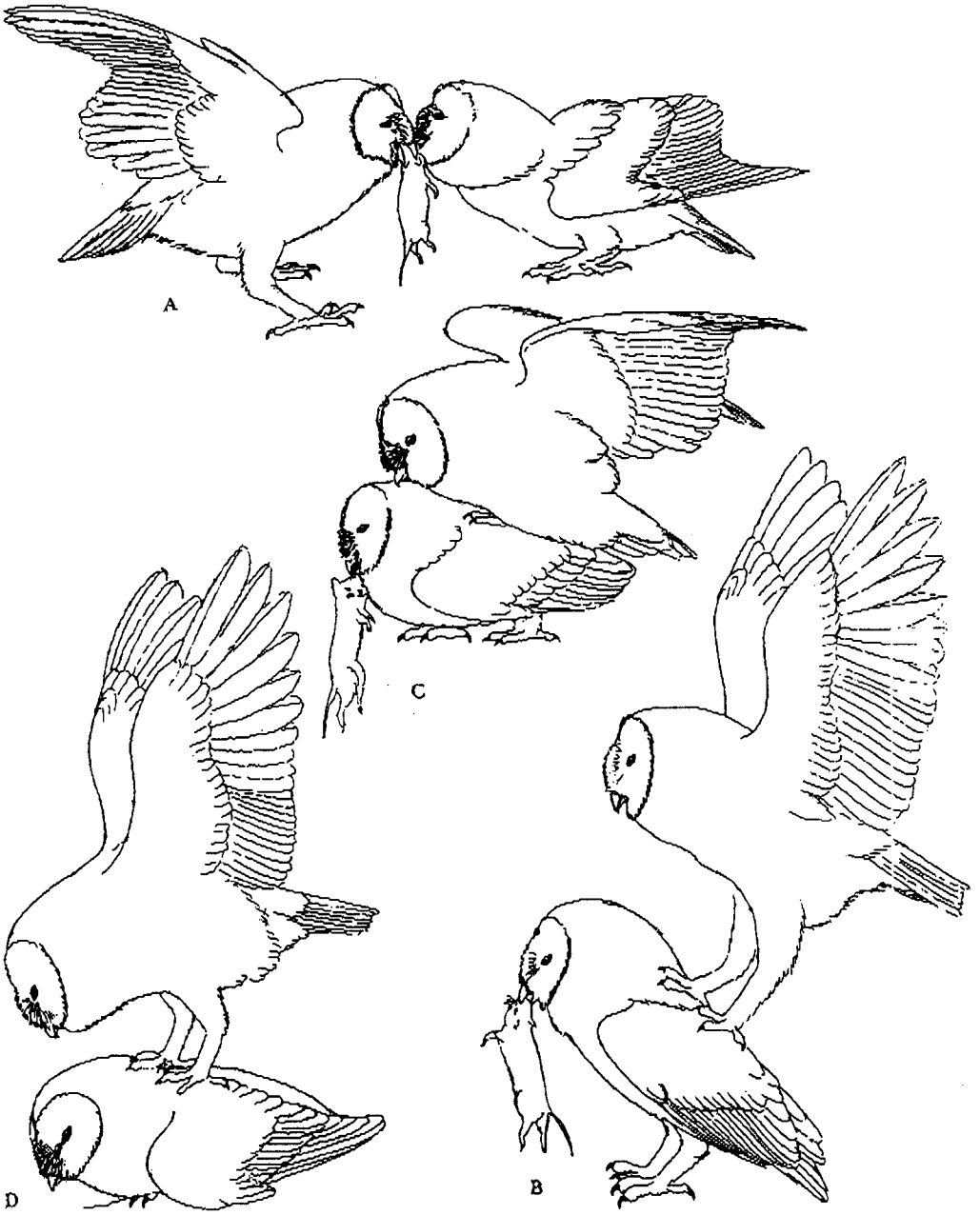


Figure 20. Behavior patterns of Common Barn-owl, including courtship feeding (A) and copulatory sequence (B–D). After drawings in Glutz and Bauer (1980).

suggest that persistent habitation of nest sites for a decade or more is the result of successive pair usage. Unlike with typical owls, territorial and nest-site defense is apparently performed by the male only. Additionally, mate choice by females is apparently not directly linked to courtship feeding, as copulatory behavior typically begins seasonally well prior to the start of courtship feeding (Epple, 1985).

True courtship begins in late February in England and is marked by screeching song flights of males as they patrol their territories and search for prey to present to their mates. Sometimes pairs may be seen in flight together, and sexual chases are frequent, with the male following the female while both birds scream loudly. One male display occurring during this time is the "moth flight," during which the male hovers in front of the female at her head level, exposing his white underparts. A second display is the "in-and-out flight," during which the male repeatedly flies in and out of the nest site, apparently trying to entice the female into it. A female responds to her mate by uttering juvenile-like snoring calls that stimulate the male to present food to her. Copulation usually occurs at possible nest sites and often follows food presentation by the male. Treading (Figure 20) typically is preceded by the female snoring quickly and softly. She then lowers her body, whereupon the male quickly mounts, maintaining balance with his wings and holding her nape feathers in his bill. Upon dismounting the male often begins to doze, while the female preens him, especially his head and underparts. Although copulation is probably most prevalent during the egg-laying period, it has been observed as late in the breeding cycle as when the oldest chick was 29 days old (Bunn, Warburton, and Wilson, 1982).

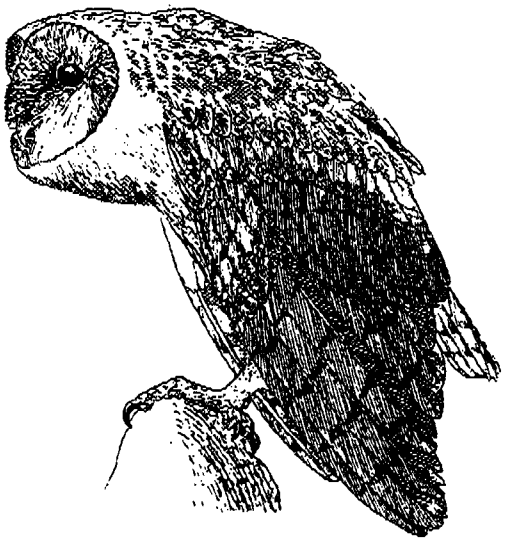
Nesting sites in Britain are most frequently in barns, in holes of hollow trees, and in other holes in walls, towers, roofs, chimneys, and the like. Natural rock cavities, such as in cliffs, mines, quarries, etc., are only infrequently used, and gullies or road cuts are evidently almost never used. However, in western North America these are common nest sites; and in areas such as the sandhills of Nebraska, where the substrate is soft enough a good deal of actual excavation may be done by the birds, using the feet. The nests are rarely more than 10 meters above ground in the case of tree nests, averaging about 5 meters, and are usually in a cleft or cavity of the main trunk (Bunn, Warburton, and Wilson, 1982).

Breeding Biology

Information on clutch sizes in barn-owls has been presented earlier (Tables 7, 8), and in general clutches are highly variable, ranging from 2 to 11 eggs. The eggs are laid at two- to three-day intervals, with incubation beginning with the laying of the first egg, as in all owls. Thus, as much as about a three-week difference in hatching times is possible between the youngest and oldest hatchlings. However, fledging success drops off sharply in nests with clutches of 5 or more eggs, and in general it appears to be closely associated with the relative abundance of prey during the chick-raising period. In southern Texas the hatching success of eggs averaged 54.9 percent (2.7 chicks per nest, average clutch of 4.9 eggs) over a seven-year period, while an average of 2.5 young per nest were raised in years of prey abundance, compared with 1.0 young per nest during years of prey scarcity (Otteni, Bolen, and Cottam, 1972).

The young fledge at ages of about 56–62 days and soon begin to venture away from the nest site. As that occurs the adults begin to roost away from the nest, apparently to avoid the attentions of their young. Usually courtship begins again when the first brood is about seven weeks old. The female may even begin to lay a second clutch before the youngest owlets of the first brood have fledged. The eggs of the second clutch may be laid in the same nest as the first, sometimes while the last owlets are still present, though other hens may choose new sites. The total length of a single breeding cycle is about four months, so that two broods per year are easily possible in areas with long summers. Schulz and Yasuda (1985) found that 56 percent of the birds using nest boxes in a California study had two clutches, the average observed clutch size being 6 eggs and the hatching success 72 percent. A few rare instances of three broods per year have been reported, these typically being associated with captive birds (Bunn, Warburton, and Wilson, 1982). Remarkably, one captive barn-owl trio at the Raptor Rehabilitation Center in Lincoln, Nebraska, produced five clutches of eggs in a 12-month period, four of which resulted in reared young, while the other (fourth) attempt was aborted (because of the eggs freezing) before incubation began (Betsy Hancock, personal communication). This trio consisted of one male and two females (both of which participated in egg-laying and parental care); cooperative biandry in captivity has also been observed (Epple, 1985).

Tyto alba *(Scopoli) 1769*



It is clear that by virtue of its highly flexible clutch size, as well as its potentially extremely prolonged breeding season, the common barn-owl is highly adapted to maximizing its annual productivity in favorable years or situations. Colvin and Hegdal (1985) reported that yearly differences in nest-site use and annual productivity in New Jersey were related to relative grassland and *Microtus* availability, while Schulz and Yasuda (1985) correlated nesting success variations in California with the relative quality of the nest site.

Evolutionary Relationships and Conservation Status

The evolutionary relationships between *Tyto* and *Phodilus* have been discussed earlier in this book and need no additional attention. The general population status of this species in North America appears to be unfavorable, particularly near the northern end of its range in the Midwest, where agricultural practices have had negative effects on it (Colvin, 1985). The National Audubon Society included the common barn-owl on their Blue List of apparently declining species from 1972 to 1981, and since 1982 it has been on their list of "species of special concern," which they believe pose serious conservation problems (*American Birds* 40:232). The federal authorities have not yet listed it as a species warranting special attention.