

## THE ECOLOGIC PAIRING-OFF OF THE SPECIES OF HAWKS AND OWLS

CHARLES H. ROGERS

Convergent evolution, whereby unrelated animals attain a marked similarity of form correlated with similar feeding habits, is a well known phenomenon. This may result in a goodly variety of subgroups of a large group of animals occupying the same series of ecologic niches as the subgroups of an unrelated large group, not at the same place and time but replacing them either geographically or in time.

A classic example is the replacement by modern mammals and birds of many of the forms of reptiles long extinct, there having been in the Age of Reptiles herbivorous groups occupying the places of today's elephants and deer, carnivorous forms which preyed on them as a tiger preys on deer, marine fish-eating reptiles remarkably like porpoises, and even reptiles with true flight which occupied more or less the same places in the scheme of things as do our bats and birds. I must admit, though, that convergence in form was limited chiefly to necessities such as raptorial teeth and claws, the animals, except the porpoise-like ichthyosaurs, being widely different in general appearance from their modern equivalents. As the mammals replace in time so many of the ancient reptiles, so do the members of two orders of mammals, the monotremes and the marsupials, in Australia replace geographically the sloths, anteaters, insectivores, moles, woodchucks, tree squirrels, flying squirrels, civets, wolves and wolverine of other continents, and are often very similar in appearance, although the echidna occupies the anteaters' niche but looks like a hedgehog while kangaroos replace sheep ecologically but look like nothing else under the sun.

To get finally to our subject, we all know that the Falconiformes (hawks, eagles, falcons, vultures), and the Strigiformes (owls) are all 'birds of prey' and, except the carrion-eating vultures, have similar, strong feet with sharp, curved talons for seizing and holding living prey, and short, strong, hooked bills for tearing it, and that not so long ago (as in the second edition of the A. O. U. 'Check-List,' 1895) they were considered closely related, forming one order of birds (still so listed in the third edition, 1910, whose classification was, however, admitted in its preface to be obsolete). Now we believe that their resemblance is purely superficial and corresponds to their feeding habits, and that the diurnal birds of prey belong among the lower birds, perhaps least distantly related to the cormorants, while the owls are near the much higher nightjars. We all know that hawks and owls occupy about the same place ecologically, the former hunting almost entirely by day, the latter chiefly by night. Very little has been written, however, to show how neatly many

species of one group pair off with definite species of the other in choice of haunts and food.

The Screech Owl pairs off with our Kestrel, the American 'Sparrow Hawk.' Each is one of the most widely spread and familiar of its group in the United States. Both frequent farm and suburban areas, breed in holes in trees (either natural cavities or those made by woodpeckers, especially flickers), in old magpie nests, and frequently in bird boxes or cavities in buildings. Though so differently proportioned, they are of much the same size, the owl slightly the larger (body length 76 and 67 mm. respectively in a male of each skinned by me). Two food-counts for the owl and one for the kestrel are remarkably alike, giving for the owl: pigeon, 1; other birds, 38, 36; mice, 91, 86; other mammals, 11, 8; insects, 100; for the kestrel; bob-white, 1; other birds, 53; mice, 89; other mammals, 12; insects, 215. Each eats a few reptiles and spiders, and great numbers of insects in late summer and autumn. The owl takes some fish and more crayfish, the hawk none.

The Horned Owl is larger than our largest widely distributed buzzard, the Red-tailed Hawk, but is similar in habits. They both breed in woodland trees throughout most of North America, or on cliffs in arid areas. The Red-tail builds its own nest on the branches of trees but has been known to use old nests of other large hawks. In trees, this owl builds no nest but uses either a hollow or a nest built by some other bird (or squirrel); of 13 found by Bent, 11 had been built by Red-tailed Hawks. Both species live chiefly on mammals and birds, and the two take an equally small number of insects, but A. K. Fisher's famous counts found four times as many Horned Owl stomachs containing poultry and game birds as other birds, and only a fifth as many mice as other, usually much larger, mammals (mammals twice as often as birds), while the less powerful Red-tail contained poultry and game, and other birds, equally seldom, and mice more than twice as often as other mammals (mammals four times as often as birds).

The Snowy Owl, in its great size, arctic habitat and habits, compares with the Gyrfalcon, and resembles even in color the latter's white phase. It nests on the ground, the falcon on cliffs or, farther south, in the tallest trees. Both live on birds and mammals, to which the owl adds some fish. The owl's mainstay is rodents, though preying also on birds, especially when feeding its young, while the falcon depends more on birds, largely ptarmigan.

The Hawk Owl may be loosely compared with the Accipiters it somewhat resembles, and like them it nests in trees (or in a cavity when one can be found), but it breeds almost entirely north of the United States and lives mainly on mammals instead of mainly on birds.

The Barred Owl and the Red-shouldered Hawk are as neatly matched as could well be, their ranges largely the same, their sizes similar. By 1935, Bent had studied in southeastern Massachusetts 38 nests of the former, 173 of the latter, and he writes that their 'local distribution . . . in this region coincides almost exactly . . . ; I have always considered these two as comple-

mentary and friendly species; their haunts and their food are very similar . . . They often use the same nests alternately and rarely even simultaneously; almost always there is a Red-shouldered Hawk's nest in the same patch of woods with the barred owl; once I found the occupied hawk's nest within 24 yards of the owl's nest.' Both take an extraordinarily wide variety of animal food, practically anything they can catch, from snails, insects and spiders to rabbits and poultry, but both live mainly on mammals, eating practically the same large proportion of mice, other mammals less than half as often. The buzzard takes very nearly no poultry or game birds, but few more other birds, the owl a little more of each, also more fish and crayfish but far fewer reptiles, batrachians and insects.

The Long-eared Owl and the Broad-winged Hawk are another pair very close in size; of three males skinned by me, two Broad-wings had a body length of 107 and 103, the Long-eared 98 mm. Their ranges overlap widely, although the owl breeds considerably farther west, the buzzard much farther south, the latter usually building its own nest on the branches of a tree, the former usually using an old nest of a hawk or crow. Their food is almost as varied as that of the last pair of species, and closely similar, but including few or no poultry and game birds. The Long-eared eats rather more small birds than the Barred Owl and does not go in for the latter's fish and crayfish.

The Short-eared Owl and the Marsh Hawk, with nest sites so different from their relatives, match each other well. Both avoid trees and nest, roost and feed on the ground in meadows across the United States and far northward, the owl even to Point Barrow. Both subsist chiefly on mammals, especially rodents, and eat large quantities of insects; frogs and reptiles also figure prominently in the harrier's diet. At times both prey heavily on birds, the hawk sometimes taking even poultry or game species, which are too big for the owl.

While we have seen that several owls eat fish, as their falconiform counterparts do not, the Americas have no essentially piscivorous owl to pair with the Osprey. However, the Osprey ranges over most of the world, and there are, allied to *Bubo*, two genera of Fish Owls (*Ketupa* in eastern and southern Asia, *Scotopelia* in tropic Africa) which live so largely on fish that their tarsi are more or less bare and the soles of their toes covered with sharp spicules as in the Fish Hawk, the better to hold their slippery prey. They do, however, take terrestrial animals far more than does the almost exclusively fish-eating Osprey.

In the New World are no falconiform birds much less than twice the length of the sparrow-sized Elf Owl, but our slightly larger Pygmy Owls have relatives in their own genus (*Glaucidium*) in tropic Asia where there is a genus (*Microhierax*) of equally tiny falcons, the Falconets, 5½ to 7 inches long. Elf and Pygmy Owls and Falconets all nest in woodpecker holes or other holes in trees. The Elf subsists almost entirely on insects, the Pygmy Owls and Falconets on insects and small birds and mammals, the Pygmy Owls on reptiles as well.

The Horned Owl and the other members of *Bubo* are called Eagle Owls. The biggest are much bigger than our bird, truly of eagle size. But the biggest of all owls seems to be *Ketupa blakistoni doerriesi* of the Ussuri Valley, north of Korea, for which Hartert gives a wing length of 56 cm., 53% greater than that of an average female of our Great Horned Owl! That would indicate a bird something like 36 inches long, as long as a female of our Bald Eagle.

While at least some eagles and larger hawks are not averse from carrion, carrion-eating is rare among owls, and so they have no species at all like vultures, nor do they have any with a regular vegetable diet corresponding to the eating of palm nuts by the Palm Vulture (*Gypohierax angolensis*) of West Africa and the Red-throated Caracara (*Daptrius americanus*) of tropic America.

For the details of this paper I have turned especially to Arthur Cleveland Bent's 'Life Histories of North American Birds of Prey' (U. S. Nat. Mus. Bulls. 167 and 170, 1937 and 1938), Edward Howe Forbush's 'Birds of Massachusetts and Other New England States,' Part II, 1927, and E. C. Stuart Baker's 'The Fauna of British India: Birds,' Vols. IV and V, 1927 and 1928.