

BIRDS AND THE SCAVENGER NICHE

T.P. O'CONNOR

Dept. of Archaeological Sciences, University of Bradford,  
Bradford BD7 1DP, U.K.

**ABSTRACT:** The development of towns and cities has created a potential scavenger niche for opportunists, and several species of birds have adapted to exploit this source of food. Evidence from northwest Europe shows a relatively small group of urban scavengers to have been successful, principally predators and carrion feeders, and including species which have been most markedly reduced in range during the last few centuries.

**KEYWORDS:** URBAN, SCAVENGER, ACCIPITRIDAE, CORVIDAE

**RESUMEN:** La aparición de pueblos y ciudades ha creado un nicho carroñero potencial para oportunistas al que una serie de especies de aves, interesadas en la explotación de esta fuente de alimento, se han adaptado. La información obtenida en Europa noroccidental evidencia el éxito de un pequeño grupo de carroñeros urbanos, especialmente depredadores y necrófagos, donde se incluyen especies cuyas áreas de distribución se han visto marcadamente reducidas durante los últimos siglos.

**PALABRAS CLAVE:** URBANO, CARROÑERO, ACCIPITRIDAE, CORVIDAE

One of the more distinctive and archaeologically significant environmental impacts which humans have had is the creation of sets of new habitats, most typically by the development of substantial nucleated settlements such as towns or industrial sites. To the biota of the surrounding region, a town presents both challenges and opportunities. It may disrupt spatial feeding behaviour, or result in some degree of pollution of watercourses or land. The subsistence activities of the human population may modify the regional environment by turning grassland over to arable, or by clearing woodland. More positively, a town represents a source of food and shelter to an opportunistic species, and one in which competition may be reduced by the exclusion of less adaptable taxa. The gradual adaptation to modern towns of a wide range of plants and animals has been described by contemporary ecologists (Gilbert, 1991; Bornkamm et al., 1982), and some attempts have been made to look at the ecology of ancient towns in a similar way (Hall & Kenward, 1990). Birds are diverse in their behaviour and their autecology, and this class includes taxa which are highly adaptable in terms of food sources, requirements of living and breeding space, and tolerance of disturbance. A number of taxa have adapted well to living in modern towns, either by direct exploitation of the human population, as with the pigeon *Columba livia*, or by exploiting the effects which the urban environment has on a food resource, as with the use by swifts *Apus* spp of concentrations of insects borne on thermals over towns. Some of the most successful urban birds are scavengers: broad-spectrum omnivores which subsist on the detritus of human settlements, or on detritivores of a lower trophic level. This commensal relationship is as old as nucleated settlement. Tchernov (1984) has documented the association of humans with house sparrow *Passer domesticus* as early as the Natufian period, and *P. domesticus* has become one of the most successful Old World commensal birds.

In ecological terms, the scavenger niche is an interesting and complicated one. If the food source being exploited is human refuse, then population growth in the scavengers is

donor-controlled. The limits to growth are imposed by the rate of donation of refuse by the human population. The scavenger population can theoretically increase up to the carrying capacity of the food source, but any decline in the population (and thus a reduction in 'predation') will have no effect on the availability of 'prey'. To put this into real terms, if the *Columba livia* population which scavenges the Old Town at Dubrovnik exceeds the carrying capacity of the town's refuse, then the death or emigration of half of the pigeons will not necessarily result in the 'survival' of more refuse and thus a rise in carrying capacity. Equally, the 'population' of refuse may vary dramatically in its abundance irrespective of the size of the scavenger population. The familiar linking of predator and prey populations which can be seen in most carnivores and phytophages does not apply to scavengers. It is interesting to reflect that donor-control is otherwise seen in populations such as detritivores in leaf-litter habitats: one of the few similarities between *Columba livia* and Isopoda (wood lice). A characteristic of species assemblages which are donor-controlled is that they are expected to be relatively stable, and this stability is expected to be either independent of, or to increase with, increased diversity and food web complexity. Thus donor controlled systems contrast quite markedly with predator-prey systems where the Lotka-Volterra dynamics apply (Begon et al., 1990, 361-2). For populations of vertebrate scavengers, therefore, we should not be surprised to find consistency through time and quite diverse associations, rather than predominance by one taxon.

It is proposed to examine the role of birds as urban scavengers in northern Europe by attempting to determine which taxa are likely to have made successful scavengers, and then by comparing this list of candidates with the archaeological record. The feeding and hunting behaviour of different species will have rendered them more or less likely to be able to adapt to the opportunities which a town presents. First, broad spectrum omnivores ought to be favoured. Urban refuse might, in some circumstances, provide a predictable source of a particular food item, but the very nature of a donor-controlled supply means that it inhibits that co-evolution of predator and prey which favours specialised predation. Those groups of birds which feed on live fish or littoral invertebrates might therefore be ruled out, thus excluding virtually all of the Charadriiformes. Unspecialised seed-eaters might succeed, as any town will have its weeds, but taxa specialised to a particular group of food plants would not. Insect-feeders could be well suited to urban scavenging, apart from those such as the spotted flycatcher *Muscicapa striata* which rely on a particular hunting strategy which towns would be unlikely to facilitate. On the whole, it is the facultative carnivores and carrion-feeders which are likely to have been most successful, exploiting the animal-waste elements in refuse, and the invertebrate scavengers which would be attracted to it.

In order to consider the most likely candidates as urban scavengers in the past, we have to make the assumption that the present patterns of feeding behaviour observed in different bird taxa are a good indicator of past behaviour. Here there is an obvious circular argument, for few bird populations within Europe can be regarded as unaffected by human activity, and thus any modern data will represent the behaviour of bird populations which are to a greater or lesser degree accommodating human influence. However, it may be an acceptable and useful assumption that modern behaviour shows the adaptation and aptitudes of a particular family or species, and therefore gives some grounds for analogy with past populations.

To proceed through the European avifauna more or less systematically, one of the first families which deserves consideration is the Anatidae. This has obviously been an important group in terms of prey and domesticates, and some urban sites have yielded impressively long lists of duck and goose species, notably Dorestad (Prummel, 1983) and London (Bramwell, 1975). There is an

issue concerning specific identification within the Anatidae, but this is not the place to discuss it. Only one anatid seems a likely urban scavenger, and then only at waterside sites, and that is the mallard *Anas platyrhynchos*. This species is a very broad spectrum feeder, and succeeds very well in a number of modern towns. Its conspecificity with the domestic duck perhaps indicates a degree of preadaptation to synanthropic behaviour, and therefore we should maybe allow that the *Anas platyrhynchos* bones identified at riverine urban sites derive from several different populations: truly wild individuals taken by hunting, fully domestic ducks reared under close control, and a resident urban duck population which subsisted by scavenging and maybe interbred to some degree with both the wild and domesticated populations. Acceptance of this model would require an end to the practice of identifying some specimens as 'mallard' and some as 'domestic duck', there being no such simple division. In any case, this discrimination is usually made on the questionable premise that 'large = domestic', a division which might appear to be valid on the grounds of size variation in modern ducks, but which would not bear close scrutiny on zoological grounds.

A similar question of domesticated status arises with respect to the rock dove *Columba livia*, and its familiar descendant the street pigeon. *C. livia* is commonly reported from medieval urban sites around Europe, and was listed at eleven of Parker's (1988) 86 Roman sites. Occasionally, the identification is explicit, as in medieval Beverley (Scott, 1992), or in the recognition of both *C. livia* and stock dove *C. oenas* in medieval London (B. West in litt.). Often, however, one is confronted by the depressing attribution 'dove - *Columba* sp.', leaving open the question of whether the author actually means *C. livia*/*C. oenas*, or really meant to include the possibility of the readily-identified *C. palumbus*. One might even wonder whether the *Streptopelia* species have been properly considered and explicitly excluded. Bubien-Walaszewska (1979, 247) records *C. livia* f. *domestica* from six early medieval sites in Poland, an attribution to domestic status which presumably depends on context, as there are no attributions to *C. livia*. The archaeology of the street pigeon is thus a hopeless tangle of uncertain attributions and sweeping assumptions. The ecology of *C. livia* would seem not to be inconsistent with a relatively early adoption of the scavenging role within the contemporary range of the wild form, though taxonomic uncertainties make it difficult to decide what this former range might have been. Archaeological specimens firmly attributed to *C. livia* could conceivably be truly wild birds, closely-managed domestic birds, feral individuals from a formerly domestic population, or synanthropic individuals from a formerly wild population, and it seems unlikely that the matter will ever be satisfactorily resolved.

Moving on, the diurnal raptors offer several obvious candidates as urban scavengers. The osprey *Pandion haliaetus* can probably be excluded, as its specialist feeding behaviour render it unlikely to adapt to scavenging. Osprey was recorded from post-medieval deposits at Exeter, England (Maltby, 1979), but this must be seen as a trophy or chance occurrence. The Accipitridae include several species which are currently common scavengers, notably the kites *Milvus* spp. The red kite *M. milvus* is a broad sceptrum feeder, taking live prey up to the size of a rabbit *Oryctolagus cuniculus* and also feeding on carrion (Peterson et al., 1974, 70-71). Although rare in Europe today, 'kites' (presumably this species) are historically recorded as scavengers in towns. The substantial literature pertaining to kites in London even records a period when their role in tidying up was rewarded by legal protection (Gurney, 1921), an ironic contrast with the reason for the present-day protection of this species. Bones attributed to *M. milvus* have been recorded from many towns in Europe, amongst them medieval Leicester (Thawley, 1981), medieval Beverley (Scott, 1991, 1992), Late Saxon Portchester (Grant, 1976), Saxon and medieval York (O'Connor, 1989, 1991), early

medieval Menzlin, where *M. migrans* was also recorded (Benecke, 1988), and from four of the 86 Roman sites in Britain listed in Parker's survey (Parker, 1988). One other notable record is from the late prehistoric hill-fort at Danebury (Grant, 1976). Absences are always rather contentious, as absence of evidence is not evidence of absence, but the lack of records of *Milvus* spp. in Bubien-Walaszewska's survey of 32 early medieval sites in Poland, taken with the frequent occurrence of *M. milvus* on sites in Britain, suggests that *M. milvus* may have been well adapted to urban scavenging but was limited on biogeographical grounds to towns in the more western parts of Europe. If further data bear this out, then the record from Menzlin becomes particularly noteworthy.

The buzzard *Buteo buteo* is also commonly recorded from urban sites, and is, like the kites, a generalist feeder on live prey and carrion. Parker noted *B. buteo* at nine sites out of 86 in his Roman survey. Though this list obviously included rural sites as well, urban occurrences included those in Cirencester, Brancaster, and Staines. The species has also been recorded from early medieval London (B. West in litt.), post-medieval Coventry (Bramwell, 1982), medieval Leicester (Thawley, 1981), Mecklenburg (Muller, 1984), medieval Oslo (Lie, 1988), Saxon and medieval York (O'Connor, 1989, 1991), medieval Menzlin (Benecke, 1988), medieval Exeter (Maltby, 1979), and at three early medieval Polish sites (Bubien-Walaszewska, 1979). *Buteo buteo*, then, would seem to have been as successful as a scavenger as *Milvus milvus*, and perhaps with a more general European distribution.

One accipitrid which has attracted some attention in the archaeological context is the white-tailed eagle *Haliaeetus albicilla*. Reichstein (1974) reviewed the occurrence of this species at sites in Central Europe, drawing attention to what he argued was a markedly disparate occurrence of skeletal elements. Bones of the wing, particularly ulna, radius, and carpo-metacarpus, appeared in the archaeological record more frequently than other elements, leading the authors to suggest that eagles' wings were traded extensively as a source of feathers, probably to fletch arrows. The implication of this interpretation is that the archaeological distribution of *H. albicilla* does not represent the former range of the species. Given that the numerous occurrences which Reichstein notes from Denmark and throughout Germany lie outside the modern range (eastern and south-eastern Europe, western coastal Norway, western Iceland), their interpretation of what is, admittedly, an odd distribution of skeletal elements, has credibility. However, not all of the numerous occurrences of the species beyond those sites surveyed by Reichstein consist principally of wing bones. From York, for example, the present author has recorded pedal phalanges, and elements of the legs and pectoral girdle. Roman deposits in Leicester recently yielded a skull of *H. albicilla*, with evidence that the skull had been cut away from the neck (Ian Baxter, pers comm.), and Parker's (1988) six records from Roman Britain include two urban occurrences from Droitwich and London. Parker does not include Roman records from an urban context at Binchester and from the fort at Segontium (both unpublished records, this author), and the species also occurred in 1st century AD deposits at Velsen (Prummel, 1987). These Roman records are important. The 'feather hypothesis' is unlikely to hold for early medieval central Europe and for Roman western Europe: that would be something of a cross-cultural coincidence, and the documentary evidence which underpins the hypothesis for the medieval period is absent for the Roman period. In Roman western Europe, therefore, *H. albicilla* appears to have occupied a range appreciably wider than that occupied today: if in Roman Europe, why not into the medieval period as well? Though it is accepted that for at least some of the sites in Reichstein's survey, their interpretation may well explain the disparity in frequency of elements, the data clearly indicate that *H. albicilla* was far more widespread in Europe in the past. The species takes live prey and carrion, and has been recorded as nesting in trees and on the ground, as well as on the cliffs and rocks with

which it is more usually associated today. In ecological terms, therefore, *H. albicilla* is just as suited to the role of urban scavenger as any other accipitrid. Amongst the medieval sites which have yielded specimens are Mecklenburg (Müller, 1984), Oslo (Lic, 1988), Menzlin (Benecke, 1988), and York (O'Connor, 1989, 1991).

Moving on from the diurnal raptors, the next group which deserves consideration is the Passeriformes, and in particular the Corvidae. This family includes some of the most resourceful and adaptable of European birds, as well as specialists such as the choughs *Pyrrhocorax* spp. and the nutcracker *Nucifraga caryocatactes*. Diverse behaviour notwithstanding, the family shows little somatic adaptation to a particular feeding habit, and most species take a wide range of prey and detritus. In those respects, the corvids make excellent scavengers. The number of urban sites in Europe which have yielded remains of corvids is too great to list them all at length, and there are, in any case, some problems with secure attribution to *Corvus corone* or *C. frugilegus* where sufficient reference material is not available. Jackdaw *C. monedula* and raven *C. corax* are perhaps the most frequently encountered, with *C. corax* noted at 39 of Parker's 86 sites, a frequency exceeded only by *Anas platyrhynchos* and *Gallus gallus*. Amongst medieval towns in Europe, *C. corax* seems to have been virtually ubiquitous, though the present author's records show one interesting absence. In York, *C. corax* is frequent at all periods up to the end of the medieval period, yet the species is absent from substantial assemblages recorded from 8th to 15th century AD deposits barely 40km away in Beverley (Scott, 1991, 1992). This difference cannot be explained in terms of preservation of bird bones, recovery methods, or identification bias, and a sufficiently large quantity of bird bones from Beverley has been identified to indicate that *C. corax* was, if not actually absent, certainly appreciably less common in medieval Beverley than in nearby York. There is no obvious explanation: D. Bramwell (in litt.) has suggested an absence of tree cover for roosting and breeding in the Beverley area, though documentary records would tend to contradict this.

As *C. corax* appears to have been such a successful scavenger throughout the medieval period, it seems valid to ask why it is not still a common sight around northern European towns, and when the decline in numbers set in. There are two major problems with using direct evidence of presence or absence of any species as evidence of a changing range in relatively recent times. The first is the philosophical problem that one can never be confident of having recovered the latest specimen. The gap between the original live population and the recovered archaeological assemblage is so great that the latest known archaeological specimen can only confirm that a species was present as late as that date, not that it was not present later than that date. The second problem is more basic. The post-medieval deposits in a town are often immediately below the modern surface, and are thus those most vulnerable to destruction by modern building work, and to destruction by brisk removal by archaeologists in search of early medieval or Roman structures. Even in towns with a relatively respectable history of archaeological investigation, the 16th to 19th centuries AD may be very poorly represented. One can only observe that *C. corax* occurs in Britain in 16th century contexts at Coventry (Noddle, 1982), and is absent from the 18th and early 19th century deposits investigated to date in York (author's records). Historical records show that *C. corax* was a common urban bird in Britain into the 17th century, and the association with the Tower of London is, quite literally, legendary (Gurney, 1921). Somewhere within the last two centuries, then, *C. corax* has left the urban avifauna, at least in Britain. It is difficult to see this as a consequence of a major change in urban ecology at this time. If *C. corax* was closely associated with the medieval urban habitat of small, crowded timber buildings and copious surface accumulations of refuse, then a speedy disappearance

during the 14th and 15th centuries might have been expected. However, if more systematic disposal of refuse in post-medieval towns left some scavengers surviving in less than optimal conditions, then some may have been vulnerable to competition from new species. In this context, the comparative scarcity of bones of gulls *Larus* spp. in medieval towns in western Europe, even in coastal areas, deserves mention, given that some, notably *L. ridibundus*, are common urban scavengers today.

Two other species amongst the Passeriformes deserve mention. The house sparrow *Passer domesticus* has been mentioned above as an avian synanthrope of great antiquity and conspicuous success, and the starling *Sturnus vulgaris* is similarly active as a scavenger in towns in some parts of Europe. With these species there is a problem of archaeological visibility, however, as their bones are small, and probably infrequently recovered when present. In some earlier work, too, little effort may have been made to identify bones of the smaller Passeriformes even when they were recovered. There is the possibility of confusion of *P. domesticus* with some of the larger finches Fringillidae with which its biogeographical range overlaps. Accordingly, one can only note that both species have commonly been reported from Roman and medieval urban sites where deposits have been sieved to ensure recovery of small bones, though this amounts to too few records to use as the basis of any meaningful discussion.

In some ways, any attempt to look at the ecology of birds in Roman and medieval towns through the archaeological record is premature and rather depressing. Although this paper has deliberately not set out to be a complete synthesis of all available records, it is clear from a scrutiny of the British, German, Dutch and Scandinavian literature that we are in the position of having a very few points of light in a still very cloudy picture. The prediction from ecological first principles that it would be generalist obligate or facultative carnivores which would be best suited to adoption of this niche is to some degree borne out by the regular occurrence of *Milvus milvus*, *Buteo buteo*, *Haliaeetus albicilla*, *Corvus monedula* and *C. corax*, probably with *Passer domesticus* and *Sturnus vulgaris*, given appropriate recovery. To this list would have to be added *Columba livia*, and maybe a case can also be made for *Anas platyrhynchos* in towns with a riverine location. That is a not inconsiderable number of taxa, and the possible westerly distribution of *M. milvus* reminds us that not every town will have had populations of all or most of these species. Donor control of the food supply to scavengers means that population densities can potentially be higher than in 'wild' populations, a point again particularly relevant to *M. milvus*. In vertebrate animals, it is not unusual for a synanthropic, or even explicitly urban, habit to be adopted as a means of maintaining populations towards the limits of the biogeographical range, or as a means of extending that range. Maybe the development of towns and the range of opportunities which they offered presented some taxa whose habitats were under pressure in the countryside with a means of maintaining populations in return for a modification of behaviour. Adaptive tolerance by raptors of human disturbance has recently been described for the Berlin area (Fiuczynski, in Bornkamm et al., 1982, 342-3). Given the archaeological and documentary evidence that *Milvus milvus* was still common around towns in Britain into the late medieval period (Edlin, 1952, 74), it would be fascinating to be able to assess its abundance in rural areas at the same time. Was the species generally widespread, or had its range already begun to fragment to the limited rural refugia in which it is found today, plus an opportunistic and, at least briefly, successful urban population? Regrettably, the data currently available do not permit such an analysis.

Human beings have in common with virtually all other organisms that they modify their environment to some degree, and thus have direct and indirect effects on the other organisms around

them. In building towns, people created new suites of habitats, in which versatile organisms could develop new niches. The role of urban scavenger was one such niche, and it is evident that a number of birds adopted this niche with success. When considering bird bone assemblages from urban sites, or from any nucleated human settlement, therefore, we must move away from naive categorisation into 'wild' and 'domestic' species, and allow that some of the species represented in the refuse of human settlement were at least as much the exploiters as the exploited.

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