

ZS 72

BRITISH BIRDS

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List of photographs

COLOUR PLATE		PAGE
2	Western Sandpiper <i>Calidris mauri</i> , Semipalmated Sandpiper <i>C. pusilla</i> , Red-necked Stint <i>C. ruficollis</i> , Little Stint <i>C. minuta</i> , Least Sandpiper <i>C. minutilla</i> , Temminck's Stint <i>C. temminckii</i> and Long-toed Stint <i>C. subminuta</i> (painting by D. I. M. Wallace) <i>following</i>	20
BLACK-AND-WHITE PLATES		
1	Gannet <i>Sula bassana</i> brooding two chicks, East Lothian (Peter Rowe) <i>facing</i>	20
3	Least Sandpiper <i>Calidris minutilla</i> , Western Sandpiper <i>C. mauri</i> , Temminck's Stint <i>C. temminckii</i> and Long-toed Stint <i>C. subminuta</i> in flight (drawing by D. I. M. Wallace)	
4	Lanner <i>Falco biarmicus</i> tearing up rodent stolen from Black-winged Kite <i>Elanus caeruleus</i> , Kenya (J. F. Reynolds); Wren <i>Troglodytes troglodytes</i> feeding young Cuckoo <i>Cuculus canorus</i> (N. A. J. Wilde) <i>facing</i>	21
5-12	Palcarctic birds in East Africa (J. F. Reynolds): Grey Heron <i>Ardea cinerea</i> , Purple Heron <i>A. purpurea</i> , White Stork <i>Ciconia ciconia</i> with Yellow-billed Stork <i>Mycteria ibis</i> , Steppe Eagle <i>Aquila rapax orientalis</i> , male Pallid Harrier <i>Circus macrourus</i> , female Lesser Kestrel <i>Falco naumanni</i> , Green Sandpiper <i>Tringa ochropus</i> , Ruff <i>Philomachus pugnax</i> , Blue-checked Bee-eater <i>Merops superciliosus</i> , Red-throated Pipit <i>Anthus cervinus</i> , male Black-headed Wagtail <i>Motacilla flava feldegg</i> and Isabelline Wheatear <i>Oenanthe isabellina</i> <i>facing</i>	64
13-20	Black Grouse <i>Lyrurus tetrix</i> at the lek: display grounds, various postures, 'flutter jumps', courting, threatening and fighting, Sweden, Dumfriesshire and Perthshire (Robert T. Smith, Arne Schmitz, Gösta and Tony Tysk, and C. E. Palmar) <i>facing</i>	110
21-24	Adult Common and Arctic Terns <i>Sterna hirundo</i> and <i>S. paradisaea</i> , mostly in flight, comparing upperwing patterns (David and Katie Urry, Eric Hosking, J. B. and S. Bottomley, H. E. Grenfell, and Hans Schouten) <i>facing</i>	154
25	Display platform, and egg nest with ramp, of Moorhens <i>Gallinula chloropus</i> , Hampshire (N. A. Wood)	
26-27	Male Common Tern <i>Sterna hirundo</i> paired with female Roseate Tern <i>S. dougallii</i> , and chick, Northumberland (C. Stephen Robbins)	
28	Nest of Stone Curlews <i>Burhinus oedinenus</i> containing two eggs from each of two females, Kent (R. E. Scott); Red-throated Diver <i>Gavia stellata</i> , Lincolnshire (Keith Atkin) <i>facing</i>	155

PLATES		PAGE
29-36	More examples of the best recent work by British bird-photographers: Marsh Warbler <i>Acrocephalus palustris</i> at nest, Somerset (G. H. E. Young); Barnacle Geese <i>Branta leucopsis</i> in flight, Ross-shire (David A. Gowans); Canada Goose <i>B. canadensis</i> , Ayrshire (William S. Paton); juvenile Common Sandpiper <i>Tringa hypoleucos</i> pulling worm, Cornwall (J. B. and S. Bottomley); Little Egret <i>Egretta garzetta</i> with <i>Dytiscus</i> water beetle, Spain (Rodney Dawson); Purple Heron <i>Ardea purpurea</i> on nest, Portugal (Kevin J. V. Carlson); pair of Long-tailed Skuas <i>Stercorarius longicaudus</i> at nest, Alaska (Bryan L. Sage); pair of Arctic Terns <i>Sterna paradisaea</i> at nest, Outer Hebrides (D. A. P. Cooke); Swift <i>Apus apus</i> in flight, Lincolnshire (Keith Atkin); male Crossbill <i>Loxia curvirostra</i> , Surrey (Frank V. Blackburn); male Sparrowhawk <i>Accipiter nisus</i> flying away from incubating female, Staffordshire (R. J. C. Blewitt); Azure-winged Magpie <i>Cyanopica cyanus</i> at nest, Portugal (R. G. Carlson); herd of Whooper Swans <i>Cygnus cygnus</i> walking on frozen lake, Lancashire (Dennis Green); Red-legged Partridge <i>Alectoris rufa</i> , Suffolk (S. C. Porter) facing	198
37-40	Immature and juvenile Purple Gallinules <i>Porphyrio porphyrio</i> . habitat and clutch, Spain (Jacques Vielliard) facing	238
41-44	Great Northern and White-billed Divers <i>Gavia immer</i> and <i>G. adamsii</i> (J. B. and S. Bottomley, G. V. Adkin, and D. B. McGinn), and bills and other details of both species from specimens (D. M. Burn, G. V. Adkin, and City of Liverpool Museums) facing	282
45-50	Rare birds in 1973: immature Night Heron <i>Nycticorax nycticorax</i> , Lincolnshire (Keith Atkin); Great Spotted Cuckoo <i>Clamator glandarius</i> , Cornwall (J. B. and S. Bottomley); Long-billed Dowitchers <i>Limnodromus scolopaceus</i> , Cornwall (J. B. and S. Bottomley) and Somerset (B. W. Thomas); drake Steller's Eider <i>Polysticta stelleri</i> with Eiders <i>Somateria mollissima</i> , Outer Hebrides (Pamela Harrison); Alpine Swift <i>Apus melba</i> , Devon (M. Rogers); White-rumped Sandpiper <i>Calidris fuscicollis</i> , Suffolk (C. R. Naunton); Buff-breasted Sandpiper <i>Tryngites subruficollis</i> and Sharp-tailed Sandpiper <i>Calidris acuminata</i> , Flintshire (Dennis Green) facing	334
51	Pectoral Sandpipers <i>Calidris melanotos</i> , Cornwall (J. B. and S. Bottomley) facing	335
52-54	Icterine Warblers <i>Hippolais icterina</i> feeding brood, and nest and eggs, Denmark (Ib Trap-Lind) facing	382
55	Winter roost site of Crag Martins <i>Hirundo rupestris</i> , Gibraltar (N. Elkins) facing	383
56-63	Breeding behaviour, nests, eggs and young of Great Crested Grebes <i>Podiceps cristatus</i> , Northern Ireland and Berkshire (W. N. Charles; egg-laying (M. Wicchmann) facing	426
64	Immature Ross's Gull <i>Rhodostethia rosea</i> , Hampshire (J. B. and S. Bottomley) facing	470

List of photographs

PLATES		PAGE
65-66	Model of outspread rectrices of Woodcock <i>Scolopax rusticola</i> (Collingwood Ingram); day-old Cuckoo <i>Cuculus canorus</i> in nest of Swallows <i>Hirundo rustica</i> , Somerset (G. H. E. Young); aerial view of Regent's Park and Primrose Hill, London (Aerofilms)	
67	Matthew Fontaine Maury Meiklejohn, MA (1913-1974) <i>facing</i>	471
68-71	Shore and Horned Larks <i>Eremophila alpestris</i> : in winter plumage, and habitat, Lincolnshire (J. B. and S. Bottomley), female incubating, Norway (Eric Soothill), and at nests with young, Utah (Allan D. Cruickshank); Temminck's Horned Larks <i>E. bilopha</i> at nests with young, Jordan (Eric Hosking) <i>facing</i>	512

List of vignettes

PAGE	
40	Bewick's Swans <i>Cygnus bewickii</i> (Robert R. Greenhalf)
65	Rook <i>Corvus frugilegus</i> (Robert Gillmor)
66	Partridge <i>Perdix perdix</i> and Red-legged Partridge <i>Alectoris rufa</i> (Robert Gillmor)
67	Woodpigeon <i>Columba palumbus</i> (Robert Gillmor)
88	Lesser Kestrel <i>Falco naumanni</i> (D. I. M. Wallace)
103	Gannets <i>Sula bassana</i> (Robert Gillmor)
120	Black Grouse <i>Lyrurus tetrix</i> (Donald Watson)
301	Fulmar <i>Fulmarus glacialis</i> (James Williamson-Bell)
348	Little Swift <i>Apus affinis</i> (D. I. M. Wallace)
437	Great Crested Grebe <i>Podiceps cristatus</i> and young (Robert Gillmor)
501	Barn Owl <i>Tyto alba</i> (Robert R. Greenhalf)



BRITISH BIRDS

STINT IDENTIFICATION
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BRITISH BIRDS

Field identification of small species in the genus *Calidris*

D. I. M. Wallace

with special assistance from P. J. Grant

Plates 2-3

INTRODUCTION

The field identification of small *Calidris* species, commonly called stints in Britain and sandpipers or 'peeps' in North America, presents many problems. Yet separation is possible in many circumstances, and the recent record of British and Irish identifications bears witness to the increasing success of observers who try hard. However, it has been difficult for them to find helpful references quickly, and in 1970 the Rarities Committee decided that in response to many requests a paper should be prepared. Its original aim was to simplify as much as possible the identification of the Semipalmated Sandpiper *C. pusilla*, and the task eventually fell to me. For many years I had been collecting material on stints, and since 1967 I had also been pursuing the thought that our lack of knowledge could be masking occurrences of the two east Asiatic species, the Red-necked (or Eastern Little) Stint *C. ruficollis* and the Long-toed Stint *C. subminuta*.

This paper has therefore been written on a wider brief than was originally intended and deals with the three species already mentioned, the Little Stint *C. minuta*, the Western Sandpiper *C. mauri*, the Least Sandpiper (or American Stint) *C. minutilla* and Temminck's Stint *C. temminckii*. That the inclusion of the two east Asiatic species was wise has been demonstrated by the events of last autumn, which have dramatically upset previous attitudes to stint identification and which forced me to revise this paper at its

eleventh hour. An adult stint in moult to winter plumage stayed at Minsmere, Suffolk, from 14th August to 26th October 1973. It was thought by most observers to be a Semipalmated Sandpiper, but some early doubts became vexing when a young stint present on the River Humber near Brough, Yorkshire, from 14th to 19th September, which also recalled Semipalmated, showed unwebbed feet. On 24th September the Minsmere bird was trapped and it, too, was found to have unwebbed feet. Clearly neither bird was a Semipalmated Sandpiper, and both may have been Red-necked Stints. Wider research has disclosed that of all the stints the Red-necked is the globe-trotter. Normally migrating between the eastern Palearctic and Australasia, since 1962 vagrants have reached Ohio, U.S.A. (Ahlquist 1964), Bermuda (K. Pellew *in litt.*), West Germany (Ringleben 1969) and South Africa (Clancey 1964a, 1964b). The records are dated from July to December and the three birds in the northern hemisphere were all adults, immediately posing the question of how many immatures have been missed. As yet there is no European record of a Long-toed Stint, but there is growing evidence of a small passage to East Africa (Broberg 1967, Backhurst and Britton 1969; S. C. Madge, H. P. Medhurst and Dr R. J. Raines verbally or *in litt.*). Patently, neither Red-necked nor Long-toed should be regarded as more unlikely to reach Britain and Ireland than the Sharp-tailed Sandpiper *C. acuminata*. Stint identification has never been easy; it now calls for the keenest eyes, the greatest concentration and the most patient analysis of both visual and aural characters.

STINT SYSTEMATICS

The fact that the Red-necked Stint has reached continental Europe (and, as may yet be proved, Britain) has complicated the already difficult situation surrounding records of the Semipalmated Sandpiper. It is vital to understand why, and thus some comment on stint systematics is necessary. Initially regarded as only a subspecies of the Little Stint, the Red-necked is now generally awarded specific rank (Vaurie 1965, Dementiev and Gladkov 1966-68). However, it is clearly very closely related to the Little Stint and even specimens can leave one groping. Furthermore, it converges with the Semipalmated in two structural characters, and exhibits at least one plumage virtually matched by both this species and the Little Stint. Semipalmated and Western also have historical claims to be considered as forming a superspecies: on the basis of their partially webbed feet, many North American authorities have even placed them in a separate genus *Ereunetes*. Another species pair is made up of Least and Long-toed, whose convergence is also marked to some eyes. Thus only one species stands alone, and that is Temminck's. Significantly it possesses the only faultless field-

character—mainly white outer tail-feathers. In the context of this paper, however, it would be pointless to quarrel with the view of Vaurie (1965) and Voous (1973) who lump all seven stints in *Calidris*; the sequence of species followed on pages 4-10 and elsewhere is enough to indicate their relationships within this genus.

Two other Nearctic species, the White-rumped Sandpiper *C. fuscollis* and Baird's Sandpiper *C. bairdii*, are also often referred to as 'peeps'. However, they are not true stints and, since both possess very individual field-characters adequately described in the current literature—for example, Hollom (1960) and Johns (1969)—they are excluded from this paper.

OTHER IMPORTANT CONSIDERATIONS

A thorough knowledge of the Little Stint, particularly in variant immature and winter plumages, is the *sine qua non* of stint identification. Observers must not regard this common autumn migrant simply as providing a starting point. Annual study of Little Stints is fundamental to the crucial comparisons needed to prove the identity of other stints. A long peep at each autumn's first, second, and so on, is worth days of book work (and is much less confusing).

As I have just hinted, no field guide or handbook gives sufficient detail for observers to identify every stint, even in the most favourable circumstances. Reference to the widest possible literature and skin examination is essential in difficult cases and, wherever possible, any unusual stint should be trapped and photographed. Even in the hand this group is difficult: witness the long haul to the first British record of a Western Sandpiper, on Fair Isle in 1956 (Nisbet 1963).

Lastly, I must stress the complex effects of age and moult upon plumage in stint identification. We are concerned with three main plumages: first-autumn, winter and breeding. Of these the first is the most important, since in temperate regions the majority of contacts between observers and stints occur from August to October. Only recently have the authors of field guides and handbooks realised this, and most books currently available feature mainly adults in breeding and winter dress. The former is exhibited by most spring migrants through Europe, but the latter is rarely seen here except on a few wintering birds. To redress the previous ill balance, therefore, discussion in this paper concentrates on the appearance of immatures in first-autumn plumage.

FIELD-CHARACTERS OF STINTS

Plate 2 portrays all seven stints in first-autumn, six in winter and four in breeding plumage. In several figures the plumage has been 'stretched' to show important marks more fully, but as far as possible all the birds are scaled against mean measurements of wing, bill

and tarsus (with some allowance for size and overall length). Plate 3 illustrates the flight-patterns of the four species most distinctive on the wing. Figs. 1-4 show the general character of stints and the three Nearctic species in situations likely to occur in the field. The detailed treatments which follow describe the more useful diagnostic characters, though the comments on the length of the closed wings relative to the tip of the tail must be regarded as tentative at this stage.

Little Stint *C. minuta*

First autumn: Upperparts dark brown or chestnut, feathers with small dark centres and light buff tips and fringes forming delicate pattern (more scaly than immature Dunlin *C. alpina*); mantle and scapulars on each side marked by two pale whitish stripes, the upper sharply defined and joining in mid-back to form classic V (some individuals have upperparts noticeably darker than average, and a few have them greyer, but all still show both stripes); forecrown whitish, appearing unmarked in profile; supercilium whitish (sometimes pronounced but often clouded with buffy-grey), forking above and behind eye; lores dark but ear-coverts pale brownish and rarely well marked; chest patches tinged orange-buff and lightly spotted in lines (buff often extending to form faint pectoral band, particularly on dark individuals).

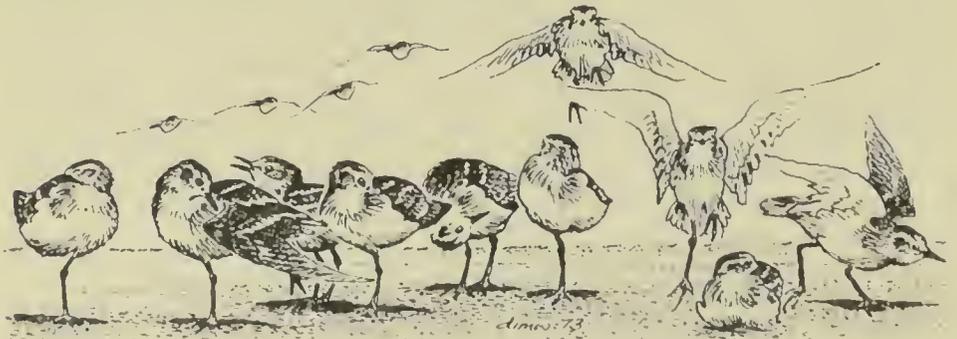
Winter: Upperparts pale pearly or mouse-grey, feathers with noticeable dusky centres and light tips (pattern of scales still present but less delicate); in first-winter birds usually a brownish cast on back and occasional retention of pale stripes; forehead markedly white, and supercilium whiter than in first autumn; lores and ear-coverts dusky; chest patches greyish with fine streaks.

Breeding: Upperparts foxy (redder than in first autumn), general tone becoming yellower with wear, with beautiful patterns of feathers each dark-centred and light-tipped or fringed, but lacking obvious pale stripes (though one occasionally shows along edge of mantle); head rich brown and lacking pale arch over bill; chest with full or partial gorget of buff, finely spotted and streaked.

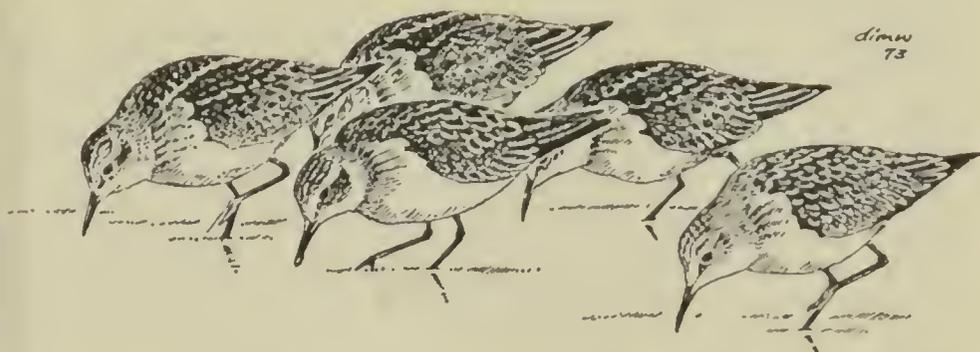
All plumages: Outer tail-feathers greyish; in flight a pronounced whitish wing-bar (all primary shafts whitish).

Bare parts: Bill black, short, almost straight, fairly fine (base quite stout, tip always fine without obvious expansion); legs and feet blackish, occasionally dark green.

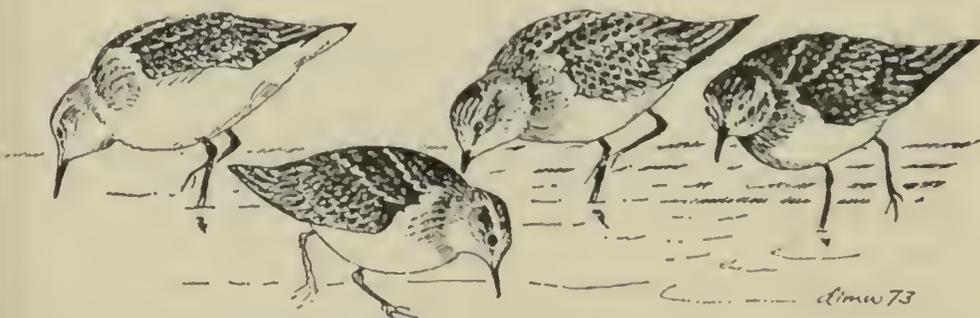
Wing structure: Three or four primary tips show beyond longest tertial and extend slightly beyond end of tail.



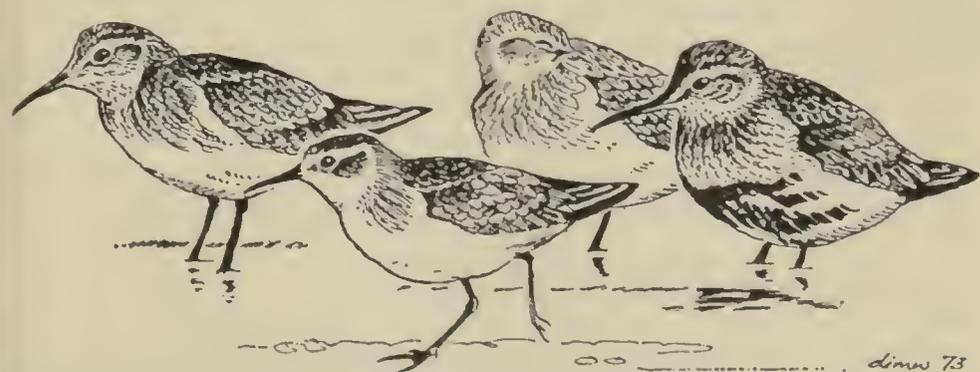
Autumn stints, fig. 1. Flock of Little Stints *Calidris minuta*, illustrating general characters of stints—small size, volatility, complex upperpart pattern, white underparts and endearing appearance



Autumn stints, fig. 2. Four Little Stints *Calidris minuta* and (foreground, second from left) one Semipalmated Sandpiper *C. pusilla*. Last atypically small but still separable from three rear Little Stints (in unworn first-autumn plumage) by duller, only faintly striped back, from Little on far right (in partial winter plumage) by prominence of rear scapulars, and from all four by blunt bill-tip and prominent pale collar



Autumn stints, fig. 3. Three Little Stints *Calidris minuta* behind Least Sandpiper *C. minutilla*. Last smaller and more crouching, with thinner back stripes (contrasting less in spite of darker plumage) and needle-like bill. Dark immature Little Stints (far right) occur, requiring care



Autumn stints, fig. 4. Western Sandpiper *Calidris mauri* in front of three Southern Dunlins *C. alpina schinzii* (from left, in first-autumn, winter and worn summer plumage). Western approaches young Dunlin in size (particularly in bill length), but is distinguishable on face and underpart pattern, behaviour and call

Red-necked Stint *C. ruficollis*

First autumn: Upperparts when fresh colder, more blackish-brown than in Little Stint, particularly on crown and mantle where feathers have dull buff and whitish fringes; overlap of mantle-edge fringes forming on some only diffuse and incomplete V (far less distinct than in Little, not meeting over back); overlap of mantle-centre fringes creating indistinct whitish streaks (not obvious scales as in Little). Upperparts when worn (this happening quickly) become darker and greyer than in Little (losing all vestiges of mantle V) and drabber than in Semipalmated. Whether fresh or worn, rear upperparts noticeably black and scapular lines obvious, with blackish feather centres enhancing pale greyish-white fringes (recalling Semipalmated); wing-coverts appear generally paler and more spangled than mantle (unlike Semipalmated), with fringes pale buff or ochre (not chestnut as in Little), tertials similarly fringed (again paler than in Little); pale buff fringes of feathers often give upperparts pink tone; forecrown and supercilium white (as Western, not like Semipalmated and much cleaner than in Little), latter not forking prominently above eye; throat white extending to form half-collar (as in Semipalmated and Western), lores and ear-coverts essentially greyish (lacking brownish suffusion of most Little Stints); chest pattern variable, either washed with buffy-grey with side streaks, or more usually white with faint ochre wash and very restricted marks; rest of underparts white, probably palest of all young stints (at least in early autumn).

Winter: Upperparts light grey, very close to Little but cleaner due to new feather centres being more finely streaked, not so blotched dark (thus more uniform than Little and lacking the ochre tinge of Semipalmated); forecrown strikingly white (distinct from Semipalmated and Long-toed); rest of face paler than in first autumn; underparts usually very clean and white, with chest washed grey only at sides (majority much cleaner than Semipalmated and most Little, but some with wash complete or a few side streaks).

Breeding: Upperparts essentially as Little, but pattern again different, with feather-centre and edge contrast reduced and combined effect less scaly, more spangled with white; forecrown and fore-supercilium whitish, upper head duller than in Little but lower part suffused rufous; throat (not white chin) and upper chest markedly rufous (unique to this species, but absent in some individuals), chest sides and flanks with some large spots.

All plumages: Tail as in Little, though outer feathers can appear paler; in flight a well-defined whitish wing-bar (at least as pronounced as in Little, more so than in Semipalmated and Long-toed).

Bare parts: Bill blackish, short, almost straight, rather stout (base noticeably thick, and tip very slightly expanded, thus looking stubby compared with most Little Stints but not appreciably different from smaller-billed Semipalmated, *contra* Peterson 1961, Robbins *et al.* 1966); legs and feet blackish or grey.

Wing structure: Longest winged of all stints, some exceeding Little by 10%, though not appreciably overlapping tail (since this is also longer than in Little).

Semipalmated Sandpiper *C. pusilla*

First autumn: Upperparts drab greyish- or ochraceous-brown (paler and less rusty than in Little and Western, recalling Dunlin), with darker feather centres and light tips giving scaly appearance as in Little, but less bright; mantle and scapulars each marked by a pair of pale stripes but much less distinctly than in Little, the upper pair obvious only from behind and worn off by late autumn; lower scapulars dark brown with pale ochre fringes forming prominent overlay of spearheads between evenly patterned back and wing (as in Red-necked); centre of forecrown

grey, joining with faintly streaked dun-grey crown, supercilium whitish and rather broad behind eye but not forking prominently above it (forecrown dirtier than in Red-necked, this and less diffuse supercilium useful differences from Little), lores dusky and ear-coverts dark brownish, forming solid patch below which whitish throat extends to give half-collar effect (like Red-necked and Western, again affording more definite face pattern than in Little); chest patches greyish-buff, spotted or streaked with smudged marks (more obvious than in Red-necked), and on some a very faint but complete buff or salmon-pink pectoral band.

Winter: Upperparts ochraceous-grey (more uniform than in Little, again recalling Dunlin and very like first-winter Red-necked); no obvious back stripes but scapular spearheads retained (and often more obvious); head and face pattern as first autumn but paler and greyer, particularly on lores and ear-coverts; chest patches less marked.

Breeding: Upperparts markedly yellowish or ochraceous-brown, with dark feather centres and rufous, buff or yellowish-white fringes (brighter and warmer than in first autumn, but still paler than in Western and yellower than in Little); head and face as first autumn but suffused brown; chest markings sharp and widespread, continuing as streaks along flanks (not heart-shaped as in Western, and their lateral extension a clear distinction from Little).

All plumages: Tail as in Little; in flight a fairly distinct whitish or greyish wing-bar (usually less contrasting than in Little, due to generally duller plumage).

Bare parts: Bill black, typically short, straight or very slightly decurved, and stout (base thick and deep, tip blunt in profile and noticeably expanded head-on, forming unique character at close range), but longer and narrower in birds breeding in eastern Canada; legs and feet blackish, dark brownish-grey or olive, feet semi-palmated (webs visible on still or slowly moving bird close to observer and head-on, occasionally yielding club-footed appearance at longer range).

Wing structure: One or two primary tips show beyond longest tertial and extend to or just past end of tail.

Western Sandpiper *C. mauri*

First autumn: Upperparts mixed rufous-brown and grey (rufous feathers much warmer than in Semipalmated), feather tips varying from bright chestnut to whitish (yielding more striking pattern than in Semipalmated, but most individuals less warm and scaly than Little); no sharply defined stripes on mantle (as Semipalmated, and unlike Little), but scapulars noticeably edged or blotched rufous and black in most, forming bold bright line over wing; wing-coverts greyer and rather paler than back, some fringed with rufous or buff and others tipped white (some birds noticeably grey in this area, with rufous splashes few and isolated); forecrown distinctly whitish (as in Little and Red-necked, whiter than in Semipalmated); supercilium almost white, wide, square-ended and only indistinctly forked (most striking of any stint), with forecrown yielding white face and contrasting with dark rufous crown and ear-coverts, latter usually forming clear-cut patch (more obvious than in Semipalmated); throat white extending to form half-collar; chest patches buffish-grey with pronounced and extensive side streaks (more than in Little or Semipalmated), rest of underparts appearing whiter than in Semipalmated.

Winter: Upperparts eventually pearly grey (recalling Broad-billed Sandpiper *Limicola falcinellus*), but many first-winter and adult birds retain chestnut blotches on mantle, scapulars and wing-coverts, looking strongly variegated; head usually noticeably pale with forecrown wholly white and lores very pale (these features increasing the white face to a degree unmatched by any other stint except Red-

necked); chest marks less obvious than in first autumn, some appearing white-chested; flanks retain a few shaft marks.

Breeding: Upperparts rufous-brown, scapulars particularly rusty (thus warmer than Semipalmated and Least, but not as foxy as Little); crown and ear-coverts always bright chestnut with darker flecks, in some whole head suffused reddish-buff and pale face reduced; chest sides buff, and chest, flanks and even lateral tail-coverts heavily spotted and streaked with black arrowheads or hearts (marks in these areas the most extensive of any stint).

All plumages: Tail as in Little; in flight a fairly distinct whitish wing-bar (less obvious in winter due to paler upperparts).

Bare parts: Bill blackish, typically strikingly long, heavy and drooping (base noticeably deep, distal third becoming thinner and ending in fine tip, recalling Southern Dunlin *C. a. schinzii*), but broad overlap in males with female Semipalmated (none with Little); legs and feet blackish or dark olive, former fairly long (exceeding those of any other stint) and latter semi-palmated (webs visible in similar circumstances to those noted under Semipalmated, though probably even more noticeable).

Wing structure: Two primary tips show beyond longest tertial, and longest primary extends just past end of tail.

Least Sandpiper *C. minutilla*

First autumn: Upperparts swarthy dark brown, particularly on mantle, little patterned due to absence of more than thin rusty or whitish tips or fringes (much darker than in Semipalmated, less bright than either Little or Western, more uniform than Long-toed); mantle and scapulars each marked by a pair of pale buff or whitish stripes, the upper often forming a thin V (as in Little but less obvious), the lower more prominent but not joining at rear; sides of forecrown pale (but rarely markedly so, compared with Little and particularly Western), crown feathers dark with rusty edges, forming cap; supercilium buffish-white with slight forking above eye (as in Little, not as in Long-toed); lores and ear-coverts dusky, with brown marks behind eye hardly forming patch, but head generally darker than in Semipalmated; chest patches joining in pectoral band, ground colour pale buffish-grey with streaking pronounced at sides and, on some, across chest (recalling Long-toed and thus distinct from Semipalmated); rest of underparts looking particularly white in contrast with dark upperparts.

Winter: Upperparts dusky-brown, with dark feather centres still obvious (less so than in Long-toed but much more prominently than in Little, thus distinct from drab Semipalmated); head and face pattern as in first autumn but less marked; chest retaining many streaks (like Long-toed and heavier-marked than Little and Semipalmated), lower throat also streaked (unlike Little and Semipalmated); rest of underparts still very white in appearance.

Breeding: Upperparts warm dusky-brown with feathers tipped thinly with paler brown or buff (not as boldly patterned as Long-toed, darker and less rufous than in Little, and much darker than in Semipalmated), wing-coverts tipped orange-buff; head rather dark and chest strongly streaked (as in Long-toed, more than in Little and Semipalmated); underparts gleaming white in contrast with upperparts which become very dark when worn.

All plumages: Tail as in Little; in flight a thin whitish wing-bar contrasting little with dark plumage.

Bare parts: Bill blackish, short, straight except for faint drop, and thin (base finer than in any other stint, bill tapering to needle-like tip); legs and feet typically yellowish-green to brown or grey-green in first autumn, but may be dark brown or

olive, appearing black (thus exhibiting widest colour range of all stints); legs rather short.

Wing structure: Primary tips cloaked by longest tertial and wings shortest of all stints (9% shorter than those of smallest Little Stints), just lapping end of tail.

Long-toed Stint *C. subminuta*

First autumn: Upperparts similar to dark Little and Least but noticeably stronger-marked, mantle with prominent blackish feather centres (larger than in Little by 50%) and lacking stripes; forehead dark with streaks of crown cap extending to bill (not as Little, and darker than most Least), supercilium whitish or cream-coloured with slight flecking, not forking above eye (unlike Little or Least), lores and ear-coverts well marked (more flecked than in Little), nape distinctly greyish (more obvious than in Little); chest streaked right across, forming gorget (recalling Temminck's), rest of underparts apparently dull white (noticeably darker in skins than any other stint, though this not noted in field observations).

Winter: Upperparts darker, duller and browner than in typical Little (and browner than all Red-necked), similar to Least but with the larger and blacker feather centres remaining obvious and their edges greyish-fawn (not so clean as in Little and Red-necked, nor as thin as in Least); forehead still dark, face patch still pronounced (thus no white face effect as in Little, Red-necked and Western); chest suffused greyish-brown and streaked (as in Least, much darker than in Little and Red-necked), some marks extending along flanks; underparts again rather dull (in skins).

Breeding: Upperparts typically recalling dark Little or Least, generally rufous-brown but with mantle always showing more obvious and blacker feather centres; crown noticeably dark and heavily streaked; chest tinged rufous and streaked (not finely spotted as in Little); white of underparts again sullied (in skins).

All plumages: Lower back and rump centre very black; tail as in Little; in flight a thin, diffuse, whitish wing-bar, made obvious only by dark plumage; all but one primary shaft brownish (as Temminck's, not Little).

Bare parts: Bill colour of some adults unique among stints, yellowish or olive-brown with dark tip, but in others paler colour is confined to base of lower mandible and in others still it is absent; bill colours of young birds uncertain but many apparently wholly dark or with only greenish base to lower mandible; bill shape close to that of Least, with fine tip slightly drooping; legs and feet dull yellow through olive to greenish slate (again matching Least and spring Temminck's).

Wing structure: Second shortest of all stints, being only marginally longer than that of Least.

Temminck's Stint *C. temminckii*

First autumn: Upperparts dusky or oily brown, almost olive in some lights, with less distinct tips and fringes than in Little or any other stint (thus much less pattern, looking uniform at long range); head rather dark, with noticeably indistinct supercilium (again far less pattern than in Little); chest patches pronounced, washed strong grey, softly streaked and barred.

Winter: Upperparts dull grey-brown, much darker than in Little, with feather edges faint (thus virtually uniform); chest patches still very obvious.

Breeding: Upperparts brown, rather olive when fresh, greyer later, with back feathers irregularly patched by dark centres or marks and yellowish-buff fringes (never as foxy or scaly as in Little); supercilium poorly marked ('eyebrows' only); gorget greyish, usually complete and well streaked.

All plumages: General pattern recalls Common Sandpiper *Tringa hypoleucos*; three outer tail-feathers mainly white, unique to this species; in flight a whitish wing-bar (all but 2nd primary shafts brown) and noticeably dark centre to tail (partly due to contrast with outer feathers).

Bare parts: Bill blackish, often darkening at tip, short, straight or slightly decurved, and fine (normally finer than in Little); legs and feet pale, greenish-yellow to brown, rarely green or dark green.

Wing structure: At least three primary tips show beyond longest tertial and form pointed 'cloak' to tail.

SIZE

Since all stints are small, with total lengths between $12\frac{3}{4}$ cm (5 inches) and $16\frac{1}{2}$ cm ($6\frac{1}{2}$ inches), judging their size is difficult unless they are in close company with other small or medium-sized waders. Further complications arise from the considerable variation in size between individuals of the same species and sex, and from the fact that females are usually larger than males, by up to 5%. Even so, it is generally accepted that the mean lengths of the five Nearctic and west Palearctic species may be graded as follows:

Least	$12\frac{3}{4}$ cm (5")	Shortest wings and tail, small head; looks slighter than normal Little
Little	14 cm ($5\frac{1}{2}$ ")	
Semipalmated	$14\frac{1}{2}$ cm ($5\frac{3}{4}$ ")	Looks bulkier than Little, with longer tail and slightly longer head; longer legs sometimes obscured by crouching gait
Temminck's	$14\frac{1}{2}$ cm ($5\frac{3}{4}$ ")	Rather short bill and legs compared with Little, but longer wings and especially longer tail give generally lengthier appearance
Western	$16\frac{1}{2}$ cm ($6\frac{1}{2}$ ")	Longest bill and legs; looks larger-headed, bulkier and longer-bodied than Little and most Semipalmated

Placing Red-necked and Long-toed into this series is difficult. In the field the former looks fractionally larger and bulkier than the Little Stint; on average it is longer-winged and tailed and must therefore be very close to Semipalmated in size. Surprisingly for a species considered closely allied to Least, Long-toed is, on published measurements (except wing), closer to Little in size, and it has rather long legs and distinctly longer toes, the middle one averaging about 24 mm against 19 mm in Little. 'Far more foot' has been seen in the field and clearly photographed. It is possible that the size of Long-toed varies considerably, since some observers opine that it appears larger and taller than Temminck's, while others stress its slightness, comparing it with Least. Finally, it should be noted that the occurrence of runt Dunlins close in size to Western Sandpipers can mislead even the most experienced: one such observer was baffled by this problem for eight hours.

VOICE

In this section I discuss only calls, since migrant stints very rarely utter song-phrases. Most stints are vocal on passage and in winter, and the literature contains many transcriptions of the calls of the American and European species. However, translating these for ease of comparison is difficult (and it is certain that two pairs of human ears can hear the same call of a small *Calidris* quite differently). This must be remembered when referring to table 1, where all the available information is summarised.

Table 1. Calls of small *Calidris* on passage

For each species monosyllables are given first, then multisyllables, and finally alternative transcriptions indicating similarity to other species

Little <i>C. minuta</i>	<i>tit</i> or <i>chit</i> , short, clipped, quite low in pitch, but sharp and incisive to some ears; <i>titti-tit-tit</i> or <i>tit-titter</i> , with suggestion of trill at times (thus <i>tirri-tit-tit</i>); also <i>drirt</i> , <i>pit</i> or <i>chup</i>
Red-necked <i>C. ruficollis</i>	<i>pit</i> or <i>pip</i> , <i>chit</i> , close to call of Little but 'coarser', and more typically a squeak like movement of saddle leather; <i>chit-chit-chit</i> , thin and weak; <i>week-week-week</i> , short and high-pitched; also <i>teet-teet-teet</i> , <i>kririt</i> in alarm, and soft <i>chlit</i> as contact-note
Semipalmated <i>C. pusilla</i>	<i>cherk</i> , <i>crit</i> , <i>chirt</i> , short, clipped, quite low; <i>chrruk</i> , <i>chrrp</i> , <i>chrup</i> , <i>krip</i> , husky, less emphatic than Dunlin <i>C. alpina</i> but harsher than Little Stint; <i>chirr-chirrt-chirrt</i> or <i>chereet</i> , with slightly increasing pitch; also <i>cheh</i> , <i>chet</i> , <i>chep</i> , <i>chip</i> , <i>chup</i> , all rather flat in tone and weaker than Little; <i>kripe</i> , <i>creet</i> , rolled <i>chrrup</i> or <i>trrr</i> , <i>churrup</i> , <i>chittup</i> , <i>tik</i> , <i>chu</i>
Western <i>C. mauri</i>	<i>cheet</i> or <i>jeet</i> , short, high-pitched and penetrating (recalling White rumped Sandpiper <i>C. fuscicollis</i>); 'peeping trill' or liquid phrases recalling Dunlin, also <i>chee-rp</i> , <i>jeep</i> , <i>preep</i> , <i>prect</i> , <i>pritt</i> , <i>pit</i> or <i>swit</i>
Least <i>C. minutilla</i>	<i>kreet</i> or <i>kreep</i> , drawn out (more than in Western) and quite high in pitch; <i>kree-it</i> , <i>kree-eet</i> , <i>quee-ce-eet</i> , <i>trrip-trip</i> and <i>trip-trip-peat-wit</i> recalling Temminck's; also <i>quee</i> or <i>che</i> (sometimes in rapid succession), <i>breep</i> and <i>teer(i)p</i> in great variety of inflections
Long-toed <i>C. subminuta</i>	<i>chrrup</i> , <i>trerp</i> , purring or rolled; <i>twirr</i> , high-pitched; <i>tik</i> or <i>chi</i> ; <i>chi-chi-chi</i> , rapid, medium or high-pitched; <i>chirrup</i> and <i>trrr-trrr-trrr</i> (half-way between Curlew Sandpiper <i>C. ferruginea</i> and Dunlin); also <i>tic</i> , <i>tring</i> and <i>tik-tik-tik</i>
Temminck's <i>C. temminckii</i>	<i>tirr</i> , short, trilled, medium-pitched; <i>tirri</i> , <i>trrrrit</i> or commonly <i>tirr-it-tit-tit</i> , with rising inflection (sometimes with <i>tsweeu</i> interjected), also <i>chit-chit</i> and <i>titititititi</i>

It is evident that, like other *Calidris*, stints utter a variety of calls and commonly extend monosyllables into series or phrases. Monosyllables are essentially contact notes, but they may also be given in alarm, when a greater degree of emphasis is usually audible. The purpose of multisyllables (from migrants) is less clear, but I have noted such calls from Semipalmated, Least, Long-toed and Temminck's as long escape or flight-intention signals. They may

also have a special function in locating an individual bird among its kin or other waders. Little Stints frequently titter in flocks, and I have heard Western Sandpipers trill in a small group. Solitary vagrants are sometimes remarkably vocal, one British Least Sandpiper giving at least four clearly distinct calls within a few minutes.

The notes in table 1 show that there are both actual and perceived overlaps in voice. These are inevitably troublesome but, if written with care, transcriptions of calls may be of great use in identification. In particular, it should be noted that the common trilling calls of Temminck's are very distinctive, that constantly high-pitched calls are usually given by Red-necked, Western and Least, and that medium or low-pitched calls normally come only from Little, Long-toed and Semipalmated, the last usually putting an 'r' in all its utterances. There may be no inviolate precepts, but the observer who notes the voice of an unusual stint merely as a non-committal *peep* is making a sore rod for his back!

GENERAL CHARACTER AND ACTIONS

Once again it is difficult (and inadvisable) to rule on the general characters of the seven species, but some seem to have distinctive actions and attitudes. Western has often been noted as assuming a more upright posture than Little and Semipalmated (recalling Curlew Sandpiper *C. ferruginea* rather than Dunlin), but recent experience has shown that this is not a constant character of Western, in spite of its long legs. Nevertheless it does look longer-bodied or rangier than Little and Semipalmated, and the set of its bulky head tends to make its lengthy bill point downwards at a steeper angle both on the ground and in flight. Western also appears to carry more weight forward than any other stint, and its flight action is rather less fluttery, perhaps also because of its extra bulk. It wades and swims more freely than any other stint and probes more frequently when feeding; thus it can recall Dunlin in more characters than just size.

In contrast, Semipalmated exhibits a much closer and more troublesome affinity with Little and Red-necked. It has been usual to stress its less round-shouldered carriage and more upright alarm posture compared with Little, but again British observations during the last few years have not confirmed these differences as constant. At least one definite Semipalmated closely watched over several weeks, often with Little Stints, exhibited a squarer head held low, less neck extension, marked crouching with tibia often cloaked, and a mouse-like gait. Certainly the flight of Semipalmated appears identical with that of Little; when feeding it wades less than Western and picks rather than probes, usually with greater deliberation than Little. Lastly, Dr I. C. T. Nisbet, who has seen all seven stints in

numbers, regards Semipalmated as the most quarrelsome.

Least is, to my eyes, 'the stint of stints', a marvellously quick and engagingly erratic creature, but it has also been noted as placid and confiding. It looks small and square-headed and flexes its legs more than any other stint, thus appearing remarkably crouched when feeding or running. Its flight action is very rapid, with a very fast rate of climb; its wings look small in relation to its body.

Fast climbing or 'towering' is also characteristic of Temminck's and Long-toed, but on the ground both are noted as rather placid. Because of the contrasts of dark rump and tail centre against white lateral tail-coverts and outer tail-feathers, Temminck's often looks longer-tailed than other stints in flight; it also appears more slender than Little on the ground and moves its head less. Compared with Temminck's (and Least), Long-toed often shows a noticeably upright stance, recalling *Tringa* sandpipers, and frequently extends its neck, thus adding to its visibility among flocks of Red-necked and Temminck's. However, it can also look as attenuated as the latter species.

Red-necked has been noted as more quarrelsome than Long-toed, and very vociferous. While observers stress its similarity in winter plumage to Little, they nevertheless opine that its general character recalls a miniature Sanderling *C. alba* by virtue of its greater girth and stubby bill. However, similar comments have been applied to Semipalmated, and clearly it and Red-necked may be very close in character and behaviour; much more critical observation of both is needed before any distinction can be attempted on these grounds alone. Indeed, much remains to be learned about stint character and behaviour in general, and it is hoped that observers will pay more attention to these aspects, particularly specific interactions. The meagre evidence gathered so far indicates that Little is dominated by Semipalmated, Long-toed and probably Red-necked, usually giving ground to any sign of aggression from them.

Finally, lest it be thought that Little Stints do not at least occasionally crouch on flexed legs and patter across mud largely by foot movements alone, I must state that I watched at least five continuously showing such stance and gait for 15 minutes on 29th and 30th September 1973. They were on exposed mud facing into a force 4-5 wind. In sheltered pools nearby, up to six others were moving about normally.

HABITAT PREFERENCES

Since habitat preferences are so often suppressed by the exigencies of migration, reliance upon them even as pointers to identification is dangerous. However, all three pale-legged species, particularly

Table 2. Important characters of small *Calidris* in first-autumn dress

Italics indicate the most reliable marks

Character	Little <i>C. minuta</i>	Red-necked <i>C. ruficollis</i>	Semipalmated <i>C. pusilla</i>	Western <i>C. mauri</i>	Least <i>C. minutilla</i>	Long-toed <i>C. subminuta</i>	Temminck's <i>C. temminckii</i>
Size	—	—	—	largest	<i>smallest</i>	—	—
Bill: structure	—	stubby	<i>stubby, expanded tip</i>	<i>long, droops from deep base</i>	<i>needle-like</i>	—	short
colour	—	—	—	—	—	pale base to lower mandible	—
Facial appearance	—	whitish half-collar	whitish half-collar	<i>white on pale head</i>	—	dark	dark
Upperparts: colour	<i>rufous</i>	blackish	<i>dark-grey</i>	<i>grey/rufous mix</i>	dark brown	dark brown	<i>olive-brown indistinct</i>
feather centres	—	—	—	—	—	<i>black, prominent</i>	<i>faintest</i>
scales	clearest	—	—	—	—	—	—
stripes forming V on mantle edge	<i>very obvious</i>	<i>none or faint</i>	indistinct	indistinct	present but thin	none	none
Wing: length	—	longest	—	—	<i>shortest</i>	short	—
bar	well defined	well defined	—	—	—	least defined	—
Tail: length	—	long	—	—	short	—	long
outer feathers	—	—	—	—	—	—	<i>uniquely white</i>
Chest	—	<i>whitest</i>	—	—	well streaked	well streaked	<i>darkest</i>
Legs: length	—	—	—	long, often flexed	look short	look long	look short
colour	—	—	—	—	<i>usually pale</i>	<i>usually pale</i>	<i>usually pale</i>
Feet: semipalmation	—	—	present	present	—	—	—
middle toe	—	—	—	—	—	<i>uniquely long</i>	—
Normal call	'chit'	squeak	'chrrup'	'cheet'	'kreet'	'trep'	<i>trill</i>
Behaviour: escape	—	—	—	—	towers	towers	towers
feeding	—	—	—	probes most	—	—	—

Long-toed and Temminck's, share not only towering flights but a liking for small pools or wet patches in grassy or reedy ground inland. (It may well be that their escape behaviour is linked to the generally close horizons of these habitats compared with those of open mud.) These habitat preferences appear to be widespread, having been recorded for Temminck's from Ireland to Thailand and for Long-toed from Aden and Iran to Thailand. Finally, it may be noted that Semipalmated occasionally searches floating seaweed, Least is very prone to feed on floating vegetation, and Long-toed trots over lily-pads.

CONCLUSIONS AND SUMMARY

Observers attempting stint identification in Europe must take into account all seven small *Calidris* breeding in the Holarctic. Nowadays four species occur regularly and one, probably two, others have been recorded at least twice in the last six years. A full and annually revised knowledge of Little Stints is the only safe start to the identification of the six others. However, given close views and a clear head, it appears that only silent, foot-hiding Red-necked and Semipalmated in winter pose insoluble problems. Indeed, it had become evident that the crux of the whole problem is no longer the separation of Semipalmated from Little but the elimination of Red-necked from this process.

The features that characterise the seven stints in first-autumn dress are summarised in table 2. Arranging them into a key is difficult and probably dangerous at this stage. I very much hope that this paper will be sufficiently instructive and stimulating for someone else to attempt final conclusions in due course, and we shall all be served if my mistakes are quickly spotted.

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Since most of the information summarised in this paper came from three private logs, over 40 letters and a search of over 30 individual books, papers and notes, no attempt has been made to include references to all supporting texts. The following list is confined to those mentioned in the paper and (in square brackets) a selection of others considered to be essential sources of information.

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POSTSCRIPT

Photographs

It is very unfortunate that we are as yet unable to publish photographs of the seven species of stints. Despite both private and public appeals (*Brit. Birds*, 66: 411-412), those so far received feature only five species and only in the case of the Little Stint is their standard good enough for reproduction. We are therefore continuing the search in the hope of eventually publishing a full set of photographs, and at the same time adding any new information that might be obtained from discussion of the paper and from future fieldwork. Prints and transparencies, which should be sent to Mr Wallace at the address opposite, will be acknowledged and then returned when finished with.

Review of certain past records

Throughout the preparation of this paper, we and the Hon. Secretary of the Rarities Committee have received many letters from observers giving grounds for doubting previous decisions on rare stint identifications. Some of the records involved date back to the early years of the Rarities Committee and before. Our correspondents have also urged a review of such records and its simultaneous publication with the preceding paper. We accept in principle that a review is necessary, but it should not be rushed. Furthermore, we hope that the initiative in setting any record to right will not be left entirely to the Rarities Committee. A case for reconsideration is best put forward by the observers directly involved in the record, whether now or ten years ago. Eds

Mediterranean Gulls at Blackpill, Glamorgan

R. A. Hume and P. G. Lansdown

From November 1972 to late July 1973 Mediterranean Gulls *Larus melanocephalus* were continually, though by no means daily, present at Blackpill, Glamorgan, 18 different individuals being involved. Blackpill is the part of Swansea Bay beach which attracts the majority of the gulls in the area, due to a small stream which runs out across the beach affording bathing facilities, a higher stretch of beach giving a longer resting time for the birds before each high tide, and a sand bar which remains uncovered except during the higher tides.

OCCURRENCES AT BLACKPILL

A	winter adult	12th November-3rd February, 21st March
B	second-winter	18th-30th November
C	summer adult	23rd March-4th April
D	second-winter	24th March
E	summer adult	24th-25th March

F	first-year	10th April-8th May, 25th May, 4th June
G	first-year	14th April-10th May, 1st June
H	first-year	3rd-8th May, 23rd-24th May, 27th June
I	first-year	4th-5th May
J	first-year	4th-8th May, 24th May, 1st June
K	first-year	16th May-20th July
L	first-year	17th-27th May
M	summer adult	30th June-2nd July, 11th-17th July
N	second-summer	12th-24th July
O	summer adult	17th-27th July
P	summer adult	17th-18th July
Q	second-summer	18th-23rd July
R	second-summer	23rd-27th July

At the time of writing (September 1973) there are still two Mediterranean Gulls at Blackpill, an adult and a second-year, but, being in winter plumage, their individual identification is impossible.

Sharrock (1972), in his analysis of 285 records of Mediterranean Gulls from 1958 to 1967, gave averages of 19 birds per year over the whole of Britain and Ireland during 1958-62, and of 38 during 1963-67. The Blackpill observations, involving 18 birds in less than a year from a single locality, suggest that this increasing trend is continuing, and this is supported by conservative minima for the whole of Britain of 53, 50 and 63 in 1971, 1972 and 1973 respectively (P. F. Bonham *in litt.*, from 'Recent reports' files).

Sharrock also compared the number of immatures and sub-adults with the number of adults. From 1958 to 1962 immatures and sub-adults comprised 20% of all those aged, and from 1963 to 1967 34%. At Blackpill, 67% were immatures or sub-adults, reflecting the increasing trend noted by Sharrock.

In his analysis of arrival dates, Sharrock stated: 'There is clear evidence, however, of a distinct arrival increasing throughout July and reaching a peak in early August, probably continuing throughout August, September and October, possibly even into November.' From his histogram (fig. 92) one can also make out a secondary peak in mid-April. It is, perhaps, impracticable to compare the pattern of first dates of 18 records with one of 285, but the list on pages 17-18 shows clear peaks between late March and mid-May, with another in mid-July, and no arrivals at all during the August-September period which Sharrock gave as the most frequent arrival time. It is interesting that four of the seven first-year birds left during May to reappear in June, F and J after a gap of one to two weeks, G after over three weeks and H after over a month, thus illustrating the difficulty experienced by Sharrock in analysing a series of records of birds not individually distinguished, some or all of which may have been recorded as different individuals at the same locality or nearby.

BILL COLOUR

Adults

- A Bright scarlet with small, sharply-defined brownish-black tip
 C, E Rich red, apparently unmarked
 M, P Red, with thin dark band, thicker on lower mandible
 O Red, with dark area on gonys, and yellow tip

Second-year

- B Dingy pale orange-buff basal two-thirds, blending into blackish tip
 D Dark, darker at tip, but not seen sufficiently close to establish colour
 N Red, slightly duller than those of the summer adults, with dark band (thicker on lower mandible) and red between this and a thinner, less distinct, dark band isolating the yellowish tip
 Q, R Red, with yellow tip and no dark mark whatsoever

First-year

- F, G Orange or reddish, with distal third black and sharply defined
 H Orange-red blending into blackish tip; some dark marks near gape
 I, J Reddish-buff blending into blackish tip, bird I having the larger tip
 K Bright red with extensive, clean-cut black tip
 L Buffish with distal third black

All the first-year Mediterranean Gulls appeared to have very dark or black bills at a distance, the patterns described above and illustrated in fig. 1 on pages 20-21 being visible only on standing birds at reasonably close range. It should be noted, however, that observations elsewhere (and at Blackpill in previous years) have produced individuals of each age group with black bills with just a trace of deep red at the base, even at very close range.

LEG COLOUR

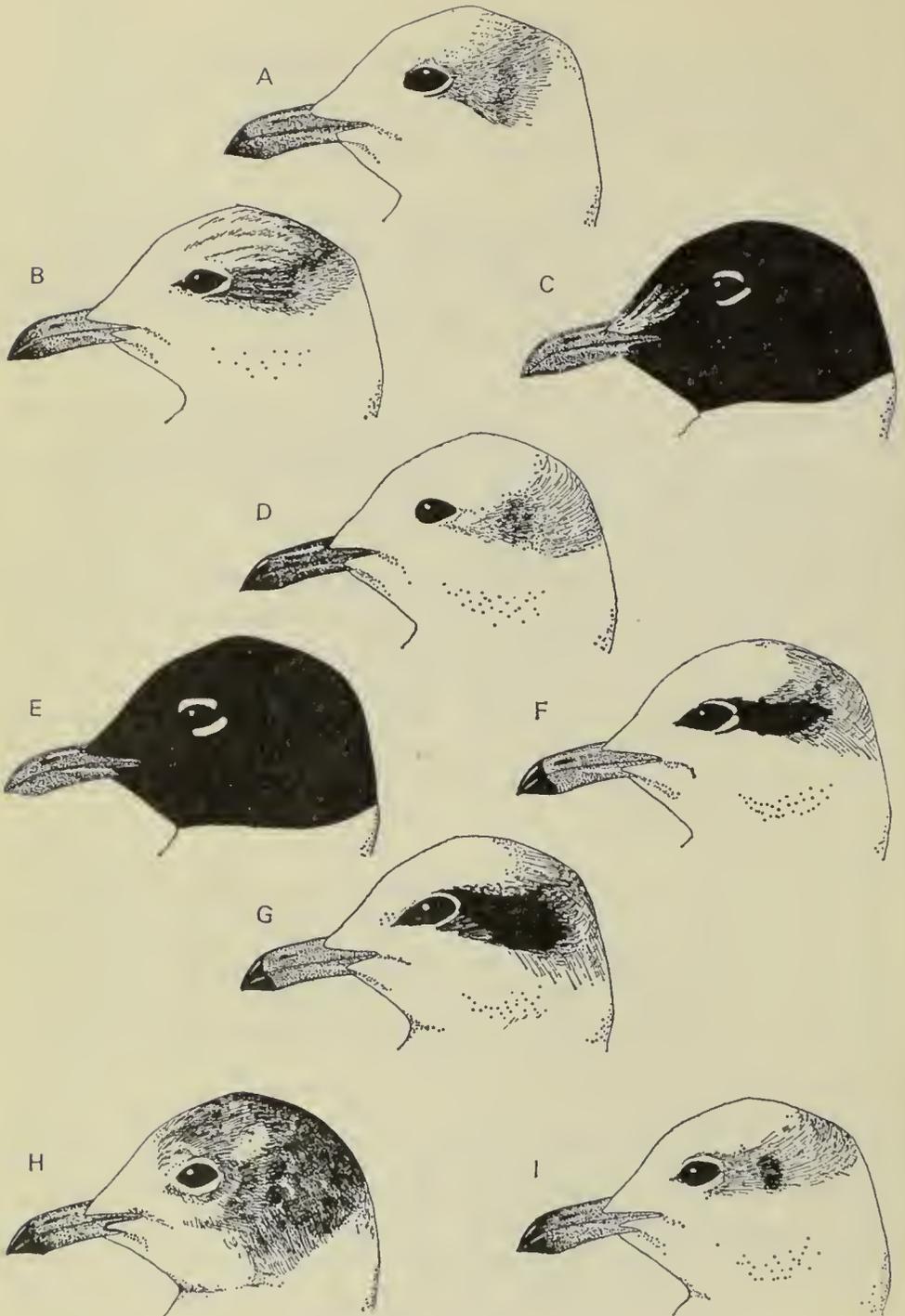
All adults had bright red legs, though these could appear almost black at a distance. Of the second-year individuals, B and D had very dark reddish, almost black legs, while those of N, Q and R were plum-coloured. The first-year birds all had dirty brownish-red legs, G, I and J the reddest and F the darkest (almost black).

HEAD PATTERN

See fig. 1 on pages 20-21. All the first-year individuals staying for a lengthy period (F, G, H and K) retained their original head pattern throughout, except that the nape, and later the crown, took on a dingy-grey appearance, though not strongly enough to affect individual identification. Bird H arrived in May with a mottled brownish hood, and when last seen nearly two months later had basically the same pattern but with a blackish hood and a thin ring round the throat (as in fig. 1). Bird K, however, did not change in pattern over two months but gained the dingy nape and crown.

TAIL

Adults and second-year birds had pure white tails. First-year birds



R.A.H. '73

Fig. 1a. Head and bill patterns of nine Mediterranean Gulls *Larus melanocephalus* at Blackpill, Glamorgan, during November 1972-June 1973. A, C and E were adults, B and D second-year birds, and F to I first-year birds (see pages 17-19 for full details)



PLATE 1. Gannet *Sula bassana* brooding two chicks together, Bass Rock, East Lothian, July 1973; two days previously, none of the adults in this part of the colony had more than the normal brood of one young (page 25) (photo: Peter Rowe)



dimw 1973



PLATE 3. Stints in flight, all in first-autumn plumage: left, Least Sandpiper *Calidris minutilla*; top centre, Western Sandpiper *C. mauri*; right, Temminck's Stint *C. temminckii*; and bottom, Long-toed Stint *C. subminuta*. Flight identification of stints is very difficult, but of the seven species these four exhibit the most obvious distinguishing marks (pages 1-16) drawn by D. I. M. Wallace

PLATE 2 (opposite 1). The seven small species of the genus *Calidris*: see pages 4-10 for detailed comparisons of all plumages (drawn by D. I. M. Wallace)

Western Sandpiper *C. mauri*: 1 autumn flock, 2 breeding, 3 winter, 4 first autumn
 Semipalmated Sandpiper *C. pusilla*: 5 autumn flock, 6 breeding, 7 first winter, 8 first autumn

Red-necked Stint *C. ruficollis*: 9 autumn flock, 10 adult winter, 11 first autumn

Little Stint *C. minuta*: 12 autumn flock, 13 first winter, 14 breeding, 15 first autumn

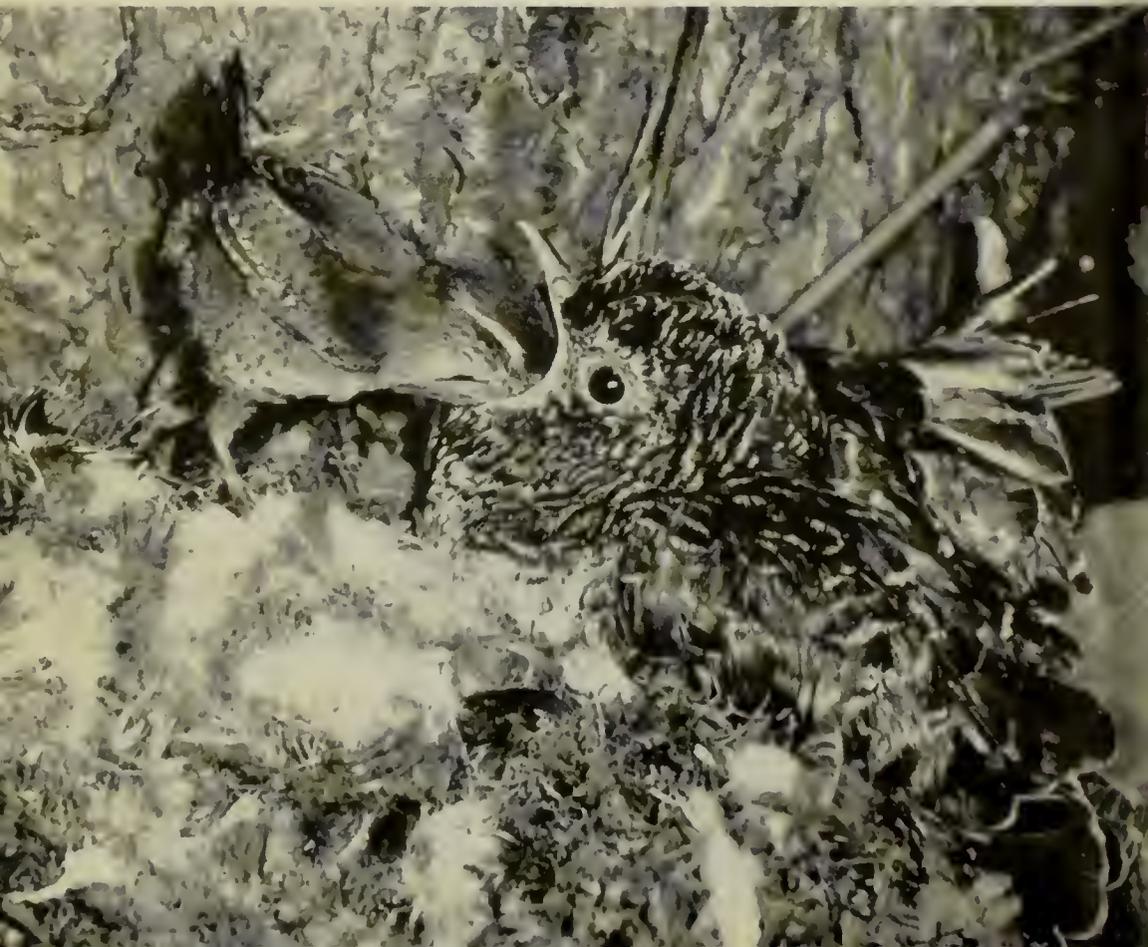
Least Sandpiper *C. minutilla*: 16 breeding, 17 first autumn, 18 autumn flock, 19 first winter

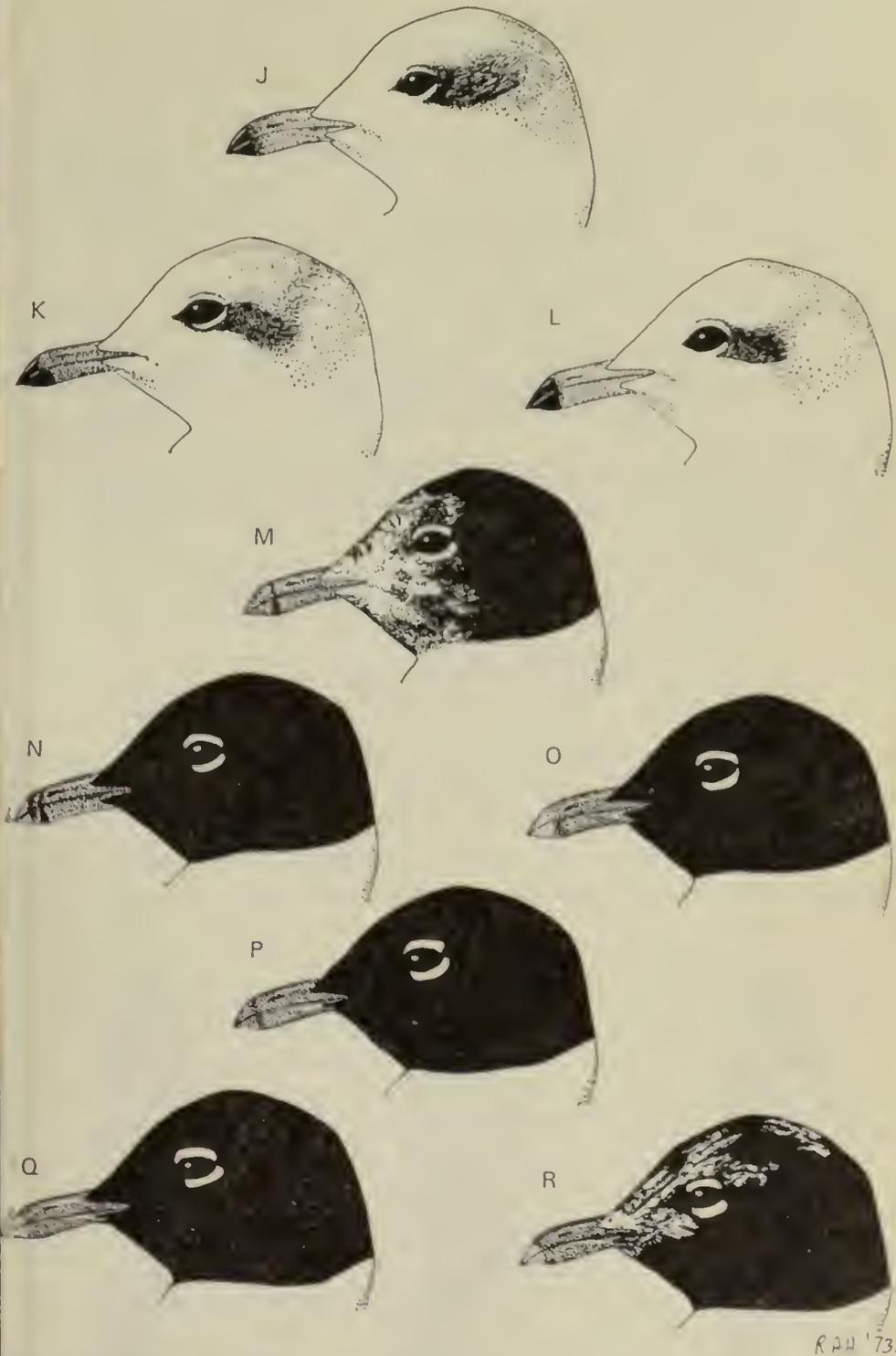
Temminck's Stint *C. temminckii*: 20 first autumn, 21 autumn party

Long-toed Stint *C. subminuta*: 22 first autumn, 23 winter, 24 autumn flock



PLATE 4. Lanner *Falco biarmicus* tearing up rodent stolen from a Black-winged Kite *Elanus caeruleus*, Kenya, September 1973 (pages 25-26) (photo: J. F. Reynolds). Below, Wren *Troglodytes troglodytes* feeding young Cuckoo *Cuculus canorus* on green larvae and centipedes, Shropshire, June 1973 (pages 26-27) (photo: N. A. J. Wilde)





RAH '73.

Fig. 1b. Head and bill patterns of nine Mediterranean Gulls *Larus melanocephalus* at Blackpill, Glamorgan, during May-July 1973. J to L were first-year birds, M, Q and R second-year, and N, O and P adults (see pages 18-19 for full details)

had a blackish to dark brown subterminal band, both narrower and darker than that of an immature Common Gull *L. canus* (though this did not seem a particularly useful field mark).

MANTLE

All birds had a pale grey mantle, a little paler than that of a Black-headed Gull *L. ridibundus*. In bright light, however, both Black-headed and Herring Gulls *L. argentatus* can look equally pale on the mantle.

UPPERWING

Adults

All Same colour as mantle, fading to white on tips of primaries. (White underwing useful for initial identification)

Second-year

B, D, N As adults, but with 3-4 short dark subterminal lines on primaries

Q, R As adults, but with 2 short dark subterminal lines on primaries

First-year (see fig. 2)

G Dark brown forewing, blackish-brown outer primaries and coverts, blackish bar across secondaries breaking into series of dark marks across edge of inner primaries, and pale grey midwing panel and inner primaries (same colour as mantle)

F, H Much less distinct in flight—paler brown forewing, browner outer primaries and coverts, similar hindwing bar and, consequently, less contrasting wing panel

I, J, K, L Pale grey or buffish forewing, dark brown outer primaries and coverts, very faded hindwing bar, and pale grey midwing not contrasting with either forewing or mantle

Of all the first-year birds, G had the most distinct wing panel, though it never appeared paler than the light grey mantle. (First-

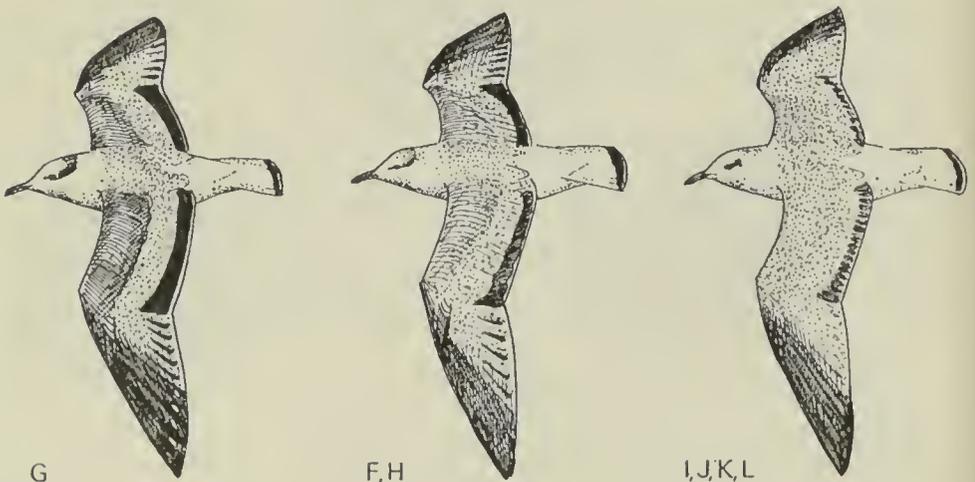


Fig. 2. Upperwing patterns of seven first-year Mediterranean Gulls *Larus melanocephalus* at Blackpill, Glamorgan, during April-July 1973 (see pages 18, 22-23)

year Common Gulls have wing panels paler than the mantle, and their wings, though they show considerable variation, are browner and less clear-cut, even the wing panel being buffish.) The white spots on the inner webs of the dark outer primaries of the first-year Mediterranean Gulls were seen only on a few occasions, usually as the bird stretched a wing or was about to alight, thus spreading the feathers.

DISCUSSION OF FIELD-CHARACTERS

Our observations are at variance with those of Grant and Scott (1967) in several respects. They described 'a black streak from the bill through the eye'. On the Blackpill birds, however, the streak did not originate from the bill in any individual, commencing only just in front of the eye in all cases. Grant and Scott stated: 'The bill of the immature appears black, but close views usually reveal a trace of dark red at the base of the lower mandible.' At Blackpill the bills of all first-year birds (F-L) appeared dark at a distance, but close views revealed that at least two-thirds was medium coloured, varying from bright red to buffish, the tip being black; P. J. Grant (*in litt.*) has agreed that this first-year coloration was probably normal. Two of the second-summer birds (Q and R) had no trace of black on the bill, but these were not dealt with in any detail by Grant and Scott.

Concerning the upperwing-pattern, it was stated that: 'In immatures the dark markings on the wing are black, even in strong sunlight . . .' On the Blackpill immatures, however, the outer primaries varied from blackish-brown to medium brown, rarely appearing black, and the bar along the secondaries varied from blackish to faded brown; thus the wing-pattern was less distinct from that of an immature Common Gull than Grant and Scott suggested. Discussing first-winter individuals, they wrote that 'The pale area on the wing, caused by the almost white secondary and inner primary coverts and inner primaries, is a good field mark . . .' At Blackpill, the contrast between dark and pale on the upperwing was more obvious in the Mediterranean Gulls than in the Common Gulls due to the more clean-cut lines of the dark areas, not to the panels being paler. Mr Grant's illustration of the first-winter bird (plate 48, top left) shows the wing panel as virtually white, contrasting with the grey mantle, but on none of the Blackpill birds was the wing panel any paler than the mantle.

Lastly, we did not find wing-tip pattern a useful field distinction between first-year Mediterranean Gulls and first-year Common Gulls, and thus we agree with the views expressed by Mr Grant in the series of letters on this subject between him and Dr W. R. P. Bourne (*Brit. Birds*, 61: 138-143; 63: 91-93; 64: 285-288).

AGGRESSIVE BEHAVIOUR

The following aggressive behaviour was noted by over half of the Mediterranean Gulls towards Common Gulls and Black-headed Gulls, and more particularly towards Kittiwakes *Rissa tridactyla*. A hitherto inactive Mediterranean Gull, among equally inactive gulls of other species gathered on the beach prior to high tide, would suddenly lunge at another bird, sometimes running up to five metres to do so, passing and ignoring other gulls during its approach. The bird thus attacked either evaded the lunge or, if taken unawares (frequently asleep), received a hard downward stab around the rear end or a horizontal thrust about the head or neck. It normally moved up to a metre and received no more attention from the Mediterranean Gull, though a similar attack was sometimes made towards another gull after a further period of inactivity. There seemed to be no reason for this behaviour and the only consequence was that the Mediterranean Gull took up the position of the attacked bird for a time.

WALK

Each individual had the same gait: a fairly high-stepping walk in which the body remained at a constant height and position while the legs moved easily and rapidly. This walk is presumably due to the longer legs of this species. The only other gulls seen at Blackpill during this period with a similar walk were two Ring-billed Gulls *L. delawarensis* (*Brit. Birds*, 66: 509-517) which also had relatively long legs. The Mediterranean Gulls tended to walk about more frequently than the other species, sometimes walking up to 50 metres through an otherwise static flock.

ACKNOWLEDGEMENTS

We would like to thank all the observers who supplied records and helped to clarify the situation, in particular M. Davies, K. E. Vinicombe and D. R. Waugh.

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P. G. Lansdown, 14 Can-yr-aderyn, Pinewood, Morriston, Swansea, Glamorgan

Notes

Gannet nest with two chicks My wife and I were on the Bass Rock, East Lothian, in July 1973 photographing Gannets *Sula bassana* at their nests. On our first visit we saw nothing out of the ordinary. During the following two days there was some very heavy rain, and on our next visit immediately afterwards we found that some of the nests had been washed away. In the area where we had been photographing before, one of the Gannets was now brooding two chicks together, one larger than the other (plate 1). We are fairly certain that we would not have missed this on our first visit, and the photographs we took of this part of the colony before the storms appear to corroborate this. PETER ROWE

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We showed this note and the three photographs sent by Mr Rowe to Dr J. B. Nelson, author of many papers on this species (for example, in *Brit. Birds*, 58: 233-288, 313-336). He comments as follows: 'It seems to me more likely that the larger of the two chicks got there after disturbance by man. In terrain such as this, no dislodgement of nest material could be sudden enough or total enough to cause the chick to fall—it would (in the very unlikely event of the nest being dislodged) simply scramble on to the site where the nest had been. On a tiny ledge on a sheer cliff, a nest could be dislodged, but then the chick would almost certainly fall into the sea, and there seems little possibility, in the location in these photographs, that the chick had come from a sheer cliff nest above. If it arrived by dislodgement, there would be nothing unusual in the adults feeding it. The inequality in the size of the two chicks, however, would almost certainly have led to the death of the smaller, whether or not it was the rightful occupant, since the larger would dominate and attack it.' EDS

Piracy by Lanner On 16th September 1973, in Nairobi National Park, Kenya, I saw a Lanner *Falco biarmicus* flying fairly low over open grassland with scattered *Acacia* and *Balanites* trees. On one of the latter a Black-winged Kite *Elanus caeruleus* had just landed with a rodent, roughly equivalent in size to a half to three-quarters grown Brown Rat *Rattus norvegicus*. The Lanner flew at the Black-winged Kite which, taking to evasive flight, dropped its prey; this was seized by the falcon and carried to open ground where it was devoured in about 25 minutes (see plate 4a). The Lanner then flew to a nearby post where it stayed dozing and occasionally preening for an hour before flying away.

The usual prey of the Lanner is a wide variety of birds, taken both on the wing and on the ground, and it is also recorded as taking mammals, reptiles and even insects, but Brown and Amadon (1968, *Eagles, Hawks and Falcons of the World*) did not record it feeding by piracy.

J. F. REYNOLDS

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Observations on Wren rearing young Cuckoo On 19th May 1973, in the grounds of Dudmaston Hall, Shropshire, I and a companion discovered the nest of a Wren *Troglodytes troglodytes* which had been parasitised by a Cuckoo *Cuculus canorus*. The nest, in the form of a complete ball some 17 cm in diameter, was 50 cm above the ground among brambles close to the foot of a Scots pine tree. The entrance had been neatly enlarged, presumably by the Cuckoo, to an opening measuring 6 cm wide by 5 cm high, and the contents, which consisted of five Wren's eggs in addition to the Cuckoo's egg, were clearly visible in the cup. The Cuckoo's egg had a dark blue-green background colour and was uniformly flecked with fine red-brown marks, being very similar to egg no. 6 on plate XIII in *The Popular Handbook of British Birds* (1965 edition) by P. A. D. Hollom.

I revisited the nest on 2nd June and found the Cuckoo hatched and occupying the whole of the cup. The five Wren's eggs, all still intact, were lying on the ground beneath the nest. When I again returned on 8th June, the young Cuckoo was well grown and feathered and measured 18 cm from bill to tip of tail. It was resting on what remained of the Wren's nest. The whole of the top of the nest had become detached and had been pushed aside. I was able to observe the feeding behaviour throughout the entire day from a photographic hide which I set up some three metres from the nest (see plate 4b). Food was brought by only one of the pair of Wrens, probably the female, distinguishable from its mate by its paler and more worn plumage. The other occasionally accompanied its mate to the vicinity of the nest but always perched at least two metres from it. The Cuckoo made no sound and did not call for food but, whenever the Wren came within sight, whether carrying food or not, it opened its orange-red gape wide. Small birds of other species promoted no response from the Cuckoo. Feeding took place at intervals of 4½-13 minutes, eight- or nine-minute intervals being the most common. The food was of only two types: green larvae approximately 2.5 cm long brought singly, and centipedes of a similar length brought in what appeared to be pairs but which I suspect were single creatures either folded over or cut in two. The green larvae formed the larger part of the diet, the Cuckoo being fed perhaps five larvae to one centipede.

After most feeds the Wren looked round the nest for a faecal sac, though the Cuckoo produced them only at approximately two-hourly intervals. Even though the Cuckoo was sitting on a relatively flat platform, it went through the motion of ejecting the faecal sac over the edge of an imaginary nest. Between feeds the Cuckoo dozed with eyes closed, but it was instantly alert when predators such as Jays *Garrulus glandarius* and Carrion Crows *Corvus corone corone* called or came within sight. Other birds, for example Turtle Doves *Streptopelia turtur* and Blackbirds *Turdus merula*, calling nearby did not disturb it. The Cuckoo left the nest during the following week and could not be located on 15th June. N. A. J. WILDE

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These notes provide an interesting comparison with the observations of Brian Curtis and the comments by the Reverend Edward A. Armstrong, author of *The Wren* (1955), in *Brit. Birds*, 62: 117-119. Mr Curtis saw only one Wren come to the nest throughout the 16 days of observation. It became so tame that eventually he was able to watch feeding activities from a distance of a metre, without a hide. The food included moths and spiders as well as caterpillars and other larvae; the feeding rate was variable and became decidedly faster when the Cuckoo was well grown; and the Cuckoo called and quivered its wings as soon as it first sighted the Wren with food. The Wren also spent much time preening near the nest. One particular point of interest in the present note is the differing reactions of the young Cuckoo to other birds. EDs

Domed nest of Chaffinch With reference to I. J. Ferguson-Lees' note on a nest of a Chaffinch *Fringilla coelebs* partly roofed over (*Brit. Birds*, 39: 213), it may be of interest to record the following. On 29th April 1963 I was walking by a laurel hedge on the edge of some woodland near Corsham, Wiltshire, when I disturbed a Chaffinch which emerged from an egg-shaped construction of grass inside the hedge. On closer investigation I found a domed structure of coarse dead grass, three-quarters of a metre from the ground, 21 cm high and 11.5 cm wide, and thickest at the base. There were a few long pieces of grass hanging from the base of the nest, while the roughly interwoven grass at the top was 12 mm thick. The entrance was a spherical hole about 35 mm in diameter, situated half-way up the nest and facing the line of the hedge. The nest contained three normally coloured eggs. I visited it again on 6th May to find that the eggs had been sucked, probably by Wood Mice *Apodemus sylvaticus*. Closer examination revealed that inside the grass structure was a normal type of nest, a moss cup lined with hair. JULIAN C. ROLLS
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Letters

Scope of 'British Birds' and seasonal analyses of records I could not agree less with A. Reynolds or more with Michael Thomas (*Brit. Birds*, 66: 408-409). To call 'Recent reports' by this title is a misnomer. By the time one receives *British Birds* the records are long outdated, and a certain percentage is only based on rumour. I would much rather read an authenticated quarterly summary. The advantages of quarterly reporting are enormous, and such summaries could show, for example, migrational trends and breeding successes. The space thus taken up would be used in a far more meaningful manner than at present. Regarding the setting up of an extensive network of regional recorders, I have always understood that this system was already in being (see *Brit. Birds*, 66: 325-328): certainly it has long been true of Bedfordshire, where we also have a local 'rarities committee' which continually vets unusual records.

Mr Reynolds is surely suggesting that the contents of *British Birds* become very insular. The amount of research being devoted to wholly indigenous bird populations must be limited, and publication of major papers on these should remain largely in the appropriate journals. I would prefer to read a short note on the behaviour of Greenfinches at peanut feeders than a five-page article! Again, the present policy of *British Birds* in publishing identification papers is, in my opinion, the correct one, and I would like to see this aspect expanded. In this day of enlightened identification science and greater coverage, British birdwatchers need to know the finer points of jizz, plumage and other features of vagrants. For example I certainly enjoyed P. J. Grant's Ring-billed Gull paper (*Brit. Birds*, 66: 115-118) that Mr Reynolds included among 'foreign material', and would point out that at the time of its publication the first of this species to be recorded in Britain was being observed in Swansea Bay, Glamorgan (*Brit. Birds*, 66: 509-512).

Now that the subscription rate has been increased, I believe that *British Birds* should adopt an even wider scope and become more of a 'popular' journal to attract new readers: there are undoubtedly more amateur field-workers than senior students. I also think that the title of the journal should remain unchanged. B. D. HARDING
26 Woodlands Avenue, Houghton Regis, Dunstable, Bedfordshire

A. Reynolds' letter on the scope of *British Birds* has been something of a shock for me. In my opinion it shows a great degree of narrowness, which I can only call unscientific. Like the editors, I think that British bird life must be seen in the frame in which it takes place, that is in a natural unit (mainly the western Palc-

arctic) and not within the arbitrarily fixed boundaries of Great Britain. How, according to Mr Reynolds' view, should Ireland be treated?

So a note on a British bird in its wintering grounds in Africa can be of much more importance than one on its behaviour in Britain. As the Greenshank note from Nairobi does not impress Mr Reynolds (and other readers, who I regret he does not name), I ask him whether, for example, a note should not be printed in *British Birds* on the ecological situation in the Sahel zone, which might have a great influence on British breeding Whitethroats and other birds that have greatly decreased? Should the results of the successful British wader-ringing expeditions to Iceland, Greenland or Morocco not be noted by readers of *British Birds*? Should these expeditions of British ornithologists be stopped? Will he perhaps disregard important factors in the life of British birds only because they do not take place in Britain? If so, he will never find and understand the really important connections in many species: finding connections is science!

Reviewing foreign books, which are the results of scientific researches in other countries, seems to me necessary too. The *Handbuch der Vögel Mitteleuropas* is by far the most important work on central European birds, of a higher standard than Witherby's *Handbook of British Birds*; should it be neglected in Britain? Here, by the way, I come to a point of general criticism of British papers: literature from the Continent is often not consulted, though British ornithologists should be aware that also on the Continent much ornithological work is done.

Of course, an article on penguins in the Antarctic would be out of place in *British Birds*, but the scope now maintained is just adequate. Many really important scientific results can be obtained only by international co-operation, not by working in isolation.

Concerning the seasonal analyses of records proposed by Michael Thomas, I think that 'Recent reports' in its present form is valuable though a little unsatisfactory, since the data are unchecked, comparisons on an international scale are not possible, and homogeneous periods (breeding, migration, winter) are subdivided. Periodic summaries would be preferable, either quarterly or covering the periods March-June (spring migration and breeding), July-October (autumn migration) and November-February (winter). The latter arrangement seems somewhat more practicable than a regular three-month summary, since the spring migration and breeding season (which largely overlap) and the winter period would not then be split as they would by a quarterly schedule. Besides being better adapted to the movements of birds through the year, such periodic summaries would offer two further advantages: more

checking would be possible, and the inclusion of the reports in *British Birds* would be easier, since you would not always have to find space to print 'Recent reports' in every issue as at present.

MICHAEL SPECKMANN

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I agree entirely with the views expressed by A. Reynolds in the September issue, and have had the same experience of increasing criticisms from many quarters of the undue emphasis on material from abroad. The main birdwatching activities of the majority of your readers are necessarily based in this country.

I have always regretted that *British Birds* suspended some years ago their practice of presenting reviews and summaries of the annual reports of the various bird clubs and natural history societies.

Let us have more details of what is happening in our own environment.

JOHN LORD

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On any rational basis it is difficult to engender any sympathy for A. Reynolds' aversion to reading about the habits of his native Greenshanks while they are wintering in Kenya. Although I confess to approaching semi-senility, having had my first note in *British Birds* in 1943 (a report of a Dartford Warbler in Caernarvonshire in 1932 when I was a member of the Lower Fourth and which I persuaded the late Bernard Tucker to accept—a report which has since caused me considerable unease), to me Mr Reynolds' views brand him as being a part of the Dodo age. In addition to the obvious and compelling reasons for an all-embracing approach to ornithology in the Palearctic which should be reflected in your pages, a rapidly growing band of bird enthusiasts are clearly keen to widen their horizons and this is shown whenever the amateurs gather together. Mr Reynolds can speak only for a small minority whose purity of thought will lead them inevitably to concentrate on the Red Grouse to the exclusion of all else.

Michael Thomas, on the other hand, is to be commended. Between the scientific austerities of the Rarities Committee and the worst excesses of those suffering from the twitching syndrome (*vide* the man whose wife managed to deflect him via the telephone and the AA at Newmarket from a Bluethroat in Norfolk to a Wall-creeper in Dorset) lies a considerable body of bird people who are deeply interested in the migration patterns of Ross's Gull and its appearance at Teccmouth, for example, and who would like to see woven into the reports comments on such things as the effects of the splendid 1973 breeding season in the Arctic on numbers of migrants, arrival dates and so on. 'Recent reports' is titillating and very worth-

while but a little akin to the flavour of a gossip column, because there is an implication of capriciousness in the selection of items stemming from the casual method by which the intelligence is gleaned and edited. The practical difficulties of organisation are awe-inspiring, but a more systematic and timely treatment as suggested would, I suspect, be much to the taste of your middle-of-the-road readers.

DEREK BARBER

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Having read A. Reynolds' letter of criticism regarding the inclusion in *British Birds* of what he and his friends call 'foreign material', I would like to express my disagreement with him and to give my wholehearted support to the editors for the policy they have been pursuing.

I have been a subscriber for well over 50 years and, no doubt like many of your readers, have made many trips abroad. I have gained much knowledge from the information published on not only the habits of what we class as British birds—many of which spend but a short part of their lives in this country—but also (and possibly of far greater importance) the differences, however slight, in plumage and song of closely allied species or subspecies in Britain, Europe, North Africa, south-west Asia, or even further afield. To an ornithologist all matters pertaining to a species are of interest, no matter where the information is collected or the observations made. I feel sure Mr Reynolds and his friends will find a wealth of information in local publications about birds but, for those of us who wish to increase our knowledge, may *British Birds* continue to publish material of ornithological importance without regard to what some people may consider foreign sources.

ALASTAIR ANDERSON

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A. Reynolds' letter raises a valid, but very debatable, question. Avian mobility makes a nonsense of international boundaries, and the modern British ornithologist (and reader of *British Birds*) is no longer as insular in his outlook as were many of his predecessors of pre-war days. He is in fact (and rightly) European in his approach.

In this climate it is surely absurd that, because of the journal's title, it should be debarred from studies of, say, the Short-toed Eagle, found in France but not on the British list, while admitting material on some Asiatic or American warbler which has wandered off course, been recorded, and thereby earned the courtesy title of a British bird.

At the same time, Mr Reynolds has a point. There is a difference between being insular and being cosmopolitan. For me, the paper

by D. I. M. Wallace on birds in Iran, also in the September issue, is stretching the boundaries of 'British' to the limit. The percentage of your subscribers who are seriously interested in Iran must, I am sure, be small. It is certainly not the sort of material to attract new subscribers, or indeed to retain old ones. To my mind there is no doubt that, despite the number of editorial names connected with it, this paper should have been regarded as outside the scope of this journal.

I appreciate that the difficulty is to know where to draw the line. Clearly no definite geographical boundary can be given. This must be left to the discretion of the editors. I would, however, suggest that they look hard—and twice—at all material submitted on birds east and south of the Mediterranean shore-line, and that they ask themselves, with the readership of *British Birds* in mind, whether such papers would not be more suitable for publication in the *Ibis*, or some such ornithological journal with global coverage, rather than for one entitled *British Birds*. GEORGE YEATES

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We have received five more letters replying to Mr Reynolds, three in disagreement and two supporting him to some extent, stressing that a balance must be struck and suggesting a readership survey. In addition, we have also received three further letters on seasonal summaries of reports, and we thank all those who have written on either topic for their many useful suggestions. EDS

News and comment *Robert Hudson*

About-turn in Belgium In 'News and comment', October 1972 (*Brit. Birds*, 65: 448), I gave the welcome news that Belgian bird protection laws had been revised so as to prohibit the large-scale trapping, for food and caging, that had given Belgium such a deservedly bad reputation in west European conservation circles. At that time, the Minister concerned announced that his Department was looking at a formula that would permit indigenous birds to be taken for caging in a moderated and controlled manner; and one now learns that the Belgian Government has bowed to pressure from the cage-bird lobby, declaring an open season from 10th October to 15th November. A quota for 1973 was fixed at 120,000 birds, restricted to finches and buntings, ranging from 60,000 Chaffinches down to 400 each of Hawfinch, Crossbill, Yellowhammer, Corn and Reed Buntings. All those intending to trap wild birds will have to register their names and catches with the Administration des Eaux et Forêts, be of Belgian nationality, over 21, without criminal convictions, and have sufficient knowledge of birds; but, as Belgian ornithologists have pointed out, the last requirement cannot be tested, and in any case there is not the machinery to ensure that the stated quotas are not exceeded.

Breeding of Peregrines in captivity The Cornell University Laboratory of Ornithology, New York, claims that it can breed Peregrines in captivity on a sufficiently large scale to provide a surplus for falconers and for restocking natural sites (see 'News and comment', September 1972). This view has been challenged in the U.S.A. on the grounds that the difficulties of domestic propagation in falcons will prevent captive-breeding on a practical scale. However, Cornell's *Peregrine Fund Newsletter* no. 1, recently to hand, shows that a technique has been mastered. In 1973 their four pairs of Peregrines laid 41 eggs (in ten clutches), which were placed in an incubator: 26 proved fertile, 22 hatched and 20 young were reared, a highly satisfactory result. These successfully reproducing falcons are all eyasses—birds taken as nestlings—and experience has shown that these, together with captive-bred birds, will breed easily in confinement, unlike wild-caught adults. Based on their 1973 results, Cornell point out that by 1976, when they have 20 such pairs of Peregrines, they could produce over 100 young a year for restocking programmes; their next task is to experiment on the best ways of 'hacking' the juveniles into the wild, preferably without the high post-fledging mortality experienced under natural conditions.

Feral parakeets near London A number of reports during the last three years in the bulletins of the London Natural History Society, Kent Ornithological Society and Surrey Bird Club suggest that at least one species of parakeet is developing feral populations in three separate areas south of London. These reports have referred to 'Ring-necked', 'Rose-ringed' and 'Grey-breasted' Parakeets, though it would seem that *Psittacula krameri* of Africa and south Asia, the most commonly imported member of the genus, is the one intended in most instances. In the Southfleet/Northfleet/Gravesend/Shorne area of Kent feral parakeets have been present since 1969, in which year a family party was seen at Southfleet. Also from 1969, small numbers have been present in the Bromley/Park Langley/Shirley/Croydon area on the borders of Kent and Surrey. Proven instances of feral breeding there have been few, but a pair certainly nested successfully in the wild near Croydon in 1971; and in 1972 and 1973 display and nest-site prospecting was noted at Park Langley, where a party of eleven 'long-tailed parakeets' was seen in March 1973. The third area is Claygate and Esher, Surrey, where a feral pair was seen in late 1970, successful breeding proved in 1971, and a party of six seen in February 1972. Information on feral parakeets in the Gravesend area is sought by B. Dalton, 31 Clarence Place, Gravesend, Kent, and in the Bromley/Beckenham area by C. P. Carpenter, 162 Wickham Way, Beckenham, Kent. It is desirable that the histories of the birds be followed in case *Psittacula krameri* becomes an established breeder. It remains to be seen whether this tropical species could survive a really severe British winter in a feral state, but it is known to be hardy in captivity. It is not without interest that the Monk or Quaker Parakeet *Mycopsitta monachus* of South America has in recent years established feral populations in the U.S.A. as far north as New York, and at least one eradication programme has been initiated.

County boundary changes On 1st April 1974 a new system of county boundaries will come into effect in England and Wales, the changes being relatively minor in some regions but major in others. In England six new Metropolitan Counties will be created, and large portions of some existing counties will be split off and merged with others to make entirely new ones, such as Humberside, Cumbria, Cleveland, Avon, and combined Hereford+Worcester and Cambridge+Huntingdon; while Wales will be divided into five redefined counties. These changes will have serious repercussions for naturalists, since most recording work has been on a county basis; county natural history societies (and naturalists' trusts) must now choose whether to adhere to their existing boundaries, opt for

the new ones, or compromise. This matter was discussed at length at the third conference of local bird report editors, organised by the British Trust for Ornithology and held in Bristol on 3rd November 1973. This was not the kind of meeting at which ultimate decisions could be taken, since local societies are autonomous bodies, each with its own policy committee; but there was a frank exchange of views, from which it appeared that the majority of English county ornithological and natural history societies favoured retaining their traditional areas as far as possible, at least for the present, with liaison between adjacent societies for the exchange of records (where coverage overlapped) and to ensure that no areas remained uncovered by a bird report. It was clear that loyalties to present county boundaries are strong, though it was recognised that this would not be so for the next generation of birdwatchers. Frank Gribble, opening the discussion, made a case for some amalgamations of local ornithological societies, so that there would be fewer English bird reports, each covering a wider area; he pointed out that the West Midland Bird Club had shown this to be feasible by satisfactorily covering three counties (Staffordshire, Warwickshire and Worcestershire). This plea was supported by delegates from Wales and Scotland, for which there are national bird reports as well as a variety of local ones. After lengthy discussions on whether this two-tier system could be adopted in England, I. J. Ferguson-Lees proposed that the question be referred back to the Report Editors' Committee of the B.T.O., to suggest a subdivision of England into about eight regions and to offer recommendations on how such regional bird reports might be financed. This proposal was adopted by the conference.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

Recent reports—October *D. A. Christie*

These are largely unchecked reports, not authenticated records

This summary concerns October, a month in which short anticyclonic spells alternated with westerly weather from Atlantic depressions. Following widespread gales at the end of September, the first week became fairly settled and, as a high pressure area moved south over the Continent, some large falls were recorded, especially on the east coast. This was followed by a short cold spell with winds mainly in the north and east when further influxes of passerines occurred. In the second half of the month there was a short period of wet westerly weather with strong winds which later became more settled, and more arrivals took place with numbers of winter visitors increasing generally throughout Britain and Ireland.

TUBENOSES, SPOONBILLS AND WILDFOWL

During the gales at the very beginning of October, a **Manx Shearwater** *Puffinus puffinus* was found in the porch of a house at Badicaul-by-Kyle (Ross-shire) and a **Storm Petrel** *Hydrobates pelagicus* landed on the deck of a ship at Kyle pier; a **Leach's Petrel** *Oceanodroma leucorhoa* was seen at Spurn (Yorkshire) on 3rd, and three **Balearic Shearwaters** *P. p. mauretanicus* passed Bardsey (Caernarvonshire) on 9th. Off Cape Clear Island (Co. Cork) there was a **Little Shearwater** *P. assimilis* on 6th, three **Great P.** *gravis* on 9th and a **Cory's** *Calonectris diomedea* on 11th. Also during this period, 16 **Great Shearwaters** and 35 **Storm Petrels**, together with 1,375 **Gannets** *Sula bassana*, were counted on a voyage between Swansea (Glamorgan) and Cork on 7th. During the month as a whole, 45 **Sooty Shearwaters** *P. griseus* were reported from six places on the coasts of Aberdeenshire, Northumberland and Yorkshire, with a maximum of 18 south at Seaton

Sluice (Northumberland) on 10th. An immature **Spoonbill** *Platalea leucorodia* was seen at Capel Fleet (Kent) on 30th, but as in September there were no reports of the rarer herons.

Wildfowl counts on 14th returned high totals of 10,200 **Teal** *Anas crecca* and 3,800 **Pintail** *A. acuta* on the Cheshire side of the Mersey and 2,050 **Teal** and 1,600 **Pintail** on the Ribbles (Lancashire). **Long-tailed Ducks** *Clangula hyemalis* were widely reported in England, mainly from the east coast though four were seen together at three places off the Hampshire coast on 13th and a drake was at Whiteford (Glamorgan) from 14th; 52 had gathered at Ross (Northumberland) by 28th, while in Scotland 106 had been present with 1,320 **Eiders** *Somateria mollissima* at Murcar (Aberdeenshire) on 13th. Two drake **King Eiders** *S. spectabilis* were off Holborn Head (Caithness) on 18th, and a drake **Surf Scoter** *Melanitta perspicillata* found among a flock of Common Scoters *M. nigra* off Bamburgh (Northumberland) on 25th was still present in January 1974. There were 3,000 **Greylag Geese** *Anser anser* at Cornhill-on-Tweed (Northumberland) on 28th, while **Pink-footed Geese** *A. brachyrhynchus* numbered over 5,000 by mid-month on the south Lancashire moorlands. A **Bean Goose** *A. fabalis* was at Cley (Norfolk) from 21st until 17th November and another was seen on Fenham Flats (Northumberland) on 25th. Reports of **Brent Geese** *Branta bernicla* were received from twelve places, including one inland at Bough Beech Reservoir (Kent) on 13th, flocks of 100 or more in Langstone Harbour (Hampshire) and flying south at Minsmere (Suffolk), and 535 pale-bellied birds *B. b. hrota* on Lough Foyle (Co. Londonderry) on 14th. Unfortunately we do not have any October figures from Foulness (Essex) but record numbers were noted there in November and will be dealt with in the next summary. **Barnacle Geese** *B. leucopsis*, reported from eight localities, included 150 in the Holy Island area of Northumberland on 7th; on Cape Clear one on 16th, two on 17th and two on 21st were new to the island list. The largest gathering of **Whooper Swans** *Cygnus cygnus* reported was of 197 at Lough Beg (Cos. Antrim/Londonderry) on 14th; in all, 308 were counted in Northumberland during October. The first **Bewick's Swan** *C. bewickii* was at Egginton gravel pits (Derbyshire) on 13th; subsequently this species was reported from nine places, mainly from 22nd, the largest number being 205 (22 juveniles) on the Ouse Washes RSPB Reserve (Cambridgeshire) on 29th, a very high count for October.

RAPTORS

One of the most interesting features of October was an exceptional influx of **Rough-legged Buzzards** *Buteo lagopus* from Fenno-Scandia (and also, to some extent, of **Hen Harriers** *Circus cyaneus* and **Merlins** *Falco columbarius*). After an early record in Lancashire in September (*Brit. Birds*, 66: 544), the first October reports were of single birds at Formby Point (Lancashire) on 12th and 13th, at Harrow-on-the-Hill (Middlesex) on 13th, and in Northamptonshire at Hollowell Reservoir and near Brockhall on 14th. From 17th there was a huge influx, mostly on the east coast of England; records came from Yorkshire, Lincolnshire, East Anglia, Kent, Middlesex, Bedfordshire and Northamptonshire. Although it is impossible to assess the degree of duplication, reports suggest a total of at least 70 individuals. An indication of the size of the influx is given by the following figures: at least 30 birds in Norfolk between Holme and Winterton during 20th-27th, including nine at Cley on 26th; at least eight in Kent; and six in the Beachy Head area of Sussex on 21st. The last time such a passage of Rough-legged Buzzards was recorded in Britain was in the autumn of 1966 (*Brit. Birds*, 61: 449-455).

Honey Buzzards *Pernis apivorus* and **Montagu's Harriers** *C. pygargus* were both recorded in Scilly, single birds on Treco on 17th and St Mary's from 6th to 8th respectively. A **Marsh Harrier** *C. aeruginosus* was also on Treco, on 6th, and another **Honey Buzzard** was watched at Pennington (Hampshire) on 21st. Single **Ospreys** *Pandion haliaetus* were noted at Langstone Harbour from 5th to 9th, Holy-

well Ponds (Northumberland) on 7th and Nettlestead (Kent) on 20th, and birds stayed on from September at Bittell (Worcestershire) until 2nd and at Luton Hoo (Bedfordshire) until 10th. The **Hobby** *F. subbuteo* seen at Fair Isle (Shetland) in September (*Brit. Birds*, 66: 544) remained until 3rd October, and other singles were seen at Walton-in-Gordano (Somerset) on 14th and at Minsmere on 16th. Lastly yet another **Red-footed Falcon** *F. vespertinus* was recorded in an exceptional year for this species, this time at Barrow Gurney Reservoirs (Somerset) on 4th.

A **Corncrake** *Crex crex* appeared on Lundy (Devon) on 4th, and **Spotted Crakes** *Porzana porzana* turned up at Fair Isle, Cley, Framlingham (Suffolk), Sandwich Bay (Kent), Chew Valley Lake (Somerset) and the River Exe (Devon), while singles remained from August at the last locality and at Tring Reservoirs (Hertfordshire) (*Brit. Birds*, 66: 502). An adult male **Little Crane** *P. parva* was identified on St Agnes (Scilly) on 9th.

WADERS

American vagrants included **Pectoral Sandpipers** *Calidris melanotos* at Tring Reservoirs on 3rd, Dibden Bay (Hampshire) on 10th and 13th, and Chew Valley Lake on 13th and 14th. At the last place there was also a **Buff-breasted Sandpiper** *Tryngites subruficollis* on 3rd, and another stayed at Shotton (Flintshire) from 18th until at least 21st. A **Short-billed Dowitcher** *Limnodromus griseus* was reported between Sandwich Bay and Deal from 7th to 11th, and a **Lesser Yellowlegs** *Tringa flavipes* at Wisbech sewage farm (Lincolnshire/Norfolk) on 11th. Small *Calidris* sandpipers from the Nearctic continued to be reported: **Baird's** *C. bairdii* on Skokholm (Pembrokeshire) on 5th and 6th and in Gower (Glamorgan) on 14th, single **Semipalmated** *C. pusilla* at Sutton Bingham Reservoir (Dorset/Somerset) from 18th to 20th and at Durleigh Reservoir (Somerset) on 22nd and 23rd, a **Least** *C. minutilla* on the Stour estuary (Kent) on 22nd, and a **Western** *C. mauri* at Warsash (Hampshire) on 27th. There were also single **White-rumped Sandpipers** *C. fuscicollis* at Chew Valley Lake on 14th, Thornham Harbour (Norfolk) on 24th, the Bann estuary (Co. Antrim) from 27th to 30th, and Deerness (Orkney) on 28th, and two at Lough Beg on the last date. A **Wilson's Phalarope** *Phalaropus tricolor* was at Freckleton (Lancashire) from 4th to 9th and another at Cley on 21st.

Palaearctic vagrants were a **Black-winged Stilt** *Himantopus himantopus* at Englefield Green (Surrey) on 10th, a **Great Snipe** *Gallinago media* on St Agnes on 13th and another on St Martin's (also Scilly) on 21st, and two **Sharp-tailed Sandpipers** *C. acuminata*. The one which caused most excitement stayed at Shotton from 14th until at least 21st and was seen by scores of observers; the second was watched at Morfa Harlech (Merioneth) on 14th and 15th. If accepted these will be only the ninth and tenth records of this Asiatic wader, which breeds in north-east Siberia and winters in Australasia. Among the scarcer migrants, **Dotterels** *Eudromias morinellus* occurred on Fair Isle until 8th, on St Mary's on 13th and 14th (and possibly the same individual on St Agnes on 17th), and on Lundy on 15th. A **Temminck's Stint** *C. temminckii* was at Dibden Bay on most days and two at Sandbach (Cheshire) on 20th had been present for some time. **Avocets** *Recurvirostra avosetta* were reported from eight places, an unusual inland record being of one flying over Old Acres Valley, Cannock Chase (Staffordshire), on 6th. Single **Red-necked Phalaropes** *P. lobatus* were seen at Wisbech sewage farm on 7th and 11th, the last of a remarkable series of five or six individuals during the autumn, and there were single **Grey Phalaropes** *P. fulicarius* at Lcamington Reservoir (Staffordshire) on 7th, Minsmere from 10th to 12th, Cheddar Reservoir (Somerset) from 13th to 16th, Cley from 13th to 31st, St Agnes on 14th, and Blithfield Reservoir (Staffordshire) and Church Wilne Reservoir (Derbyshire) on 21st.

Little Stints *C. minuta* were reported from 36 localities: the highest counts were in the first week, with 24 at Slimbridge (Gloucestershire) on 2nd and 23 at

Dibden Bay on 6th, after which numbers dropped steadily in most areas except for a secondary peak in mid-month. There were far fewer **Curlew Sandpipers** *C. ferruginea*, about 30 at 18 localities, and the maximum was only four at Chew Valley Lake on 3rd. Among the winter visitors **Jack Snipe** *Lymnocyptes minimus* were particularly numerous: small parties were seen at many places and over 15 at Sandwich Bay on 23rd was a record for the observatory, while at Leighton Moss (Lancashire) numbers rose from six on 3rd and 25 on 6th to more than 40 on 17th, the highest numbers ever recorded there. An influx of **Woodcocks** *Scolopax rusticola* was noted at Spurn on 31st when more than 20 arrived, and it is worth noting that 46,000 **Dunlin** *Calidris alpina* in the Ribble on 14th was yet another record for that estuary (see *Brit. Birds*, 66: 545).

LARIDAE TO ALCIDAE

Skua movements were evident at several places on the east coast. A northerly passage of well over 100 skuas at Seaton Sluice on 10th included at least 13 **Pomarine** *Stercorarius pomarinus*, and there were four of this species off Holy Island on 14th and five off Collieston (Aberdeenshire) on 27th. Forty **Great Skuas** *S. skua* flew south at Spurn on 21st, while at Shellness (Kent) on 11th two Great, 35 **Arctic** *S. parasiticus* and an unprecedented 70 **Pomarine** were recorded. At least six skuas were found inland: immature **Arctic** at Belvide Reservoir (Staffordshire) on 3rd and at Gratham Water (Huntingdonshire) on 14th; **Great** at Holme Pierrepont (Nottinghamshire) on 10th and at Chasewater (Staffordshire) on 12th; a **Pomarine** over Sawston Hall woods (Cambridgeshire) on 22nd; and even more surprising, a **Long-tailed** *S. longicaudus* found dead at Wisbech sewage farm on 3rd, possibly a casualty of the late September gales (see *Brit. Birds*, 66: 546).

Mediterranean Gulls *Larus melanocephalus* were reported from eight places, **Glaucous** *L. hyperboreus* from six, including two inland, and **Iceland** *L. glaucoides* from Portstewart (Co. Londonderry) and Cape Clear Island on 19th, and Girdle Ness (Aberdeenshire) on 24th. Single **Sabine's Gulls** *L. sabini* were seen at Weybourne (Norfolk) on 1st, Chew Valley Lake on 3rd and Cape Clear Island on 10th; on 20th a **Little Gull** *L. minutus* was present off St Mary's (this species is rare in Scilly); and next day a **Bonaparte's Gull** *L. philadelphia* was in Newhaven Harbour (Sussex). **Black Terns** *Chlidonias niger* remained very late, being present in October in at least 13 counties in Britain and Ireland as far north as Aberdeenshire; in Scilly, where the species is very rare, one was on St Agnes on 12th and 13th. There were three rare terns: a **White-winged Black** *C. leucopterus* at Cley from 1st to 10th, a **Caspian** *Hydroprogne caspia* at Chasewater on 14th, and a **Gull-billed** *Gelochelidon nilotica* in Aberlady Bay (East Lothian) on 28th. Off Cape Clear Island there was one **Little Auk** *Plautus alle* on 6th and two on 7th, and singles appeared at Spurn on 18th and 23rd.

DOVES TO WRYNECK

A **Turtle Dove** *Streptopelia turtur* on Fair Isle from 25th to 28th was very late for so far north. Its close relative from central and eastern Asia, the **Rufous Turtle Dove** *S. orientalis*, of which there have been three British records, was identified at Lands End (Cornwall) on 5th but the possibility of an escape cannot be entirely ruled out. From North America a **Yellow-billed Cuckoo** *Coccyzus americanus* at Chewton Glen, near Highcliffe (Hampshire), on 20th was found dead there two days later. Late **Swifts** *Apus apus* included two at Minsmere on 1st, one at Spurn on 10th, one flying north at Bardsey on 16th, and one at Lakenheath (Suffolk) on 23rd. Southern vagrants were an **Alpine Swift** *A. melba* at Portland Bill (Dorset) on 7th and at Berry Head (Devon) on 9th and a **Bee-eater** *Merops apiaster* at Seasalter (Kent) on 16th. In addition single **Hoopoes** *Upupa epops* were reported in early October from Corby (Northamptonshire) and Mare de Carteret

(Guernsey), from the Annstead/Beadnell area of Northumberland on 13th and on Fair Isle from 11th until 27th. About ten **Wrynecks** *Jynx torquilla* were seen at eight places, the latest being one on Lundy on 25th.

PASSERINES—WINTER VISITORS

A small arrival of **Robins** *Erithacus rubecula* on 4th included 250 at Spurn, 250-300 at Blakeney Point (Norfolk) and unusual numbers at several places in Tyneside. **Redwings** *Turdus iliacus*, though coming in from 1st, showed two distinct peaks: a massive movement at Fair Isle from 5th to 9th with a huge fall of 13,000 on 6th (when large falls were also apparent all down the east coast of Scotland); and further south a large arrival between 10th and 14th. The latter included 3,500 at Spurn on 10th, 2,000 north-east over Bardsey and 700 on the Calf of Man on 11th (when heavy influxes were also recorded in Kent and the London area), over 5,000 on St Agnes and large numbers moving north-east over Slimbridge on 12th, 2,000 at Cape Clear on 13th and 5,000 at Leighton Moss on 14th. **Fieldfares** *T. pilaris* were a little later, arriving mainly between 16th and 22nd with falls of 1,000 on the Calf of Man on 16th, 1,000 at Leighton Moss on 17th, 1,900 at Spurn on 18th, a large arrival in Tyneside between 18th and 22nd and a big influx in Kent on 21st; a second arrival at the end of the month included 1,400 on the Calf of Man on 28th. There was a large fall of 6,000 **Blackbirds** *T. merula* at Spurn on 22nd followed by another of 1,700 on 31st when large influxes were noted in Tyneside, though on Fair Isle no large arrivals took place at all during October.

Records of **Shore Larks** *Eremophila alpestris* were received from 14 places. Numbers were generally small, in most cases not reaching double figures, and the maximum was 40 at Gibraltar Point (Lincolnshire) on 28th; two unusual inland records were of single birds at Attenborough (Nottinghamshire) on 21st and Church Wilne Reservoir on 26th, in each case the second county record. There were far more **Snow Buntings** *Plectrophenax nivalis*, again mostly on the east coast, the largest flock being 50 at Cley on 18th; in the west a flock of 15 was at Southport (Lancashire) on 25th, three on Dunkery Beacon (Somerset) on 28th, and singles on the Calf of Man on 1st, 4th and 24th; while unusually far south on Guernsey there were two at Vazon on 14th, 18th and 28th and three there on 29th, and one at Bordeaux Harbour on 25th. **Lapland Buntings** *Calcarius lapponicus* were reported from 18 localities, six of them in western Britain, and the largest flock consisted of 20 at Cley on 10th; passage was recorded on Lundy on 15 days, while on Cape Clear Island there were singles on 3rd and 15th. On the east coast birds were noted at Spurn on 14 days with a maximum of 18 on 23rd and 24th; inland one at Beddington sewage farm (Surrey) on 25th is only the third London Area record, and a late report we have received is of one flying over Big Moor (Derbyshire) with two **Twites** *Acanthis flavirostris* on 27th September. The largest flock of Twites on the east and south coasts in October was 300 at Minsmere from 10th to 15th; on Lundy there were two on 26th and one on 29th. A large gathering of 350 **Redpolls** *A. flammea* was at Fawley (Hampshire) on 13th. Rather small numbers of **Bramblings** *Fringilla montifringilla* arrived, with maxima of up to 70 on Holy Island and up to 100 at Hauxley (Northumberland) between 4th and 7th, 100 at Freebirch (Derbyshire) on 25th and 40 on the Calf of Man on 27th. There was evidence of more **Great Grey Shrikes** *Lanius excubitor* than usual: about 17 were present in Norfolk, over ten in Kent, seven in Tyneside, and at least 40 more scattered throughout Britain. **Waxwings** *Bombycilla garrulus* were extremely few—just one at Morston (Norfolk) on 26th and one on Fair Isle on 31st. Two **Black-bellied Dippers** *Cinclus c. cinclus*, a scarce winter visitor, were seen at Kcswick Mill (Norfolk) on 28th and singles subsequently.

Reports of abnormal numbers of **Long-tailed Tits** *Aegithalos caudatus* were received from many areas. Among the more interesting observations were a maximum of 15 on 15th and 16th on the Calf of Man, where there is only one

previous record as long ago as 1957; 24 in Regent's Park (London) on 22nd, possibly the largest number ever recorded there; and 50 at Hauxley from 20th to 24th. Although there was no major irruption of **Bearded Tits** *Panurus biarmicus*, small numbers were seen in south and south-west England, several moved west in Norfolk, two were on Alderney on 29th, and at Spurn there were two migrants on 14th, five on 20th, three on 26th, two on 27th and five on 29th (*cf. Brit. Birds*, 66: 131). Between 4th and 31st 20 migrants were trapped on the River Exe, and one controlled there had been ringed at Radipole Lake (Dorset) in the summer.

PASSERINE VAGRANTS

From the Nearctic there was an **Ovenbird** *Seiurus aurocapillus* trapped on the Out Skerries (Shetland) on 7th and 8th which, if accepted, will be the first live record of this wood warbler for Britain and Ireland (see *Brit. Birds*, 63: 289), and a **Myrtle Warbler** *Dendroica coronata* on Tresco on 16th and 17th which would be the fourth, the previous three also having been in south-west England.

Palaearctic vagrants were mainly of a northern or eastern origin. The only truly southern species were **Cetti's Warbler** *Cettia cetti*, recorded at three places—singles at Litlington (Sussex) on 4th, on Bardsey from 26th to 30th, and at Minsmere on 4th and 7th, with two on 30th—and an immature **Woodchat Shrike** *Lanius senator* at Portland Bill from 6th to 12th. A **Tawny Pipit** *Anthus campestris* at Steart (Somerset) on 4th, up to four (including three trapped) at Beachy Head during 7th-17th, and up to five in Scilly from 13th, and a **Serin** *Serinus serinus* on St Agnes on 14th, were probably of southern origin, while a **Short-toed Lark** *Calandrella cinerea* on the Out Skerries from 4th to 10th and up to three on Fair Isle during 27th September to 13th October were more likely to have all been of the eastern races. Two **Penduline Tits** *Remiz pendulinus* at Wells (Norfolk) on 27th would constitute only the second British occurrence (and the first since October 1966), if accepted. A **Stonechat** *Saxicola torquata* showing the characteristics of the Siberian race *maura* arrived on Fair Isle on 5th, and a **Radde's Warbler** *Phylloscopus schwarzi* turned up on St Agnes on 13th. **Yellow-browed Warblers** *P. inornatus* were reported at 15 localities on the east and west coasts and Cape Clear, about 33 birds being involved; in Scilly there were at least eleven from 9th onwards. A **Greenish Warbler** *P. trochiloides* was trapped on North Ronaldsay (Orkney) on 16th. There were far fewer **Richard's Pipits** *Anthus novaeseelandiae* than in recent years: one to two throughout the month on Fair Isle, singles at Breydon (Norfolk) and Bardsey on 7th, Minsmere from 9th to 12th, St Agnes on 12th, 15th and 18th, Spurn on 21st with two on 27th, Lundy from 23rd to 27th with at least three on 26th, Fenstanton (Huntingdonshire) on 28th, and Lavernock Point (Glamorgan) on an unspecified date during the month. Single **Red-throated Pipits** *A. cervinus* were seen at Beachy Head on 6th, on St Mary's on 11th, on St Agnes on 14th and on Lundy from 31st to 2nd November. An immature female **Rose-coloured Starling** *Sturnus roseus* was trapped at Wainfleet, Skegness (Lincolnshire) on 18th. **Scarlet Rosefinches** *Carpodacus erythrinus* were present at Bamburgh on 6th, Tresco on 10th and Spurn on 12th-13th and 21st. Lastly there were sightings of **Little Buntings** *Emberiza pusilla*, all singles, on St Mary's from 7th for a few days, on St Agnes on 12th and 27th, on Cape Clear Island from 11th to 17th and on Fair Isle on 15th.

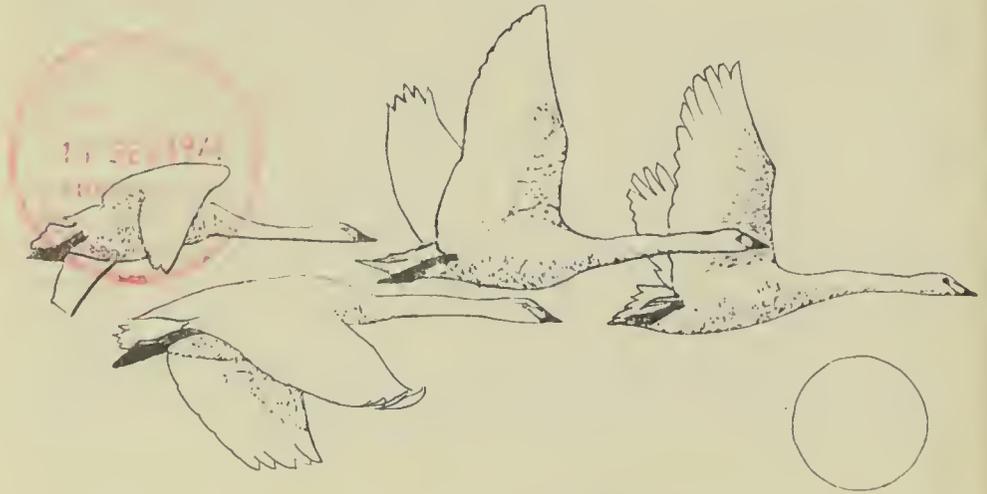
PASSERINES—PASSAGE MIGRANTS

A **Woodlark** *Lullula arborea* appeared on Fair Isle on 6th, up to three on St Agnes on 13th and 14th, and singles on Lundy on 14th and 24th. One to two **Bluethroats** *Luscinia svecica* were present daily on Fair Isle until 25th, and elsewhere there were singles at Spurn on 1st, Tynemouth on 6th, Portland on 7th, Holy Island on 13th and 14th and Cape Clear Island from 15th to 19th. At the last place there was also an **Aquatic Warbler** *Acrocephalus paludicola* on 14th and

15th, a **Melodious Warbler** *Hippolais polyglotta* on 9th and 10th, and single **Icterines** *H. icterina* on six dates during 13th-23rd, besides an unidentified *Hippolais* on 14th. Another Icterine appeared at Alnmouth (Northumberland) on 13th. **Barred Warblers** *Sylvia nisoria* were reported at Spurn on 2nd, Hauxley on 6th and 7th, Holy Island and two at Foxton (Northumberland) on 13th, St Agnes on 13th, 15th and 17th, and the Calf of Man on 28th. Single **Lesser Whitethroats** *S. curruca* appeared unusually far west on Cape Clear Island on 6th, 7th, 11th and 13th, and one of the eastern race *blythi* was on St Mary's and St Agnes from 13th. Up to six 'northern' **Chiffchaffs** *Phylloscopus collybita* were present in Scilly from 12th, and passage was noted on Fair Isle all month with a peak of eleven on 16th.

Nine or more **Firecrests** *Regulus ignicapillus* were noted on Lundy during 10th-31st, while as many as 14 were counted at Lihou (Guernsey) on 27th. Some 40 **Red-breasted Flycatchers** *Ficedula parva* were reported from 21 places, 16 of them in eastern Britain where the majority appeared between 4th and 7th; twelve or more were recorded in Scilly from 9th, and one on Cape Clear Island on 13th and 15th. The only **Ortolan Buntings** *Emberiza hortulana* reported were singles on Fair Isle on 1st and at Sevenoaks (Kent) on an unspecified date.

Of the commoner migrants, unprecedented numbers of **Ring Ouzels** *Turdus torquatus* were recorded in the west, including about 200 on St Agnes on 12th and 52 on Cape Clear Island on 14th (the previous highest autumn maximum there being seven); 40 were at Beachy Head on 14th. Up to twelve **Black Redstarts** *Phoenicurus ochruros* were on St Agnes from 12th. Record numbers of **Blackcaps** *Sylvia atricapilla* were ringed at Spurn during the month—200 altogether, a normal October total being about 70; the maximum count was 33 on 15th. Very high numbers of **Goldcrests** *R. regulus* occurred also: an influx in the first week was followed by further falls in the middle of the month and the highest counts were 500 or more on Bardsey on 8th and 550 at Spurn on 16th. During September and October a record 686 were ringed on the Calf of Man and 850 on Bardsey. Miscellaneous migrants included a **Nuthatch** *Sitta europaea* on St Agnes on 12th and a **Hawfinch** *Coccothraustes coccothraustes* at Spurn on 25th.



Best recent work by British bird-photographers The selection of photographs for this annual feature (see *Brit. Birds*, 66: 157-159, plates 25-32) is to be made shortly, and all prints should reach us by 29th March. Each print should be marked with the month, year and county (or country, if abroad) in which the photograph was taken.

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BRITISH BIRDS

Volume 67 Number 1 January 1974

- 1 Field identification of small species in the genus *Calidris*
D. I. M. Wallace Plates 2-3
- 17 Mediterranean Gulls at Blackpill, Glamorgan
R. A. Hume and P. G. Lansdown

NOTES

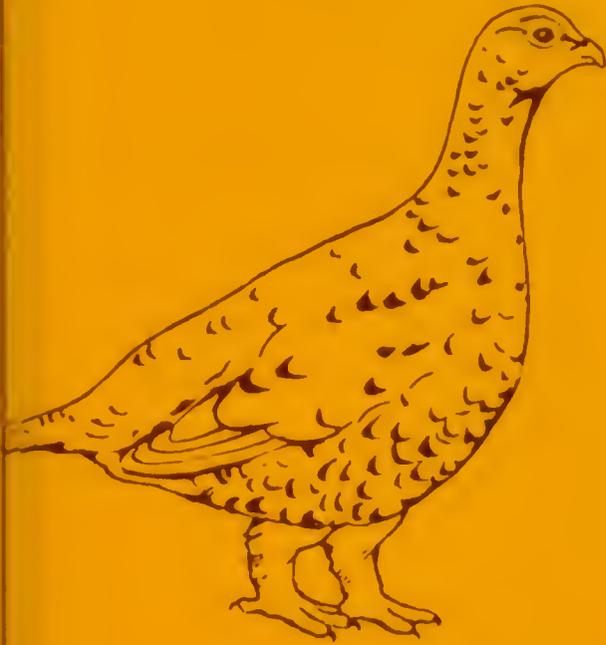
- 25 Gannet nest with two chicks *Peter Rowe* Plate 1
- 25 Piracy by Lanner *J. F. Reynolds* Plate 4a
- 26 Observations on Wren rearing young Cuckoo *N. A. J. Wilde*
Plate 4b
- 27 Domed nest of Chaffinch *Julian C. Rolls*

LETTERS

- 28 Scope of 'British Birds' and seasonal analyses of records
B. D. Harding, Michael Speckmann, John Lord, Derek Barber,
Alastair Anderson, and George Yeates
- 32 News and comment *Robert Hudson*
- 34 Recent reports—October *D. A. Christie*

Robert R. Greenhalf drew the Bewick's Swans on page 40

3 72
Volume 67 Number 2 February 1974



BRITISH BIRDS

EFFECTS OF AGRICULTURAL CHANGE
ON BIRDS

PALEARCTIC BIRDS IN EAST AFRICA

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BRITISH BIRDS

Some effects of agricultural change on the English avifauna

R. K. Murton and N. J. Westwood

INTRODUCTION

Drastic and rapid changes occurring in the agricultural habitat have led to widespread expressions of concern for the welfare of any dependent flora and fauna. For instance, current projections suggest a two-fold increase in demand for home-produced cereals by the turn of the century (Strickland, in press); this could be met by doubling either the cereal acreage or the yields, or, most likely, by a compromise between these two alternatives. There is a need to define and quantify the consequences of farming practice on the component flora and fauna and to predict future trends, especially since a large proportion of the total area of Britain is involved (over 80% of England and Wales is devoted to agriculture). Birds have been well studied compared with other animals and with plants, and are useful indicators of biological change. We have undertaken various investigations of farmland birds since the mid-1950's, particularly in areas of intensive arable farming on the Cambridge-shire/Suffolk border, and our records, although they refer mostly to common species often regarded by farmers as pests, serve to illustrate factors which are especially pertinent to the farmland avifauna in general. In interpolating many previously unpublished results in this review, we have aimed to illustrate and focus attention on some topics worthy of future research.

Two major ways in which agricultural expansion can affect wildlife ought to be distinguished: first, farming may engulf and destroy unique habitats such as forest and marsh; second, agricultural practice may alter the niches available for birds within the

agricultural system itself. The first situation is self-evident and is not dealt with in detail in this paper. It is clearly imperative that both local societies and national conservation bodies should identify threatened habitats and liaise with the appropriate landowners and authorities to ensure a sensible allocation of priorities for land use in Britain. There is a research need to define the optimum size, configuration and distribution of a particular habitat to guarantee the survival of a given species. Sites of prime importance are already documented in the Reserve Review of the Nature Conservancy, while the British Trust for Ornithology's planned 'Register of Ornithological Sites' (*BTO News*, nos. 58 and 59, 1973) will identify and describe those of particular ornithological interest. The BTO's Common Birds Census scheme (Williamson and Homes 1964) has been especially useful not only in monitoring large-scale fluctuations in bird populations from year to year, but also in developing a standard technique for censusing breeding birds on farmland and quantifying the effects of changes in land use or management. Mention should be made of the special cases of agricultural practice which cause widespread environmental deterioration, including pollution of waterways or eutrophication resulting from the excessive use of nitrogenous fertilisers, and accumulations of certain persistent toxic insecticides (reviewed by Prestt 1972, Prestt and Ratcliffe 1972). The rest of this paper is concerned with the farmland ecosystem itself, particularly lowland arable farmland, and with changes that are occurring within the system.

FACTORS AFFECTING INDIVIDUAL SPECIES

The birds which typically occur on farmland have been listed in papers dealing with the Common Birds Census and by various individual workers (Williamson 1967, Murton 1971, Batten 1971 *et seq.*). There are two major components, one derived from deciduous woodland, which manages with scattered trees and hedges, and the second originating from open heath or moor. Because at least two habitats occur on the farm, the potential number of species is greater than in either woodland or open country alone, and the biomass is much higher (Murton 1971). The species which are particularly well adapted may at times assume pest status, but the majority are poorly suited to farm conditions.

Farmland as a suboptimal habitat

In deciduous woodland at Oxford (Wytham Estate), nests of Great Tits* were more spaced than would be expected with a random distribution, and interactions between pairs produced a local

*Scientific names of birds not given in the text are listed in appendix 2 on page 69.

density-limiting effect (Krebs 1971). Removal of territorial pairs enabled new birds to take their place and these proved to be largely first-year individuals coming from territories in the hedgerows surrounding the woods. The vacated hedgerow territories were not refilled and thus were 'suboptimal' in terms of the tit's reproductive success. Factors affecting the survival of the birds in the 'optimal' woodland habitat are important for an understanding of population regulation in this species (Krebs 1970), whereas fluctuations occurring in the suboptimal habitat are only of secondary significance. Thus a decline of the Great Tit, or any other woodland species, in farmland would not presuppose a danger to the welfare of the species in the country as a whole. Precisely the same applies to the Wren. In years of low population density this species has a relatively invariable-sized territory in woodland or in vegetation along streams and rivers, but when population density is high it spreads into neighbouring farmland, gardens and orchards and occupies linear territories in hedgerows and other less favoured sites (Williamson 1969).

Most Woodpigeons in Britain today live in association with arable farming, and probably more than three-quarters of the total population is dependent on cereals and clover leaves; that is, less than a quarter of the birds rely on the natural habitat of deciduous woodland, for which their arboreal feeding habits are adapted. Adults assume breeding capacity in March, though the gonads of first-year birds do not become viable until July (Lofts *et al.* 1967). Thus the first eggs and young can be produced in April and May when the tree buds of elm *Ulmus procera*, beech *Fagus sylvatica* and hawthorn *Rataegus monogyna* are opening and are most nutritive, being heavily laden with the precursor materials for flower and leaf production. Adults have first choice of the best territories in woodland and exclude juveniles, as was shown by catching breeding birds on their nests, using baits treated with alpha-chloralose, at two adjacent woodland breeding localities on the Six Mile Bottom estate, Cambridgeshire. At one site ('Study Belt') the pigeons were allowed to recover and were released after being aged, but at the other ('Long Belt') they were killed (fig. 1). It was found that birds nesting away from the woodland belts in corn crops, or at the base of hedges in rank vegetation, or in isolated bushes, were mostly in their first year and possessed brown-tipped juvenile feathers on the front edge of the wing. Removal of territory-holding and nesting pigeons from Long Belt led to their replacement by young birds, which presumably would otherwise have nested in less favoured sites away from the woodland. In fact, during 1964-68 juveniles made up 28% of 4 pigeons at Long Belt, compared with only 7% of 157 caught at Study Belt ($\chi^2_1 = 22.4$, $P < 0.001$).

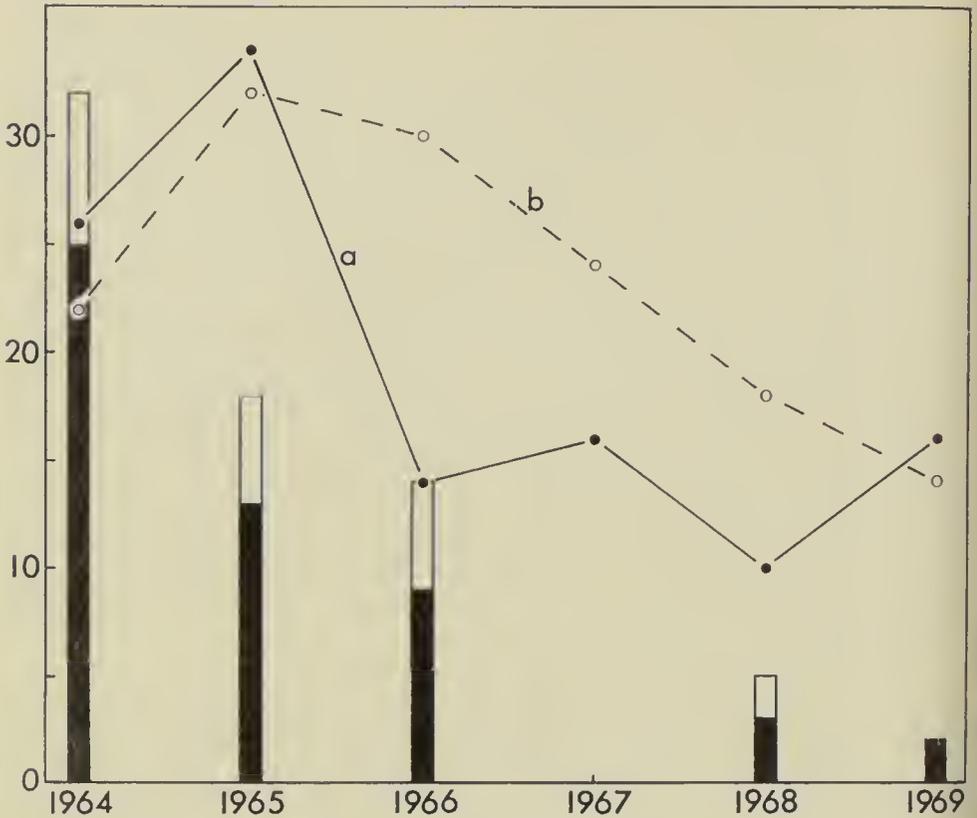


Fig. 1. Changes in numbers of breeding Woodpigeons per acre* from 1964 to 1969 at two adjacent nesting sites in Cambridgeshire: (a) Long Belt (1.94 acres) where birds were shot on their nests or captured and killed using stupefying baits; (b) Study Belt (3.69 acres), which served as a control, where pigeons were captured for ageing but then released unharmed. Histograms show numbers of adults (solid) and juveniles (open) per acre killed at Long Belt

The eggs laid by Woodpigeons are heaviest in spring and thereafter their weight declines to a minimum in August and September, when abundant food supplies in the form of ripe cereals are available (Murton *et al.* 1974). Egg-weight is related to the adult's ability to compensate a chick for a low weight at hatching by providing it with 'milk' and other foods. Thus if the adults find it easy to nourish a newly hatched chick there is no advantage in producing a heavy egg, since to do so would require energy which the female must largely supply. The seasonal decline in egg-weight is adaptive and is determined by physiological mechanisms. But these mechanisms could become a disadvantage if the Woodpigeon attempted to

*Since many of the studies cited in this review used English units of length and area, it has not been practicable to express measurements in the metric units now normally used in this journal. Conversion may be made using the following factors: 1 acre = 0.4047 hectares, 1 square foot = 0.0929 square metres, 1 yard = 0.9144 metres, 1 square yard = 0.8361 square metres, 1 mile = 1.609 kilometres

Table 1. Average egg-weights of Lapwings nesting in arable farmland, fenland pasture and heath

Weights (\pm standard deviation) are in grams; the number of eggs is shown in brackets. The 1973 data for arable farmland refer to sites in west Suffolk

Month of laying	Arable farmland, Carlton, Cambs.	Fenland pasture, Ouse Washes	Heath, Breckland
April 1971	27.8 \pm 2.0 (21)	25.2 \pm 2.0 (24)	25.5 \pm 1.9 (28)
April 1972	26.3 \pm 1.3 (24)	27.1 \pm 1.6 (30)	25.7 \pm 1.6 (22)
April 1973	28.8 \pm 2.2 (20)		24.9 \pm 1.7 (16)
May 1971	28.3 \pm 0.9 (8)	26.4 \pm 0.4 (8)	25.2 \pm 0.5 (4)

colonise a habitat where food availability declined instead of increased during the breeding season. This leads us to suspect that there are countless undiscovered physiological adaptations which help or hinder a species in adapting to a man-altered environment.

Another aspect of egg-weight is illustrated by the Lapwing. Females nesting on arable farmland or fenland pastures produce heavier eggs than those inhabiting more 'natural' sites such as are found in the East Anglian Breckland (table 1). Data are accumulating which show that in March and early April females obtain good supplies of earthworms (*Oligochaeta*: *Lumbricidae*) and other soil invertebrates on farmland and so are better off than Lapwings in Breckland, which rely on beetles (*Colcoptera*) and other ground invertebrates, supplies of which are then sparse and variable. But newly hatched Lapwings are unable to eat earthworms, and in any case these become difficult to collect in May as the ground begins to dry. Supplies of beetles and other surface-dwelling invertebrates are also very scanty on cultivated farmland in May and June compared with those on natural grassland, including Breckland, so Lapwings in the more natural sites can now compensate for the initial advantages gained by individuals which had resorted to farmland. Unlike Lapwings, Oystercatchers *Haematopus ostralegus* feed their young and so are better able to cope with earthworms after the chicks hatch. This may partly explain the success of the Oystercatcher on farmland in Scotland, for it is known that individuals able to obtain earthworms rear their young more successfully than those which feed in the littoral zone (Heppleston 1972). The milder climate of Scotland may be a contributory factor in that the onset of summer droughts is delayed compared with that in East Anglia.

Changes in farming affecting bird populations

There has been a marked increase in mechanisation, a concentration of stock-rearing under cover and, of course, an increasing dependence on chemicals. Modern fashions in arable farming now involve

repeated cereal cropping, risks of reduced yield being circumvented, at least so far, by improved varieties, artificial fertilisers and pesticides; increases in cereal production have been associated with a decrease in grass and forage crops, including undersown leys. It is of some significance that chemical control of weeds in cereals is much more difficult if the crop is undersown with clover. In southern East Anglia in 1967, 104 cereal fields were surveyed: in only eleven was no herbicide used, while in 49 fields mixtures of various kinds were employed, MCPA (4-chloro-2-methylphenoxyacetic acid), mecoprop (2-(4-chloro-2-methylphenoxy) propionic acid), dicamba (3, 6-dichloro-2-methoxybenzoic acid) and 2,4-D (2, 4-dichlorophenoxyacetic acid) being the most important (Elliott and Cox 1968). Application of herbicides can increase the net farm income by up to 20%, so their use on a wide scale is not surprising (Evans 1966), but even the introduction of the synthetic plant growth regulators MCPA and 2,4-D in 1946 and others since has not eliminated weeds in general. Instead susceptible species such as charlock *Sinapis arvensis*, corn poppy *Papaver rhoeas* and field buttercup *Ranunculus arvensis* have declined in numbers, whereas many of the more tolerant species have increased, including common chickweed *Stellaria media*, knotgrass *Polygonum aviculare*, black bindweed *P. convolvulus*, redleg *P. persicaria*, some speedwells *Veronica spp* and fat-hen *Chenopodium album* (Roberts 1962, Evans 1966, Fryer and Chancellor 1970). There have also been increases in the use of nitrogenous fertilisers and a changed cropping pattern, both factors affecting the weed seed composition. For example, during régimes of continuous vegetable growing following normal agricultural cropping, Roberts (1962, 1968) found that the viable weed seed population declined exponentially at a rate of 45% per annum for the first four years, and this was followed by an increase and more fluctuation during the next five years as the species composition became adapted; annual meadow-grass *Poa annua*, groundsel *Senecio vulgaris*, common chickweed and shepherd's purse *Capsella bursa-pastoris* increased to account for about 70% of all the viable seed present, while fumitory *Fumaria officinalis* was little affected.

In the future it has been suggested that herbicide-sensitive species will continue to decline and be replaced by resistant and better-adapted species, particularly those with short life-cycles and prolonged seed dormancy (Fryer and Chancellor 1970). However, data from Thurston (1969) covering a programme of eight years of spraying show no evidence of selection for late-germination strains, and a tendency for the dormancy of weed seeds to be decreased. It is likely that efforts at herbicide economy will follow the realisation that crop yields may not be affected if spraying is withheld for at least one season (Evans 1966). Indeed, it is rare today for weeds

in cereal crops to reduce yields, and many farmers spray because a weedy crop is more costly to harvest than a clean one.

Two species, the Grey Partridge and Woodpigeon, well illustrate different consequences of a decline in the ley and forage acreage, a trend which is now being reversed.

Grey Partridge

The well-documented decline of this species has been shown to result from a decrease in recruitment of young birds, variations in chick mortality being the key factor causing variations in the size of the adult population (Blank *et al.* 1967, Ash 1970). The food of chicks is the most important factor governing their survival rate, and the immediate cause for the decline in recruitment has been a shortage of arthropod food which has led to an increased dependence on cereal aphids (Southwood and Cross 1969). A single application of MCPA in April reduces the arthropod biomass of the standing crop (soil fauna excluded) to one-third the level in unsprayed controls (Southwood and Cross 1969). Thus aphids have become the most important food for partridge chicks in cereal fields, but, to a large extent, these migrate into the crop after the main hatch of Grey Partridge chicks, though at about the time that Red-legged Partridge chicks are born (Potts 1970). Thus, by virtue of having a slightly later breeding season, the Red-leg can make much greater use of cereal aphids and in consequence has increased (Middleton and Huband 1966). It is possible, as Potts has suggested, that aphids are now more numerous in consequence of chemical sprays, for 2,4-D selectively removes the ladybird larvae (Coleoptera: Coccinellidae) which predate aphids (Adams 1960). But Potts has also shown that a greater dependence on cereal aphids has made the Grey Partridge more prone to cold wet springs, for these delay the aphid migration. In such years the birds become extremely dependent on the cereal-feeding sawfly larvae (Hymenoptera: Symphyta: Tenthredinidae) and the survival of Grey Partridge chicks, but not Red-leg chicks, is strongly correlated with the abundance of such sawfly larvae as *Dolerus haematodes*. These overwinter in the soil as pupae and they do so much more successfully if leys are left undisturbed following a cereal crop than if the stubbles are burnt or the fields immediately harrowed, cultivated, planted and rolled. The essential cause of the Grey Partridge's decline has been a loss of chick food consequent on the disappearance of leys and forage and an increased dependence on cereal insects, themselves subject to chemical treatment.

Woodpigeon

In the mid-1960's in East Anglia the old four-course Norfolk system

of crop rotation, which involved undersowing half the cereal acreage and included a root crop such as swedes, sugar-beet or turnips as part of the rotation, gave way to routines of continuous cereals without leys. In the Carlton study area (which totals 2,647 acres) there were, in January 1960, 572 acres of long-term leys and pastures plus 108 acres of stubble undersown with clover. The situation remained virtually unchanged until early 1965 when there were 630 acres allocated to leys and pasture and a further 173 acres of undersown stubble. But in the summer of 1965, 159 acres of pasture and established ley, equivalent to 25% of the January 1965 acreage, were ploughed and made ready for cereals. By 1966 the acreage of winter forage available to pigeons was reduced to 475 acres and maintained at this level until 1970 (473 acres); that is, the acreage of winter feed from 1966 to 1970 was 75% of the level between 1959 and 1965. For a while during the mid-1960's, increases in the cereal acreage provided an improved food supply during and following the breeding season. But the modern practice of stubble burning and ploughing immediately after harvest has caused a sharp decline in the autumn cereal food supply and an increased dependence on the diminished winter supply of clover leaves. Not surprisingly, there has

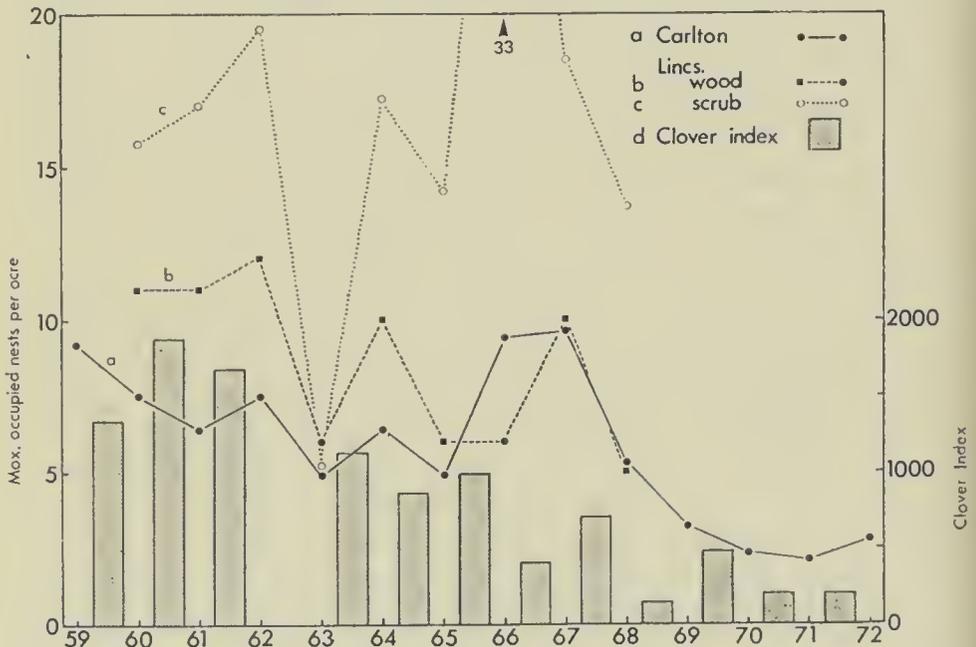


Fig. 2. Changes in Woodpigeon populations at three sites, shown as maximum number of occupied nests per acre: (a) Carlton, Cambridgeshire, 1959-72 (4.7 acres of deciduous woodland surveyed); (b) Buckminster, Lincolnshire, 1960-68 (40 acres of deciduous woodland surveyed); (c) Buckminster (6 acres of scrub and bushes adjacent to b). Histograms give winter Clover Index (mean number of clover leaves per square foot multiplied by percentage acreage supporting clover) at Carlton from 1959/60 to 1971/72

Table 2. Summary of counts of nesting Woodpigeons in study areas at Buckminster, Lincolnshire, and Carlton, Cambridgeshire, during 1960-68 (see fig. 2)

Correlations: lines 1 and 4 ($r_7 = 0.595$, $P = 0.10$ to 0.05); lines 2 and 3 ($r_7 = 0.815$, $P = 0.01$ to 0.001)

	1960	1961	1962	1963	1964	1965	1966	1967	1968
Total nests at Buckminster	553	543	616	259	498	314	441	497	264
Proportion of Buckminster birds in scrub	17%	18%	19%	12%	21%	27%	45%	22%	30%
Proportion of juveniles breeding at Carlton	21%	25%	27%	8%	45%	31%	54%	26%	30%
Total breeding population Carlton	64	51	64	41	49	41	77	80	44

been a marked drop in the Woodpigeon population to probably about one-quarter of the level obtaining up to and during the 1950's. Fig. 2 illustrates these changes by reference to detailed records collected at Carlton.

Fig. 2 also demonstrates that changes in pigeon numbers at a 40-acre mature deciduous wood at Buckminster, Lincolnshire, paralleled closely those occurring at Carlton. Adjacent to this wood were six acres of scrub (Bush Field), which, though supporting a higher nesting density of pigeons (a mean of 29.6 occupied nests per acre over nine years compared with 8.6 per acre in the main wood), probably provided a less preferred habitat, for the wood was occupied first. Following the hard winter of 1962-63, when pigeon numbers were drastically reduced and first-year birds suffered particularly badly, the breeding population in the wood fell by 50% but that in the scrub by 70% (fig. 2). Indeed, the percentage of the total Buckminster population which utilised the scrub area was strongly correlated, at least during 1960-68, with the percentage of juveniles in the breeding population at Carlton, which was probably also indicative of the age ratio of the Buckminster population (table 2). This example again emphasises that territoriality can limit density in the preferred habitat so that surplus birds must attempt to nest elsewhere.

Soil invertebrates and the Rook

Herbicides appear to have no immediate or long-term effect on the soil fauna (Fletcher 1966): MCPA applied for ten out of 13 years in an area of intensive cereal cropping did not affect numbers of arthropods (Davis 1965), and the same applies in the case of the newer chemicals such as paraquat. In contrast, chlorinated hydrocarbon insecticides, such as aldrin, dieldrin and DDT, do have a more profound short-term effect in reducing the variety of species of microarthropods, though actual numbers often increase due to reductions

of predatory species; the detrimental effects usually last for only a season, numbers and species diversity subsequently recovering (Edwards and Lofty 1969). In fact, cultivation generally causes a greater and longer-lasting decrement in the soil micro-arthropods and dependent predators, though improved drainage, irrigation and treatment with fertilisers may partly compensate. Worms (Oligochaeta) and slugs (Gastropoda: Pulmonata) accumulate more DDT than ground beetles (Coleoptera: Carabidae) and retain the residues far longer: the common earthworm *Lumbricus terrestris* has been shown to accumulate the biggest residues (25 ppm) because it pulls down leaves into its burrow immediately after spraying (Davis and French 1969). Obviously, the more toxic insecticides have had short-term harmful effects on wildlife and longer-term effects on certain predatory species. But many people continue to suggest in general terms that seed dressings may be responsible for a decline of other farmland birds. For example, Dobbs (1969) explained the failure of the Rook in Nottinghamshire to recover from a sharp decline in the early 1960's in terms of mortality in the 1962/63 winter, more efficient shooting at the rookeries, and seed dressing with dieldrin. Earlier Dobbs (1964) presented data to suggest (statistically confirmed by Murton 1971) that Rook numbers in Nottinghamshire increased as the cereal acreage increased, but he argued that any causative relationship probably depended on tillage increasing the availability of soil invertebrates rather than that of cereal seed. In contrast, in the adjacent county of Derbyshire Rook numbers have fallen most in areas where cereal farming has intensified (Lomas 1968).

The maximum total population of Rooks at Carlton in March and April each year has exhibited no consistent trends during 1964-71 (see fig. 3, which is based on a count of all Rooks in the study area and not the breeding population only, in contrast to the usual counts of occupied nests). Total numbers, and the proportion of first-year birds in the population, reach a minimum in June and



Fig. 3. Maximum number of Rooks (breeding and non-breeding) in 2,647-acre study area at Carlton, Cambridgeshire, in either March or April, 1964-71

July, when it may be suspected that food supplies are most difficult to obtain for the Rook; summer droughts force earthworms and other soil animals to move deeper into the soil and an alternative food supply of cereal grain does not become available until early August. Patterson *et al.* (1971) found that marked birds in their Aberdeenshire study area were most dispersed in summer. Ringing recoveries also show that the proportion of Rooks recovered at a distance from the home rookery increases through the first winter and remains high until the second winter, after which survivors return to their birthplace (Holyoak 1971).

Some salient data on Rook numbers and food availability are set out in appendix 1 on page 68, justification for regarding cereal seeds and earthworms as key food items having been given elsewhere (Murton 1971, Holyoak 1972). The maximum population of Rooks recorded in March/April (column 1, also fig. 3) has not been correlated with the minimum biomass (column 5a) or number (5b) of earthworms sampled in these months. Nor has it been related to earthworm biomass or numbers in the preceding March/April nor to the amount of grain on the stubbles in the preceding November (column 7—the best indication of the autumn availability of cereal grain). But, as fig. 4 demonstrates, it has depended strongly on the minimum earthworm biomass recorded in the previous June/July (column 6a in appendix 1); the correlation was only slightly less when earthworm numbers (column 6b) instead of biomass were considered.

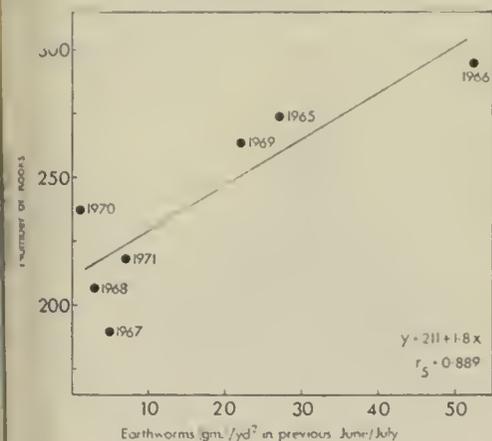


Fig. 4. Maximum number of Rooks in Carlton study area in March/April, 1965-71, plotted against minimum biomass of earthworms recorded in the previous June/July. An index of earthworm availability was obtained by watering dilute formalin solution on to square-metre sample plots and weighing the earthworms emerging

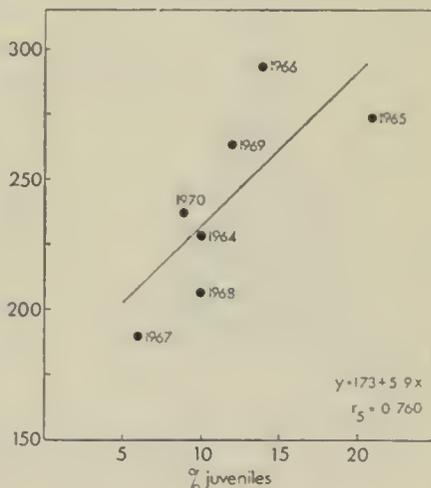


Fig. 5. Maximum number of Rooks in Carlton study area in March/April, 1964-70, plotted against percentage of black-faced birds (juveniles) present in the population at the same time

Total Rook numbers in spring were also just correlated with the percentage of black-faced first-year birds in the population (fig. 5); though with the data available it did not seem that the spring juvenile ratio was related to the minimum worm count in June/July. More data might establish a relationship but, on the other hand, if young birds tend to move out of the area in summer this need not follow. However, the maximum proportion of black-faced birds actually remaining at Carlton during June/July was probably correlated with the minimum availability of earthworms at this time (appendix 1). According to Holyoak, most first-year mortality occurs in June, July and August, most second-year from January until April (the annual mortality of first- and second-year Rooks is around 59% and 51%, respectively), while adults suffer maximum mortality in April (adult mortality being about 25% per year). Thus winter frosts do not appear to be important (*cf.* Lockie 1956), and the clue to the success or failure of the Rook is the availability of soil invertebrates during the critical period of summer droughts.

Earthworm stocks increase in late autumn and winter before Rooks are able to supplement their numbers through breeding to take advantage of the improvement. Accordingly, immigrant Rooks from central Europe are able to winter alongside residents. This winter supply of earthworms also supports other migrants to lowland farmland, including Lapwings, Golden Plovers and various thrushes (Turdidae). In parts of Scotland this food supply is also exploited by Oystercatchers: for example, in midwinter on the tidal estuary of the River Ythan, Aberdeenshire, these birds have insufficient time to obtain food but are able to compensate by resorting to grass fields at high tide (Heppleston 1971).

Adjustment of breeding season and reproductive success

The temporal ordering of avian breeding seasons in the north temperate zone typically involves reproduction in the spring; this season broadly corresponds with maximum food availability in the form of soil invertebrates, prior to soil drying in summer, or of defoliating caterpillars. Weed seeds are produced for a greater segment of the year but, even so, those birds which rely entirely on a seed diet do best in competition with conspecifics if they rear their young as soon as possible; others need in any case to supplement a seed diet with invertebrates when breeding. The trend from pastoral to intensive modern arable régimes has tended to shift the peak of general food availability from spring to late summer. Under intensive cereal cropping, land is ploughed as soon as possible after harvest so that it can be planted again with winter wheat or spring barley from October until March or April. During the early stages of cereal growth, herbicides and insecticides are used to ensure that

no weed flora and associate invertebrate fauna can develop. Hence, growing cereals are not overwintering habitats for invertebrates and it is not until early summer that they secondarily become host to a fauna which immigrates from other crops.

Because of its potentially long breeding season, the Woodpigeon usefully illustrates the consequences on reproductive performance of a temporal shift in food availability. Cramp (1972) has compared the breeding season of Woodpigeons nesting in London with that of birds in our Cambridgeshire study sites to illustrate how breeding activity in London is concentrated in the months of April-July, while in Cambridgeshire over 75% of egg production occurs during July-September. A similar but less well-defined trend can be seen by comparing the egg-laying season of Woodpigeons in predominantly pastoral counties of western Britain with that in the arable east using BTO nest record card data (fig. 6). Unfortunately the



Fig. 6. Percentages of Woodpigeon nests containing eggs or young recorded per month in samples from eastern and western Britain; sample sizes given at top left. Seasonal patterns of data collected under the BTO Nest Record Scheme (top two histograms) probably suffer from observer bias, but the same bias should apply to both samples

Counties contributing to the eastern sample (mostly arable) were Midlothian, Northumberland, Durham, N. and E. York, Lincoln, Northampton, Huntingdon, Cambridge, Norfolk, Suffolk, Bedford, Hertford, Middlesex and Essex (excluding London suburbs); and to the western sample (mainly pastoral) Cumberland, Westmorland, Lancashire, W. York, all Wales, Cheshire, Derby, Stafford, Shropshire, Warwick, Hereford, Gloucester, Wiltshire, Somerset, Dorset, Devon and Cornwall. For distribution of counties in Colquhoun's samples, see Colquhoun 1951

Table 3. Percentage of Woodpigeon eggs hatched according to region and month

The number of eggs laid is given in brackets. Western and eastern counties are listed in the caption to fig. 6

	BTO Suburban 1951-69	BTO Western 1951-69	BTO Eastern 1957-69	Cambridgeshire	
				Spike Hall 1961-69	Carlton 1959-70
February	} 26 (54)	27 (22)	20 (20)		
March					
April	34 (149)	13 (213)	12 (73)		
May	19 (143)	23 (376)	21 (188)	67 (9)	0 (5)
June	35 (136)	24 (393)	27 (199)	65 (167)	53 (186)
July	33 (54)	29 (257)	37 (172)	61 (354)	62 (518)
August	} 50 (26)	42 (172)	73 (109)	50 (303)	63 (531)
September					
October		33 (98)	70 (33)	55 (214)	60 (319)
				0 (8)	30 (53)
TOTALS	30 (169)	26 (394)	34 (795)	57 (1,055)	60 (1,612)

BTO records suffer from observer bias, because people concentrate on finding nests in the spring, and for this reason they are not an absolute representation of the real breeding season in either area. However, there is no reason to doubt that this bias has affected both samples in much the same way, and partial confirmation comes from records collected by Colquhoun (1951), also depicted in fig. 6.

Obviously, the feeding prospects for those pigeons breeding late in the season are totally different in regions where no or few cereals are grown from those pertaining in East Anglia. This is reflected in hatching and fledging success (tables 3 and 4). Other unpublished records for suburban London sites and for Cambridgeshire are included in the tables for comparison, none of these records suffering from any seasonal observer bias. It is seen that hatching success early in the season was similar in both the pastoral western and arable eastern counties, but it improved markedly during the second half of the season in the east. Presumably in either region those birds which attempt to breed in the spring occupy deciduous woodland. But in eastern England more and more birds can be found nesting in scrub and hedgerow sites as the season progresses and first-year birds settle to breed and take advantage of the ripening cereal crop. The average breeding success, calculated as the product of hatching and fledging success, was slightly higher in the east than in the west (23% of eggs laid gave rise to fledged young in eastern England, against 16% in the west). But, because breeding is proportionately concentrated in the more propitious summer season in the east, the real difference in terms of productivity must be considerable; for example, the breeding success in August in the west was 33%, compared with 64% in the east.

Table 4. Percentage of Woodpigeon nestlings fledged according to region and month

The number of chicks hatched is given in brackets. Western and eastern counties are listed in the caption to fig. 6

	BTO Suburban 1951-69	BTO Western 1951-69	BTO Eastern 1957-69	Cambridgeshire	
				Spike Hall 1961-69	Carlton 1959-70
February	} 73 (11)				
March					
April	50 (52)	54 (24)	15 (13)		
May	57 (37)	63 (35)	42 (33)	50 (6)	
June	71 (52)	49 (116)	54 (52)	70 (109)	84 (98)
July	94 (49)	64 (112)	70 (69)	91 (215)	91 (323)
August	80 (15)	79 (107)	87 (89)	95 (150)	93 (334)
September	75 (24)	} 58 (79)	89 (28)	89 (117)	84 (191)
October					
TOTALS	70 (240)	62 (473)	68 (284)	87 (597)	89 (962)

Since first-year birds do not breed until early July, they must be relatively unproductive in pastoral areas until their second year, whereas in eastern England young birds acquire breeding capacity in time to exploit the cereal harvest. Thus proportionately more of the total population experiences a high breeding success in the east than in the west and in consequence the reproductive rate must be higher in the east. Compensation is to be expected in the form of an increased juvenile mortality or a reduced life-expectancy for adults. Mortality could be expressed by a higher rate of emigration, but recoveries of ringed birds between April and September show no significant difference between the two samples in the proportion of birds moving more than five miles (20% of 45 birds in the west, 23% of 222 in the east; $\chi_1^2 = 0.14$). Similar data for recoveries between October and March were 57% of 75 birds in the west, and 50% of 323 in the east ($\chi_1^2 = 1.37$). The average annual adult mortality rate of Woodpigeons ringed as nestlings in eastern England was 41%, compared with 36% in the west (and 35% in Scotland). Since the patterns in the west and in Scotland did not differ, these records are combined in fig. 7 to illustrate that there was a poorer survival of Woodpigeons in the arable east, particularly during the first two years of life.* Of 493 recoveries of birds ringed as nestlings in the east, 77% had been shot, while in the west 84% of 122 had

*The original data were assembled as a 2×7 array for χ^2 comparison, with years 6-14 grouped. With $\chi_6^2 = 11.13$ the differences were not significant overall. However, comparison of first-year recoveries and first + second year showed higher mortality in the east than in the west ($\chi_1^2 = 5.19$, $\chi_2^2 = 6.97$ respectively; $P < 0.05$), but the significance vanished when more years were included ($\chi_3^2 = 7.04$, $\chi_4^2 = 7.30$).

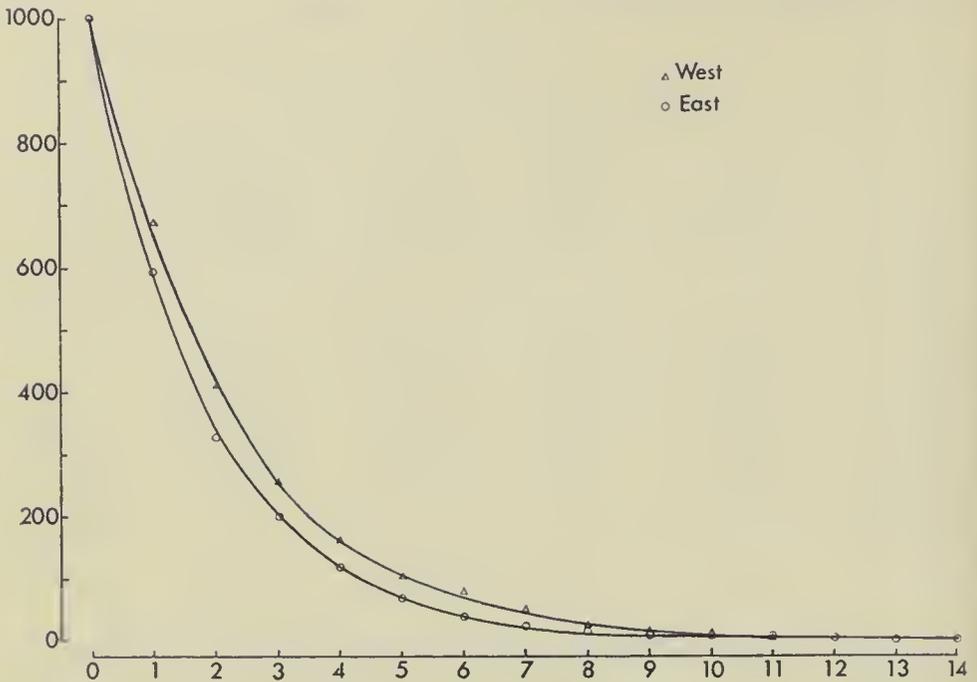


Fig. 7. Survival curves for Woodpigeons ringed as nestlings in the west of Britain (including Scotland), and in the east. The original data have been converted to 1,000 nestlings initially present, and successive points denote numbers alive at one-year intervals, years running from 1st March

The eastern counties were those designated in the caption to fig. 6, plus Nottingham, Leicester and Rutland, Buckingham, Oxford, Wiltshire, Berkshire, Hampshire, Surrey, Sussex and Kent. All other English counties, Wales and the whole of Scotland contributed to the west, since a preliminary analysis showed no differences between Scotland and the western counties of England plus Wales. The average adult mortality rate in the east was $41 \pm 1.4\%$, compared with $36 \pm 1.6\%$ in the west and Scotland

been shot. These proportions do not differ significantly ($\chi^2_1 = 3.13$), so shooting cannot be held responsible for the additional mortality in arable areas.

There are few species with the capacity for a phenotypic adjustment of the breeding season comparable with the Woodpigeon. Several seed-eating finches which breed late in the year appear to be expanding on farmland, for example the Goldfinch, Linnet and Redpoll. In contrast, the Chaffinch has declined on farmland, and pesticides have been suggested as the cause. But the Chaffinch has a short breeding season to coincide with the availability of defoliating caterpillars, and an inability to reproduce in late summer. This may well have prevented it from compensating for the loss of spring food already discussed. The advantage gained by the Red-legged Partridge in being able to breed later than the Grey Partridge has already been mentioned (page 47; see also Potts 1970). But, while few species have been able to adjust their breeding season radically to cope with an artificial cropping pattern, several have achieved a

higher breeding success and productivity on farmland (and in suburbia) than in their natural habitats, evidence relating to the Blackbird, Song Thrush, Dunnoek and Chaffinch having been given by Snow and Mayer-Gross (1967). Any increase in reproductive rate must result in a population increase or be compensated for by a higher mortality or rate of emigration, and this suggests that the rate of population turnover is higher on farmland than in woodland. This trend will allow some species to become more efficient at removing residues of toxic chemicals from the ecosystem without detriment to their own populations, but at the same time the risk of secondary contamination for any predatory species must increase. The essential point is that the farmland populations of many species will be better able to compensate for excessive mortality than populations of the same species living in natural habitats. Given an increase in the rate of population replacement, circumstances must favour an increase in genetic diversity and in opportunities for selection to operate.

FACTORS AFFECTING THE COMMUNITY

There are few species absolutely dependent on lowland arable farmland for their welfare in Britain, but several for which farmland contributes a large proportion of the total population; the partridges, pigeons, Turtle Dove, Rook, Whitethroat, Corn Bunting and Yellowhammer are examples. There is no indication that the survival of any species in Britain is threatened (though the lot of birds of prey could be improved) by potential changes *within* the farming scene (excluding the expansion of farmland to other habitats), and the main efforts of conservationists are focused on maintaining as high a faunal diversity as possible and in facilitating the rational exploitation of game species. To these ends the removal of hedgerows is usually regarded as detrimental (see Hooper and Holdgate 1970) but, in the absence of factual data, the topic tends to become emotive. However, it is possible to make some assessments and predictions from several censuses of different kinds of farmlands, and fig. 8 gives details (explained more fully on pages 59-60). For instance, Murton (1971) monitored the avifauna on 200 acres of arable farmland at Carlton, Cambridgeshire, from November 1960 to December 1963 and reproduced a map of the study area. The same site was studied again between February 1971 and October 1972, using exactly the same census techniques, after fairly drastic changes in land use had occurred (summarised in table 5); these changes are typical of those which have occurred over large tracts of lowland arable farmland. Williamson (1971) published a breeding bird census conducted in 1970 on a 310-acre Dorset dairy farm (excluding a 20-acre deciduous wood). This comprised about 26

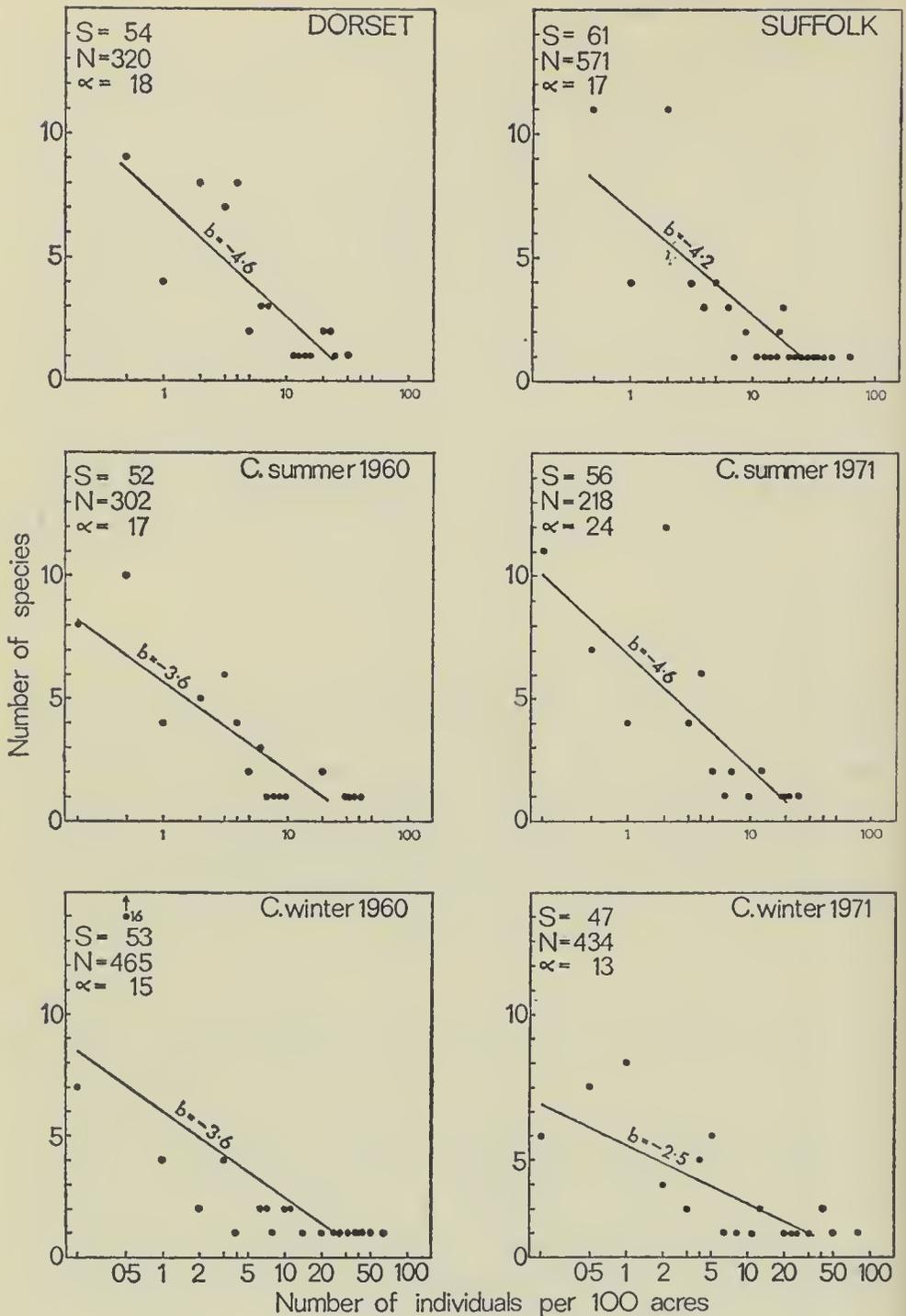


Fig. 8. Numbers of species at different densities (individuals per 100 acres) in various surveys on farmland. (Density plotted on logarithmic scale, so that all regressions refer to number of species against \log_{10} density.) Common Birds Census data for Dorset (based on Williamson 1971) and Suffolk (based on Benson and Williamson 1972) refer to counts of singing males and occupied territories; data for species not normally covered by the CBC scheme are derived from those authors' estimates. Data for Carlton, Cambridgeshire (lower four diagrams), are based on direct counts in summer or winter (details in Murton 1971). S = total number of species, N = total number of individuals, α = index of diversity, b = slope of regression line (see pages 59-60)

Table 5. Changes in land use in 200-acre study area at Carlton, Cambridgeshire, between 1962 and 1972

Percentage devoted to:	1962		1972	
	summer	winter	summer	winter
Pasture	1	1	1	1
Clover ley	9	13	—	—
Winter wheat	36	36	10	16
Spring barley	21	—	72	—
Legumes (beans)	6	5	10	—
Roots (sugar-beet)	6	—	—	—
Plough	3	33	—	76
Fallow	6	—	—	—
Rough and waste	5	5	2	2
Hedgerow	3	3	1	1
Woodland	4	4	4	4

fields, with 130 acres of water meadows. There were dense, well-grown, double hedgerows, often on either side of a bank flanked by ditches, with many large mature trees and also several copses and spinneys. Benson and Williamson (1972) have also reported a census of Reydon Grove Farm, Wangford, Suffolk, which is only two miles from the sea. Farmland in coastal Suffolk was judged by Murton (1971) to be among the most productive for birds because it often incorporates fragments of shore, heath or estuarine fauna. Indeed, Reydon Farm was such a site, for its 220 acres incorporated drainage ditches, pools, areas of coarse grass and rushes, as well as deciduous woods with scrub. In the Common Birds Census studies by Williamson and his associates, numerical estimates for such difficult species as Woodpigeon and House Sparrow, which are not normally censused by the CBC method, were also made.

Fisher *et al.* (1943) demonstrated a universal relationship between the number of individuals per species and number of species in random samples of animal and plant communities. The frequency distribution of species represented by 1, 2, 3, . . . n individuals could best be described by a logarithmic series. Williams (1964) examined many plant and animal samples to validate and extend the scope of this empirical observation and should be consulted for the detailed mathematical treatment. The salient point for the present discussion is that there are constant terms in the equations which can be written

$$S = \alpha \log_e (1 + N/\alpha)$$

where S = number of species, N = total number of individuals, and the constant α represents a measure of species diversity. There are only two parameters and only one possible series for any given combination of S and N . The constant α , which is common to all samples from a single population, is high when diversity is high and

zero when all the individuals in a community belong to a single species. This particular measure of diversity is probably as good as any presently available—others exist which are based on information theory—but they all suffer the major drawback that it is not possible to calculate error terms. If N and S are known for any population, α is easily obtained from the nomograph given by Williams (1964).

Fig. 8 shows that, when the number of species is plotted against the logarithm of the number of individuals per 100 acres of farmland, a common pattern emerges. Diversity is high if the points are clustered to the left, for this indicates the existence of many species and few individuals. These results are perhaps unexpected, for they confound the conclusions which might have been made on subjective judgements. In spite of relatively drastic changes in the farm scene at Carlton, the diversity of breeding birds has actually increased during the last decade. This is probably significant, for the total number of breeding species has increased (see table 6) though the total number of all individual birds has declined (fig. 2 illustrated the decline of the Woodpigeon). On the other hand, the number of species present in winter has fallen over the decade from 53 to 47 (fig. 8). It would be unrealistic to expect any farm to have more and better hedges than those found in the Dorset sample, but this aesthetically pleasing site had a bird diversity in 1970 which was intermediate between Carlton in 1960 and 1971. This rules out any suggestion that the hedgerow acreage at Carlton had already reached a critical level in 1960 so that further depletions caused relatively little effect. If N increases while α remains constant, then S must increase. This was the situation at the Suffolk farm which, although it supported a very high total of individual birds, had the same ecological diversity as the other two farms. The species unique to the Suffolk site were Teal *Anas crecca*, Shoveler *A. clypeata*, Shelduck *Tadorna tadorna*, Oystercatcher, Snipe and Nightingale *Luscinia megarhynchos* (also Reed Warbler *Acrocephalus scirpaceus*, present in Suffolk and Dorset but not at Carlton), none of which is a typical farmland species; indeed, the first five are marsh or seashore birds which presumably obtained some if not most of their food away from the farm.

All the sites had a small amount of woodland without which such species as Treecreeper would probably disappear. Nevertheless, the inclusion of a large 20-acre woodland block into the Dorset sample did not increase the diversity of the combined area. Since increase in sample size, whether in terms of number of animals counted or area searched, involves an increase in both S and N , caution is needed when results obtained for a large or small area are averaged on a 100-acre basis. Because a species is recorded in a 200-acre plot it

does not follow that it will be present in a 100-acre sample. Similarly, if territories are mapped it is not justifiable to assume that those at the edge of the sample plot represent two individuals, for one of the pair may really contribute to the adjoining sample.

There are no figures referring to 'prairie-type' farms lacking any hedges or copses. But Glue (1970b) censused the breeding birds on 700 acres of the Furufjörður in north-west Iceland. The area comprised coastal sand-dunes, a shingle platform and the meadows of deserted farmland. There were 71 pairs of 20 species, giving an index of about 12-13. Similarly, 218 acres of Westmorland farm yielded 191 pairs of 38 species, giving an index of 12-15 depending on whether individuals or pairs are considered (Robson and Williamson 1972). Two further sets of data which are of interest refer to a census count made at a 100-acre Hampshire gravel pit by Glue (1970a) in 1963 and again in 1968. As before, he recorded his results as number of pairs, and it is evident that in many cases he recorded one bird, perhaps a singing male, and then assumed the presence of a mate. For this reason, diversity is best calculated in terms of the number of encounters, and values of α so obtained are 22 in 1962 and 17 in 1968. Moreover, during the course of this study, eight acres of bare gravel were created by bulldozing, nest-boxes were erected and an electricity sub-station was built, and it seems that these various man-made alterations helped to increase the species diversity (details in Glue 1970a).

The summer census data for Carlton depicted in fig. 8 refer only to the breeding species; sporadic non-breeding visitors were omitted, though such vagrants were included in the winter records. Table 6

Table 6. Composition of the avifauna on 200-acre arable farmland study area at Carlton, Cambridgeshire, in 1971-72 compared with 1960-61

The species are listed in appendix 2 on page 69

	NUMBER OF SPECIES WHICH:					Total species recorded in both periods
	Did not change in status	Increased in number	Decreased in number	Were gained	Were lost	
SPRING						
Breeding	18	6	16	4	3	47
visitor	3	2	4	3	1	13
vagrant	2	0	0	2	2	6
SUMMER	23	8	20	9	6	66
AUTUMN						
Breeding	12	12	11	3	8	46
visitor	0	2	3	1	1	7
vagrant	1	0	0	2	3	6
WINTER	13	14	14	6	12	59

summarises the status of all species recorded in either summer or winter between 1960-61 and 1971-72 at Carlton (species listed in appendix 2), and shows that the frequency of occurrence of vagrants and passage birds did not change over the period. More breeding species decreased than increased, and on balance there was a reduction in total numbers (fig. 8). Species which decreased included Grey Partridge, Woodpigeon, Skylark, Linnet and House Sparrow, these being among the commonest resident species of farmland. Reductions were also noted in the numbers of the Lapwing, Turtle Dove, Corn Bunting and Goldfinch. Of resident species present in 1960, Green Woodpecker, Jackdaw and Magpie were absent in 1971, as was the Tree Pipit of summer visitors. The cultivation of an area of rough neglected grass and scrub, the site of an old wartime personnel encampment, accounted for the disappearance of several of these species, and also for some loss of Swallows which used the old huts and shelters for nesting. However, there was a compensatory increase of House Martins, this species seemingly being able to range further afield from its nesting places to fill the local niche for an aerial feeder.

New breeding species recorded in 1971 were Great Spotted Woodpecker (contrasting with loss of Green Woodpecker), Coal Tit, Sedge Warbler, Garden Warbler, Chiffchaff (contrasting with decreases of Blackcap and Whitethroat), Goldcrest and Redpoll. Although the total numbers involved were in all cases small (two or less individuals per 100 acres), it is significant that the Coal Tit, Goldcrest and Redpoll have undergone a national increase on farmland, as judged by CBC returns (Batten 1971a *et seq.*). Species which increased in numbers included Stock Dove, Blue Tit, Willow Tit, Lesser Whitethroat, Starling, Greenfinch and Reed Bunting (the last again a national trend, from Batten 1972). The Stock Dove appears to be better adapted to open arable farmland without leys than the Woodpigeon, presumably because it specialises in collecting weed seeds from bare ground (Murton *et al.* 1964), which probably explains its success in Breckland, an extreme prairie habitat. It is likely that the national improvement in the status of the Stock Dove (see Batten 1972, 1973) depends on the trend to more intensive arable farming rather than on a recovery from supposed mortality due to toxic chemicals.

CONCLUSIONS

It is clearly impossible to make value judgements of whether agricultural practices are good or bad for bird communities. At Carlton the trends have resulted in fewer Woodpigeons but more Stock Doves; Song Thrushes displaced by the clearance of hedgerows have been replaced by Reed Buntings, while the summer Blackbird

population has remained unchanged. Blackbirds which in the early 1960's nested in high, thick hedges now built a few inches above the ditch banks where the ground vegetation intermixes with hedgerow stumps. Their actual territories remain unchanged, presumably because the same feeding sites exist, these being primarily on the ground along the ditch sides. We might speculate that with less vegetation the ground dries out more readily, making invertebrates more difficult to find, but this could affect breeding success without influencing population size.

It follows that the structure and, more important, the diversity of the farmland avifauna is not affected by relatively drastic changes in land use. This makes it pointless to condemn hedgerow removal or other farming trends on general grounds. The essential need is to treat individual species on their own merits and to introduce management schemes with defined objectives; these might centre on improving conditions for a game species or reducing damage by a pest. The conservationist should be less concerned with what happens on the farm *per se*, provided agricultural practice does not result in widescale hazards to wildlife through indiscriminate use of toxic chemicals or the pollution of waterways. While the objectives of agriculture must be towards improvements in yields and efficiency, conservation interests ought to concentrate attention on those small areas of habitat which support an interesting and locally unique flora and fauna. Isolated wetlands, plots of natural grassland, gravel pits, scrub or woodland may occur in agricultural areas and be under the influence of farmers, but they are to be distinguished from the farmland ecosystem. Hedgerows appear to be suboptimal habitats which have become a red herring so far as the real issues affecting the welfare of birds in Britain are concerned.

Williams (1964) examined census data collected by R. E. Moreau in East Africa and demonstrated that there were many times as many congeneric species per habitat than would be expected from a random sample. This apparently confounds the generally held view that closely related species are likely to have similar feeding requirements and so be potential competitors. He concluded from a wide study of various plant and animal groups that this was generally true, that it might well depend on closely related species being adapted to similar physical conditions, and that this might be sufficient to affect the drawbacks consequent on competition for food or living space. This is an interesting concept that may well repay more detailed study on farmland. At Carlton we have noted a tendency for many closely related breeding species to occur together at low population densities, for example seven warblers, six finches, and three buntings. Moreover, in those cases which have been examined in detail, the foods and feeding habits of closely related

species become less clearly differentiated on farmland than in natural habitats (see Newton 1967 for the finches). It may be that physiological and physical factors assume more importance than purely ecological ones in habitats drastically altered by man. If this is true, our ideas about conserving these species will need adjustment.

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SUMMARY

The complex factors affecting the farmland avifauna have remained relatively unstudied. Indeed, in this review it has been necessary to illustrate several of the processes which are probably affecting a wide range of species by reference to unpublished material for the Woodpigeon. The following major topics are discussed with examples (for scientific names see appendix 2 on page 69):

(1) The fact that farmland and the constituent hedgerows are a suboptimal habitat for the majority of species has been demonstrated in studies of the Great Tit (Krebs), Wren (Williamson) and Woodpigeon. Many of the adaptations of birds, such as genotypically determined seasonal variations in clutch size or egg weight, are inappropriate in unnatural habitats.

(2) Changes in farming practice may cause a direct decline of some species due to a loss of some critical factor. Thus modern trends to continuous cereal production at the expense of winter ley and forage crops have resulted in marked declines of both the Woodpigeon and the Grey Partridge. Factors affecting the availability of earthworms in June and early July determine the size of the Rook population in the following breeding season. The effect of herbicides and insecticides on the soil fauna is discussed in this context.

(3) Changes in the seasonal distribution of food supplies have necessitated that some species change their breeding seasons. This is discussed in relation to the Woodpigeon. In some species this has not been possible because the proximate regulation of reproductive activity depends on physiological mechanisms controlled by day length and other factors not directly linked with food resources. There is a tendency for those species able to breed late in the year, such as the Redpoll and Reed Bunting, to be more successful on farmland than those with a limited spring breeding season, such as the Chaffinch.

(4) A 200-acre farmland site at Carlton, Cambridgeshire, was censused in 1960-61 and again using the same methods in 1971-72; in the interim, hedgerows, waste grassland and scrub had been lost. Changes, including both decreases and increases in numbers of individual species, are detailed. *In toto* more species but fewer individual birds bred in 1971 than in 1960, so that there was no decrease, and perhaps an increase, in species diversity as defined by Fisher *et al.* (1943). Other census data are reviewed to show that species diversity remains approximately constant from pastoral areas supporting dense hedges and woodland pockets to relatively barren East Anglian arable farmland, contrary to popular opinion. It would be wiser to study individual species rather than draw general conclusions based on habitat changes. An unusually large number of closely related species co-exist on farmland, presumably because population densities are low, but this fact needs more investigation.



PLATE 5. Grey Heron *Ardea cinerea*, Kenya, March 1973: the sparse resident population in East Africa is generally thought to be augmented by migrants from the Palearctic during the northern winter pages 70-76 photo: J. F. Reynolds

PLATE 6. Purple Heron *Ardea purpurea*, Kenya, October 1972, a species whose status in East Africa is similar to the Grey Heron's but which habitually skulks in dense cover and is rarely seen in the open (page 70) (photo: J. F. Reynolds)





PLATE 7. Yellow-billed Stork *Mycteria ibis* left with White Stork *Ciconia ciconia*; below, Steppe Eagle *Aquila rapax orientalis* about to drink; both Kenya, October 1972. It has been estimated that approximately 700,000 White Storks from Europe and Asia winter in Africa (pages 70-71) Photos: J. F. Reynolds



PLATE 8. Male Pallid Harrier *Circus macrourus*, Kenya, March 1973, perhaps on return passage from farther south. This is one of three Palearctic harriers which winter in open African grasslands (pages 71-72) (photo: J. F. Reynolds)



PLATE 9. Female Lesser Kestrel *Falco naumanni*. Kenya, February 1973, a gregarious species even during its long migrations from Eurasia and in its winter quarters, which are mainly in southern Africa (page 72) (photo: J. F. Reynolds)





PLATE 10. Green Sandpiper *Tringa ochropus* and, below, Ruff *Philomachus pugnax*. Kenya, February 1973, both widespread winter visitors to East Africa, though the former is rather scarce and solitary (pages 72-73) (photos: J. F. Reynolds)





11. Above, Blue-
Bee-eater *Merops*
cyanoptera, Tanzania, April
Right, Red-throated
Anthus cervinus, Kenya,
1973, a Palearctic
wintering in mainly
open habitats in variable
numbers as far south as
Tanzania (pages 73-
74; photos: J. F. Reynolds)



PLATE 12. Above, Black-headed Wagtail *Motacilla flava feldegg*, Kenya, March 1973: breeding in the Balkans and south-west Asia, this is one of at least six races of Yellow Wagtails wintering in East Africa. Below, Isabelline Wheatear *Oenanthe isabellina*. Kenya, February 1973 (pages 74-76) (photos: J. F. Reynolds)

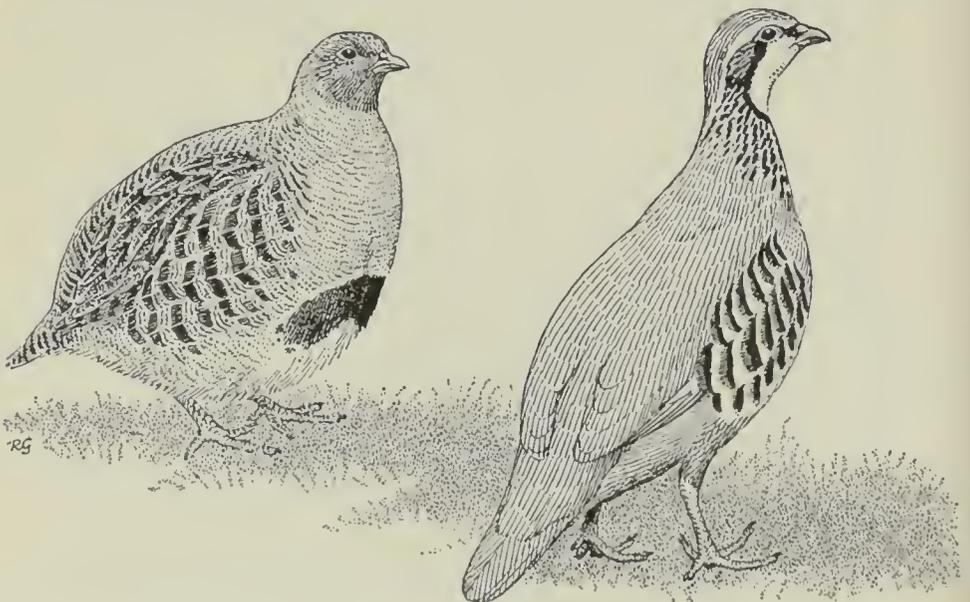


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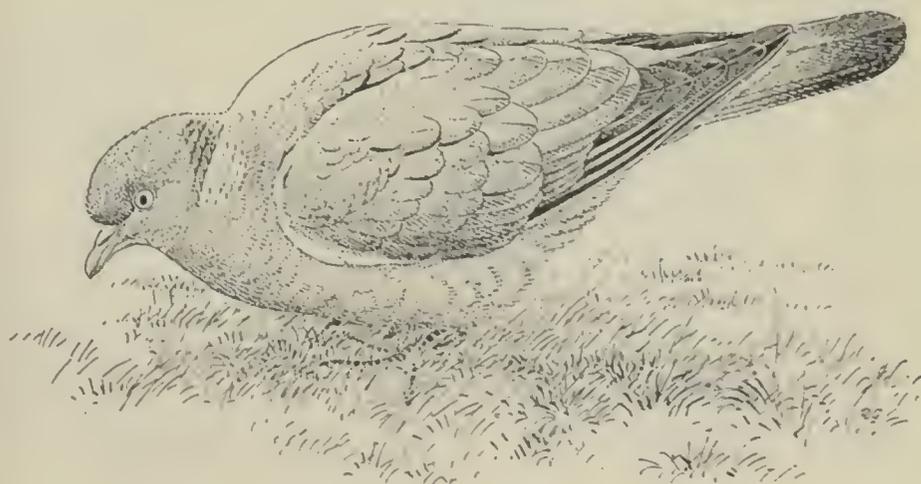


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Appendix 1. Annual variations in Rook numbers in 2,647-acre study area at Carlton, Cambridgeshire, and in their earthworm and cereal food supplies, 1964-71

Correlation tests between various columns give the following results:

- 1 and 2 $r_s = 0.760$, $P < 0.05$ 1 and 6a $r_s = 0.889$, $P < 0.01$ 2 and 6a $r_4 = 0.605$, non-significant
 1 and 5a $r_s = -0.480$, non-significant 1 and 6b $r_s = 0.834$, $P < 0.02$ 3 and 6a $r_5 = 0.742$, non-significant
 1 and 5b $r_s = -0.209$, non-significant 1 and 7 $r_s = 0.637$, non-significant 4 and 6a $r_5 = 0.681$, non-significant

Data in columns 6a, 6b and 7 refer to the preceding year, and the correlations of columns 3 and 6a, and of 4 and 6a, allow for this, so that the figure in column 3 for 1964, 24%, was paired with a worm weight of 27 gm (column 6a), and so on

Column	Maximum number of Rooks in		Maximum proportion of first-year birds in		Minimum proportion of first-year birds in		Minimum weight in grams (and number) of earthworms in samples collected in		Grain index in preceding November		
	March/April	March/April	June/July	June/July	June/July	June/July	June/July	June/July			
1964	228	10%	3	24%	4	22%	5a	5b	6a	6b	7
1965	274	21%	—	23%	—	14%	65	(49)	—	—	14
1966	294	14%	—	4%	—	4%	42	(33)	27	(10)	60
1967	190	6%	—	12%	—	3%	80	(59)	52	(29)	57
1968	207	10%	—	16%	—	11%	117	(81)	5	(3)	3
1969	264	12%	—	16%	—	7%	97	(100)	3	(1)	4
1970	238	9%	—	10%	—	9%	47	(36)	22	(18)	46
1971	218	—	—	—	—	—	65	(47)	1	(0.5)	97
									7	(2)	—

Appendix 2. Status, and change in abundance, of each species recorded at Carlton, Cambridgeshire, between 1960-61 and 1971-72

The general status of each species is given as R (resident, breeding), sv (summer visitor, breeding), wv (regular winter visitor, not breeding) or P (passage or vagrant occasionally recorded). Numerical abundance in summer (S, April-September) and winter (W, October-March) in 1971-72 is given in terms of that during 1960-61 as L (lost), G (gained), D (decreased), I (increased) or N (no change); a dash indicates that the species has never been recorded at the season shown

	Status	CHANGE			Status	CHANGE	
		S	W			S	W
Great Heron <i>Ardea cinerea</i>	(P)	L	L	Long-tailed Tit <i>Aegithalos</i>			
Ward Anas <i>platyrhynchos</i>	(R)	N	G	<i>caudatus</i>	(R)	N	I
Common Pheasant <i>Falco tinnunculus</i>	(R)	N	N	Treecreeper <i>Certhia familiaris</i>	(R)	N	N
Red-legged Partridge				Wren <i>Troglodytes troglodytes</i>	(R)	N	I
<i>lectoris rufa</i>	(R)	D	D	Mistle Thrush <i>Turdus</i>			
Partridge <i>Perdix perdix</i>	(R)	D	D	<i>viscivorus</i>	(R)	N	L
Pheasant <i>Phasianus colchicus</i>	(R)	D	D	Fieldfare <i>T. pilaris</i>	(wv)	-	D
Partridge <i>Rallus aquaticus</i>	(P)	-	G	Song Thrush <i>T. philomelos</i>	(R)	D	D
Pheasant <i>Gallinula chloropus</i>	(R)	N	I	Redwing <i>T. iliacus</i>	(wv)	-	D
Pheasant <i>Vanellus vanellus</i>	(R, wv)	D	D	Blackbird <i>T. merula</i>	(R)	N	D
Plover <i>Pluvialis</i>				Wheatear <i>Oenanthe oenanthe</i>	(P)	N	-
Plover <i>Tringa</i>	(wv)	-	L	Robin <i>Erithacus rubecula</i>	(R)	D	N
Plover <i>Gallinago gallinago</i>	(P)	G	N	Sedge Warbler <i>Acrocephalus</i>			
Plover <i>Scolopax rusticola</i>	(P)	-	L	<i>schoenobaenus</i>	(sv)	G	-
Plover <i>Numenius arquata</i>	(P)	G	-	Blackcap <i>Sylvia atricapilla</i>	(sv)	D	-
Plover Black-backed Gull				Garden Warbler <i>S. borin</i>	(sv)	G	-
Plover <i>Larus fuscus</i>	(P)	-	L	Whitethroat <i>S. communis</i>	(sv)	D	-
Plover Ring Gull <i>L. argentatus</i>	(P)	I	-	Lesser Whitethroat <i>S. curruca</i>	(sv)	I	-
Plover Common Gull <i>L. canus</i>	(P, wv)	N	I	Willow Warbler <i>Phylloscopus</i>			
Plover Black-headed Gull <i>L.</i>				<i>trochilus</i>	(sv)	N	-
Plover <i>Tringa</i>	(wv)	-	I	Chiffchaff <i>P. collybita</i>	(sv)	G	-
Plover <i>Columba oenas</i>	(R)	I	I	Goldcrest <i>Regulus regulus</i>	(R)	G	G
Pigeon <i>C. palumbus</i>	(R)	D	D	Spotted Flycatcher			
Pigeon Dove <i>Streptopelia</i>				<i>Muscicapa striata</i>	(sv)	N	-
Pigeon <i>Streptopelia</i>	(sv)	D	-	Duncock <i>Prunella modularis</i>	(R)	D	D
Pigeon Owl <i>Athene noctua</i>	(R)	N	N	Meadow Pipit <i>Anthus</i>			
Pigeon Owl <i>Strix aluco</i>	(R)	N	N	<i>pratensis</i>	(R)	D	N
Pigeon <i>Apus apus</i>	(sv)	N	-	Tree Pipit <i>A. trivialis</i>	(sv)	L	-
Pigeon Woodpecker <i>Picus</i>				Pied Wagtail <i>Motacilla alba</i>	(R)	N	L
Pigeon <i>Picus</i>	(R)	L	L	Starling <i>Sturnus vulgaris</i>	(R)	I	I
Pigeon Spotted Woodpecker				Greenfinch <i>Carduelis chloris</i>	(R)	I	I
Pigeon <i>Dendrocopos major</i>	(R)	G	L	Goldfinch <i>C. carduelis</i>	(R)	D	I
Pigeon <i>Alauda arvensis</i>	(R)	D	D	Linnet <i>Acanthis cannabina</i>	(R)	D	D
Pigeon <i>Hirundo rustica</i>	(sv)	D	-	Redpoll <i>A. flammea</i>	(R)	G	G
Pigeon Martin <i>Delichon</i>				Bullfinch <i>Pyrrhula pyrrhula</i>	(R)	N	N
Pigeon <i>Delichon</i>	(sv)	I	-	Chaffinch <i>Fringilla coelebs</i>	(R)	N	D
Pigeon Crow <i>Corvus corone</i>	(R)	N	L	Brambling <i>F. montifringilla</i>	(wv)	-	G
Pigeon <i>Corvus</i>	(R)	D	N	Corn Bunting <i>Emberiza</i>			
Pigeon <i>C. frugilegus</i>	(R)	L	D	<i>calandra</i>	(R)	D	L
Pigeon <i>C. monedula</i>	(R)	L	L	Yellowhammer <i>E. citrinella</i>	(R)	N	I
Pigeon <i>Pica pica</i>	(R)	N	N	Reed Bunting <i>E. schoenioides</i>	(R)	I	I
Pigeon <i>Garrulus glandarius</i>	(R)	N	N	Snow Bunting <i>Plectrophenax</i>			
Pigeon Tit <i>Parus major</i>	(R)	N	N	<i>nivalis</i>	(P)	-	G
Pigeon Tit <i>P. caeruleus</i>	(R)	I	I	House Sparrow <i>Passer</i>			
Pigeon Tit <i>P. ater</i>	(R)	G	L	<i>domesticus</i>	(R)	D	I
Pigeon Tit <i>P. palustris</i>	(R)	N	N	Tree Sparrow <i>P. montanus</i>	(R)	D	N
Pigeon Tit <i>P. montanus</i>	(R)	I	I				

Palearctic birds in East Africa

J. F. Reynolds

Plates 5-12

Enormous numbers of Palearctic birds—estimated by Moreau (1972) to be of the order of 5,000 million—winter in Africa south of the Sahara. Their impact on the ecology of the African avifauna is still largely speculative, but some at least, notably the harriers *Circus spp*, the Lesser Kestrel *Falco naumanni* and the Yellow Wagtail *Motacilla flava*, fill niches that, effectively, are unoccupied by African birds. The selection of species for this feature on Palearctic migrants in Kenya, Tanzania and Uganda has been based mainly on the availability of suitable photographs.

Grey Heron *Ardea cinerea* and **Purple Heron** *A. purpurea* (plates 5-6)

The rather small and scattered resident East African populations of the Grey and Purple Herons are both considered to be augmented by Palearctic migrants during the northern winter, though there is very little real evidence for this except for one recovery of a Russian-ringed Grey Heron in Kenya. Since East African herons breed mainly between February and June, 'winter' records of Grey and Purple Herons away from breeding areas could refer either to Palearctic migrants or to local wanderers.

The habits of these two herons in Africa are not noticeably different from those of birds in Europe. The Purple Heron is closely associated with tall reeds (plate 6) and is seldom seen in the open. The Grey Heron occasionally hunts for rodents and other small prey on dry land, thereby 'trespassing' on the niche of the Black-headed Heron *A. melanocephala*: competition is unlikely, however, as neither species is abundant and few Grey Herons feed away from water.

In Nairobi National Park, Kenya, where these photographs were taken, fish are absent from most of the small reservoirs favoured by herons and other wading birds. In such waters, adults and tadpoles of the aquatic Clawed Toads *Xenopus spp* (probably mostly *X. laevis*) appear to be the most frequently taken prey.

White Stork *Ciconia ciconia* (plate 7a)

Moreau (1972) estimated that somewhere in the region of 700,000 White Storks from Europe and Asia spend the winter in Africa, predominantly on the eastern side as far south as the Cape. They are mainly found in flocks on the great plains, such as the Serengeti,

over which they wander widely, gathering with astonishing rapidity at the periphery of grass fires to gorge on dead and disabled grasshoppers and locusts; presumably storks riding a thermal can see smoke from many kilometres away. The single bird shown hunting for Clawed Toads in company with a Yellow-billed Stork *Mycteria ibis* is thus rather atypical.

Most of G. C. Baekhurst's annual 'East African Bird Ringing Reports' record East African recoveries of storks ringed at Palearctic breeding places, ranging from 10°46'E in West Germany to 31°E in Russia, but with most birds from East Germany at about 12°10'E.

Steppe Eagle *Aquila rapax orientalis* (plate 7b)

Most authorities (e.g. Brown and Amadon 1968) regard the Steppe Eagle as a race *orientalis* of the widespread African and Asian Tawny Eagle *Aquila rapax*, but some (e.g. Christensen *et al.* 1972) consider it to be the western race (breeding from eastern Europe to the Kirghiz Steppes) of a separate Asiatic species *A. nipalensis*.

Loose flocks of Steppe Eagles start moving south in August, reaching winter quarters near the equator by October; the return passage, when the birds travel singly or in pairs, is between February and April. Not all birds can be safely distinguished from the Tawny Eagles *A. r. belisarius* resident in East Africa, but adult Steppe Eagles are larger, with darker brown, more uniform plumage. Juveniles have white uppertail-coverts and whitish edges to the feathers of the median and greater wing-coverts and secondaries, so that there is a conspicuous flight pattern (see fig. 32 in Christensen *et al.* 1971) and a barred and scaled appearance when the wings are folded.

Like the Tawny Eagle, it feeds to a large extent on carrion, but also catches rodents, hares and francolins *Francolinus spp.* It is a regular visitor to water holes where it both drinks and bathes. The juvenile shown about to drink in plate 7b had previously been up to its thighs in water and shortly after this photograph was taken had a thorough bath, from which it emerged looking very bedraggled.

Pallid Harrier *Circus macrourus* (plate 8)

Three Palearctic harriers (Marsh *C. aeruginosus*, Montagu's *C. cygargus* and Pallid) winter in open African grasslands where they fill a niche that, surprisingly, is largely unoccupied by African raptors. The African Marsh Harrier, regarded by some authorities (e.g. Williams 1963) as a race *ranivorus* of *C. aeruginosus* and as a distinct species *C. ranivorus* by, among others, Vaurie (1965), is by no means as restricted to marshes as European Marsh Harriers

are in the breeding season (Brown and Amadon 1968) but, at any rate in East Africa, its numbers are everywhere so small that many grasslands are hunted over only by migrant Palearctic harriers. Ornithologists with long experience in Africa (e.g. Brown 1970) report that the numbers of all migrant harriers have markedly declined during the last 20 years, possibly as a result of agricultural developments in their breeding ranges. Even so, it is still possible to see all three species, perhaps a dozen harriers in all, in a single morning's birdwatching on the plains around Nairobi in early March. In winter quarters, harriers roost communally on dry ground in longish grass, and in Tanzania all three migrant species have been reported at the same roost (Brown 1970).

The Pallid Harrier, illustrated in plate 8, has habits typical of the genus, spending much of the day quartering the ground in leisurely flight with occasional rests on bare branches, posts or boulders. Immatures and females arrive in equatorial regions in early October, being followed two to three weeks later by adult males. Some remain near the equator, but others move further south so that there is a marked return passage in Kenya during March.

Lesser Kestrel *Falco naumanni* (plate 9)

Lesser Kestrels are mainly passage migrants in East Africa, movement being most marked in late October and March. The birds are usually in loose flocks of 20 or so, but in southern Africa flocks may consist of a thousand or more birds. Mixed flocks with Kestrels *F. tinnunculus* (also mainly a winter visitor, as the resident races are rather uncommon) are not unusual and separation of females and immatures in flight is far from easy (see Christensen *et al.* 1973); at close quarters the almost white claws of the Lesser (see plate 9) are diagnostic. The food is mainly large grasshoppers caught on the ground, but often eaten on the wing, one foot being used to carry the prey to the bill: Williams (1963) claims that this method of feeding is a good distinction from the Kestrel.

Green Sandpiper *Tringa ochropus* (plate 10a)

The Green Sandpiper is a widespread but uncommon winter visitor to East Africa. It is a shy and usually solitary species favouring the edges of small streams (even in forest) and the firm margins of flooded murrain pits. About 40 have been ringed, but there have been no recoveries.

Ruff *Philomachus pugnax* (plate 10b)

The Ruff is a widespread and abundant visitor to East Africa, frequenting not only swampy and muddy edges of lakes (including

highly alkaline ones such as Magadi) and reservoirs, but wet and dry paddy fields and open grasslands, provided that water is within easy reach. I have vivid memories of about 100 Ruffs feeding on the bright green sward of Ngorongoro Crater among grazing Zebra (*Equus burchelli*) in December. Particularly in West Africa, Ruffs forsake animal food to a large extent, feeding mainly on grass seeds, including rice left lying in the dry paddy fields after the harvest has been gathered.

In all, 4,206 Ruffs have been ringed in East Africa, mainly at Lakes Nakuru and Naivaisha. There have been seven recoveries from the USSR at about 60°N and as far east as 126°E. An eighth recovery is of one ringed at Lake Nakuru on 12th April 1969 and shot in Uttar Pradesh, India, on 16th February 1973, strongly suggesting either that it left Africa much earlier than usual in 1973, or that it stayed in Asia for its last winter (Backhurst 1973). Another interesting case is that of a female ringed at Lake Nakuru on 10th May 1970 when on passage (its weight was 49% above the mean winter weight), yet recovered on the River Nadym in west Siberia (over 65°N, and 72°E) on 15th April 1971 (Backhurst 1972).

Blue-cheeked Bee-eater *Merops superciliosus* (plate 11a)

The Blue-cheeked Bee-eater has been recorded as an accidental visitor to Greece, Italy, Malta, France and Britain (Peterson *et al.* 1965). Its extreme rarity in Europe seems rather surprising, as one race (*persicus*) breeds at 40°N around the Caspian, and another (*chrysocercus*) in Tunisia. Fry (1969) suggested that its inability to penetrate into Europe is a result of its being physiologically adapted to breeding in very arid conditions.

Throughout East Africa, from the last week of August to the first week of May, the race *persicus* is a common winter visitor and passage migrant to open country with scattered trees. It does not shun the vicinity of lakes and swamps, into which it will dive in pursuit of aquatic prey (Took 1963, Reynolds 1965). The Blue-cheeked Bee-eater commonly associates with the European Bee-eater *M. apiaster*, making specific identification of high-flying passage flocks difficult as the calls, though frequently uttered, are not always safely distinguishable.

Red-throated Pipit *Anthus cervinus* (plate 11b)

In East Africa, northern Tanzania seems to be the southern limit of the Red-throated Pipit's winter range. Most records come from the comparatively well-worked highland areas of Kenya where the numbers appear to fluctuate from year to year, 1972-73 being a rather good season. Although sometimes seen in lightly wooded dry pastures in association with Tree Pipits *A. trivialis*, it is more often

seen in wet habitats such as muddy pastures and sewage filter beds, often in company with Yellow Wagtails. The ringing efforts devoted to the latter species around Nairobi have resulted in the ringing of 33 Red-throated Pipits, none of which have, as yet, been recovered or retrapped in subsequent seasons.

Yellow Wagtail *Motacilla flava* (plate 12a)

A number of authors, including Williamson (1955), think that 'the' Yellow Wagtail consists of two species: yellow-headed birds *Motacilla lutea* and dark or blue-headed birds *M. flava*. Mayr (1956) pointed out that this matter cannot be resolved until more work has been done on the mainly Russian breeding grounds of the more easterly populations. Until then it is probably more convenient to treat all these birds as a single species *M. flava* with a number of distinctively plumaged races breeding in different parts of the Palearctic.

At least six races of the Yellow Wagtail winter in East Africa in large numbers. They arrive in the Nairobi area by about the third week in September and have sometimes reached Iringa in southern Tanzania by the end of the month, though most of my Iringa 'arrival' dates fell in the second week of November. They leave Iringa by the end of February but can be seen around Nairobi up to the end of April; in general, the more southerly breeding populations move first and the most northerly ones last. Moreau (1972) stressed that an essential feature of the winter habitat is unobstructed ground which is most often provided by the grazing of cattle and wild herbivores in both dry and moist grasslands. In pastures the birds invariably associate with grazing mammals, thus filling a niche left unoccupied by small African passerines. Flocks are seldom formed except when going to roost and at times of migration.

Although mixing freely, the different races show definite habitat preferences, as first noted by Wallace (1955). Thus, around Nairobi most of the birds frequenting sewage farms are Eastern Yellow Wagtails *M. f. lutea* while Blue-headed Wagtails *M. f. flava* predominate in the surrounding cattle pastures; in both habitats smaller numbers of Grey-headed Wagtails *M. f. thunbergi* and Sykes's Wagtails *M. f. beema* are found alongside the numerically dominant races. The distinctive Black-headed Wagtail *M. f. feldegg* (plate 12a) prefers wetter habitats and is not uncommon around water holes in Nairobi National Park where it associates with Wildebeest *Connochaetes taurinus* and Zebra. Specimens showing the characters of the White-headed Wagtail *M. f. leucocephala* have been caught in the Nairobi area, though Vaurie (1959) did not include Africa in the winter range of this race. Whether British-breeding Yellow Wagtails *M. f. flavissima* reach East Africa is a controversial

matter, mainly because there are no completely satisfactory morphological criteria for separating British *flavissima* from eastern *lutea* (Williamson 1955)*. Thus, in spite of Wallace (1955) giving one definite modern Kenyan record of three wagtails showing typical *flavissima* characters, Moreau (1972) considered that the small numbers of the western *flavissima* population make it very unlikely that *flavissima*-type wagtails seen, or collected—as, for example, by van Someren (1931)—actually originate from the British population.

Most of the 30,000 Yellow Wagtails ringed in East Africa have been caught in mist nets around Nairobi, either at daytime feeding areas on sewage farms where the record is 568 'new' wagtails ringed by four people in six hours, or at roosts in Napier grass *Pennisetum purpureum*. The latter can be very productive, but unfortunately the birds often change their roosts in midwinter and, partly because of the paucity of observers, new roosts often escape detection. Such local shifts of concentration make the proving of suspected recurrence in winter quarters somewhat difficult, but some 500 retraps have shown conclusively that some individuals winter in or pass through the same general area in subsequent years.

Seventeen Palearctic recoveries represent one recovery per 1,803 birds ringed (in East Africa), a much lower ratio than in the Swallow *Hirundo rustica*, where it is one per 278 ringed. Birds, presumably on passage, have been recovered in Saudi Arabia, Qatar and Iran (one in each country). The remaining 14 recoveries are from breeding grounds in the USSR, mainly between 52°N and 58°N, and between 41°E and 48°E, with one bird from Gydanskii Poluostrov at approximately 70°N, 75°E.

Isabelline Wheatear *Oenanthe isabellina* (plate 12b)

Three species of Palearctic wheatears *Oenanthe spp* winter in East Africa south to southern Tanzania, with odd birds straggling to Zambia. 'The' Wheatear *O. oenanthe* is by far the most widespread and numerous, occurring from sea-level to 3,100 metres above sea-level on open plains and lightly wooded country. Particularly north of the equator, it can be seen alongside the Pied Wheatear *O. pleschanka* and the Isabelline Wheatear *O. isabellina*, though the latter is typically a bird of more arid country. In places like the Serengeti it is difficult to avoid the conclusion that there must be competition with the much less numerous resident Capped Wheatear *O. pileata*. Certainly where wheatears are abundant both intra-specific and interspecific intolerance is well marked.

* It has, however, recently been shown by D. J. Pearson and G. C. Backhurst (*Ibis*, 115: 589-591) that Kenyan Yellow Wagtails showing *flavissima*-type plumage may change to *lutea*-type plumage during or after the spring moult.

The habits and habitats of these birds do not favour mist-netting, so that only 46 Wheatears have been ringed in East Africa, together with eight Isabelline and seven Pied.

When considering the environmental conditions under which birds like wheatears live while in the tropics, it should be remembered that the air temperature just above the ground is significantly higher than the 'standard' temperatures recorded by meteorologists in ventilated screens about 1.2 metres above the ground. Perching on even slight elevations, as shown in plate 12b, lifts the bird into slightly cooler air (see also plate 23b in Reynolds 1972).

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Notes

Aerial plunge-diving by Shags and Manx Shearwaters In a previous note (*Brit. Birds*, 65: 480-481), I described how Shags (*Phalacrocorax aristotelis*) in the Isles of Scilly, while feeding over dense shoals of small fish, sometimes took flight over the heads of their companions in order to plunge-dive into the sea, possibly after prey. I observed similar behaviour, though on a much smaller scale, twice during the last week of June 1972 while seawatching from the high cliffs overlooking Sennen Cove, Cornwall. On each occasion about 50 Shags (probably the same birds) followed a shoal of fish on the incoming tide, numbers communally diving from the surface or taking flight only a metre or so above the sea to plunge-dive, though not submerging as they were in Scilly. On enquiry to trawlermen in west Cornwall, I have been informed that it is not unusual for Shags to plunge-dive from a height, but not in large parties. Incidentally R. D. Penhallurick, in *Birds of the Cornish Coast* (1969), wrote that 'Large gatherings are more frequently noticed at Scilly where flocks of several hundred may be seen throughout the year when conditions are favourable . . . Then rafts of a thousand birds have been recorded—as on 26 August 1960—while gatherings of half this size are not uncommon especially in September', but he did not mention plunge-diving.

Aerial plunge-diving is also performed by Manx Shearwaters (*Puffinus puffinus*). During a five-hour seawatch on 23rd June 1972, at St Ives Bay, Cornwall, I witnessed a remarkable feeding performance by large numbers of these birds. The wind was moderate WNW with occasional drizzle; high tide occurred about 15.20 GMT. At first, at 11.15, only a few Manx Shearwaters were seen. Gradually the rising tide brought a huge shoal of small fish deep into the bay and caused very large areas of surface water to ripple; trawlermen tell me that the fish were almost certainly Whitebait *Clupea alba* driven into the bay by a shoal of Herrings *C. harengus*. Shearwaters surged into the area in increasing numbers until I estimated that at least 3,000 were present, with 1,000 more in large groups flying in and out of the bay. There were huge floating rafts of shearwaters feeding on surface fish; many birds were plunge-diving from heights of up to 1½ metres and momentarily submerging, and many more just flopping into the sea to take surface food. All this activity was intermixed with the movements of many other shearwaters flying to join groups well outside the area, the whole making an impressive spectacle. All this occurred in broad daylight and a long way from the nearest breeding colony.

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Gull Cry, 9 Park Road, Newlyn, Cornwall

Occasional plunge-diving from the air by Manx Shearwaters, entering the water with partly opened wings, was mentioned in *The Handbook* (4: 42) and *Handbook of North American Birds* (1: 193). EDS

Red-breasted Mergansers diving from the air On 15th April 1973, at Portland Harbour, Dorset, we were watching a flock of 28 Red-breasted Mergansers *Mergus serrator* diving in a loose pack. They were moving quite fast and coming in towards the shore, and from their behaviour we assumed that they were closing in on a shoal of fish. Those finding themselves farthest from the front of the flock started pattering along the surface, and on reaching the front dived headlong into the water. Other birds actually took flight, several reaching a height of a metre before diving from the air. These activities continued for about two minutes.

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It is possible that this behaviour was not connected with feeding but rather a form of 'diving-play' as suggested by Bernard King for Smews *M. albellus* and various surfacc-feeding ducks (*Brit. Birds*, 48: 85); on the other hand, the same author's notes on plunge-diving by Shags *Phalacrocorax aristotelis* and Manx Shearwaters *Puffinus puffinus* (see above) imply at least a circumstantial connection with large concentrations of fish. EDS

Behaviour of Ringed Plover in defence of nest On 3rd June 1973, on the Suffolk coast, we came across a pair of Ringed Plovers *Charadrius hiaticula* nesting very close to Little Terns *Sterna albifrons* on a shingle beach. As we approach, the Ringed Plover that was incubating ran down the beach and went directly to a Little Terns' nest which had eggs. The terns mobbed the plover to no avail, the latter standing over their nest in a 'tilting' posture, attracting our attention and possibly inviting us to the nest. On our arrival there it flew off and was later found sitting contentedly on its own clutch only two metres from the terns' eggs. The Little Terns also settled down to incubate after the plover had returned to its own nest. This behaviour was repeated when we returned to the site on 10th and 17th June.

JOHN and MARGARET SMITH

Topaz, Sudbury Road, Lavenham, Suffolk

Blue Tit laying and hatching egg in substitute site with no nest material In May 1972, in the garden of the house where I then lived in Wandsworth, London, a pair of Blue Tits *Parus caeruleus* built a nest and laid eggs in a nestbox, but this was pulled down by vandals. The day after this incident the birds were investi-

ating another, empty, box about five metres from the site of the first. About a week later, a single egg was discovered in one of the front corners of this new box, laid on the bare wood with no nest material. (Unfortunately it is not known for certain when it was actually laid.) This egg was being incubated by the Blue Tits, it duly hatched (no nest material being added during incubation), and the chick eventually fledged.

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This occurrence is remarkable in that a species which normally incubates a clutch of many eggs in a soft nest incubated a single egg on the bare nestbox floor, and in the fact that the nestling survived in spite of the lack of supporting siblings or eggs, and of a soft concave nest, apparently without developing any severe deformities. EDS

Survival of young Long-tailed Tits in exposed nest At the end of April 1972, in a low hawthorn bush on the edge of Ringshall Coppice, Hertfordshire, I found a nest of Long-tailed Tits *Aegithalos caedatus* completely domed, with six eggs being incubated. By 21st May the whole top half of the nest had been removed, suggesting that a predator had made an entry. To my surprise, in the remaining half of the nest there were three live young about four or five days old, which were still thriving four days later. Subsequent evidence suggests that they fledged successfully.

ROBERT MORGAN

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Derek Goodwin suspects that the dome was removed piecemeal by nesting material; Chaffinches *Fringilla coelebs* and Grey Squirrels *Sciurus carolinensis*, at least, are known to have destroyed Long-tailed Tits' nest for this purpose. EDS

Greenfinch settling on the sea The notes by Raymond H. Hogg and T. Delaney about passerines settling on the sea (*Brit. Birds*, 1969: 169-170) remind me of an observation I made on 20th April 1958 at Hemsby, Norfolk. A north-west wind was blowing and throughout the day small passerines were flying in from the sea, individually and in small groups, and disappearing inland. At about 13.30 hours I noticed a lone bird approaching low over the water in distinctly laboured flight. It flopped down on to the water about 100 metres from the shore, and floated for some ten seconds; then, without any apparent difficulty, it rose up and flew half-way up the beach, where I found it crouching inside a hollow log, and was able to identify it as a male Greenfinch *Carduelis chloris*. It stayed completely passive as I picked it up and carried it further inland, but

after about ten minutes it seemed to be fully recovered, and, apparently roused by the call of another Greenfinch, flew off calling.

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Reviews

Birdwatchers' Year. By Leo Batten, Jim Flegg, Jeremy Sorensen, Mike J. Wareing, Donald Watson and Malcolm Wright. T. & A. D. Poyser, Berkhamsted, 1973. 351 pages; 18 photographs; many drawings, maps and figures. £4.60.

I enjoyed reading this book and was glad that the idea of six people writing about their ornithological year month by month had succeeded so well. I am not particularly thrilled by books of short stories and I had approached this collection of the works of six authors with some coolness. However, Leo Batten's account of a year's natural history at the Brent Reservoir in the heart of London's suburbia sets a pattern of a semi-diary form interspersed with an explanatory dissertation of the natural history background to his sets of facts. This pattern is followed in Jim Flegg's account of Northward Hill, Kent, with great success. Donald Watson's rather more lyrical account of his year on the southern Scottish moors, accompanied by his own scraperboard illustrations, particularly pleased me. Malcolm Wright's account of his year on an island, in this case the Calf of Man, was nostalgic.

Generally speaking, I found this a most useful and informative book. Those accounts which make less use of the strict diary form are the most successful, I think, but quite clearly the authors are naturalists if not ecologists and the book is, in my view, enjoyable reading. I also found the illustrations, by Ian Willis and Donald Watson, most pleasing.

PETER CONDER

Wildlife Photography. A Field Guide. By Eric Hosking and John Gooders. Hutchinson, London, 1973. 192 pages; 9 colour and 32 black-and-white plates; 16 text-figures. £2.95.

This book is designed to meet the increasing demand for a simple guide to wildlife photography. It is small, light, and quite handy for taking into the field on photographic excursions. Chapters on cameras and equipment, safari photography, bird photography and flash are followed by one on zoo and studio photography, which covers small mammals, reptiles and amphibians. Cinematography is considered, and then the 'inanimate world', which includes trees, flowers, lichens, fungi, and—even more curiously—insects. Finally there is a thought-provoking chapter on ethics, in which a number of

Questions are asked but the answers are largely left to the reader. The publishers' blurb suggests that photographing wildlife is an outlet for the basic need to hunt, and that many photographers have found that 'pitting their wits against a dangerous animal or a timid bird . . . brings ample excitement and reward'. However, this is only one aspect of the subject. There are still many animals which cannot yet be photographed in the wild. Illustrations of these are certainly needed, and photographs taken under studio conditions may well show details quite unobtainable in the wild. These studies often require a very high degree of skill and patience. Nevertheless, most will agree with the authors' conclusion that 'it is the responsibility of the photographer to label clearly all photographs taken in captivity and not to pass them off as wild and free'. An appendix gives useful lists of equipment for safari and hide-work, a list of rare birds for which a permit is required before they may be photographed at the nest, and a short bibliography. There are 16 simple but clean text diagrams, and eleven blank pages for notes.

The very readable text follows a simple style and should be clear to those with little or no technical knowledge. In such a small book the practical details are at times necessarily brief. Perhaps more space might have been devoted to cameras and equipment, and the 'animate world'. The illustrations are, of course, excellent, but the reproduction of some of the coloured and many of the black-and-white plates is disappointing. In addition the monochrome photographs are very small, though in most instances adequate to demonstrate the point intended. However, this book is recommended for enthusiastic but ignorant amateurs, especially the part dealing with advance planning of photographic expeditions. In fact, such study before the safari might easily save them many disappointments, much time and money. As would be expected from the authors, there are many valuable hints on every page, the fruits of long experience.

GEOFFREY BEVEN

ALSO RECEIVED

Antic Life of Birds and Mammals. By L. Irving. Springer-Verlag, Berlin, Heidelberg and New York, 1973. DM 44.00 or \$14.00.

The Turn of the Tide. By Richard Perry. Revised edition. Croom Helm, London, 1973. £3.50.

Strel Klee; The Heron Garth; Krark. All by Kenneth Richmond. Barry Shurlock. Winchester, 1973 (reprinted). £1.50 each.

Migration Ecology of the Mallard. I. A review of previous studies and the distribution and migration from breeding areas. By David R. Anderson and Charles J. Henny. Bureau of Sport, Fisheries and Wildlife, Washington, 1972. \$1.50.

Wie nach Runde. By Fritz Steiniger. Kilda-Verlag, Greven, 1972. DM19.80.

The Look-it-up Book of Birds. By Elizabeth S. Austin and Oliver L. Austin. Collins, Glasgow, 1973. £1.75.

The Technique of Bird Photography. By John Warham. Third (revised) edition. Focal Press, London and New York, 1973. £3.00.

Letters

Wader nesting associations A number of times in the past I have found individual pairs of Lapwings *Vanellus vanellus* and Redshanks *Tringa totanus* nesting within a few metres of each other, and recently Lapwings and Snipe *Gallinago gallinago* within about four metres, all in circumstances showing no scarcity whatever of equally suitable sites all around. Apart from one vague statement in *The Handbook* (4: 325) under Redshank—‘Associates freely with other waders’—which seems unlikely to have been intended to include nesting associations, I have found no mention of this habit in the literature. The explanation could be that either or both participants benefit by their neighbour’s keeping watch for approaching predators or from their neighbour’s attacks on predators, since normally Lapwings attack intruders, Redshanks only clamour in alarm, and Snipe do neither.

A. L. W. MAYO

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I have found Redshanks nesting close to Lapwings in several counties of Britain, and James Ferguson-Lees and I mentioned this association on page 230 of *A Field Guide to Birds’ Nests* (1972). In my experience the Lapwing rises first and obviously, while the Redshank slips off its nest quietly. Since most Lapwings nest rather earlier than Redshanks, there would, as Mr Mayo suggests, be added benefit to the still-incubating Redshanks when their neighbours with small young mob and distract the potential predator. I have also found Snipe nesting fairly close to Lapwings, but not as commonly as Redshanks. Another association we noted in our books, on page 198, is between Ringed Plovers *Charadrius hiaticula* and Little Terns *Sterna albifrons* (see also the note on page 78 in this issue). The reasons for waders, ducks and grebes nesting in colonies of gulls and terns were discussed in 1957 by Jukka Koskimies in *Ornis Fennica*, 34: 1-6; see also *Wildfowl*, 19: 160; 20: 154; and 21: 147 for the greater success of ducks nesting close to the huge colony of Black-headed Gulls *Larus ridibundus* on St Serf’s Island, Loch Leven, Kinross-shire, as against those nesting elsewhere on the island. It would be interesting to know whether the Nest Record Scheme of the British Trust for Ornithology, for example, provides any statistical evidence that Redshanks nesting near Lapwings have a better hatching success than others.

BRUCE CAMPBELL

Hordley, Woodstock, Oxford OX7 1EP

News and comment *Robert Hudson*

Terns in trouble It has long been clear that the welfare of terns in Britain and Ireland is largely dependent on the availability of undisturbed breeding sites along low-lying coasts, which are becoming increasingly frequented by people, rendering necessary the provision of protected reserves. The latest reports to the Seabird Group relate to the Sandwich Tern along the east coast of Scotland, where there used to be strong colonies in the Firth of Forth, in Aberdeenshire and in the Moray Firth area. At the time of Operation Seafarer (1969) there were 1,400 pairs there, about 10% of the north-west European total. It seems that the birds started to desert the Moray Firth in 1971, apparently due mainly to increasing disturbance on the beaches, one of which is a military range and another an oil platform construction site. They moved to the Sands of Forvie in Aberdeenshire, where they were disturbed by Foxes, and in 1973 the bulk of the population appears to have moved south to Northumberland and Norfolk (whence they are also reported to have been disturbed and to have moved elsewhere). The number breeding along the east coast of Scotland has fallen to about 400 pairs. Terns are now added to the list of birds for which the Seabird Group, in conjunction with the Royal Society for the Protection of Birds, will carry out regular breeding censuses, gathering information showing the necessity for protection of breeding sites. (Taken, with permission, from the Seabird Group Circular no. 14).

Nature Conservancy Council appointments The Nature Conservancy Council, set up by Parliament in 1973 as an independent body, but with reduced responsibilities, to replace the old Nature Conservancy, has announced some appointments of committee chairmen and senior staff. The chairmen of the Statutory Advisory Committees are to be A. E. Smith, OBE, for England, H. A. Maxwell, OBE, for Scotland, and Dr D. A. Bassett for Wales; while Professor A. D. Bradshaw is to be Chairman of its Advisory Committee on Science. On the staff side, Dr Derek Ratcliffe, who during 1970-73 was Acting Deputy Director (Scientific) of the old Nature Conservancy, fills the new senior post of Chief Scientist; while Ian Prestt, who joined the Conservancy in 1956, becomes Deputy Director. We wish them well in this difficult transitional period.

New Year Honours This time there was but one ornithologically familiar name on the New Year Honours list, and we offer our congratulations to H. G. Hurrell on his award of MBE for services to the environment. Mr Hurrell's name is closely associated with Devon; he had a long spell on the editorial committee of the *Devon Bird Report*, and since its inception in 1960 has been a driving force in the Devon Trust for Nature Conservation. He has been a member of the British Ornithologists' Union since 1927, is the author of various papers, and during 1947-50 organised one of the early co-operative enquiries of the British Trust for Ornithology, on summer movements of Swifts (*Brit. Birds*, 44: 146-152).

Back to the wild In December the Pheasant Trust, of Great Witchingham in Norfolk, returned another consignment of rare Asiatic pheasants to their homeland for an attempt at restocking, this time with 24 Cheer Pheasants *Catreus wallichii*. This species is native to the western Himalayas (north-west Pakistan to Nepal), where it has declined alarmingly, due to excessive hunting, to the point of having its own page in the *Red Book*; it is extremely sedentary and family parties remain for several months in the same locality, even when disturbed by shooting. This consignment from Norfolk is being taken to the Himachal Pradesh province of northern India where, following a period of acclimatisation, they will be released into a wildlife reserve.

An alternative fuel According to a report in the *Council of Europe Newsletter* (no. 10, 1973), it is planned to construct a power plant near Drama in northern Greece, which will be fuelled with peat. It is being forecast that major wetlands will result from the large-scale excavation of the peat, and become suitable nesting and resting sites for waterfowl.

Obituary It is with regret that we record the death of Dr M. C. Radford, which occurred in Oxford on 8th December 1973. An amateur ornithologist *par excellence*, Mary Radford had been a member of the Oxford Ornithological Society for nearly 50 years, and gave her most vigorous service at an age when most people would think of easing up. She edited the Society's annual bird report from 1959 to 1962, and served as President from 1963 to 1966 and Vice-President thereafter. Her book *The Birds of Berkshire and Oxfordshire* (1966) is the definitive avifauna of those counties. Her other significant contributions to ornithology are the series of analyses of gull and tern ringing recoveries published in *Bird Study* (7: 81-93, 8: 174-184, 9: 42-55); and her assistance, in literature searching, to her great friend Reg Moreau after he had left Oxford, which was acknowledged in his posthumous book, *The Palaearctic-African Bird Migration Systems* (1972). In recent years Mary Radford had borne, with astonishing fortitude, a series of disabilities and misfortunes, especially the loss of sight in one eye after a motor accident. On 27th November last she attended Professor W. H. Thorpe's Tucker Lecture in Oxford; on 4th December she entered the Churchill Hospital for a short spell of observation and she died peacefully four days later. (Contributed by Dr Bruce Campbell.)

New BTO publication The British Trust for Ornithology has recently published a 44-page booklet entitled *Early and Late Dates for Summer Migrants*. Series of such dates (and their localities) in *The Handbook* proved popular with general readers, and this new booklet gives updated and extended lists of these. Fifty species are treated, omitting those for which a few birds overwinter more or less regularly in Britain and Ireland, such as Quail, Common Sandpiper, Blackcap and Chiffchaff. For each are given the 15 latest records (to 31st December) and the 15 earliest (from 1st February), with any January occurrences listed separately; these series are long enough for the extremes to be seen in some sort of perspective. The opportunity was taken to verify the dates quoted in *The Handbook*; several errors were uncovered thereby, of which the most intriguing concerned reputed early Common and Little Terns in March 1850, though in the original report (*Zoologist* 1850: 2854) 'March' actually referred to the Cambridgeshire locality of that name! A preliminary section to the booklet, under the heading 'Long-term trends', gives reasons for supposing that the increased incidence of very early and late records in the last 30 years is real, and not solely due to the increased scale of birdwatching; it does seem that the period of climatic amelioration we have experienced has induced some individual birds to delay their departures, or to arrive earlier in spring. This booklet, BTO Field Guide no. 15, is available from the BTO, Bcch Grove, Tring, Hertfordshire HP23 5NR, at 30p, post free.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

Request for information

Influx of Rough-legged Buzzards The number of Rough-legged Buzzards *Buteo lagopus* in Britain this winter seems to be exceptional. The last influx of comparable size occurred in autumn and winter 1966/67 and this was described by R. E. Scott in *Brit. Birds*, 61: 449-455. A paper on the present influx is envisaged, and we appeal for all records from autumn 1973 to spring 1974 to be sent to **K. R. Anderson, Wymondham College, Norfolk.**

Notice

Research on Steller's Albatross A graduate in biology or zoology with an interest in seabirds is required to undertake studies of Steller's Albatross *Diomedea batrur* on an uninhabited volcanic island in the north-west Pacific Ocean. The person selected would be responsible for organising and leading an expedition of two or three people who would be isolated for a period of almost one year. There would be an opportunity to write up the research for a higher degree. Interested persons with appropriate experience should write to **Dr W. L. N. Tickell, Department of Zoology, Makerere University, P.O. Box 7062, Kampala, Uganda.**

Recent reports—November *D. A. Christie*

These are largely unchecked reports, not authenticated records

There was a mild start to November as a series of Atlantic depressions crossed Britain, winds being generally light. From about the middle of the month, however, anticyclonic conditions produced stronger winds with colder weather from the north, and from 25th-26th a week of exceptionally cold weather set in during which many of the larger lakes and reservoirs became frozen over.

SEABIRDS, SKUAS AND AUKS

Leach's Petrels *Oceanodroma leucorhoa* were reported in small numbers mainly from Irish Sea coasts, especially during the gales of mid-month; there was also the strange sight of one flying over the Serpentine in Hyde Park on 17th and one was in the Swale estuary (Kent) on 18th. Other tubenoses were extremely scarce but included a **Black-browed Albatross** *Diomedea melanophrys* flying north off Great Ouse Sluice (Northumberland) on 13th and a **Sooty Shearwater** *Puffinus griseus* at Portstewart (Co. Antrim) on 24th.

Two **Pomarine Skuas** *Stercorarius pomarinus* were seen at Minsmere (Suffolk) on 1st, one moved south off Bamburgh (Northumberland) on 3rd and three at Great Ouse Sluice on 11th, and as many as five were identified off Weybourne (Norfolk) on 26th. **Arctic Skuas** *S. parasiticus* were also very scarce—four seen in Northumberland, and singles in Suffolk and Kent, while following coastal gales one appeared at Blithfield Reservoir (Staffordshire) on 25th. The only report of a **Little Auk** *Plautus alle* concerned one between Fair Isle and Sumburgh (Shetland) on 9th.

HERONS, SPOONBILL AND WILDFOWL

Immature **Night Herons** *Nycticorax nycticorax* were present in Lincolnshire at Caithby on 11th and at Boston from 13th to 19th, and at Eye Brook Reservoir (Leicestershire/Rutland) from 17th to 26th. The appearance in Britain of immatures of this species in late autumn has become a regular feature of recent years: has yet to be explained and their origin established, though there must be a strong suspicion, on meteorological and other grounds, that these are merely ill-winged young raised in a free-flying colony such as the one at Edinburgh Zoo (they have often been very tame and have sometimes stayed at the same locality for several months). A sub-adult **Spoonbill** *Platalea leucorodia* remained at Sandwich Bay (Kent) throughout the month and until 8th December, while earlier, on 3rd November, one had been seen on the River Tavy (Devon). Unusual numbers of **Long-tailed Ducks** *Clangula hyemalis* were reported on fresh water—nine in the Tyneside area and singles inland at Drax (Yorkshire), Chasewater and Westport Lake (Staffordshire), Holme Pierrepont/Colwick (Nottinghamshire), Tring

Reservoirs (Hertfordshire) and Bough Beech Reservoir (Kent); coastal flocks were no higher than normal, though 18 were at Fingringhoe Wick (Essex) in mid-month. An unusual gathering was of 100 **Velvet Scoters** *Melanitta fusca* off Ross (Northumberland) on various dates after 4th, while 26 **Eiders** *Somateria mollissima* flying west low over Silwood Park (Berkshire) on 30th were also very unexpected. Drake **King Eiders** *S. spectabilis* were seen on Loch Fleet (Sutherland) from 17th to 19th and in the Irvine estuary (Ayrshire) throughout the month. A small number of **Smews** *Mergus albellus* came in during November, the first a female at Hoveringham (Nottinghamshire) on 3rd which stayed until 26th; this was followed by one in the Leigh area (Lancashire) from 6th to 25th, a drake at Cheddar Reservoir (Somerset) from 10th to the year's end, with two birds there on 18th, one at Welbeck (Nottinghamshire) on 18th and one at Colt Crag and Hallington Reservoirs (Northumberland) on 25th.

Exceptional numbers of **dark-bellied Brent Geese** *Branta b. bernicla* were present at Foulness (Essex)—over 16,000 on 11th, including about 50% juveniles; on 18th estimates were made of 2,000 in Langstone Harbour (Hampshire) and 1,500 in neighbouring Chichester Harbour (Hampshire/Sussex); elsewhere 400 were at East Swale and 600 in the Exe estuary (Devon) by the end of the month. A **Bean Goose** *Anser fabalis* was at Cley (Norfolk) on 24th, and 24 had returned to the Yare Valley (also Norfolk) by 17th, with up to 90 there by the end of the month. At Lough Beg (Cos. Antrim/Londonderry) there were 155 **Whooper Swans** *Cygnus cygnus* on 14th, and 82 were on Lough Foyle (Co. Londonderry) on the same date; 220 were counted at Rattray (Aberdeenshire) on 5th and in Northumberland there were 163 at Lindisfarne on 10th, 110 at Holywell by 25th and 106 on Grindon Lough on 27th.

RAPTORS, WADERS, GULLS AND TERNS

After the October influx of **Rough-legged Buzzards** *Buteo lagopus* (*Brit. Birds*, 67: 35), there were further reports from three new east coast localities in November. Up to five were present all month at Winterton (Norfolk), and at least six in the Walberswick/Minsmere area of Suffolk. Surprisingly, inland records came only from Hampshire, a total of three or four birds, but no doubt other sightings have not been reported to us. The last **Marsh Harriers** *Circus aeruginosus* at Minsmere were a pair during the first week and a juvenile on 26th and 27th. An immature **Marsh Hawk** *C. cyaneus hudsonius* at Saltfleetby (Lincolnshire) from 18th to 30th constitutes only the second report of this American race of the Hen Harrier since the one in Norfolk from October 1957 to April 1958 (see *Brit. Birds*, 64: 537-542). There were three sightings of male **Lesser Kestrels** *Falco naumanni* in the first week, at Chasewater and at Steyning (Sussex) on 4th and in the Vale of Neath (Glamorgan) on 7th. These would be the 15th, 16th and 17th ever, and make six records in the last six years.

Waders included three Palearctic rarities. A **Sociable Plover** *Vanellus gregarius* was present for three days during the first week along the Military Road (Isle of Wight), the 13th for Britain and Ireland if accepted, nine of the previous twelve having occurred in August-December. On 11th a **Great Snipe** *Gallinago media* was reported at Sandwich Bay; and a **Terek Sandpiper** *Xenus cinereus* found in the Plym estuary (Devon) on 17th was still being watched in February 1974, the tenth British and Irish record. Nearctic vagrants consisted of just two **Pectoral Sandpipers** *Calidris melanotos* at Chew Valley Lake (Somerset) until 11th and a **White-rumped Sandpiper** *C. fuscicollis* at Grutness (Shetland) from 7th to 11th, though it is worth mentioning that a **Western Sandpiper** *C. mauri* was reported in the Algarve in Portugal during the week of 17th-24th, in an autumn which has aroused considerable interest in vagrant stints.

A heavy arrival of **Woodcocks** *Scolopax rusticola* was evident on the Calf of Man on 1st when more than 20 were counted, just one day after the influx at

urn (Yorkshire) (*Brit. Birds*, 67: 37). Good numbers of **Jack Snipe** *Lymnocyptes cinereus* were present, including 15 at Pennington Flashes (Lancashire) on 1st, while two days later a similar number arrived at Blaydon Pond (Co. Durham). There were up to 40 **Spotted Redshanks** *Tringa erythropus* at Arne (Dorset) during the month and 20 at Stoke (Kent) on 11th, while **Greenshanks** *T. nebularia* numbered 20 at Kingsnorth, near Hoo (Kent), on 10th and more than 70 at Lough Beg on 18th. Late migrants included one to two **Whimbrels** *Nuneniis phaeopus* at the Calf of Man up to 24th and single **Wood Sandpipers** *T. glareola* at Enborough (Nottinghamshire) on 20th and at Shotton (Flintshire) until 23rd. Single **Curlew Sandpipers** *C. ferruginea* were at Vazon (Guernsey) on 4th, Sowley Marsh (Hampshire) on 10th, Cliffe (Kent) on 14th and Pequerries Bay (Guernsey) at the Plym estuary on 18th. **Little Stints** *C. minuta* were reported from eleven sites, about 30 individuals in all with a maximum of at least eight at Dibden Marsh (Hampshire) on 3rd, when there was also a **Temminck's** *C. temminckii* there. One **Grey Phalaropes** *Phalaropus fulicarius* stayed at Cley from 1st to 6th and another was at Blackpill (Glamorgan) on 17th, when a flock of seven **Avocets** *Avocetus avocetta* was seen at Steart (Somerset). A late **Stone Curlew** *Burhinus oedipus* was reported also at Steart on 4th.

Reports of **Glaucous Gulls** *Larus hyperboreus* south of the Scottish border included three together at Wallsend Swallow (Northumberland) found roosting on a playing field on 14th, while on Fair Isle, where the species was present on many days, the maximum was seven on 25th. Single immature **Iceland Gulls** *L. glaucoides* appeared at Holywell on 4th and (flying west) at Mansfield Reservoir (Nottinghamshire) on 23rd. Two **Mediterranean Gulls** *L. melanocephalus* were reported at Blackpill at least into March 1974. Single **Black Terns** *Chlidonias niger* were seen at Hickling Broad (Norfolk) on 1st and at four places in Hampshire and Somerset up to 11th. An adult **Sandwich Tern** *Sterna sandvicensis* was present with a juvenile at Graveney (Kent) on 1st, a **Common Tern** *S. hirundo* was still at Lydd (Kent) on 3rd, and very late Common or **Arctic Terns** *S. paradisaea* were recorded singly in Hampshire in Portsmouth Harbour on 11th and in the Hamble estuary on 30th. The only rare tern reported was a **Gull-billed** *Gelochelidon nilotica* at Minsmere Haven on 10th.

WINTER-PASSERINES AND PASSERINES

Among the winter visitors, **Shore Larks** *Eremophila alpestris* were reported in rather low numbers from 13 sites: on the east coast up to 30 were present at Araltar Point (Lincolnshire) and Minsmere, six were at both Bamburgh and Blyth (Northumberland) on 3rd, and five at Reculver (Kent) on 14th; in the west one was on Bardsey (Caernarvonshire) on 7th, a second at Dawlish Warren (Devon) from 10th to 13th, and a third at Marshside, Southport (Lancashire) on 12th. A Shore Lark at Pulias (Guernsey) from 11th to 19th was the first record for that island; but perhaps the most unusual report of this species was two in the grounds of a school in Northampton on 6th and 7th, a county first. The largest east coast flocks of **Twites** *Acanthis flavirostris* were in Kent, 500 near Ersham on 11th and 300 at Sandwich Bay on 30th; in the west there were 80 on the Calf of Man by the latter date. Up to 24 **Snow Buntings** *Plectrophenax nivalis* were at Minsmere during November and up to 40 stayed in the Ross/Bamburgh area, while 26 at Sandwich Bay on 30th was the maximum in the south-east; there were only four reports from the west, 15 at Southport on 25th being the most northerly. Guernsey records came from Fort Hommet (three on 4th) and Pulias (two from 17th to 21st); and we heard of five singles inland in England, at Winnall (Hampshire) on 3rd, Fulmer (Buckinghamshire) from 8th November to 18th November, Attenborough on 11th, Pitsford Reservoir (Northamptonshire) on 18th, and Langley (Kent) from 18th to 21st. Up to 15 **Lapland Buntings** *Calcarius lapponicus* were noted at Beal (Northumberland) on 3rd and 4th, but the only other

reports of this scarce and elusive passage migrant and winter visitor were of singles at Southport on 2nd, at Gibraltar Point on 11th, at Nafferton (Northumberland) on 22nd and on the Calf of Man on 23rd, though there were doubtless more than this. The only large flock of **Bramblings** *Fringilla montifringilla* reported to us in November was one of 500 or more in Black Park (Buckinghamshire) on 20th. **Great Grey Shrikes** *Lanius excubitor* appeared to be more widespread than usual in November, and at Winterton there were up to three throughout the month. **Waxwings** *Bombycilla garrulus* were reported from eleven places, singletons in six cases; the most together were four between Chapel and Chinley (Derbyshire) on 29th. Lastly, up to 23 **Short-eared Owls** *Asio flammeus* were counted on the Dee marshes (Cheshire) early in the month.

Passage migrants and late summer visitors were few and far between. 'Northern' **Chiffchaffs** *Phylloscopus collybita* were recorded at Hauxley (Northumberland) on 3rd and 4th, on Fair Isle up to 9th, and on the Calf of Man on 30th (showing the characters of the race *abietinus*). A fall of 60 *Phylloscopus* warblers on Cape Clear Island (Co. Cork) in the first week consisted mostly of Chiffchaffs but included one **Willow Warbler** *P. trochilus*, one **Yellow-browed** *P. inornatus*, and a possible **Greenish** *P. trochiloides*. A **Ring Ouzel** *Turdus torquatus* was at Budle Bay (Northumberland) on 3rd, while one on Fair Isle on 14th was very late so far north. At the latter locality the last **Wheatear** *Oenanthe oenanthe* was on 11th and the last **Blackcap** *Sylvia atricapilla* on 13th. Other tardy migrants included a **Whinchat** *Saxicola rubetra* at Graveney on 4th, a very late **Swift** *Apus apus* near Leigh on 6th, a **Hoopoe** *Upupa epops* in Hyde Park on 6th or 7th, a **White Wagtail** *Motacilla a. alba* at Sevenoaks (Kent) on 11th, a **Whitethroat** *Sylvia communis* at Pitsford Reservoir on 18th, and a **Yellow Wagtail** *M. flava* at New Hythe (Kent) on 24th with another at Old Slade (Buckinghamshire) on 29th.

Finally, a number of vagrants were reported: a **Short-toed Lark** *Calandrella cinerea* and a **Tawny Pipit** *Anthus campestris*, both at Winterton on 3rd; a **Nutcracker** *Nucifraga caryocatactes* at Minsmere on 4th; an **Olive-backed Pipit** *A. hodgsoni* at Staines Reservoir (Middlesex) on 7th, only the fifth ever for Britain and Ireland if accepted; a **Cetti's Warbler** *Cettia cetti* at Minsmere on 18th; an immature female **Lesser Grey Shrike** *L. minor* found dying at Haslemere (Surrey), also on 18th; and a **Serin** *Serinus serinus* at Arminghall (Norfolk) on 29th.



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Volume 67 Number 2 February 1974

41 Some effects of agricultural change on the English avifauna
Dr R. K. Murton and N. J. Westwood

70 Palearctic birds in East Africa *J. F. Reynolds* Plates 5-12

Notes

77 Aerial plunge-diving by Shags and Manx Shearwaters *Bernard King*

78 Red-breasted Mergansers diving from the air *Mr and Mrs J. C. Rolls*

78 Behaviour of Ringed Plover in defence of nest *Mr and Mrs J. Smith*

78 Blue Tit laying and hatching egg in substitute site with no nest material *R. H. Kettle*

79 Survival of young Long-tailed Tits in exposed nest *Robert Morgan*

79 Greenfinch settling on the sea *John E. Sandford*

Reviews

80 *Birdwatchers' Year* by Leo Batten, Jim Flegg, Jeremy Sorensen, Mike J. Wareing, Donald Watson and Malcolm Wright *Peter Conder*

80 *Wildlife Photography. A Field Guide* by Eric Hosking and John Gooders *Dr Geoffrey Beven*

Letters

82 Wader nesting associations *A. L. W. Mayo, and Dr Bruce Campbell*

83 News and comment *Robert Hudson*

Request for information

84 Influx of Rough-legged Buzzards *K. R. Anderson*

Notice

85 Research on Steller's Albatross *Dr W. L. N. Tickell*

85 Recent reports—November *D. A. Christie*

Robert Gillmor drew the Rook, Partridge and Red-legged Partridge, and Woodpigeon (pages 65-67), and D. I. M. Wallace the Lesser Kestrel (page 88)

8 72
Volume 67 Number 3 March 1974



BRITISH BIRDS

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MOORHEN BREEDING BIOLOGY
BLACK GROUSE AT LEK

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BRITISH BIRDS

The migration of the Gannet: A reassessment of British and Irish ringing data by Landsborough Thomson

The British and Irish ringing results for the Gannet *Sula bassana* were analysed by the writer when there were just over 200 recovery records (Thomson 1939); for the present study more than eight times that number were available. The main conclusions of the earlier paper have been confirmed and amplified; some comments have been rendered obsolete, and various new points have emerged.

An unscripted preview of these findings was given to the British Ornithologists' Union Conference at Reykjavik, Iceland, on 11th June 1972 (summarised in Thomson 1972), and again to a meeting of the British Ornithologists' Club in London on 19th September 1972. Reference is made on pages 97 and 100 to two other papers dealing in more detail with particular sections of the data. Many of the individual records have been published in the annual reports and recovery lists of the national ringing scheme (Witherby; Nichol; Thomson; Spencer).

SCOPE AND SOURCES OF RECOVERY DATA

This study relates exclusively to the eastern Atlantic population of the Gannet; and the records are derived solely from recoveries of birds ringed at breeding colonies round the coasts of Great Britain and Ireland. A smaller part of the population breeds off Iceland, in the Faeroe Islands and at a few minor stations elsewhere, but little ringing has been done in these places and the few published records add nothing significant to the picture. Even in the British Isles, the largest colony of all—that on St Kilda in the Outer Hebrides—has attributed nothing, owing to its inaccessibility to ringers.

Most of the birds recovered had been ringed on one or other of three offshore islands: the Bass Rock (East Lothian), in the Firth of Forth on the east coast of Scotland ($56^{\circ}04'N$, $2^{\circ}38'W$); Ailsa Craig (Ayrshire), in the Firth of Clyde on the west coast of Scotland ($55^{\circ}23'N$, $5^{\circ}07'W$); and Grassholm (Pembrokeshire), in the Irish Sea off south-west Wales ($51^{\circ}44'N$, $5^{\circ}29'W$). Other gannetries off the coasts of Scotland and Ireland have yielded fewer recoveries.

The number of recoveries included in the analysis is 1,761, after discarding those considered to be non-viable owing to uncertainty in the particulars or because the birds had perished without ever having flown. These records resulted from the ringing of 32,681 Gannets, mostly as nestlings (*pulli*), up to and including 1968, and recoveries therefrom up to the end of 1971: the yield was thus almost 5.4%. The exclusion of birds ringed since 1968 was deliberate, so that all the individuals recovered would have been 'at risk' for at least $3\frac{1}{2}$ years—a point of importance, since a comparison of results for birds of different ages was a principal objective of the analysis.

Table 1. Age at recovery of 1,600 Gannets *Sula bassana* ringed as nestlings

Year of life from 1st May	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Number recovered	867	255	165	105	69	44	42	27	9
Year of life from 1st May	10th	11th	12th	13th	14th	15th	16th	17th	18th
Number recovered	9	2	3	2	—	—	—	1	—

Table 2. Years from ringing to recovery of 161 Gannets *Sula bassana* ringed as adults at unknown age

The four birds recovered twice are counted at the older age

Year from 1st May	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Number recovered	31	34	21	15	10	16	12	7	6
Year from 1st May	10th	11th	12th	13th	14th	15th	16th	17th	18th
Number recovered	3	3	2	—	1	—	—	—	—

[*Note to tables 1 and 2:* With this species, heavy wear and corrosion occur when aluminium rings are used. These were gradually replaced by more resistant monel rings during the late 1950's (say 1957, on average). This change might conceivably have had an effect on the *apparent* longevity of ringed birds; and a breakdown of the figures has in fact shown an increased proportion of recoveries during 1957-63, as compared with 1909-56, among birds that had carried their rings for six years or more. Further analysis, however, suggests that this is a reflection of the improvement in the general recovery rate to which reference is made on page 100, an improvement already substantial during 1946-56, before monel rings were introduced. The three oldest birds in table 1, and the one in table 2 with the longest life after ringing, all carried aluminium rings.]

AGE AT RECOVERY

As in my earlier paper, years of life have been reckoned from 1st May. This means that there can be no recoveries during the first two to three months of the notional first year of life, before the young fledge. Taking the life-span as a whole, however, the chosen date seems to provide a reasonable approximation to the start of the main breeding season (though many of the adults are at their stations much earlier, and laying in the middle of March has been recorded). On this basis, table 1 shows the recoveries of birds ringed as nestlings in each year of life. Table 2 shows the recoveries of birds ringed as adults in each year numbered from the year of ringing at an indeterminate age.

Table 1 shows a familiar picture of the 'law of diminishing returns', with a particularly heavy mortality in the first year. After the tenth year the recoveries fall to a residual level, tailing off to a solitary record in the seventeenth year. The figures in table 2 are too small for close analysis, but there is little correspondence with the pattern of table 1 or of such part as might be considered to be equivalent; age at ringing is an imponderable factor, and it may conceivably be subject to some kind of bias. It is accordingly necessary, in other forms of analysis, to be cautious about lumping birds ringed as adults with those ringed as *pulli* and recovered in or after the fifth year of life.

GEOGRAPHICAL INCIDENCE OF RECOVERIES

Again as in Thomson (1939), four arbitrary zones are distinguished as a basis for the geographical analysis of the recovery records (see also fig. 1):

(N) Northern waters: Atlantic Ocean north of the latitude of Ushant ($48^{\circ}28'N$); also the Norwegian Sea, North Sea, Baltic Sea and approaches, English Channel and Irish Sea. The northernmost record is from latitude *c.* $64^{\circ}N$; the northern limit of the breeding range of the British population is latitude $60^{\circ}50'N$ (Hermaness, Unst, Shetland)

(W) West European waters: Atlantic Ocean from the latitude of Ushant to that of Punta Alminia on the south side of the Strait of Gibraltar ($35^{\circ}54'N$); also the whole of the Mediterranean Sea

(A) North-west African waters: Atlantic Ocean from the Strait of Gibraltar to the Tropic of Cancer ($23^{\circ}27'N$)

(T) Tropical waters: Atlantic Ocean from the Tropic of Cancer southwards. The southernmost recovery is from latitude $11^{\circ}52'N$ (Portuguese Guinea)

These four zones are approximately the same width—a little over 12° of latitude. That is taking the limit of the Northern zone as coincident with the limit of the breeding range of the population under study; there is a further belt of about 4° (including the breeding



Fig. 1. The four zones used as a basis for the geographical analysis of the recovery records of the Gannet *Sula bassana* (defined in detail on page 91). The interrupted line marks the latitudinal limit of the breeding area of the British and Irish population

range of the more northerly populations) from which come a mere dozen of the records assigned to this zone.

Zone N comprises the home waters of the British population; recoveries within it give no evidence of more than off-season dispersal. Zones W, A and T are successively more distant areas to which migration takes place. The incidence of the recoveries by zones, and by season and age, is shown in table 3.

From table 3a it is seen that, in the *first year of life*, recoveries in zone N (mostly local at first) begin in July, become more numerous in August, and reach a maximum in September and October; after that they fall away markedly, and the number remains low until July of the following year. In zone W they begin in August, reach a maximum in October and thereafter decrease. In zone A they begin in October and reach a maximum in November; in zone T there is only an isolated record for October and the maximum falls in December. One concludes that, although a few first-year birds remain in Northern waters throughout the winter, most of them move southwards rather quickly into West European waters, with a strong tendency to pass further south from November onwards.

From table 3b it is seen that in the *second year of life* a few birds remain through the summer in the southern zones T and A, and more in zone W; but that there is a definite build-up in the numbers in zone N from July onwards. One concludes that there is a return migration at about the age of one year, but that it is far from complete. The 25 second-year birds recovered in Northern waters in

Table 3. Distribution by month and zone of recoveries of Gannets *Sula bassana*

ns 3a-3c refer to birds ringed as nestlings. The zone N total in table 3f includes four adults recovered twice, counted at the older age

	Zone	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	TOTALS
red in year life	N			8	67	143	132	36	11	6	2	2	2	409
	W			-	9	83	155	63	18	4	4	11	1	348
	A			-	-	-	13	25	12	9	8	1	1	69
	T			-	-	-	1	7	13	11	7	1	1	41
	TOTALS			8	76	226	301	131	54	30	21	15	5	867
red in 1 year life	N	1	4	25	22	15	24	16	7	4	2	1	1	122
	W	1	8	12	11	6	9	17	15	11	5	7	2	104
	A	2	-	2	1	1	3	4	-	1	2	1	2	19
	T	2	2	-	2	-	-	-	1	2	1	-	-	10
	TOTALS	6	14	39	36	22	36	37	23	18	10	9	5	255
red in year life	N	5	20	11	12	5	11	7	5	4	5	3	6	94
	W	8	2	1	1	3	7	5	6	12	8	3	6	62
	A	1	-	1	-	-	-	-	2	2	-	2	-	8
	T	-	-	-	1	-	-	-	-	-	-	-	-	1
	TOTALS	14	22	13	14	8	18	12	13	18	13	8	12	165
red in i year life	N	8	10	7	12	6	12	3	2	4	3	2	8	77
	W	1	-	-	2	1	-	5	2	2	7	3	3	26
	A	-	-	-	-	-	-	-	-	1	1	-	-	2
	T	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTALS	9	10	7	14	7	12	8	4	7	11	5	11	105
red in ear of d over	N	17	20	37	18	6	11	5	3	11	10	10	24	172
	W	3	-	2	-	-	3	3	5	3	6	4	2	31
	A	-	-	-	-	-	1	-	-	1	-	1	-	3
	T	-	-	-	-	-	-	-	-	1	-	-	1	2
	TOTALS	20	20	39	18	6	15	8	8	8	16	16	15	27
red as ults	N	18	16	16	18	6	5	5	9	11	6	13	17	140
	W	2	1	1	-	-	2	-	3	6	2	1	1	19
	A	-	-	-	-	-	-	-	-	1	1	-	-	2
	T	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTALS	20	17	17	18	6	7	5	12	18	9	14	18	161

July show little tendency to return at this time to their native colonies; an analysis of the 19 recoveries of Bass Rock birds shows eight from the east coast of Great Britain (including only two 'local'), three from the English Channel, one from Pembrokeshire (near Grassholm), and seven from continental coasts of the North Sea (from Norway to the Netherlands).

Table 3c shows that in the *third year of life* there are again many birds remaining in zone N throughout the year, but with a falling-off after October. This is reflected in some increase in zone W from that month, with a maximum in January. Records from zone A are few, and the only record from zone T is for August.

Table 3d shows a similar tendency in the *fourth year of life*, with records from zone A negligible, and none from zone T.

The numbers then become too small for consideration by separate years, and table 3e accordingly consolidates the recoveries in the *fifth year of life and over*. The same trend appears to continue; and the increase in zone N in the summer months may be ascribed to recoveries of now mature adults at their breeding stations. The two birds in zone T, both in the sixth year of life, were found in Sénégal in January (a few kilometres south of Cape Verde, $14^{\circ}43'N$) and April (estuary of River Casamance, $12^{\circ}34'N$); the latter had been 'controlled' at its native Bass Rock in the preceding summer and was a colour-ringed male that had definitely bred there at least once (Dr J. B. Nelson *in litt.*).

Table 3f shows a somewhat similar picture for birds *ringed as adults*: there are two winter records from zone A, and no records from zone T.

COMPARISON BY AGES

There is, naturally, a continuous decrease in the absolute numbers of survivors in successive years of life; to compare one year of age with another it is necessary, therefore, to deal in percentages. Winter is taken, in accordance with the indication of the records, as comprising the months from November to February inclusive; for each year of life the numbers of recoveries in the respective zones are then expressed as percentages of the total number of winter recoveries in that age-year. The results are set out in table 4 and fig. 2.

Reading across the table, it is evident that:

(1) the proportion of birds remaining in Northern waters (zone N) in winter is markedly lowest in the first year of life, higher and increasing during the next three years, and highest in older birds;

(2) the proportion wintering in West European waters (zone W) is lower in the first year of life than in the next three years, during which it remains roughly constant and thereafter falls;

(3) the proportion in the two southern zones is markedly higher in the first year of life than in the second, and somewhat higher in the second year than subsequently.

Table 4. Age distribution of winter recoveries of Gannets *Sula bassana*, expressed as percentages of annual totals

Winter is taken from November to February inclusive. The same data are shown graphically in fig. 2

Zone	YEAR OF LIFE					Ringed as adults
	1st	2nd	3rd	4th	5th+	
N	23	31	38	40	62	76
W	40	57	53	54	33	21
A	22	8	9	6	3	3
T	15	4	—	—	2	—
N + W	63	88	91	94	95	97
A + T	37	12	9	6	5	3
W + A + T	77	69	62	60	38	24

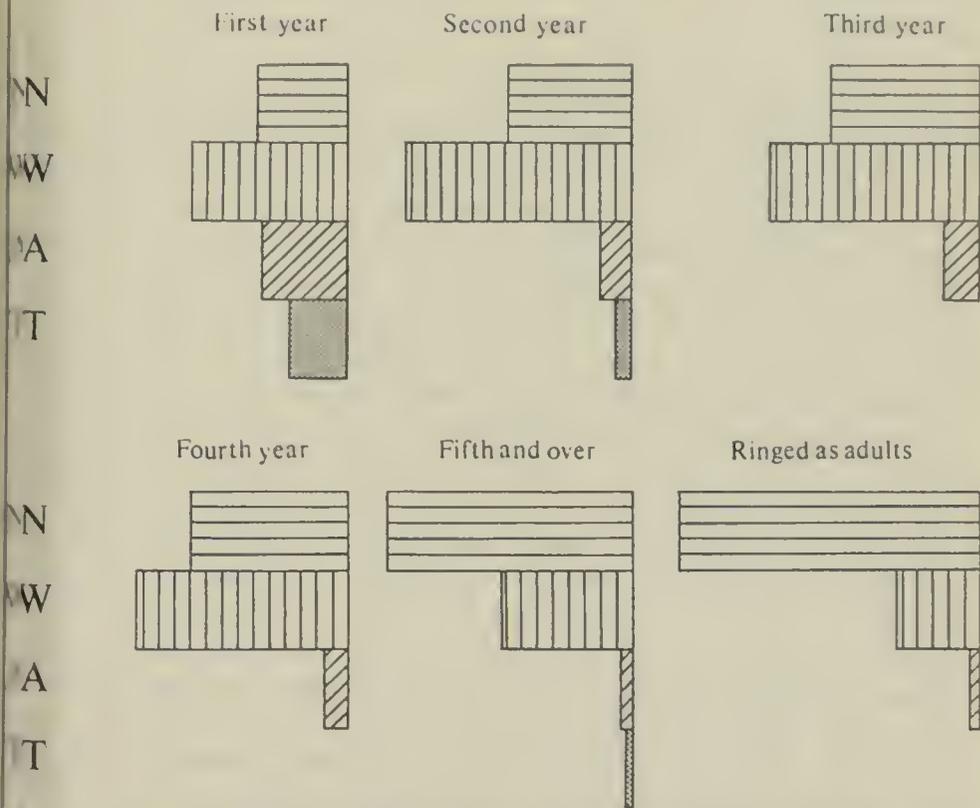


Fig. 2. Age distribution of winter recoveries of Gannets *Sula bassana* (November to February inclusive), expressed as percentages of annual totals (see table 4)

Reading the columns vertically, one may deduce that:

(1) in the first year of life the majority of the birds migrate, and many reach the southern zones;

(2) in the second, third and fourth years of life, more remain in zone N in winter, but there is still a substantial number in zone W and some are recorded further south, though the proportion in the Tropics is negligible after the second winter (the exceptional recovery of a sixth-year bird in Sénégal in April, mentioned above, is outside the date limits of the table);

(3) in older birds, the tendency to winter in zone N is greater, and the tendency to migrate further than zone W is slight.

At the bottom of table 4 the figures for adjacent zones are summed in order to show certain points at a glance. The totals for zones N and W are the proportions of birds that winter either in or near home waters, performing at most the short migration to West European waters. The totals for zones A and T represent those that perform a long migration (or that have performed such a migration and have remained in the south through the breeding season). The final line gives the total percentages of all birds found in winter beyond home waters; these may be compared with the figures in the first line.

DISCUSSION OF AGE DIFFERENCES

Ticehurst (1940), citing my earlier paper (Thomson 1939), said that the analysis of recoveries of British-ringed Gannets 'indicated that in their first year they are definite migrants, but that subsequently migratory instinct becomes less year by year, so that when three years or more old, though most appear to move south of Scottish waters, where they are seldom seen in winter, their movements are rather in the nature of a dispersal than a definite migration southwards'. Waterston (1959) repeated part of this statement, to the effect that after the first year 'the migratory instinct becomes less year by year'. In fact, I had gone no further than to say (page 286) that 'the southward movement is more pronounced in the first year of life than in subsequent seasons taken as a whole or than in the second year by itself'. Nor did my figures provide any adequate basis for Ticehurst's elaboration of that conclusion.

Table 4 and fig. 2 fully confirm that first-year birds show a greater tendency to migrate, in terms both of numbers and of distance, than older birds. The big falling-off, however, occurs between the first year of life and the second. The further decrease between second and third years is relatively slight; likewise the decrease between third and fourth years, after which the absolute numbers become too small for more detailed analysis.

Furthermore, the numbers present in the southern zones in the second, third and fourth winters do not necessarily reflect the incidence of migration from Northern waters in the autumns of these years, as there is evidence that many immature birds remain in the wintering area through the breeding season.

If the question be considered from the other end, it is relevant that the numbers of birds remaining in Northern waters in the winter is higher after the first year and thereafter continues to increase. On the other hand, the numbers wintering in West European waters remain roughly constant during the second, third and fourth years of life.

MOVEMENT INTO THE MEDITERRANEAN

The earlier paper (Thomson 1939) showed only one recovery in the Mediterranean Sea, off Algeria (then assigned to North African waters). The data available for the present paper include 46 Mediterranean recoveries; these, with five more recent records, are the subject of detailed analysis elsewhere, together with a discussion of the somewhat sporadic published evidence of occurrence in the Mediterranean based on observation (Thomson, in press). A summary will suffice here.

From the partial southward migration along the Atlantic seaboard of Europe and Africa, there is clearly a lateral diversion into the Mediterranean Sea. This is relatively small, being represented by little more than 6% of the total number of recoveries south of Ushant.

The movement is more of the nature of a dispersal, numbers falling off rapidly with distance, than a definite migration with an eastward urge. The spread takes place along both the north and south sides of the Mediterranean, the records being almost evenly divided. There are exceptional records from the far corners of the Levant—a Bass Rock bird recovered in March of its first year of life in the Gulf of Iskenderun, Turkey ($36^{\circ}40'N$, $36^{\circ}00'E$), and an Ailsa Craig bird in March of its fifth year at Ashdod, Israel ($31^{\circ}48'N$, $34^{\circ}38'E$). These are the only records from east of $20^{\circ}E$, and four-fifths of the remainder are from west of $5^{\circ}E$ (longitude of Marseilles). All those from east of $5^{\circ}E$ relate to the period November-March inclusive.

With one exception, the birds had all been ringed as *pulii*. The ratio of second-year to first-year recoveries (62.5%) is about double the corresponding ratio among all recoveries south of Ushant (29.0%). This and other points suggest that first-year birds frequently remain in the Mediterranean through their first summer. Further, there is an apparent tendency to move northwards in summer into the Gulf of Lions, an area not otherwise very productive of records.

PENETRATION OF THE BALTIC

The above-mentioned special study of lateral movement into the Mediterranean draws a comparison with the situation in the Baltic Sea. The Baltic is relatively inhospitable as a potential wintering area, and the observational evidence rates the species as uncommon there. It is therefore not surprising that ringing records show almost no penetration beyond what one may call the Baltic approaches, though it is perhaps slightly stretching that term to include a Grassholm bird recovered in March of its second year in the Gulf of Lübeck, off the coast of Mecklenburg, East Germany. The sole definite exception is a Bass Rock bird recovered in *June* of its fifth year in the Sovetsk region of Lithuania ($55^{\circ}5'N$, $21^{\circ}52'E$).

NORTHWARD OVERSPILL

There is a gannetry at Hermaness ($60^{\circ}50'N$, $0^{\circ}54'W$), about the most northerly point in Britain. Recoveries substantially beyond that latitude may be regarded as indicative of a northward overspill from the breeding range of the British population. They tend almost inevitably to occur in or near other centres of Gannet population in the Faeroe Islands, Iceland and northern Norway, and they may be summarised as follows:

Faeroe Islands (centred *c.* $62^{\circ}N$, $7^{\circ}W$): two from Bass Rock, one from Hermaness, and one from Little Skellig (Co. Kerry), in June in their respective third years of life; two from Grassholm in, respectively, July and 'autumn' of their third years (further reference is made to the first of these on page 99); and one Grassholm bird in July of its fourth year

Iceland: One from Ailsa Craig recovered at sea to the east ($64^{\circ}45'N$, $10^{\circ}40'W$) in June of its fourth year; and one Bass Rock bird near Reykjavik (*c.* $64^{\circ}N$, $22^{\circ}W$) in July of its fourth year

Northern Norway: One from Bass Rock recovered near Hasvagö, Flatanger, Nord Trondelag ($64^{\circ}29'N$, $10^{\circ}52'E$) in June of its second year; and one from Grassholm near Trondheim ($63^{\circ}36'N$, $10^{\circ}23'E$) in August of its third year

These records are, of course, included in the totals for zone N in tables 3-5. All the recoveries were in summer, except one in 'autumn', and none of the birds was more than about three years old.

RETURN TO COLONY OF ORIGIN

Records of Gannets returning to their native or former breeding places in subsequent years are almost entirely dependent on further ringing activity at these colonies, when adults are often caught on their nests. The absence of records from other colonies is thus of no evidential value; and a change from one colony to another could come to notice only if ringing were done at both. In fact, almost all the records are of Bass Rock birds returning there. With these reservations, one may note the following records of individuals

returning to the colony where they had been ringed (returns merely to the general locality being ignored):

(1) Ringed as *pulli* on the Bass Roek and recovered there in subsequent seasons (May-August): 1 in 4th and again in 5th year of life, 3 in 5th, 5 in 6th, 7 in 7th, 6 in 8th, 3 in 10th. In addition, in 13 years of colour-ringing of *pulli* on the Bass Roek, Dr J. B. Nelson (*in litt.*) has gained much evidence showing the strong tendency of birds to return not only to the native colony, but to the precise part of it in which they had been raised

(2) Ringed as *pullus* on Grassholm and recovered there: 1 in 5th year of life

(3) Ringed as adults on the Bass Roek and recovered there in subsequent seasons (May-September): 30 in all, mostly during the following four years but some after longer intervals, up to 13 years; two were each recovered twice, in different years (not counted twice in total). Further details have been given by Nelson (1965, 1966)

(4) Ringed as adults on Grassholm and recovered there: one in July six years later; one in May nine years later. (Larger figures given in Thomson 1939 were due to the inclusion, on a less rigorous definition, of merely 'local' recoveries)

One may conclude that return to the native or former breeding place is normal; but the almost total absence of recorded exceptions has little significance in the circumstances. One apparent exception (already mentioned briefly on page 98) is of a Grassholm bird recovered in July of its fourth year of life—when approximately three years of age—in *the gannetry* at Mykinesholm, in the Faeroe Islands (62°07'N, 7°38'W). It is known that some individuals in immature plumage frequent colonies in the latter part of the season one or more years before they are ready to breed. It is, of course, obvious that birds must sometimes switch to different breeding places, as the establishment of various new ganneries is well known; whether these are young birds breeding for the first time, or older ones that have already bred elsewhere, is a matter for conjecture.

COMPARISON BETWEEN COLONIES

Table 5 compares recoveries of birds ringed at the three main stations—the Bass Rock, Ailsa Craig and Grassholm. It is restricted to first-year birds, as the starting points for dispersal in the second and third years are not known; as already shown, some immatures remain in the wintering area through the summer.

It will be seen that Bass Rock birds are still mainly in Northern waters through September; not until October do the numbers in West European waters approach equality with those still in Northern waters, and not until November are they in a clear majority. Grassholm birds, on the other hand, are already present in West European waters in substantial numbers in August and to a major extent in September. The Ailsa Craig pattern lies in between, with West European recoveries first in a majority in October. By December, recoveries of Bass Rock birds are evenly distributed over the four

Table 5. Recoveries of first-year Gannets *Sula bassana* from the three main ringing localities, in each recovery zone

Month of recovery	BASS ROCK				AILSA CRAIG				GRASSHOLM			
	N	W	A	T	N	W	A	T	N	W	A	T
July	8	—	—	—	—	—	—	—	—	—	—	—
August	48	1	—	—	3	—	—	—	15	7	—	—
September	89	12	—	—	22	16	—	—	28	49	—	—
October	100	88	6	—	15	38	3	1	10	12	3	—
November	29	43	6	3	2	10	10	1	2	4	3	1
December	8	9	7	9	—	6	4	2	—	2	1	3
January	4	2	5	7	—	2	2	2	1	1	1	2
February	1	1	4	2	—	2	2	2	1	—	1	3
March	2	6	—	1	—	3	—	—	—	1	1	—
April	2	1	1	1	—	—	—	—	—	—	—	—

zones. In and after that month, recoveries of Ailsa Craig and Grassholm birds are almost nil, but by this time the total figures are becoming rather small. A separate paper on the dispersal of first-year Gannets from the Bass Rock is in preparation.

POSSIBLE TEMPORAL CHANGES

My earlier paper was based on recoveries of birds ringed up to and including 1937; the yield of viable recoveries was 3.2%. The corresponding figure in the present study is almost 5.4%. Again, there was only one Mediterranean record up to 1937, whereas there have been 46 in all to the end of 1971, a ratio far out of scale with the total increase. These facts might lead one to suspect some long-term change in the pattern of migration such as might affect the chances of recovery. It seems probable, however, that the difference is due merely to improved reporting.

Some attempt has been made to investigate the possibilities by comparing the results covered by the earlier paper with the *additional* results included in the present one. There are two periods of very roughly 30 years each, but the numbers of birds ringed in those periods were markedly disparate—6,384 and 25,297. Manipulation of the figures has disclosed no differences that might not be due to adventitious causes.

A likely explanation of at least part of the improved recovery rate lies in the great preponderance of Bass Rock birds in latter years, the North Sea being a very favourable catchment area (table 5). Of the 203 recoveries considered in the earlier paper, as many as 114 were of Grassholm birds; only 43 came from the Bass Rock colony and 46 from Ailsa Craig. This point is of interest in the methodology of ringing data analysis.

Inspection of the records, without close analysis, has not brought to light unusual movements in particular calendar years, such as

have been detected in certain other species, for example the Great Skua *Stercorarius skua* (Thomson 1966). Lastly, the number of recoveries from inland localities is very small, as would be expected.

OTHER POPULATIONS

As stated above, relatively little ringing has been done in the more northerly part of the breeding range of the eastern Atlantic population of the Gannet, where the main stations are off Iceland and in the Faeroe Islands. The western Atlantic population breeds off Newfoundland and on islands in the Gulf of St Lawrence; over 10,000 have been ringed on Bonaventura Island, Quebec, and more than 500 recoveries are now under analysis (F. G. Cooch *in litt.*). It is known from observational evidence that the migratory movement, which extends southward to the Gulf of Mexico, is more pronounced in the first year of life than in later years (Palmer 1962).

The possibly conspecific Cape Gannet *S. capensis* breeds in large colonies on a few islands off Cape Province, South Africa, and migrates northwards on both sides of the continent, but especially on the west coast, as far as tropical waters. The results of ringing nearly 20,000 birds at two of these colonies have been published (Brockhuysen *et al.* 1961). Those ringed included a high proportion of adults; and the recovery of birds at the breeding stations in subsequent years was a feature of this study. As in the British experience, there was a heavy mortality among the immature birds; it was likewise they which made the most extensive migration. The most distant recoveries were from Calabar, eastern Nigeria (*c.* 4°30'N), and Porto Amelia, Mozambique (*c.* 13°00'S); the former locality, north of the Equator, is within 8° of latitude of the most southerly recovery of a British-ringed Gannet. Most of the recoveries in tropical waters were in the non-breeding season (May-September), but there were also some during the breeding season.

The New Zealand population of the possibly conspecific Australasian Gannet *S. serrator* has been the subject of a substantial ringing study (Wodzicki and Stein 1958). From their breeding places off the east coast of North Island, the birds migrate to the warmer waters on the south and east coasts of Australia, where they apparently coexist with members of the small Australian population which breeds on islands in Bass Strait and off Tasmania. The ringing results indicate that this movement is normal for first-year birds, and that during the next two years the majority remain in Australian waters; after the age of three, recoveries are almost exclusively in New Zealand. The movement of these New Zealand birds is notable for being on a west-east line, and for having the pelagic gap of the Tasman Sea sharply intervening between home waters and the area visited during immaturity. Similar movements

between New Zealand and Australia are made by seabirds of various other species.

CONCLUSIONS AND SUMMARY

The following conclusions are based solely on recoveries of Gannets ringed at British and Irish colonies (excluding St Kilda), but are not thought to be at variance with any observational evidence.

(1) Members of the population under study are partial migrants, some remaining through the winter in Northern waters (though showing substantial dispersal therein), others migrating southwards to West European waters (off the west coasts of France and the Iberian Peninsula) and, to some extent, to North-west African and even Tropical waters (to within 12° of the Equator).

(2) From this main stream down the Atlantic seaboard, there is a relatively minor lateral diversion into the Mediterranean Sea, mostly affecting its western portion but extending on a smaller scale to its eastern extremity.

(3) There is virtually no corresponding lateral movement into the Baltic Sea beyond what may be termed its approaches.

(4) There is a small amount of northward overspill in summer beyond the limit of the British breeding range (Faeroe Islands, Iceland, northern Norway).

(5) Mature Gannets commonly return in subsequent years to their native or former breeding colonies.

(6) Some birds, mainly immature, remain in the wintering area during the summer.

(7) Birds in their first year of life are migratory to a markedly higher degree than those in their second year taken alone, or than all older birds taken together; this is shown in the proportion that quit Northern waters in winter and in the numbers then found in North-west African and Tropical waters.

(8) That there is any further decrease in the migratory urge after the second year is doubtful, despite some slight indication of this in the figures. The picture is obscured by the fact that some of the immature birds do not return to Northern waters in summer.

(9) First-year birds from the Bass Rock make their initial dispersal mainly in the North Sea and appear in numbers in West European waters decidedly later than Grassholm birds, which have a direct outlet from the Irish Sea.

ACKNOWLEDGEMENTS

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The breeding behaviour and biology of the Moorhen

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INTRODUCTION

The Moorhen *Gallinula chloropus*, despite its almost cosmopolitan distribution and general abundance, has been the subject of remarkably little investigation. Howard (1940), in his classic monograph, described in detail some aspects of its behaviour, mainly sexual. Steinbacher (1939) and Anderson (1965) briefly outlined the breeding biology of birds living under semi-artificial conditions. Anfinnsen (1961) and Norderhaug (1962) described its colonisation of Norway and outlined its habitat preferences and reproduction in that country, while the study by Relton (1972) of Moorhens nesting on farm ponds was the first to deal with this species living in an agricultural habitat. Huxley and Wood (in press) give a general survey of its breeding season, clutch size and breeding success in Britain through an analysis of Nest Record Cards completed by members of the British Trust for Ornithology.

The present paper describes the findings of a field study carried out over two seasons in an attempt to understand more fully the displays and breeding biology of Moorhens living in lowland agricultural England. The first part covers displays and territory, the second breeding biology.

LOCALITIES AND METHODS

Almost daily observations were undertaken between 1st March 1968 and 28th February 1970 in a study area covering 53 hectares of agricultural grassland in the Avon valley near Fordingbridge, Hampshire. The fields were mostly divided by hedgerows of hawthorn *Crataegus monogyna* and bramble *Rubus*; some were also bordered by streams and rivers, which had a total length of 3 km in the study area and comprised about 3.2 hectares of surface water.

Owing to the shyness of the Moorhens in the Avon valley, some additional observations, mainly concerned with behaviour, were made on semi-tame birds inhabiting a small pond in Poole Park, Dorset.

Some broods of newly hatched chicks were marked individually with numbered fish-fingerling tags attached to the patagium, and all fully grown birds with numbered metal leg-rings. For individual recognition of fully grown birds in the field, coloured plastic rings were employed initially, but these were abandoned in favour of

coloured plastic wing-tags similar to those described by Anderson (1963).

As Moorhens lack sexually dimorphic plumage characters, sex could be determined only by behavioural differences and by the measurements made at capture, males tending to be larger than females (Wood 1970 and in prep.). First-year birds (up to the summer following their birth) were distinguished from older birds (all termed 'adults') by the plumage characters described by Witherby *et al.* (1938-41).

DISPLAY ELEMENTS AND POSTURES

The basic constituents of all adult Moorhen displays appear to be as follows:

1. Head and neck position. In most aggressive displays the head and neck are well depressed, while in courtship the head is bowed. The normal, non-aggressive posture is described below.
2. Shield position. The bright red frontal shield is prominent against the black head feathers during aggressive displays, while in courtship, because the head is bowed, the shield is least obvious.
3. Undertail-coverts position. Normally the tail is depressed and only a small part of the white undertail-coverts is presented, but when the tail is raised these coverts can be expanded at will to display a large area of white. Raising of the tail takes place frequently when the bird is nervous, perhaps as a warning to its mate, and in certain displays.
4. Wing-arching. In the typical wing-arch, the wings are held erect above and away from the body, while still half-closed: this element is used in certain aggressive displays.

From these four elements or signals, the Moorhen forms a number of distinct displays in addition to the normal and alarm postures. These postures are described first, followed by the aggressive and sexual displays. All are performed by both sexes, except where otherwise stated.

Normal posture (fig. 1a)

This posture is used when the Moorhen is undisturbed. The head is held forward and often retracted (fig. 1a), the tail relaxed with the undertail-coverts barely showing. If the bird is swimming, the head and neck jerk with a forward action.

Alarm posture (fig. 1b)

The neck is stretched erect, the tail quickly raised, the white undertail-coverts at least partially expanded, and the entire tail rapidly flicked up and down. This general alarm signal is given by

both territorial and non-breeding birds at any time of the year, and is sometimes accompanied by a loud, sharp alarm call.

AGGRESSIVE DISPLAYS

Charging and Splattering (fig. 2)

These displays frequently occur if the territorial boundary is transgressed by another bird. In a charge (fig. 2a) the territory owner swims or runs at high speed towards the invader, with head and neck horizontal with the body and frontal shield prominent. Splattering (fig. 2b) is an extension of the charge, involving wing-flapping either over land or over the surface of water, but without the bird actually taking flight. It may be preceded by charging or may start immediately from the normal posture. The attacked bird usually flees in a similar manner but holds its head more erect. These aggressive displays are often sufficient to drive away even non-territorial Coot *Fulica atra* and Mallard *Anas platyrhynchos*, and may take place at any season.

Mutual retreat (fig. 3)

The term adopted by Gullion (1952) for this display in the American Coot *F. americana* was 'paired display', but this is misleading since it is another aggressive display between unpaired individuals. It was always observed to be performed by two birds simultaneously. The head and neck are held horizontal with the body, as in the charge position; the wings are arched above the back (sometimes with primary feathers crossing); and the tail is held erect, with the undertail-coverts expanded to display the maximum area of white feathering. In this position, the two birds always face away from one another and both slowly move in opposite directions, probably always into their own territories.

This display was observed frequently both on land and in the water, usually occurring on neighbours' territorial boundaries and often following a fight. It was recorded at every season of the year in birds maintaining territories.

Challenging and Fighting (fig. 4)

Observations tend to suggest that actual fighting takes place only between birds attempting to establish or enlarge a territory, and that it starts only if the invader is determined to 'hold its ground'.

Fighting was observed more frequently on land than in water. The two birds stretch their bodies and necks upwards, look at one another for a few seconds (the 'challenge' position—fig. 4a), and then fight, kicking violently with the legs and trying to claw their opponent's breast. Frequently, as the fight reaches a peak, the wings are flapped and both legs are brought into action; both birds may

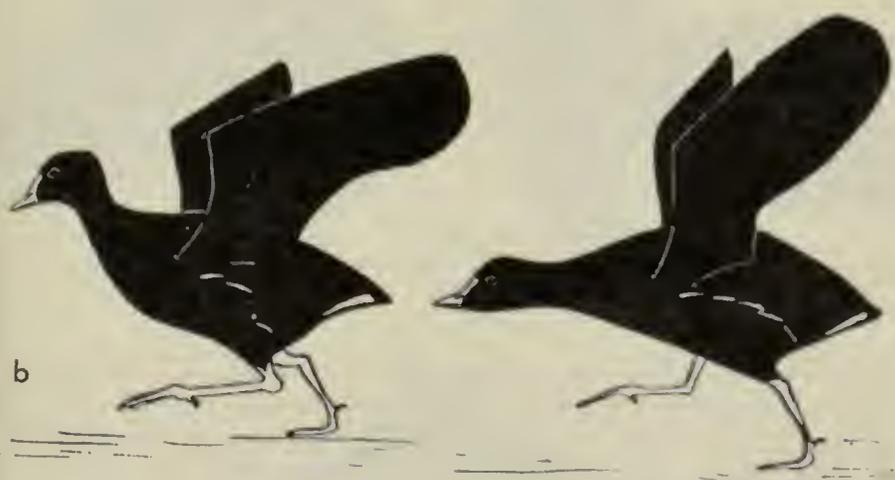


Fig. 1. Normal posture (a), and alarm posture (b), of Moorhens *Gallinula chloropus*; in the latter the tail is rapidly flicked up and down (see pages 105-106)

Fig. 2. Moorhens *Gallinula chloropus* (a) charging on water, and (b) splattering (see opposite)

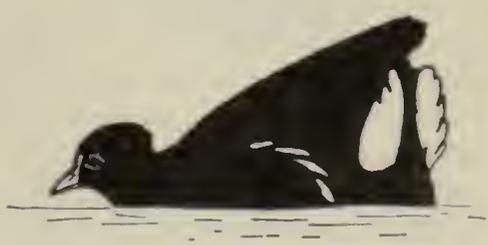


a



b

Fig. 3. Moorhen *Gallinula chloropus* in 'mutual retreat' from another (see opposite)



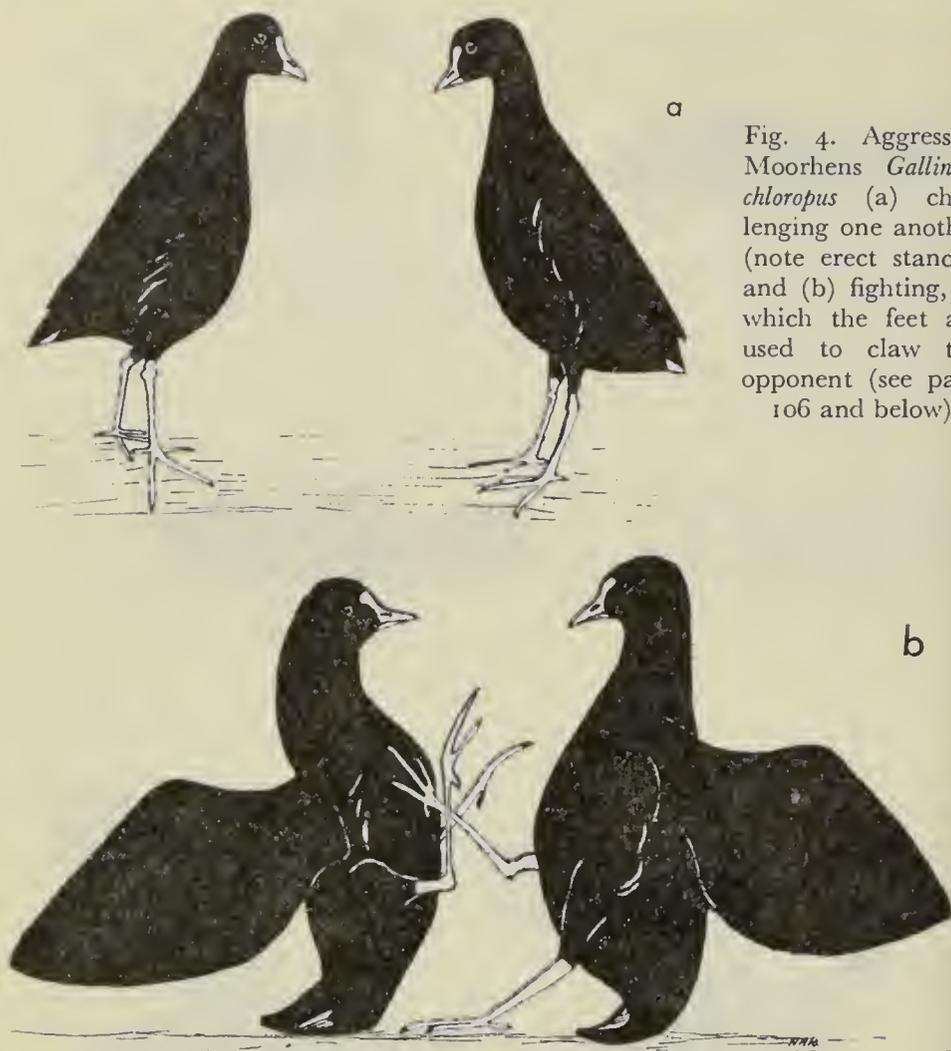


Fig. 4. Aggressive Moorhens *Gallinula chloropus* (a) challenging one another (note erect stance), and (b) fighting, in which the feet are used to claw the opponent (see page 106 and below)

then continue fighting as much as a metre off the ground. The 'winner' is usually the higher of the two, and the combat ends with the loser fleeing from the territory. 'Mutual retreat' by both birds frequently follows on the boundary of the territory.

Fighting was observed only from late February until early June. Charging was sufficient to evict intruders at other times of the year.

Swanning and Churning (fig. 5)

In swanning, the posture is similar to 'mutual retreat' except that the undertail-coverts are not fanned. Churning, which may then follow, involves slapping the water violently with alternate feet.

These displays are used against intruders of other species, even including man, but apparently only in the defence of nests containing eggs (particularly near the hatching stage) and young. The two displays are interrelated, since swanning always takes place first and,

Fig. 5. Moorhen *Gallinula chloropus* swanning: note similarity to mutual retreat in fig. 3 (see pages 108-109)



if insufficient to deter the 'enemy', is followed by churning. Both displays were observed only in the water, and were frequently coupled with a distress call.

SEXUAL DISPLAYS

Meeting and Passing

This seems to function as a greeting ceremony when the members of a pair meet after a period of separation. It was observed throughout the year in territorial birds and has been described in detail by Howard (1940). The male and female lower their heads and flick their tails once or twice, or sometimes fan them. After this, they carry on feeding or resume whatever activity they were doing previously.

Bowing and Nibbling (fig. 6)

Bowing and nibbling are displays connected with courtship and possibly with pair-formation. Both sexes are involved and, in most cases that I have observed, bowing has been performed by the female and nibbling by the male, though the reverse also occurs. It may take place either on land or on a constructed display platform on the surface of the water (to be described in the second part of this paper) and may occur throughout the year in paired territorial birds.

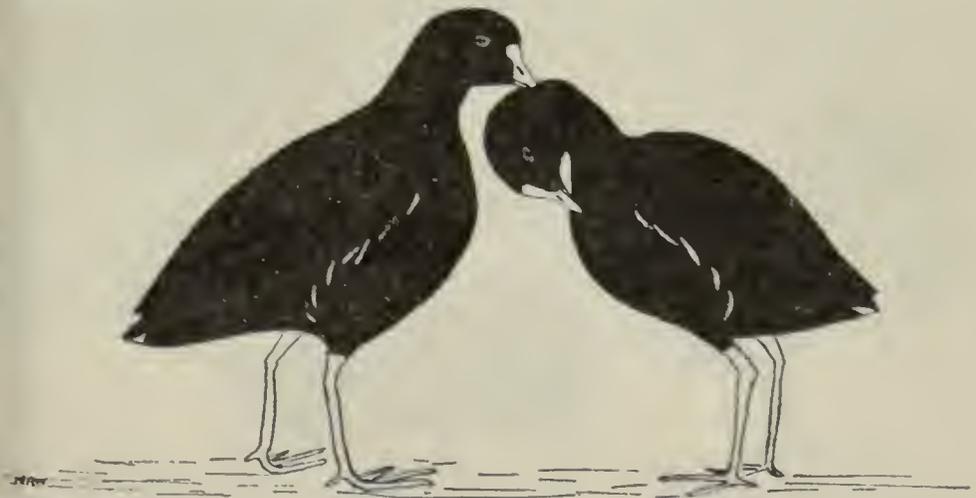


Fig. 6. Pair of Moorhens *Gallinula chloropus* bowing and nibbling (see pages 109-110)



Fig. 7. Pair of Moorhens *Gallinula chloropus* in courtship chase (see below)

Upon meeting or after a chase (see below), the female or submissive bird bows with head pointing towards the ground. If its mate is receptive to this, the submissive bird allows the other to run its bill through its feathers.

Howard (1940) referred to these displays in combination as 'platform action', though their performance is not confined to platforms.

Courtship chasing (fig. 7)

Upon meeting, the male sometimes chases the female around the territory for up to a minute. The two birds run, each with head and neck stretched forwards and body horizontal, the male's bill usually almost touching the female's tail. The female sometimes fans her undertail-coverts. When the female decides to stop running, she may bow for the male to perform nibbling, or she may arch (see below) and allow the male to copulate. Courtship chasing was observed only in the spring prior to egg-laying.

Arching and Coition (fig. 8)

Arching is performed by the female prior to coition and consists of

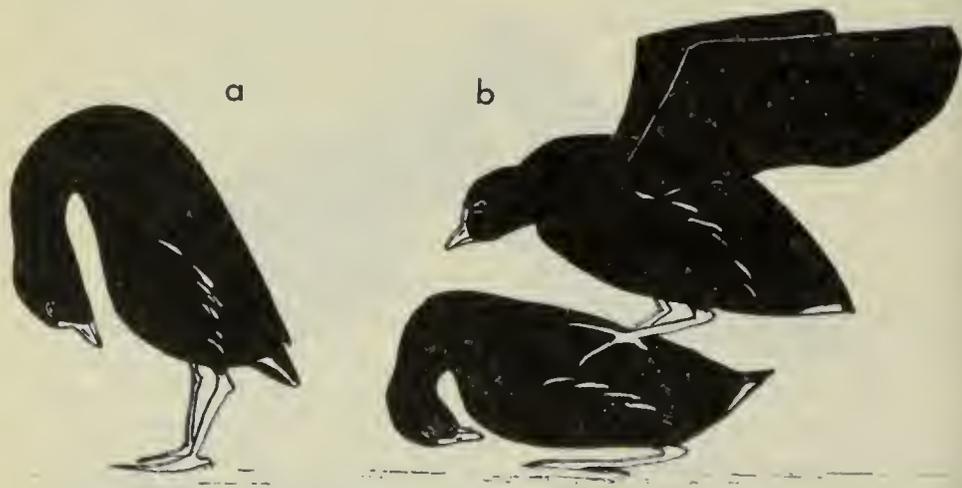


Fig. 8. Arching and coition of Moorhens *Gallinula chloropus*: (a) female in standing arch prior to copulation; (b) female in squat arch, mounted by male



PLATE 13. Display grounds of Black Grouse *Lyrurus tetrix*, central Sweden (photos: Gösta Tysk), showing two rivals males facing up in the 'Wide-necked Upright' posture (above left), and males addressing their 'Rookooing' song to a female (below); the lek is usually in the centre of a peat bog (pages 116-120).





PLATE 14. Male Black Grouse at Scottish lek above and left, in the 'Wide-necked Upright' posture, Dumfriesshire, April 1970, and Perthshire, May 1959 (photos: Robert T. Smith, C. Palmar); below, 'hissing' (often accompanied by wing-flapping at rival), also Dumfriesshire, April 1970 (photo: Robert T. Smith) (page 11)



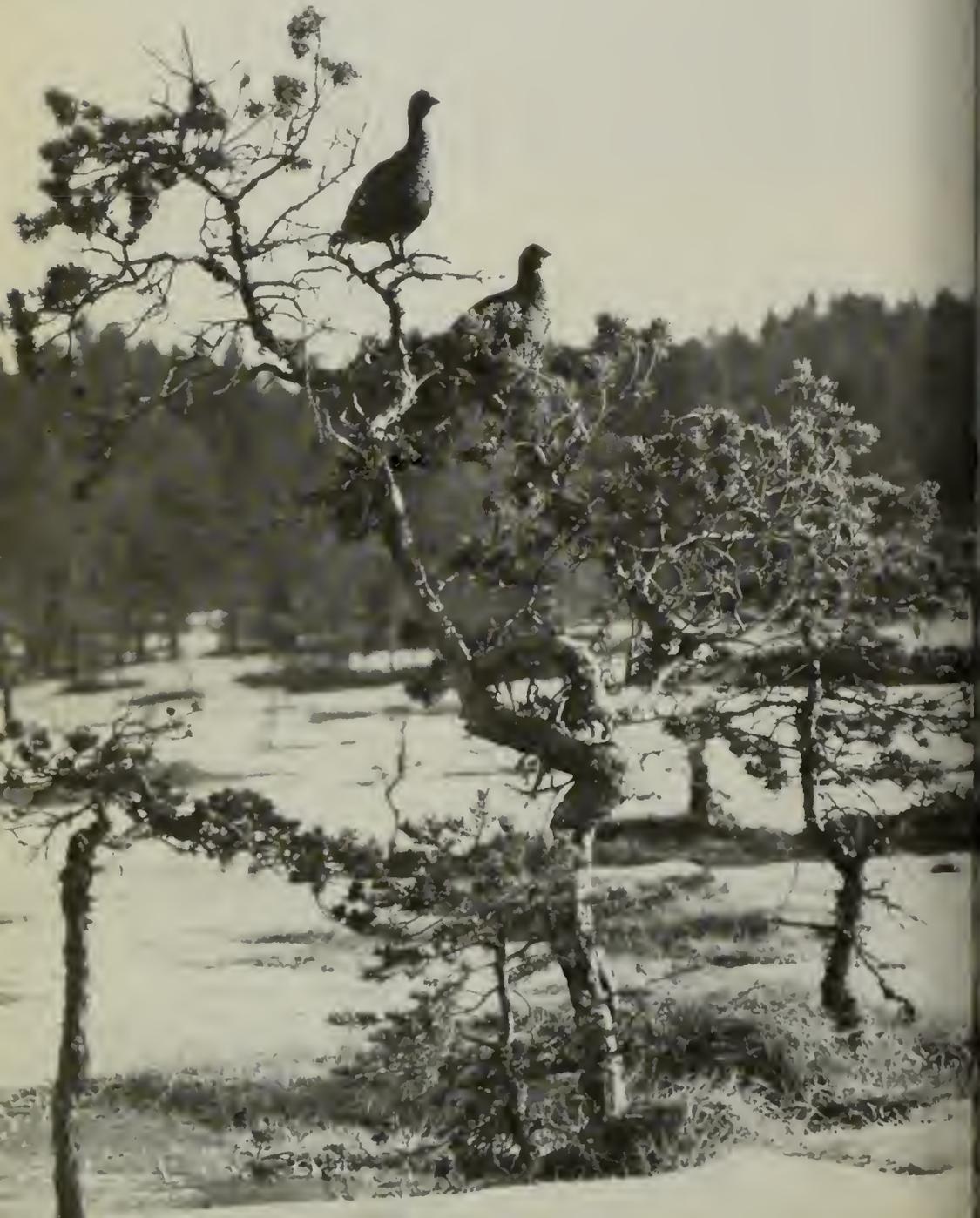


FIG. 15. Above and right, male Black Grouse during 'Flutter Jumps', showing descent and ascent phases respectively, southern Sweden (photo: Arne Schmitz); below, in the 'Forward Leap' and uttering the fat-carrying, continuous 'Rookooing' song, Dumfriesshire, 1970 (photo: Robert T. Smith) (page 118)



PLATE 17. (*opposite*). Male Black Grouse displaying to females: top two, trying to entice uninterested female by 'Rookooing' while walking to and fro next to her (*photos: Robert T. Smith*); below, two males 'courting' same female (*photo: Tony Tysk*); bottom, close-up of male 'Rookooing' to female, head and neck held very low and primaries scraping the ground (*photo: Arne Schmitz*) (pages 118-119).

PLATE 16. Females overlooking the 'arena', watching the lek, central Sweden (*photo: Gösta Tysk*); females do not arrive on display grounds in this area until the very beginning of May, when the ground is often still snow-covered (page 118)









PLATES 18 and 19. Three male Black Grouse (identified by letters, fighting, Dumfriesshire, April 1971 (*photos: Robert T. Smith*); note B's territorial boundary (broken line) and position of tussock (asterisk). Top left, A and B facing up, about to fight; centre, B and C at start of bout; bottom, B jumping back from C, which has landed after an attack; above, following a counter-attack (each bird in this tussle appeared to have the advantage in turn); below, B now in close combat with A, while C and a fourth bird behind seem uninterested (page 119)





PLATE 20. Male Black Grouse threatening each other across territory boundary (much commoner than actual fighting); above, facing left, hissing; below, forward with Rookooi (photos: Arne Schmitt) (page 119)



two parts, the 'standing arch' and the 'squat arch'. In the standing arch (fig. 8a), she stands with her head bent downwards so that her bill points towards her toes. The squat arch (fig. 8b) which follows is similar, except that she squats on bent legs. While she is in this position, the male steps on to her back, maintaining balance by flapping his wings, and then coition occurs. Arching and coition invariably occurred out of the water, sometimes, but by no means always, on the display platforms.

Post-copulatory display (fig. 9)

Displacement-feeding and preening sometimes take place immediately after coition, but more frequently these two activities are preceded by a post-copulatory display in which the female turns her head to the side of her body while the male bows.

Fig. 9. Post-copulatory display of Moorhens *Gallinula chloropus*, in which birds bow to each other



COMPARISON WITH OTHER RAILS AND RELATIONSHIPS

The display postures of the Moorhen appear remarkably similar to the corresponding actions of the American and Eurasian Coots, which have been extensively described by Gullion (1952) and Kornowski (1957) respectively. My own observations on the Eurasian Coot also confirm this similarity.

The greatest differences may be attributed to morphology and habitat preferences. For example, coots have longer neck feathers; these are erected to form a 'ruff' which is used as an additional signal in aggressive actions. The white undertail-coverts are present in the American Coot but absent in the Eurasian, though the latter still uses the tail as a display signal. Except those closely associated with copulation, most displays may be performed either on land or

on water, though coots, in keeping with their more aquatic nature, display more frequently on water.

In place of 'courtship chasing' (on water), Gullion used the term 'swimming arch' and Kornowski 'the drive', but both appear analogous with the terrestrial chasing of the Moorhen. Meanley (1957) described a similar display in the King Rail *Rallus elegans*, terming it a 'pursuit display'. However, unlike the Moorhen, the male King Rail holds his bill wide open while chasing the female. Meanley also described nibbling, and a posture which could be intermediate between the Moorhen's bowing and arching.

Courtship-feeding has not been recorded in coots, and there appears to be only one record of this in the Moorhen (Holstein 1938), suggesting that it is probably not regular. Yet it occurs in the King Rail (Meanley 1957), the Water Rail *R. aquaticus* (E. L. Turner and R. Zimmermann in Witherby *et al.* 1938-41) and the Purple Gallinule *Porphyrio porphyrio* (Holyoak 1970).

Observations on the Purple Gallinule by Holyoak suggest that some of its display postures are similar to those of the Moorhen. Most differences follow from its more sociable nature: several pairs may live amicably in a group and some birds may even share duties at the nest. In keeping with this sociability, it seems that the aggressive postures are less clearly marked, and the tail-flicking exhibited as an alarm posture by the Moorhen is used additionally to show anger. Apparently 'mutual retreat' is absent in the Purple Gallinule, but the threat posture is similar to the charge, and the challenge position almost so. The latter is accompanied by a vocalisation, as was also reported in the Tasmanian Native Hen *Tribonyx mortierii* by Ridpath (1964).

Apart from courtship-feeding, the courtship and sexual postures described by Holyoak do not appear to differ greatly from the corresponding ones of the Moorhen.

In recent years the study of the behaviour patterns of certain avian orders, such as wildfowl (Anatidae) (e.g. Lorenz 1951-53, Johnsgard 1960), have shown that these patterns are perhaps at least as important a means of taxonomic separation as morphological characters. The genus *Fulica* is regarded by most authorities as belonging to a separate subfamily, the Fulicinae, while the genera *Gallinula*, *Rallus*, *Porphyrio* and others are grouped together in the subfamily Rallinae. Comparing the work of Gullion (1952) and Kornowski (1957) on coots with the present findings, there appear to be few, if any, basic differences between the behaviour patterns of coots and the Moorhen. Obviously further work is required on other rail behaviour patterns, but it is tentatively suggested that the genera *Gallinula* and *Fulica* should be regarded as more closely related than they are at present.

TERRITORY AND THE ANNUAL CYCLE

The term 'territory' is taken here to mean a defended area as defined by Hinde (1956). The pair occupying such a territory defends a clearly defined, though invisible, boundary, within which they charge and attack, and normally chase out, any trespassing Moorhen.

Among the resident Moorhens in the Avon valley study area, territorial behaviour persisted throughout the year in some pairs, but with seasonal variations in the degree of hostility and in the size of the territories maintained. Some pairs defended territories only from early March until late October or November, even though they remained in the same general area throughout the winter. This shorter-term maintenance of territory was additionally found in all birds in the Poole Park study area during 1969, though it was not possible to determine whether they stayed there during the winter.

Two pairs in 1968 and a further three in 1969 established temporary breeding territories in the Avon study area in late April and May. However, these birds were all unsuccessful in hatching their eggs and disappeared by the end of June.

The foregoing suggests that not all pairs behave alike, and thus the following interpretation is based on the apparent situation found in the majority of pairs studied. The times of the year for particular changes in behaviour are also subject to variation, perhaps by two weeks either way, in some individuals.

September to February

During the autumn, observations indicated that a gradual decrease in territorial defence took place. In the Avon valley, the areas defended during the past breeding season became smaller (table 1), though aggressive actions still occurred when these smaller 'core' areas, as Gullion (1953) termed them in the American Coot, were trespassed.

By November, territory shrinkage had ceased and the 'core' areas maintained consisted of about 40 metres (range 33-47 metres) of waterway and the adjacent land up to a metre or so from the banks. Thus, a large proportion of the waterways that had previously been occupied as breeding territories was now made up of non-defended 'neutral' areas.

At Poole Park, territories were completely abandoned and the birds moved about more freely than earlier in the year.

When a stream was frozen over there appeared to be no defence or maintenance of 'core' areas, these also temporarily becoming neutral areas, but when milder weather returned each 'core' area was again defended by an occupying pair.

Table 1. Numbers of pairs of Moorhens *Gallinula chloropus* defending breeding territories and winter 'core' areas of different extents

*This was the same pair in both years, which occupied the only pond (circular and 33 metres wide) in the Avon study area, defending it summer and winter. The Avon valley 1969 total of 13 pairs includes one pair that did not lay eggs

	Length of waterway defended (metres)	AVON VALLEY 1968	1969	POOLE PARK 1969
BREEDING TERRITORIES	up to 40	1*	1*	4
	41-80	—	—	—
	81-120	—	4	—
	121-160	4	2	—
	161-200	3	2	—
	201-220	2	4	—
	TOTAL PAIRS	10	13	4
WINTER 'CORE' AREAS	30-40	3	3	—
	41-50	2	3	—
	TOTAL PAIRS	5	6	—

During the winter months the population of Moorhens, in addition to the young raised locally and still present in the area, increased. The origin of these immigrants was not known, though it is of interest that one such bird, trapped, ringed and tagged on 15th February 1969, was recovered in Belgium on 22nd April the same year (Spencer 1971). These winter visitors were frequently in small flocks of up to 15 individuals which utilised the undefended areas and also grazed in the adjacent fields, often some distance from water.

Members of pairs retaining 'core' areas often ventured into surrounding areas in search of food, frequently mixing with the winter flocks. Normally, one member of the pair always stayed in the 'core' area until the other returned, thus maintaining its defence at all times, but this arrangement broke down during hard weather when the 'core' area froze and food became more scarce.

March to August

An increase in territorial activity became evident among resident birds during March. Moorhens holding winter 'core' areas expanded them, and other resident birds also established territories. By the first half of April, few or no neutral areas were left and winter flocks disappeared. During this time, and continuing until late May, aggressive displays were at a peak and fighting was frequently observed.

It became evident from observations on tagged birds that during

March, and in some cases February, some territories 'changed hands'. One tagged male which lost his territory in mid-February joined a winter flock and then later, in March, regained his former territory.

The majority of first-year birds disappeared in early March, with two exceptions in the main study area, both tagged males. One paired and bred successfully; the other also paired but established only a temporary territory. In the latter case, although display platforms were built, there was no evidence of actual nesting, and the pair was finally driven out by its neighbours in late May. This neighbouring pair incorporated the newly won area into its own territory. In mid-October, the same male (now just over a year old) returned to the study area and established a new territory, of 'core' area size, about a kilometre upstream from his previous one. Within a few days another (untagged) bird was noted there, and their behaviour, including bowing and nibbling, suggested that they had paired. The following spring this same pair bred successfully in the territory they had established the previous October.

As egg-laying and incubation proceeded, less fighting occurred and aggression mostly took the form of 'mutual retreat' and charging and splattering. Possibly this was because territory sizes were well established by then and aggressive displays alone were a sufficient deterrent to birds contravening territorial boundaries.

DISPLAYS AND TERRITORY—DISCUSSION

The non-aggressive displays of the Moorhen are relatively simple and their primary function is probably sexual synchronisation. In contrast, the numerous and elaborate aggressive displays seem in keeping with the species' highly territorial nature, and suggest that the acquisition and maintenance of a territory is an essential prerequisite for a pair to attempt to breed. The defence of even a small winter territory or 'core' area seemingly has the advantage that a pair, having established a place, needs only to expand this in the spring, and that normally such birds have a greater chance of maintaining and expanding their stand than does a strange pair of acquiring a territory from birds already in occupation. However, such an advantage may sometimes be offset by the time spent guarding a winter 'core' area when food becomes scarce in the immediate vicinity. Minor differences in food availability might be one factor that decides whether or not a pair will defend such an area, and these might additionally account for the breakdown in defence when the weather is particularly hard and the water frozen over.

(to be concluded)

The lek of the Black Grouse

Ingemar Hjorth

Photographs by Robert T. Smith, Arne Schmitz, Gösta and Tony Tysk, and C. E. Palmar

Plates 13-20

The Black Grouse *Lyrurus tetrix* is well known to ornithologists as a species that displays collectively. Most males of a population keep together in small packs in the summer, or in bigger flocks during the winter, which, on most days of the year, attend a 'display ground'. They habitually abstain from visiting the display ground only in January and July. The adult males make territorial demands in a part of the display ground termed the 'arena', which is usually located in the most open area of the population's home range—at the centre of a bog, moor, marsh or meadow, or even on the frozen surface of a lake. Once selected, the arena is revisited year after year. The older birds show an extreme tenacity to this place, and younger ones are attracted there and maintain the tradition. The birds often cling to their old arena even when roads have been built through it. On the arena some males are well established: these are called 'regulars'. Others visit the site more sporadically, or are unsuccessful in defending a territory there: these males are termed 'incidentals'.

The males on an arena display threat postures, fight neighbours and chase intruders from their territories. When females are present the males try to attract them for copulation. All these routines constitute the 'lek', a collective performance on a traditional place, the arena. Some males, however, never seem to attend a lek. These 'soloists' prefer performing in isolation on the ground or in a tree at the very same site day after day, often well within hearing distance of an arena. Similarly, after half an hour of foraging following the morning lek, regulars in high season (late April and early May) usually display for a further period, but solitarily at fairly fixed sites in open fields or woods surrounding the display ground. Females may also turn up at these places and at those of soloists.

For fuller accounts of Black Grouse leks and comparisons with other tetraonids, see Höhn (1953), Hamerstrom and Hamerstrom (1960), Kruijt (1962), Kruijt and Hogan (1967) and Hjorth (1970). The present text is intended only as a brief summary to accompany the photographs on plates 13-20 (taken at display grounds in Scotland and Sweden) and is the first feature on this subject to be published in *British Birds* since those of Yeates (1936) and Lack (1939).

The display ground (plate 13)

Taking the species' whole range into account, the central portion of a peat bog (plate 13a) is the most frequent habitat for a Black Grouse lek. In western Europe today, an aggregation of 25 males must be considered a big lek flock, but in the Soviet Union gatherings of as many as 200 individuals have been reported (Dementiev and Gladkov 1966-68). On the arena, territorial boundaries are easily recognised by watching the spots where males fight or threaten each other. For an observer who sporadically visits the arena, the territorial system may appear confusing. In high season, however, a few days' study are enough to map each male's demands, since most of the boundaries vary but half a metre or less from day to day. Territory size varies with population density and position in the arena. In the centre, territories are small (about 200 square metres), whereas peripheral ones are much bigger and often without external boundaries. In meadows and cultivated fields in continental Europe south of the Baltic, the birds are scattered over a much wider area than that shown in the photograph on plate 13a.

The males congregate for the lek even in winter when snow covers the ground. In the northern parts of the species' range the snow has not gone by the time high season occurs (as in plate 13b, taken in central Sweden). In this case, the males spend the night in the adjacent forests and do not arrive on the arena until sunrise, but when the ground is nearly or entirely snow-free they fly to the arena an hour or two before sunrise, in early twilight. The shift from sunrise-arrival to early dawn-arrival is often very sudden (around 15th April in southern Sweden); for further details see Hjorth 1968.

Displays of individual males (plates 14-15)

When a male arrives at the arena, he usually lands on its edge. There he fans and raises his tail, exposing the beautiful, rose-shaped cluster of white undertail-coverts (plate 14b), and adopts the 'Wide-necked Upright' posture, one of the less intense threat postures (plate 14a). This attitude is held while he walks or runs towards and into his territory. The faster he runs, the more is his head directed forwards. Now and then he stops, extends his neck upwards, stretches his legs, and hisses with open beak (plate 14c). In cold weather a cloud of water vapour may leave the mouth. By this far-carrying call—a two-note hiss which can be described as 'choo-iiseht'—he advertises his presence and position. Hissings are given frequently throughout the morning lek, but they predominate during its opening. An optical signal is commonly added to this two-note hiss: while calling, the male once or twice flaps his wings rapidly at the shoulders, stretching the underarm and manus slightly, so that the white underwings prominently flash forwards.

Such flashes are normally included in hissings addressed to rivals nearby.

When another Black Grouse of either sex, or even another grouse-like bird, is seen flying in the vicinity of the arena, or when females walk over or are copulated with in neighbouring territories, the males on the arena spring into the air for a 'Flutter Jump' or 'Flutter Flight' (plate 15a, b). By such behaviour, including also harsh hissings, they effectively advertise their territories. The sound tells conspecific birds the rough direction of the performing male or group of males. The flashing white underwings, especially conspicuous during the descent (plate 15a), make the exact position of the performer fully clear.

Soon after arriving in his territory, the male usually adopts the 'Forward posture' and emits the powerful 'Rookooing song' (plate 15c). Owing to the ventriloquial character of the bubbling notes and to their ability to carry over a much wider area than the home range of one lek flock, it is very difficult to locate the source of this sound. Probably even female grouse have difficulty in deciding the positions of males from this song. However, the main significance of the bubbling notes to a female is probably not to guide her to displaying males but to stimulate her gonadal development in early spring. The males' song has a physiological influence upon females, one that may be essential to a species in which the sexes are separated for most of the year. The swollen neck of the performer is only partly due to feather-raising. While the notes are being produced the beak is actually closed, and air from the lungs rushes into an inflatable oesophagus, which then swells prominently. Each song lasts only about $2\frac{1}{2}$ seconds, but when strongly motivated the male may sing continually for long periods, and the songs then merge into a persistent murmuring of bubbling notes. At the end of each song, however, the beak opens momentarily.

Encounters between males and females (plates 16-17)

When females arrive at the lek, they often alight in trees (if there are any) on or close to the arena. There they may sit for long periods watching the lek, now and then preening with nervous-looking movements (plate 16). When interested in participating in the lek, the female starts walking over the arena. When she is well within the boundaries of a territory, its defender begins to encircle her or walks to and fro in front of her, continually 'Rookooing' (plates 17a-c). This male behaviour is often called 'courting', but to all appearances it is an intense threat, the function of which seems to be to display superiority to the female. However, males do not become successful copulators by a forceful approach. A skilful male balances his 'threat' perfectly and walks around the female until she shows com-

plete subordination. Only when she adopts the posture of invitation does he dare copulate with her. By her squatted posture, sleeked plumage and compact tail, a soliciting female contrasts strikingly with an intensely threatening male. Then the barrier of fright in the male is broken, and he does not hesitate to behave sexually by copulating with her.

There are some differences between a male performing routine 'Rookooing' and one addressing his song to a nearby female (plate 17d). First, his primaries are lowered stiffly so that they scrape the ground, making tracks in snow. Second, when not rapidly walking, his body and especially his neck are kept very low. Thirdly, his fanned and raised tail is always tilted a little towards that side where the female stands or walks, unless he is facing her, when his tail is held centrally.

Encounters between rival males (plates 18-20)

A male's tendency to fight his rival is revealed by a narrowing neck. A repeatedly uttered 'Nasal Whinny' reveals a conflict of motivations (attack and escape). In the series of photographs of fighting on plates 18-19, the combatants are named A, B and C. A little tussock is marked with an asterisk, and the rough position of B's territorial boundary is denoted by a broken line.

Plate 18a Here C watches A and B which are about to attack each other.

Plate 18b B has left A and fights with C: the latter is just attacking.

Plate 18c C has landed after an attack, and B jumps backwards.

Plate 19a B has attacked, and C is jumping backwards.

Plate 19b B has stopped fighting C and is now in combat with A.

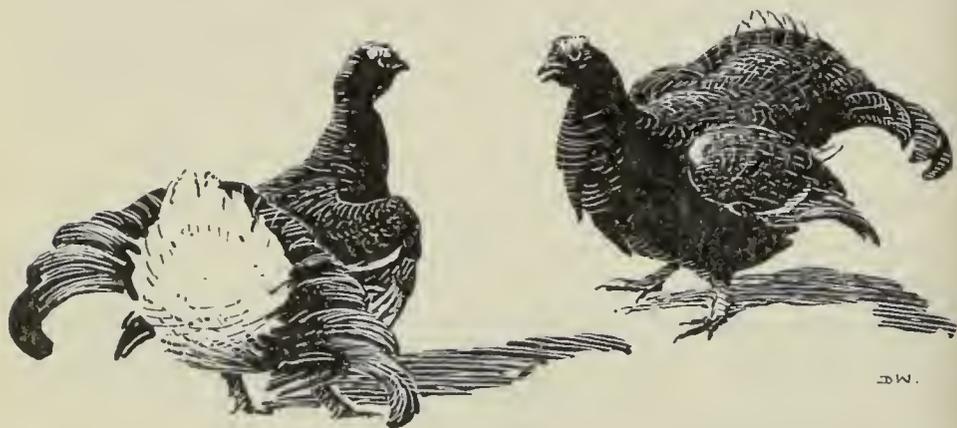
At territorial boundaries males threaten each other for much longer periods than those during which they actually fight. Their tactics combine facing-up in the 'Wide-necked Upright' posture (plate 20a), hissing (plate 20b) and 'Forward with Rookooing' (plate 20c). After a while with one neighbour, a male loses interest in defending that portion of the boundary and rushes towards another rival, the result being a repeated rushing to and fro within the territory, interrupted by periods of hissing or 'Rookooing' in its centre, or of encircling females.

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Notes

Iris colour of juvenile Night Herons *The Handbook* records the iris colour of juvenile Night Herons *Nycticorax nycticorax* as brown. During the autumn of 1970 I examined 14 juvenile Night Herons in the hand in the Parque Nacional de Doñana, south-west Spain. The iris colour varied from yellow to orange. Two had the iris yellow, six predominantly yellow but with faint red streaks, five predominantly orange formed by moderate red lines, and one bright orange formed by extensive red streaks. P. J. BELMAN
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Common Terns roosting on water During the afternoon of 5th October 1967, at Corsham Lake, Wiltshire, I spent some time watching a Common Tern *Sterna hirundo* fishing. All the *Sterna* terns that I had seen there previously had stayed for only a few hours, leaving before dusk. As the light began to fade, I assumed that the tern would go to roost on the banks of the lake or on a small wooded island which offered suitable roosting areas. To my surprise, how-

ever, it alighted on the water near five feeding Mallards *Anas platyrhynchos* and three Tufted Ducks *Aythya fuligula*, which began to move away from it. After five minutes the tern took flight and flew round the lake several times before descending on to the water where it remained for the next 30 minutes, until I lost it from sight in total darkness.

On 9th and 10th October I watched what I presumed to be the same Common Tern at Corsham Lake, and on both days it again descended on to the lake 30 minutes before total darkness, and remained there. On 12th two Common Terns were present and they both settled on the water at 17.55 hours GMT within a metre of each other. I watched them until 18.15 GMT, when it became too dark to see them.

The Handbook (5: 29) stated 'Can swim when inclined, but adults seldom do so, though they not infrequently settle on the water for a few moments to bathe'. It made no mention of roosting on water.

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Robin killing Robin At 08.32 hours GMT on 18th November 1972, a fine frosty morning, I looked out of a first-floor window into the courtyard of my Oxfordshire house and saw two Robins *Erithacus rubecula* struggling with each other close to the bird-bath in the centre of the court; a female Blackbird *Turdus merula* and a female House Sparrow *Passer domesticus* were watching in the immediate vicinity. One Robin was on the other's back, flicking its wings to maintain balance, in a travesty of the mounting posture; the bird underneath had its wings spread. Until about 08.50 the struggle continued, both Robins moving round the base of the cement pillar supporting the bird-bath; the top bird moved round the lower one, retaining its grip on the head or pecking at it, each blow being delivered with a flick of the wings, especially the left one, from a range of about a centimetre. The open eye of the lower bird was frequently visible and I expected it to make an attempt to free itself at any moment. But its wing and tail movements became feeble, and the top bird succeeded in getting it on its back, continuing the pecks and once appearing to work its mandibles, as though eating something. After about 08.55 the victim's movements ceased and the top bird kept looking up from its attacks, like a bird of prey on a kill.

At 08.59 the victor suddenly flew out of the courtyard, which has only one entrance. I ran down to look at the victim before a cat could claim it and, as I opened our door into the court, a Robin flew in from the archway. The dead bird was pecked round the eyes, where there was a little blood, but otherwise there were no obvious wounds.

During the struggle House Sparrows several times landed close to

the Robins and came within a few centimetres (at one time there were two males and a female in the vicinity); once a Blue Tit *Parus caeruleus* came close; several times a Dunnock *Prunella modularis*, which came nearest of all, just hopped round the combatants; and once two Dunnocks appeared. At about 08.35 a third Robin flew down to land on the sill of the bird-bath, looked down at the others, flew to a flower-bed on the south side of the court for a few seconds and then away.

I put the dead Robin breast-up on the bird-bath sill; at 09.18, when I went to look at it again, there were loud 'ticks' and a Robin flew away from the courtyard's entrance arch where it had evidently been watching. At 09.24 a Robin was pecking at the head of the dead bird *in situ*. At 09.33 a Robin, after being disturbed several times, entered the courtyard again, perched on a plant stem in one of the flower-beds along the wall, sang several short phrases and returned to the attack. These attacks continued intermittently for an hour or more, with song phrases and 'tick' calls in between.

For several months a Robin with a loud 'tick' had 'ruled' the area outside the entrance and, evidently, the courtyard as well. I can only suppose that the intruder, attacked after entering the court, had become confused almost as if in a room and was at a disadvantage from the start of the fight, which I did not see; nor do I know for how long it had been going on before 08.32. I did not feel able to leave my stance to get a tape-recorder and failed to note points of detail, for example how the top Robin managed to keep the other down while moving round it. I reported the incident to the late Dr David Lack, author of *The Life of the Robin* (1943), who commented: 'How extraordinary; hardly anyone, I never, has seen one Robin kill another'. Unfortunately the corpse disappeared during the morning and I was unable to examine it in detail.

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High incidence of plumage abnormalities in London birds

While birdwatching in London parks, I have gained the impression that plumage abnormalities are commoner there than in rural areas. I tested this by making counts of certain species in August 1971, only birds seen very well at close range being counted. Counts were made in Green Park, St James's Park, Hyde Park, Regent's Park and Trafalgar Square, London, and for comparison in suburban parts of Clapham, Balham and Streatham, and rural areas in Surrey and near Sandwich, Kent. The results of these counts, summarised in table 1, show that plumage abnormalities, particularly lack of melanin in some of the feathers usually melanised, were commoner in the urban populations studied.

Ilyenko (1960) found that 'albinism' was characteristic of birds

i. Frequency of plumage abnormalities in counts of four species in urban, suburban and rural areas

on counts made in central London (urban), Clapham, Balham and Streatham (suburban), Surrey and Kent (rural), in August 1971. 'Partly albinistic' individuals lacked some (not all) from the plumage only (see below). The 'melanistic' birds listed may have been caused by urban soot and grime, but a genetic basis for their darkness seems more likely, as birds of intermediate darkness were not seen

	Area	TOTAL	Normal	'Partly albinistic'	Melanistic	Dilute	Percent Abnormal
Widgeon	Urban	320	316	1	3	—	1.3
<i>A. palumbus</i>	Suburban	260	259	—	1	—	0.4
(a)	Rural	432	432	—	—	—	0
Bird	Urban	170	167	3	—	—	1.8
<i>T. merula</i>	Suburban	171	169	2	—	—	1.2
(a juvenile)	Rural	156	156	—	—	—	0
Starling	Urban	435	429	6	—	—	1.4
<i>S. vulgaris</i>	Suburban	508	501	7	—	—	1.4
(a juvenile)	Rural	588	587	1	—	—	0.2
House Sparrow	Urban	1,537	1,489	40	5	3	3.1
<i>P. domesticus</i>	Suburban	632	624	7	—	1	1.3
(a juvenile)	Rural	447	446	1	—	—	0.2

in cities and heavily populated districts in Russia. He based his conclusions on examination of 3,605 House Sparrows *Passer domesticus* and 267 Tree Sparrows *P. montanus* collected in Moscow and the rural area of Chashnikov. No 'complete albinos' were found, but 'partial albinos' accounted for 1.8% of the House Sparrows and 1.7% of the Tree Sparrows from Moscow, compared with none of either species in the Chashnikov samples.

Harrison (1963) redefined terms for certain abnormalities in melanin pigmentation. His distinction between albinism (lack of all melanin pigmentation) and leucism (lack of all melanin pigments from feathers, but with other parts of the body normally melanised) creates terminological difficulties for those individuals which lack the usual melanin in some feathers but are otherwise normally coloured. These latter are usually referred to as 'partial albinos' in the literature, but, as they have normally coloured bare parts, 'partly leucistic' seems more consistent with Harrison's definitions. Discarding the term 'leucism' entirely may be the simplest solution, otherwise it seems best to reserve the terms 'albinism' and 'leucism' for the extremes of melanin deficiency defined by Harrison, and to refer to partly affected individuals as 'lacking some plumage melanin'.

There has been considerable debate on the causes of melanin deficiency, though there is ample evidence that it is often under

genetic control. Even when partial or complete melanin deficiency appears to be related to the effects of senility or dietary deficiencies on melanin metabolism, it is apparent that a measure of genetic involvement exists, as in all cellular metabolism. Voitkevich (1966) summarised the abundant evidence that inadequacies of nutrition affect melanin pigmentation less than lipochrome pigmentation (lipochromes include carotenoids and related lipid pigments). As no abnormalities in lipochrome pigmentation were recorded in the species listed in table 1 (such as could occur in bare-part colours of Blackbirds *Turdus merula* and Starlings *Sturnus vulgaris*, and breast colour in Woodpigeons *Columba palumbus*, it seems that the plumage abnormalities are more likely to be of direct genetic origin than caused by diet.

Mallards *Anas platyrhynchos* and Feral Pigeons or Rock Doves *C. livia* are polymorphic in towns, but wild Mallard populations are not polymorphic in rural areas, and wild-living Rock Dove populations unaffected by escaped domestic birds are less polymorphic than the urban Feral Pigeons with which they are conspecific. Although these urban polymorphisms were originally caused by the variety of genetic origins of the captive ancestors of the present-day feral populations, the maintenance of the polymorphisms must presumably be due to selection.

The frequency of partial melanin deficiencies in London bird populations (table 1), if under direct genetic control, is too high to be due to recurrent mutation alone, even allowing for the possible effects of mimic genes (Ford 1964). Thus they may be true polymorphisms, like those of Mallards and Feral Pigeons. Even if inadequacies of diet are the proximate cause of the observed abnormalities, it could be that these are expressed phenotypically only because of an underlying greater variability in the genes controlling metabolism of melanins.

It may be speculated that a high incidence of polymorphism in urban bird populations is a result of selection favouring variability in the constantly changing and comparatively new environments provided by cities, which may prevent single well-adapted forms from emerging.

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Reviews

The Animal in its World. Explorations of an Ethologist 1932-1972. By Niko Tinbergen. Allen & Unwin, Hemel Hempstead, 1973. Vol. 1: 343 pages, 31 photographs, 100 text-figures; £6.35. Vol. 2: 231 pages, 8 photographs, 44 text-figures; £5.25.

In recent years, a number of books have appeared collecting together previously published scientific papers by well-known investigators of animal behaviour, including those of Konrad Lorenz. This selection of 18 papers by Niko Tinbergen is particularly welcome; his work—with its emphasis on the animal in its environment and insistence on the importance of observation and description as well as experimentation—has had more influence on and greater appeal to ornithologists in this country than that of any other ethologist.

The papers are grouped in four sections, each introduced by the author. Sections 1 (observational and interpretative studies) and 2 (field experiments) come in volume 1, sections 3 (laboratory experiments) and 4 (general papers) in volume 2. Most appeared originally in specialist journals and seven have been translated from German. Although there might be initial disappointment at the absence of some expected and historically valuable contributions, Professor Tinbergen amply justifies his choice and the collection has a remarkable uniformity, with its growing emphasis over the years on the study of the survival value of behaviour and its application to an understanding of some of the unique features of the behaviour of Man himself.

Five papers deal specifically with birds. The earliest is the classic study on the gaping responses of nestling Blackbirds and Song Thrushes (1939). None of the famous single species studies is represented, such as that on the Snow Bunting, though, of course, *The Herring Gull's World* (1953) is still in print; instead we are given the long, comparative study of gull behaviour (1959). Three papers of 1962-63 treat various aspects of eggshell removal by the Black-headed Gull, with special emphasis on the selection pressure of predation, and these are supplemented by two further experimental studies on food-hoarding by the Red Fox (1965) and the survival value of spacing-out (1967). Four papers deal with the author's famous studies on orientation and courtship in certain insects (1932-38, 1942), while a fifth examines the defensive rôle of the spines of sticklebacks against fish predators (1957). Finally come the six general papers, mostly recent, chosen to give an assessment of the present status of both pure and applied ethology, all drawing to a greater or lesser extent on examples from bird be-

haviour, particularly of gulls. The first two discuss behaviour and natural selection (1965) and appeasement signals (1959). The next outlines the development of ethology (1969) and paves the way to the last three on ethology and Man: the search for animal roots in human behaviour (1964), early childhood autism (1972), and functional ethology and the human sciences (1972). Again, one might regret the complete exclusion of reviews written in the years 1936-48, but these were integrated into Professor Tinbergen's book *The Study of Instinct* (1951, recently reprinted) which gives the necessary historical perspective.

The work is mostly well produced, but there are some unsatisfactory publication features. For instance, there are no indexes. The two volumes (the combined price of which may place them beyond the pockets of the students for which the collection was partly intended) could well have been combined, thus removing the irritation of having the same foreword (by Sir Peter Medawar) in both but Professor Tinbergen's own general introduction only in the first. In spite of these criticisms, the book can be highly recommended to all ornithologists interested in animal behaviour. It stands as its own tribute to Niko Tinbergen on the eve of his retirement.

K. E. L. SIMMONS

Pedigree: Words from Nature. By Stephen Potter and Laurens Sargent. *New Naturalist series*, Collins, London, 1973. 322 pages; £3.15.

This original and stimulating work, arising from the peculiar scholarly pastimes of James Fisher and Stephen Potter, through whose deaths we are, in Donne's phrase, all diminished, has been excellently completed by the Reverend Laurens Sargent. Although the primary interest of all three in natural history has been ornithological, this work ranges very widely over the animal and plant kingdoms, where it would not be appropriate for this review to follow.

Evidence of place-names can assist in indicating former distribution. A good example is the occurrence in two-thirds of English counties of place-names founded on the Crane. The authors argue plausibly that modern confusion among the ignorant between 'Crane' and 'Heron' could hardly have existed in the Middle Ages, and that Cranes were actually then as widespread as the place-names indicate, though, unlike Herons, not so universal as to be without value for purposes of distribution. Unfortunately the comparable problem whether the name 'Goshawk' was used in confusion for the Peregrine is not discussed, and there is also a disappointing failure to come to grips with the significance of 'woodwale' which is baldly stated in a footnote to be the Golden Oriole, despite

the Oxford English Dictionary caution that it may also denote the Green Woodpecker.

It is interesting to note that in both the English and scientific names there is an ancient confusion between doves (*Columba*) and divers (formerly *Colymbus*). It is tantalising also to find that the derivation of 'isabelline'—somewhat oddly described as a 'shade of grey'—from Queen Isabella's alleged vow not to change her shift before Granada was captured from the Moors is classed as doubtful, without explanation.

As international communication about birds increases, and familiarity with the dead classical languages declines, many choices and decisions have to be made about the correct use of English names for birds. Awareness of the fascinating etymological background and relationships so agreeably discussed in this book is therefore not merely a diversion or relaxation but an important element in accurate and scholarly use of terms. It opens the way to a work, which may perhaps some day follow, treating systematically the entire range of English bird names in use in different English-speaking lands, and the changes which they continue to undergo, in the effort to evolve out of a mixed bag of loose or misleading epithets a tolerably scientific and convenient set of identifying terms for all species.

E. M. NICHOLSON

Letters

Proof of breeding of Shore Larks As many other readers must have been, I was very interested in the paper by A. Watson on Shore Larks *Eremophila alpestris* in Scotland in summer (*Brit. Birds*, 6: 505-508). But why the caution in the title: 'possibly breeding'? An adult of a species known to feed its young directly and seen carrying a beakful of food was accepted as 'proof of breeding' for the *Atlas of Breeding Birds in Britain and Ireland*, quite apart from the other evidence marshalled by Mr Watson. If this is not now considered to provide adequate proof, how many *Atlas* 'FY' records stand to be demoted?

BRUCE CAMPBELL

Wardley, Woodstock, Oxford OX7 1EP

The reason why we are cautious in not claiming a definite record of breeding is that we did not get a good view of young, which to us would have been proof. To accept the sight of an adult carrying food, or other such circumstantial evidence, as proof rather than likelihood of breeding may be suitable for certain purposes, but we do not think it sufficient for a first British breeding record.

A. WATSON Sr, ADAM WATSON and N. PICOZZI

Wardley Arms Hotel, Newburgh, Aberdeenshire

News and comment *Robert Hudson*

Eiders and oil pollution Most of our wildfowl live inland or on the quieter estuaries, where they are not particularly vulnerable to pollution. The sea ducks have one particularly weak spot, a tendency to gather and feed around sewage and distillery outfalls, either on waste matter or the filter-feeding shellfish that also make use of it. The most famous example is the Edinburgh sewer at Seafield, where up to 30,000 Scaup gather in winter just downstream from the new Cramond North Sea oil terminal; but recurrent trouble also occurs at outfalls at Invergordon on the Moray Firth (where some 200 out of 278 Mute Swans were oiled this February), among other places. Eiders are also vulnerable where they gather in large flocks in sheltered places in winter; some 2,000 were killed in the *Tank Duchess* disaster off the mouth of the Tay in the spring of 1968, and if it had occurred a little earlier there could have been ten times as many; while over half the 600 Eiders in Loch Indaal, Islay, were killed by an oil leak in October 1969 (*Scot. Birds*, 5: 189-196; 6: 149-153). The latest threats to them come from two of the oil development sites. Up to 2,000 Eiders have been reported this winter around Drumbuie in Loch Carron, Ross-shire (also an important breeding area), presumably a large part of the population of that part of the Hebrides sheltering from the weather; while up to 4,000 have been reported between Unst, Fetlar and Yell in northern Shetland, some two-thirds of the known population in those islands. While the occurrence of an Eider concentration in Loch Carron was pointed out when the proposal to locate oil platform construction sites there was announced, it is notable that there is no mention of them or their vulnerability to oil in the environmental impact study prepared for the site by Sphere Consultants; fortunately the Nature Conservancy Council is now investigating the situation. While the occurrence of flocks of Eiders is not necessarily sufficient cause for holding up development, ornithologists will doubtless wish to be assured that very thorough measures are taken to avoid accidental pollution in areas where bird flocks feeding in narrow channels with strong tidal currents are likely to be entirely wiped out by any passing slick. (Contributed by Dr W. R. P. Bourne.)

World's largest national park Denmark is planning to create a North-east Greenland National Park, which will be established in the near future when the Greenland Protection Act is passed by the Danish Parliament; this is expected to be a formality, since agreement has already been reached with the Greenland Council at Godthåb. This national park will cover about one-third of Greenland, the virtually uninhabited region between Petermann Glacier in the north-west and King Oscar Fjord in the south-east; including inland ice and surrounding seas, the total area is about 700,000 sq. km. Hitherto, the world's largest national park has been Wood Buffalo Park in Canada, which is 44,800 sq. km. North-east Greenland is a major breeding area for the Polar Bear and Atlantic Walrus. Parts of the region are well vegetated (by arctic standards) and contain good habitats for the lemmings, Arctic Hare, Ermine, Arctic Fox, and the now-localised Musk Ox. The varied bird life includes, as breeding species, such local or spectacular ones as Pink-footed and Barnacle Geese, Gyrfalcon and Snowy Owl.

New bird club for Shetland A new county ornithological society came into being last December, when the Shetland Bird Club was inaugurated at a meeting held in Lerwick. The Club will take over the publication of the Shetland Bird Report (hitherto produced under private initiative), support bird conservation in the islands, organise wildfowl counts, and encourage residents and visitors

to look at breeding birds as well as migrants. 1974 breeding surveys are planned for the Red-throated Diver, and Reed and Corn Buntings, the Shetland status of the latter two being virtually unknown. New members will be welcomed; the annual subscription is £1, and the secretary is Iain Robertson, West Isle, Skerries, Shetland. Also, the Club is anxious to get co-operation from the numerous birdwatchers who visit Shetland every year, for many do not submit records, and doubtless many data on breeding birds and migrants are lost; such records will be gratefully received by Bobby Tulloch, Reafirth, Mid Yell, Shetland. We wish every success to the youngest and northernmost bird club in Britain.

RSPB staff moves Colin Bibby has for the last three years organised the Beached Bird Survey from the headquarters of the Royal Society for the Protection of Birds at Sandy; but he has now returned to fieldwork. In January he began a three-year study of the Dartford Warbler, based on the Isle of Purbeck, Dorset. One of the chief aims of this research is to make a close study of this scarce warbler's feeding habits, and so identify the food plants and winter conditions most needed for survival. It has been heavy mortality in severe winters, with snow and ice cover, that has caused recurrent population crashes in the small, restricted English population. With knowledge, it may be feasible to make artificial provision for the species' needs in such conditions. Meanwhile, the RSPB's Beached Bird Survey will be continued by Miss Clare Lloyd, a former Edward Grey Institute researcher who has studied seabirds (especially the Razorbill) on Skokholm, Pembrokeshire.

Birds of the Persian Gulf The first comprehensive avifaunal publication for the entire Persian Gulf is currently being prepared by Major M. D. Gallagher, who has had several protracted tours of duty in the region. It is intended that this work will bring together all bird records, published and unpublished, for the Persian Gulf, its coasts and islands, including the Arabian states from Oman to Kuwait; it will provide a working distributional list for use by the increasing numbers of birdwatchers visiting the region. Anybody with unpublished data is invited by Major Gallagher to contact him c/o Lloyds Bank Ltd, 6 Pall Mall, London SW1Y 5NH.

Houbara Bustard research cancelled In an earlier 'News and comment' (*Brit. Birds*, 66: 236) I mentioned an Houbara Bustard research project, involving captive breeding, to be conducted in Pakistan by W. A. Newlands. However, a note in the latest *I. U. C. N. Bulletin* (February 1974) relates that this project has had to be cancelled. Protracted delays in expected financial support from the Sheikh of Abu Dhabi, plus continuing unsettled conditions in the area, are the reasons given for abandoning the project.

Noted in passing . . . An intriguing advertisement in the bulletin of an African natural history society (which shall be nameless): 'The following journals are being offered for sale by a member who is leaving for the benefit of the Society . . .' How public-spirited!

Relieve for Foulness? Since 1971 the Conservatives have held steadfastly to their plans for a Maplin International Airport, while both the Labour and Liberal parties are pledged to scrap the project and the Scottish and Welsh nationalists are unlikely to defend it. Thus, with the formation of a Labour minority government and their probable support on this issue by the Liberals and nationalists, there is now reason to hope that Foulness and its Brent Geese will be safe, at least for the lifetime of the present Parliament. This provides a breathing space in which aviation requirements and conservation priorities

can be reassessed in the light of recent developments in the fuel oil and general financial situations.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

Recent reports—December *D. A. Christie*

These are largely unchecked reports, not authenticated records

The extremely cold spell which set in at the end of November lasted only until 3rd/4th December, after when the rest of the month was mild. A series of depressions crossed the country from the Atlantic, bringing wet, windy conditions to most areas of Britain, and during the last week a deep depression west of Iceland produced gales in the Atlantic and western Britain, conditions which were to characterise the first six weeks of 1974.

SEABIRDS

On 8th a juvenile **diver** found dead at Hornsea (Yorkshire) was identified as a **White-billed Gavia adamsii**. A paper on the identification of this difficult species, with a full review of the British records, will be published in this journal during 1974. At Seaton Sluice (Northumberland) two **Gannets** *Sula bassana* flew north on 23rd and nine on 30th, and on the latter date one was seen off Foreness Point (Kent). About eight **Arctic Skuas** *Stercorarius parasiticus* were reported from Northumberland, Kent, Hampshire and Co. Antrim; two **Pomarine** *S. pomarinus* were at Allhallows (Kent) on 8th, while at Jaonneuse Point (Guernsey) a **Great Skua** *S. skua* flew west on 8th and a **Manx Shearwater** *Puffinus puffinus* did likewise on 15th. A **Great Shearwater** *P. gravis* settled on the sea at Benacre Ness (Suffolk) on 20th. On 15th an unidentified **petrel** moved west at Cley (Norfolk), and on 27th a **Storm Petrel** *Hydrobates pelagicus* was seen far inland flying beside the A1 near Carlton on Trent (Nottinghamshire). Stormy weather resulted in other seabirds being driven inland: a **Shag** *Phalacrocorax aristotelis* was seen flying low north-east at Earlham, Norwich (Norfolk), on 3rd, and in Northamptonshire singles turned up at Thrapston gravel pits on 24th and Sywell Reservoir on 27th, but more remarkable was a flock of 16 which arrived at Tring Reservoirs (Hertfordshire) about 11th, three remaining until 19th and one to 27th.

An adult **Ring-billed Gull** *Larus delawarensis* which arrived at Blackpill (Glamorgan) on 5th and was still present in March 1974 was considered to be the one recorded there in March 1973, the first ever in Britain and Ireland (see *Brit. Birds*, 66: 509-512). There were three inland reports of **Glaucous Gulls** *L. hyperboreus* in England and a number of coastal sightings, while single **Iceland Gulls** *L. glaucooides* were at Blackpill on 5th and 6th, at Steart (Somerset) on 23rd, and at New Brighton (Cheshire) all month for the 18th successive winter. Only three new **Mediterranean Gulls** *L. melanocephalus* were notified to us, singles at Pagham Harbour (Sussex) on 1st, at Benacre on 13th and at Warsash (Hampshire) on 29th, while the usual two were at Blackpill all month. Lastly, an **Ivory Gull** *Pagophila eburnea* stayed in Dunnet Bay (Caithness) from 18th to 23rd.

SPOONBILL AND WILDFOWL

An immature **Spoonbill** *Platalea leucorodia* which appeared on the River Lynher (Cornwall) during the month was presumably the bird recorded on the Tavy (Devon) on 3rd November (*Brit. Birds*, 67: 85).

Birds showing the characters of drake **Green-winged Teal** *Anas crecca carolinensis*

were identified at Eynhallow (Orkney) on 2nd November, at Longman Bay (Inverness-shire) on 12th December and at Hurworth Burn Reservoir (Co. Durham) from 23rd until at least the middle of January 1974; and a drake **American Wigeon** *A. americana* was reported on Seal Sands, Teesmouth (also Co. Durham) on 4th. A count on the River Mersey during 8th-9th revealed a total of 3,000 ducks, including 14,700 **Teal**, 14,800 **Pintail** *A. acuta* and 7,700 **Wigeon** *A. penelope*, and 27,500 Wigeon were counted on the Ouse Washes (Cambridgeshire/Norfolk) in mid-month, 2,000 fewer than in December 1972, which itself was a rather low total (*Brit. Birds*, 66:177). There were 70 **Long-tailed Ducks** *Clangula temalis* off Ross (Northumberland) during December and this mainly maritime species continued to be reported at reservoirs well inland, in Derbyshire, Essex, Middlesex, Hertfordshire, and Somerset (two). An **Eider** *Somateria mollissima* with an injured leg was found at Adbaston (Staffordshire) early in the month and later died. The mild weather meant that numbers of **Smew** *Mergus albellus* were low all winter, a total of less than 40 being reported in December from Northumberland, Lancashire, Leicestershire/Rutland, Northamptonshire, Buckinghamshire, Middlesex, Essex, Kent, Surrey, Hampshire and Somerset; the highest numbers were, as usual, on the London reservoirs, including up to six at Brent and Staines and five at Kempton Park. On the other hand, exceptional numbers of **Goosanders** *M. merganser* were present at some places, an unprecedented 235 at Eye Brook Reservoir (Leicestershire/Rutland) on 29th (still 170 on 31st); 62 at Chew Valley Lake (Somerset) and 30 at Staunton Harold (Derbyshire) in the second half of the month, both being among the largest flocks ever recorded at those localities; and up to 96 on King George VI Reservoir (Middlesex) in late December.

From 9th a **Lesser Whitefront** *Anser erythropus* was present at Slimbridge (Gloucestershire) with the wintering flock of **White-fronted Geese** *A. albifrons*, which numbered about 2,500 on 30th. The **Bean Geese** *A. fabalis* in east Norfolk reached a total of 112 on 21st, the highest number there since February 1959; elsewhere they were found at five places, the most being nine at Lindisfarne (Northumberland) on 3rd with 1,500 **pale-bellied Geese** *Brant bernicla hrota*. **Dark-bellied Brents** *B. b. bernicla* were more numerous than usual on the south coast: record counts were made of 6,075 in Langstone Harbour (Hampshire) on 9th and 6,000 in Chichester Harbour (Hampshire/Sussex) towards the end of the month; in the Swale estuary (Kent) there were 1,020 on 6th. The Ouse Washes total of 743 **Bewick's Swans** *Cygnus bewickii* on 14th was 65% up on mid-December 1972, though the 300 at Slimbridge at the end of the month showed no change (*Brit. Birds*, 66: 78). Sixty-seven **Whooper Swans** *C. cygnus* at Kirkby Thore on 22nd was an abnormally high number for Westmorland, and a record 59 were counted on Belmont and Rivington Reservoirs (Lancashire).

CAPTORS AND WADERS

There were continuing reports of **Rough-legged Buzzards** *Buteo lagopus*, again mainly from the east coast and with three together in one area in Kent. Rarer birds of prey were a **Gyrfalcon** *Falco rusticolus* on Tiree (Argyll) from 27th to 1st and a **Red Kite** *Milvus milvus* on Alderney from 30th until 3rd January.

Two vagrant waders were reported during the month, a **Short-billed Dowitcher** *Linnodromus griseus* at Stanpit (Hampshire) on 2nd and one, perhaps two, **Wendover-billed Curlews** *Numenius tenuirostris* at Harty (Kent) on 24th. The former an extreme rarity with only six British records and none since 1965; and the latter would, if accepted, constitute the first British and Irish record of this species, which breeds in western Siberia and migrates south-westwards to winter in Iraq, the eastern Mediterranean and north-west Africa.

In the north-west, **Snipe** *Gallinago gallinago* reached a peak of some 3,000 at Martin Mere (Lancashire), while on 23rd 1,150 **Black-tailed Godwits** *Limosa*

limosa were counted on wintering grounds on the Dee estuary (Cheshire); wintering waders in Devon included 31 **Greenshanks** *Tringa nebularia* (21 on the Exe) and 94 **Avocets** *Recurvirostra avosetta* (79 on the Tamar and Tavy). **Little Stints** *Calidris minuta* were present in small numbers in the Bann estuary (Co. Londonderry), at Marshside on the Ribble (Lancashire), at Chew Valley Lake, in the Hayle and Camel estuaries (both Cornwall), at Dibden Bay (Hampshire), and in north Kent at Cliffe, Kingsnorth and Sandwich Bay. Very high numbers of **Dunlin** *C. alpina* were recorded inland in Somerset, 765 at Chew Valley Lake on 17th December and later 1,000 on Wet Moor on 3rd February, while on 1st December a **Purple Sandpiper** *C. maritima*, normally very much a coastal bird in winter, turned up well inland at Egginton gravel pits (Derbyshire) and later beside the River Trent. Single **Grey Phalaropes** *Phalaropus fulicarius* were found at King George VI Reservoir on 1st, at St Mary's Island (Northumberland) on 1st and (possibly the same bird) close by at Seaton Sluice on 7th, at Frodsham (Cheshire) on 8th, and at Cley on 15th.

NEAR-PASSERINES AND PASSERINES

The mild weather favoured the few summer visitors and migrants still present in Britain in December. On 1st a **House Martin** *Delichon urbica* was seen at Penzance (Cornwall), and a **Hoopoe** *Upupa epops* which had stayed in the Fleet area of Hampshire since the summer was last seen during the first week of the month. In Kent there was a **Turtle Dove** *Streptopelia turtur* at Cuxton on 9th, a **White Wagtail** *Motacilla a. alba* was reported at Sevenoaks on 19th and 28th, and a **Lesser Whitethroat** *Sylvia curruca* was watched at Margate on 9th January. **Chiffchaffs** *Phylloscopus collybita* and **Blackcaps** *S. atricapilla* were, as usual, reported in very small numbers from widespread localities. The most unusual reports concerned a **Lesser Grey Shrike** *Lanius minor* at Sutton Coldfield (Warwickshire) on 1st and a female **Serin** *Serinus serinus* at Collier Street, Marden (Kent), on 9th.

Small numbers of **Shore Larks** *Eremophila alpestris* were present on the east coast, 30-40 feeding daily on the Scrape at Minsmerc; elsewhere two were at Waterloo (Lancashire) for the first week and one was at Portland Bill (Dorset) on 28th, while inland one stayed at Theale gravel pits (Berkshire) from 18th to 22nd. The largest flocks of **Snow Buntings** *Plectrophenax nivalis* reported were 250 at Holme (Norfolk) from 29th and 140 at Sandwich Bay on 15th. In the west there were singles at three places in Somerset, and the species was described as widespread on the Lancashire coast, with 32 at Waterloo during the month; one was at Pulfrey (Guernsey) on 4th. The few inland records were of singles except for an unusual series of reports in the Pennines and Border Hills, involving a party of about twelve near Edale Head on Kinder (Derbyshire) on 31st and, in Northumberland, seven at Hedgehope on 9th, 36 at Threestone Burn on 23rd and 25 on The Cheviot on 28th. Only five reports of **Lapland Buntings** *Calcarius lapponicus* were received: singles in Northumberland at Seahouses on 2nd, at Nafferton (inland) on 3rd, and at Ross on 12th; and parties in Kent at Shellness (eleven on 1st and one on 22nd) and Sandwich Bay (up to nine). Five hundred **Twites** *Acanthis flavirostris* at Cliffe on 2nd was the largest flock notified to us, and at Dibden Bay unusually large numbers had built up to a maximum of 145 by 8th.

Finally, a small influx of **Waxwings** *Bombycilla garrulus* was noted during the month. On 2nd one was at Sulham, Reading (Berkshire), one at Newark (Nottinghamshire), three at Sutton Coldfield and about 50 between Cley and Holt; later there were singles at Barnstaple (Devon) and Northampton on 8th and 9th, at Graveney (Kent) on 11th, at Bletchley (Buckinghamshire) on 18th, and at Whitley Bay and Stocksfield (both Northumberland) on 24th, three at Mickleover (Derbyshire) on 26th and three at Sandwich Bay and one at Mitcham (Surrey) on 29th.



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Volume 67 Number 3 March 1974

- 89 The migration of the Gannet: a reassessment of British and Irish ringing data *Sir A. Landsborough Thomson*
- 104 The breeding behaviour and biology of the Moorhen *N. A. Wood* (part 1)
- 116 The lek of the Black Grouse *Dr Ingemar Hjorth* Plates 13-20

Notes

- 120 Iris colour of juvenile Night Herons *P. J. Belman*
- 120 Common Terns roosting on water *Julian C. Rolls*
- 121 Robin killing Robin *Dr Bruce Campbell*
- 122 High incidence of plumage abnormalities in London birds *D. T. Holyoak*

Reviews

- 125 *The Animal in its World. Explorations of an Ethologist 1932-1972* by Niko Tinbergen *Dr K. E. L. Simmons*
- 126 *Pedigree: Words from Nature* by Stephen Potter and Laurens Sargent *E. M. Nicholson*

Letters

- 127 Proof of breeding of Shore Larks *Dr Bruce Campbell; and A. Watson Sr, Dr Adam Watson and N. Picozzi*
- 128 News and comment *Robert Hudson*
- 130 Recent reports—December *D. A. Christie*

Robert Gillmor drew the Gannets (page 103) and Donald Watson the two Black Grouse (page 120); the former is reproduced from *The Natural History of Cape Clear Island* by permission of the editor

Volume 67 Number 4 April 1974



BRITISH BIRDS

UPPERWING OF COMMON AND
ARCTIC TERNS

MOORHEN BREEDING BIOLOGY

FOOD OF BEE-EATERS

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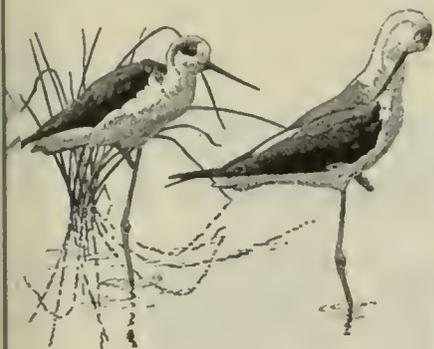
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BRITISH BIRDS

The upperwing pattern of adult Common and Arctic Terns

R. A. Hume and P. J. Grant

Plates 21-24

The separation of adult Common Terns *Sterna hirundo* and Arctic Terns *S. paradisaea* in the field is notoriously difficult. Several differences have been described previously and are widely known: compared with the Common Tern, the Arctic has relatively shorter legs, greyer underparts, shorter and finer bill (which is all dark red, rather than orange-red to scarlet with a black tip), and longer tail-streamers. To the trained ear some calls are diagnostic. Perhaps the most useful plumage mark in the British literature was first described by Richardson (1953): in the Arctic's spread wing all the flight-feathers (except at the tips of the primaries) are translucent when viewed directly from below against the light, whereas in the Common the translucent area is restricted to the innermost primaries, the rest appearing darker and opaque.

The Arctic is slightly smaller and more lightly built, and some authors, for example Jacobsen (1961) and Vande Weghe (1966), have stressed its rounder head. Vande Weghe combined this feature with the Arctic's shorter bill and longer tail to give a different ratio in the flying bird between the length in front of the wings and the length behind the wings: he claimed that this was 1 to 2.5-3.0 in the Arctic as against 1 to 1.5-2.0 in the Common, though measurements of many photographs by P. F. Bonham (*in litt.*) give smaller ratios of 1 to 1.8-2.2 and 1 to 1.3-1.7 respectively.

Juveniles share many of these differences (where they do not apply exclusively to adult characters) and have additional diagnostic features which tend to make them more easily separable than adults (Grant and Scott 1969).

Unfortunately all these distinctions often require ideal viewing conditions at close range for them to be usable. Jacobsen (1961) described and illustrated a further field-character that seems to have been overlooked by subsequent authors, and which was also noted by RAH while watching both species in Staffordshire and Shetland during 1973. In adult Arctic Terns the grey colour of the upperside of the primaries appears clean and uniform, whereas in Common Terns the outer five to seven primaries (including the very short first) are darker than the remainder, and on the innermost of these in particular there is often a dark wedge extending forward from the rear edge of the wing. This is illustrated in fig. 1 and can be clearly seen in plates 21-24 (and also in the colour photographs on page 1050 of *Birds of the World*, volume 4, part 2).

Once familiar with the appearance of this dark wedge it becomes a most useful field mark and can be picked out at surprisingly long range, in ideal conditions up to a kilometre. It has the additional advantage of being visible on birds in normal flight seen from the side (for example, while on migration over the sea) when the differences of underwing translucency are virtually impossible to detect. If the dark wedge is seen then the bird is certainly a Common Tern; in some individuals in adverse conditions, however, this mark is not always obvious, and identification as Arctic is therefore inadvisable unless the bird is close enough to ensure that the primaries *are* uniform, or other features confirm identification.

A study of museum skins and other references by PJG explained the reasons for this difference in the upperwing pattern. Common Terns (n nominate race considered only) have an arrested moult of their primaries, the timing and extent of which are rather variable but broadly fit the following pattern. From August to October the inner four to six primaries are renewed while the birds are still within their breeding range. The moult is then halted while they migrate, and is resumed in their winter quarters. In spring, just prior to the northwards migration, the inner four to six primaries are moulted again (this moult usually commences before the renewal of the outer primaries is complete), so that the inner primaries are moulted twice a year and the outer ones only once. Thus, for the whole time that Common Terns are in their northern breeding range, the outer five to seven primaries are several months older than the adjacent inner ones. The effect of wear on the primaries of *Sterna* terns has been described previously (for example, in Scott and Grant 1969): the pale grey bloom (radii) on the primaries is steadily lost, revealing progressively more of the blackish base colour (rami). This causes a contrast between the older (thus darker) outer primaries and the fresher (paler) inner

1. Upper, Common
Sterna hirundo; lower,
c Tern *S. paradisaea*,
ing upperwings of
adults (see text)



RAH. 1973

ones. In Arctic Terns a complete primary moult takes place in winter quarters: because there is little age difference between adjacent feathers, the primaries appear uniform in colour. It should be stressed that these differences are valid only for adults outside their wintering grounds. It is also worth bearing in mind from the foregoing that any adult 'Commic' tern showing active wing moult late in the autumn (as in plate 24b) is a Common.

Finally, although the Roseate Tern *S. dougallii* does not normally present an identification problem in adult plumage, it seems worth describing its upperwing pattern for the sake of completeness. The upperwing is generally much whiter than that of either the Common or Arctic, and like the Common it has an arrested moult, though usually only the outer three to five primaries are retained. Thus the dark area on the outer wing contrasts even more with the inner primaries but is much smaller, often giving the appearance in the field of a blackish leading edge to the primaries (well shown in colour photographs on page 1056 of *Birds of the World*).

ACKNOWLEDGEMENTS

We are most grateful to R. E. Scott and others at Dungeness Bird Observatory who provided useful comments during the preparation of this paper, and to P. F. Bonham, whose research and field observations have been invaluable. Dr D. W. Snow kindly arranged access to skins at the Zoological Museum, Tring.

SUMMARY

A difference in the upperwing pattern of adult Common Terns *Sterna hirundo* and Arctic Terns *S. paradisaea* is described and its usefulness as a character for separating the two species in the field is discussed. The Common Tern has the outer five to seven primaries darker than the remainder, while the Arctic's upperwing is uniform, and this difference applies for the whole time the birds are outside their wintering areas. It is related to the arrested moult cycle of the Common Tern.

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The breeding behaviour and biology of the Moorhen

W. A. Wood

Plate 25

(Concluded from page 115)

NESTING

Three types of structure associated with breeding are made by paired Moorhens: display platforms, egg nests and brood nests.

Display platforms

These structures were built from late February onwards. Almost any available material from the immediate vicinity was used, mainly dead twigs, sedges *Carex spp*, reeds *Phragmites communis* and waterweeds. Some pairs utilised a floating pile of dead waterweed that had accumulated in emergent vegetation. Platforms were frequently built in quite exposed places; they were sometimes on dry land at the edge of the water, but more often attached to semi-aquatic vegetation in the stream. They measured 2-5 cm in depth and 20-25 cm in diameter, were loosely made and, with frequent rises in water level, seldom lasted more than three weeks. At times, as many as five platforms were present simultaneously in the territory of a single pair. A display platform is shown in plate 25a.

New platforms were never built while egg-laying or incubation was in progress, but old platforms were sometimes used as night roosts by non-incubating birds.

Egg nests

Both sexes were seen to take part in nest-building. Males took the greater share of collecting the materials, while females did most of the arrangement. Most pairs built two nests before laying their first clutch of the season, but in re-nesting attempts only one was built. Where there were two nests, the unoccupied one was sometimes used as a roosting place by the non-incubating bird; since such nests were constantly disintegrating, however, most disappeared before incubation was completed.

All nests were either in water, or suspended above it, or on mud banks surrounded by water. As also found by other workers (e.g. Fredrickson 1971, Relton 1972), many, but by no means all, were well concealed in emergent vegetation.

Nests were built while the display platforms were still in use,

frequently about a week prior to egg-laying. In four cases nest construction started less than twelve hours before the first egg was deposited. Such rudimentary nests were really foundations, consisting of twigs and coarse stems, and similar in appearance to the platforms; further materials were subsequently added to the sides, and the cup was lined with finer matter. Early nests were constructed almost entirely of dead material, since green vegetation was not available. As the season progressed, increasingly greater proportions of green vegetation were utilised. In some early nests, green material was added to the original structure during incubation.

During the early stages of construction, anything available in the immediate vicinity was used to form the base, though preference was shown for coarser materials, such as dead twigs or stems of reeds. In the later stages finer materials, usually leaves, were added. Where pond sedge *C. acutiformis* or floating sweet grass *Glyceria fluitans* was present, this was used in preference to reed stems. One pair nesting in a reed bed brought sedge leaves from 12 metres away for this purpose.

Nests floating in water over 20 cm deep often had a ramp incorporated on one side. This was made of coarse materials like the base of the nest and permitted the owners to enter and leave without damaging the sides of the nest (plate 25b). About half the nests had no ramp and these were generally situated in shallower water.

Brood nests

Brood nests were built shortly after the young hatched, and were similar to egg nests in both size and structure but usually much more rapidly constructed, frequently being completed in less than eight hours. Some brood nests lacked a ramp, and there was evidence to suggest that certain pairs always made ramps while others did not, though, as with egg nests, this might depend to some extent on the water depth. Some pairs had as many as five brood nests; as will be shown later, this appears to be related to the number of young hatched.

EGG-LAYING

Egg characteristics

The base colour of the egg was buff, though one female laid greenish-white eggs. All eggs were spotted with a darker colour of varying shades of brown, from reddish and purplish to almost black. These spots varied considerably in size and number and were concentrated more at the blunter end (air-space region), unlike the eggs of the Eurasian and American Coots which have spots evenly distributed (Witherby *et al.* 1938-41, Gullion 1954). The depth of both ground

and spot colours, and the size and density of spots, were consistent in all eggs laid by each individual female, whether in the first nest, the second nest or renests.

Eighty-eight eggs were weighed, generally within 24 hours of laying. The mean weight was 24.88 gm, the range 21.5-28.5 gm.

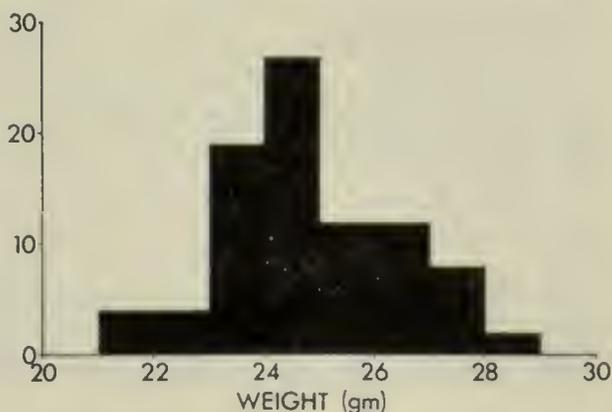


Fig. 10. Weights of 88 freshly laid eggs of Moorhens *Gallinula chloropus*, Avon Valley study area, 1968-69

Season

In 1968 the earliest egg was found on 6th April, while in 1969 the earliest was not until 13 days later. First eggs were generally later in 1969 (see table 2). Table 3 shows that the mean temperatures in February and particularly in March were lower in 1969 than in 1968, possibly reducing food availability prior to laying. The latest clutch recorded was commenced on 22nd July. Relton (1972) reported clutches started as early as 26th March and as late as 8th August in Huntingdonshire.

Rate and time of laying

One egg was deposited each day until completion of the clutch, confirming the statements of Witherby *et al.* (1938-41) and Steinbacher (1939). Where two birds were laying in the same nest (see below), the eggs of each female were considered separable on the basis of their individual characteristics, particularly colour variation. Relton (1972) and C. R. Huxley (*in litt.*) also consider this method reasonably reliable.

Table 2. Laying dates of first eggs of Moorhens *Gallinula chloropus*, Avon Valley study area, 1968-69

Some eggs might possibly have been laid in an earlier period if predation had occurred before the first observation

	APRIL			MAY				JUNE	TOTAL PAIRS	
	1-7	8-14	15-21	22-30	1-7	8-14	15-21	22-30		1-7
Number in 1968	1	1	2	5	1	-	-	-	-	10
Number in 1969	-	-	1	3	1	3	1	2	1	12

Table 3. Mean spring temperatures (degrees Centigrade) at Hurn, Hampshire, 1968-69

The overall mean given here is the average of the mean maximum and mean minimum

		February	March	April	May
1968	Mean maximum	6.4	10.7	12.7	14.8
	Mean minimum	-0.9	2.4	2.9	5.6
	Overall mean	2.7	6.5	7.8	10.2
1969	Mean maximum	5.6	8.9	13.2	15.5
	Mean minimum	-1.2	1.4	3.0	7.3
	Overall mean	2.2	5.1	8.1	11.4

The exact time when eggs were laid was not determined, but in all known cases this took place before 08.00 hours GMT. Steinbacher (1939) reported that egg-laying normally takes place at night.

Clutch size

The mean clutch size in 'first nests' (the first clutch of the season), excluding those predated or parasitised during laying, was 6.1 in both 1968 and 1969 (table 4). There appeared to be little difference in clutch size between first nests and 'first renests' (the first attempt at a replacement clutch following destruction or predation of a first nest), but, as the season progressed, the clutch size in subsequent renests generally became smaller (table 4), and reneesting was eventually curtailed altogether. Thus, the mean clutch sizes

Table 4. Clutch sizes of Moorhens *Gallinula chloropus*, Avon Valley study area, 1968-69

Data exclude incomplete clutches and those laid by more than one bird

Year	Type of nest	TOTAL CLUTCHES	Number of clutches of:						Mean
			4	5	6	7	8	9	
1968	First nest	6			5	1			6.1
	First renest	6			5	1			6.1
	Second renest	2	1	1					4.5
	Third renest	3	1	2					4.7
1969	First nest	8		1	5	2			6.1
	First renest	6	2		3		1		5.9
	Second renest	2			2				6.0
	Third renest	2	1	1					4.5
	Fourth renest	1		1					5.0
	Fifth renest	1		1					5.0
	Second nest	1			1				6.0
	First renest	1			1				6.0
	Second renest	1	1						4.0

over the whole of the 1968 and 1969 seasons were 5.32 and 5.39 respectively. Relton (1972) also found clutches of six were commonest, but her first nests averaged 6.7 eggs, renests 6.0 and second nests 5.25.

The laying of eggs in the nest of another Moorhen (referred to here as 'nest parasitism') was found in a few cases and resulted in large 'clutches' of, for example, ten eggs (six laid by nest owner, four by 'parasitic' bird) and eight (six laid by the nest owner, one each by two 'parasitic' females). In all cases nest parasitism took place between birds of neighbouring territories, and it may be significant that these were either comparatively small territories or ones where the nests themselves were situated in relatively close proximity to the neighbours' territory. In one case the predation of a nest after the third egg was laid resulted in the bird laying her fourth egg in the egg nest of her neighbour on the following day. This 'parasitic' bird subsequently laid a further six eggs in a newly constructed nest in her own territory.

Renesting

During 1969 eight birds each renested once, and single birds twice, three times, four times and five times; the latest egg-laying in renests occurred in the last week of July. The 1968 breeding season was shorter, despite an earlier start, and renesting was curtailed earlier, in the last week of June.

Renesting intervals varied considerably (table 5). The average

Table 5. Renesting intervals of Moorhens *Gallinula chloropus* predated at different stages of incubation (in days), Avon Valley study area, 1968-69

Stage of nesting	Stage of incubation	Interval	Mean interval
Egg-laying	—	1	} 6.75
	—	2	
	—	10	
	—	14	
First half of incubation	2	8	} 10.0
	2	9	
	2	10	
	2	18	
	6	10	
	7	7	
	10	6	
	10	15	
Second half of incubation	13	7	} 6.67
	16	4	
	20	9	

renesting intervals of nests predated during the first and second halves of the incubation period (10.0 and 6.67 days respectively) closely resembled those found by Blandin (1965) for the Clapper Rail *R. longirostris*—10.3 days during the first 14 days of incubation, and 7.6 during the final 15-23 days.

Second nesting

Only one case of a 'second nest' (another attempt at nesting following the successful hatching and rearing of the young of a previous nest in that season) was recorded (see table 4). Laying commenced in the second nest on 17th June 1969, 26 days after the first brood hatched. Each parent, when not incubating, continued to feed the young of the first brood. This nest was predated after seven days of incubation. A first reneest was attempted seven days later, but again, after eleven days of incubation, predation terminated this nesting. After a further interval of seven days a second reneest was started on 22nd July and one chick hatched in mid-August. The first brood had by this time dispersed.

Causes of egg failure

During the two breeding seasons 267 eggs were known to have been laid in the study area, of which 47 hatched. The causes of this considerable loss are summarised in table 6.

Table 6. Causes of egg failure of Moorhens *Gallinula chloropus*, Avon Valley study area, 1968-69

Cause of failure	Number of eggs	
	1968	1969
Flooding	42	—
Infertility	1	—
Suspected predators:	Corvidae	8
	Mustelidae	—
	Fox <i>Vulpes vulpes</i>	7
	Unknown	100
Undetermined factors	—	3
TOTAL EGG LOSSES	102	118

The 1968 season was particularly affected by sudden heavy rain, causing rapid rises in the water level and producing fast-flowing torrents which dislodged nest structures and flooded eggs.

Infertility appeared to be insignificant, but it is not known what proportion of the eggs lost to other causes was also infertile. Relton (1972) also reported a low infertility rate in Moorhens in Huntingdonshire.

Predation is believed to have accounted for the greatest egg losses in both years. However, since the act of predation was

never witnessed, only subjective evidence can be given. Firstly, all eight eggshells found (from eight different nests) were between 4.5 and 12 metres from the nests in question, a feature reported as being characteristic of predation by crows (Corvidae) on eggs of Ruffed Grouse *Bonasa umbellus* (Bump *et al.* 1947) and on duck eggs (Sowls 1948). Secondly, all these eggs had retained their shape, and all had a moderate-sized hole on one side and another small puncture on the opposite side with outward-projecting fragments. From the review by Rearden (1951) of waterfowl nest predators, this appears to be typical of crow predation.

Two mustelids—Stoat *Mustela erminea* and Weasel *M. nivalis*—are known to have been present in the study area, while American Mink *M. vison* inhabited the Avon Valley, though they were not seen in the study area. There was evidence of mustelids taking six eggs (from one nest) from the presence of their characteristic musty odour. No damage to the structure of the nest had taken place.

Predation of two nests (13 eggs) was believed to have been carried out by one or more Foxes *Vulpes vulpes*, the nest form being completely destroyed, with the greatest damage to the side. This was the pattern found by Rearden (1951) for six out of eight nests destroyed by the American Red Fox *V. fulva*.

INCUBATION AND HATCHING

Start of incubation

Data concerning the time when incubation commenced were obtained from 34 nests during the two breeding seasons (table 7). In first nests incubation did not start until completion of the clutch, with one exception in which it commenced with the laying of the last egg but one. In contrast, in renests, and also in the single second nest recorded, incubation always started before completion of the clutch, usually when about half the clutch had been laid but in two cases after the laying of the second egg in eventual clutches of six.

Table 7. Proportion of eggs laid by Moorhens *Gallinula chloropus* at start of incubation in relation to stage of egg-laying in first and later nests, Avon Valley study area, 1968-69

Stage of nest	Mean no. eggs per			Percent eggs laid at start of incubation
	Number studied	nest at start of incubation	Mean total clutch size	
First nest	11	6.1	6.2	98.5
First renest	7	3.3	5.8	56.1
Second to fifth renests	13	3.2	5.5	58.3
Second nest	1	3.0	6.0	50.0
First and second renests	2	2.0	5.0	40.0

Incubation behaviour

Both sexes incubate. Observations on the duration of each bird's incubation shifts in the main study area were limited, owing to the shyness of the birds and to the dense cover surrounding the nests. During two days' observations on a 'tame' pair at Poole Park, the female's incubation shifts varied from 26 to 105 minutes, while the male's turn varied from 45 to 155 minutes. The non-incubating bird usually spent a short time washing before seeking food.

During one of the female's shifts in the morning of the first day's observation at Poole Park, the male spent 19 minutes collecting new nest materials and presenting them to the incubating female; she then arranged them round the rim while still sitting. When the presentation took place the male frequently uttered two-syllabled calls of very low volume: 'cruck-cruck, cruck-cruck'; and at change-overs he continually uttered this presentation call.

While incubating a certain amount of spasmodic preening and changes in position took place. During one of the male's shifts a Mallard came very close to the nest; the Moorhen raised his head, flicked his tail repeatedly and uttered a barely audible 'te-te-te . . .'. This behaviour stopped when the 'danger' was four metres away. No such reaction was recorded in the female which, in addition to being approached by the Mallard, had a similar encounter with a Mute Swan *Cygnus olor*. In the Avon Valley study area observations on nest defence responses were confined to those performed against mammalian intrusion only. This main Moorhen population was exceedingly shy of humans and, at the first sight of such an intruder, the incubating bird would run or splutter rapidly away and hide in dense vegetation, returning to the nest only after the intruder was no longer visible.

In four comparatively intensively studied pairs that successfully brought off broods, nest defence or 'distraction' displays were performed. Such behaviour took place between one and five minutes after the initial action of fleeing from the nest and hiding. Firstly, the bird appeared from the undergrowth and uttered loud distress calls: in the female these consisted of a single, or sometimes a repeated, 'kirk', while the male's equivalent was somewhat like the amplified sound of a pair of garden shears being opened and closed. Then, in addition to the calls, swanning took place and was sometimes followed by and interspersed with churning (see pages 108-109), the latter being more frequent after the eggs had been pipped or when chicks were present. Although both sexes performed these displays, the male usually took the dominant rôle. If he had been incubating or brooding the young, the female rarely joined in and displayed. If the female had been incubating, she

came out of hiding and displayed, but when the male also started to take part she quite frequently went back into hiding again.

In three of these four closely observed pairs, defence displays were never performed before the eggs were pipped, but once this had occurred they were continued, with diminishing frequency, until the young dispersed from the territory. These pairs were single-brooded. In the fourth pair, which was double-brooded, the same behaviour was exhibited with the first nest, but the second was defended throughout egg-laying and incubation.

Despite their shyness towards humans, the Moorhens in the main study area showed no pronounced fear of cattle, with which they had frequent contact. The presence of these animals near a nest invoked no marked defensive reactions.

Incubation period

To ascertain the incubation period, each egg when first found was marked with a pencilled number and the nests visited at least once daily until the start of incubation. This was judged to have begun when the temperature of all eggs present was uniform, since prior to this only the last egg, just laid, was warm.

In one first nest in 1968 all six eggs hatched within one hour, after an incubation period of 21 days (plus or minus about four hours). In a first nest in 1969 pipping (a star-shaped crack in the shell) was synchronous, but the time between the hatching of the first and last chicks was 18 hours. The incubation period of these eggs, assuming that incubation began at 04.00 hours GMT on the day the last egg was laid, averaged 21.75 days and ranged from 21.25 to 22.1 days (table 8). These incubation periods lie within the range of 19-22 days given by Witherby *et al.* (1938-41) and Relton

Table 8. Hatching events in two nests of Moorhens *Gallinula chloropus* of known history, Avon Valley study area, 1968-69

Type of nest	Order of egg-laying	Order of hatching	Incubation period (days)
First nest	1	2	21.5
	2	1	21.25
	3	3	21.8
	4	5	22.1
	5	4	22.0
Second re-nest	1	} 1	22.6
	2		
	3		
	4	4	22.0
	5	5	21.1
	6	6	20.9

(1972); the latter found a mean of 20.1 days for seven clutches.

In renests and second nests it has been shown that incubation starts before completion of the clutch. In such cases, as one would expect, hatching is non-synchronous, being spread over several days. However, despite successive differences of about 24 hours between the laying of each egg (and therefore, theoretically, between the embryonic development of each egg laid after the start of incubation), such eggs hatched at considerably less than 24-hour intervals. Sufficient data to confirm this could be obtained from only one nest, where the exact time of hatching was observed for four of the six eggs and a maximum possible error of plus or minus one hour obtained for the hatching time of the other two. These data (table 8) show that the first three eggs laid hatched at the same time; since incubation was known to have started with the third egg, they all underwent the same incubation period. However, eggs four, five and six, laid about 24, 48 and 72 hours after incubation commenced, hatched at 13, 33½ and 40 hours respectively after the hatching of the first three eggs. Vince (1968) has shown experimentally in Bobwhite Quail *Colinus virginianus* that a reduction in hatching spread can be brought about by retardation of the most advanced embryos and also by an acceleration of the most retarded embryo. The same phenomenon may possibly occur in the Moorhen.

Hatching events

The first external sign of hatching begins with the chick pipping a small star-shaped crack in the shell about 2-2½ days before hatching. Typically, about four hours later four or five such cracks, fairly evenly spaced, appear round the line of the air-space. For about the next 20 hours no change occurs, but after an additional four hours more cracks appear and after a further 18 hours a small hole is made through which the chick's beak can be clearly seen. The chicks usually hatch two to 18 hours later.

Four Moorhen and three Coot eggs set in an artificial incubator also pipped about two days before hatching. These likewise had a resting period, during which no change occurred, the day before hatching.

The embryo chick gives a characteristic 'phew' vocalisation from shortly after the time it first pips into the air-space, a call which is maintained until the chick is quite well grown. This call is given continually except during the resting periods after pipping and immediately after hatching, and while sleeping or being brooded.

The chick's eyes are open when it emerges from the shell, but, being exhausted by the final efforts of hatching, it rests with eyes closed if undisturbed. Despite its initial weakness, it is capable of holding its head erect about 15 minutes after hatching. Drying

Table 9. Productivity of Moorhens *Gallinula chloropus* at different periods, Avon Valley study area, 1968-69

	Period	Nests started	Nests successful	Eggs laid	Chicks hatched	Chicks reared (to 70 days)
1968 (10 pairs)	April 1-15	2	1	13	6	6
	16-30	7	—	38	—	—
	May 1-15	3	1	16	5	5
	16-31	5	—	27	—	—
	June 1-15	4	—	19	—	—
	16-30	1	1	5	5	5
TOTALS		22	3	118	16	16
1969 (12 pairs)	April 16-30	4	1	22	5	5
	May 1-15	9	2	39	6	6
	16-31	5	1	29	6	6
	June 1-15	4	—	18	—	—
	16-30	6	2	26	9	7
	July 1-15	1	—	6	—	—
	16-31	2	2	9	5	5
TOTALS		31	8	149	31	29

takes about two to four hours. Very soon after each chick has hatched—even while it is still wet—the eggshell is either removed or eaten by a parent.

Hatching and rearing success

Table 9 shows the hatching and rearing success of 267 eggs known to have been laid in the Avon Valley study area during 1968 and 1969. During 1968 only three of 22 nests started (13.6%) were successful, and of the 118 eggs laid only 16 (13.6%) hatched, giving an average of 1.6 chicks per pair. The situation improved somewhat during the 1969 season when eight nests out of 31 (25.8%) were successful and 31 chicks hatched, representing a mean production of 2.6 chicks per pair.

Rearing success as measured by the proportion of young known to be surviving at 70 days of age, in contrast to hatching success, was high. During 1968 all chicks were reared, while in 1969 29 out of 31 chicks hatched (94%) survived; of the two young lost, one disappeared at about ten days of age, while the other was killed by a Stoat when 65 days old.

PARENTAL CARE AND DEVELOPMENT OF YOUNG

Parental care and chick behaviour

Once 'dry, the chicks were quite buoyant and capable of climbing in and out of the nest if necessary, though chicks from synchronous

hatches generally stayed in the nest for the first twelve to 24 hours. When hatching took place over several days, the first chick to emerge normally stayed in the nest for two days. By the time several chicks had hatched, they usually left the nest for short periods in the care of one of the parents, while the other, usually the male, continued incubating the remaining eggs.

Brood nests (already mentioned on page 138) were built soon after the last chick had hatched, though in one case the egg nest was used for brooding the chicks until the fifth day. Although additional materials were added from time to time, new brood nests were built and the old ones eventually allowed to disintegrate. Owing to the difficulty of finding brood nests in the dense vegetation, an intensive search for these structures was confined to five territories containing broods. It appeared that the number of brood nests constructed was correlated directly with brood size and inversely with their duration and functional life (table 10).

Like nidicolous young, the chicks are initially dependent upon their parents for food. On the approach of a parent the chick performed a begging display (fig. 11a). The entire head and body were stretched upwards and forwards at an angle of about 60° from the horizontal, so that the bird was sitting on its 'tail end'. The wings were outspread and often quivered. The head, which thus displayed most prominence, often developed gentle swaying movements not unlike those sometimes seen in nidicolous nestlings. As the chick approached two weeks of age this begging display was gradually modified (fig. 11b): it tended to squat and elevate its hind quarters with neck held low, while the head was pointed slightly upwards; as before it still displayed with outstretched, quivering wings.

Upon the presentation of food (fig. 11c), chicks of all ages snatched at the parent's bill. Food tended to be offered to the chick which begged and pecked most voraciously. It seems likely that chicks are adapted to peck at the adult's beak, as in many

Table 10. Comparison of brood size in five cases with number and duration (in days) of brood nests constructed by Moorhens *Gallinula chloropus*, Avon Valley study area, 1968-69

One chick in brood B died when approximately one week old

Brood	Chicks hatched	Brood nests constructed	Total time brood nests used by chicks	Mean functional life of each nest
A	1	2	66	33.0
B	3	2	55	27.5
C	4	4	50	12.5
D	5	4	35	8.75
E	6	5	44	8.8
Means	3.8	3.4	50	14.7

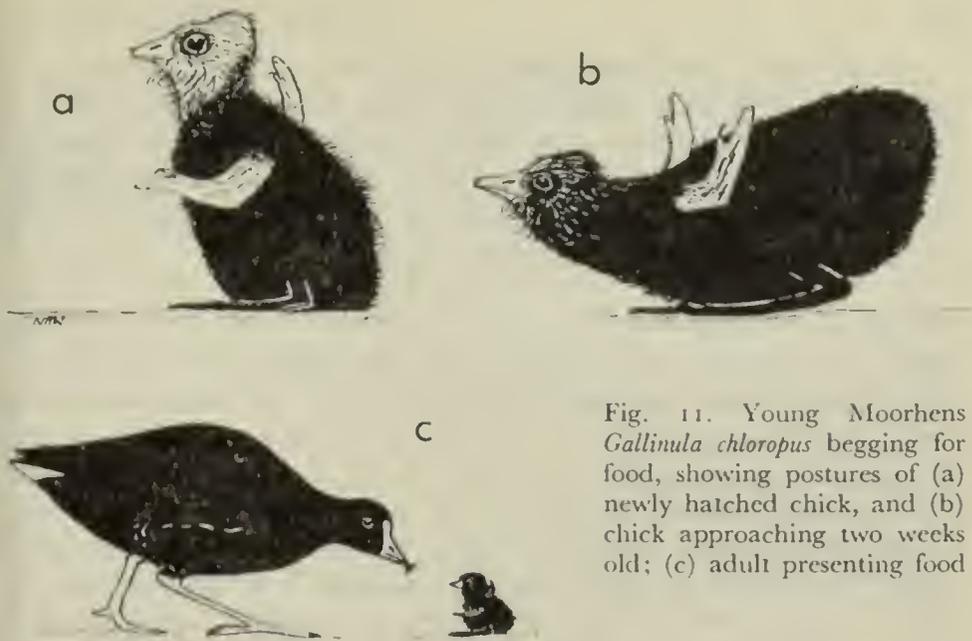


Fig. 11. Young Moorhens *Gallinula chloropus* begging for food, showing postures of (a) newly hatched chick, and (b) chick approaching two weeks old; (c) adult presenting food

terns and gulls (Laridae), since it has been shown experimentally (Weidmann 1965, Kear 1966) that Moorhen chicks tend to peck at red and yellow more readily than other colours.

Although feeding of the chicks by the parents was frequently observed, only common duckweed *Lemna minor* and Canadian pondweed *Elodea canadensis* were specifically identified as food items. Animal food was unidentifiable. W. E. Collinge (in Witherby *et al.* 1938-41) found 'vegetable matter 61%, worms 23% and insect larvae 16%' in six 'nestlings' examined. Plater (1969) reported an adult Moorhen taking an unhatched egg from its own nest and feeding it to the chicks, and N. A. Wood (in Plater 1969) examined a chick less than one week old which contained grass and Mallard egg remains. Fredrickson (1971), working with the North American race *G. c. cachinnans*, noted that nymphs of dragonflies (Odonata) and mayflies (Ephemeroptera) were frequently fed to the chicks.

After the first week daytime brooding decreased considerably. At two weeks of age early-hatched chicks were regularly brooded only on colder days. Late broods (hatched from June to August) were never seen to be brooded between 08.00 and 18.30 GMT.

From about the eighth day chicks, when disturbed, were capable of diving and swimming up to three metres underwater. This may be an important survival mechanism, as from this age the parents often temporarily deserted some of the young while searching for food. The parents appeared to have no difficulty in relocating their young, even in dense vegetation, presumably because of the almost continuous 'phew' cries made by the chicks. Larger broods containing more than four chicks were sometimes divided between the two parents, with separate groups foraging in different areas of the territory.

As the chicks grew they became less reliant on their parents and by the age of 25 days were finding a large proportion of their own food. Although juveniles often foraged with their parents, parental feeding was not observed after 45 days of age. Juvenile Moorhens could fly well at 60 to 65 days of age, though one individual did not attain the power of flight until 75 days old.

Multiple brood family units

Although one pair managed to produce two broods in the same season, its first brood had dispersed before the next brood hatched, the interval between these hatches being eleven weeks. Thus it was not possible in this study to observe the behaviour of family units containing two broods, though I have seen first-brood juveniles help feed younger siblings elsewhere. Grey (1927) first recorded juveniles taking food from their parents and passing it to younger chicks. Brown (1944) further reported first-brood juveniles feeding those of the third brood. Juveniles have also been seen to collect food and present it to their parents which in turn fed it to the chicks, and also to collect food and feed it to younger chicks directly. Robertson (1964) reported a juvenile Moorhen incubating, while I have observed a juvenile brooding younger siblings. A further link in this chain of remarkable domesticity was provided by Hayman (1955) who recorded an adult presenting sticks and leaves to a half-

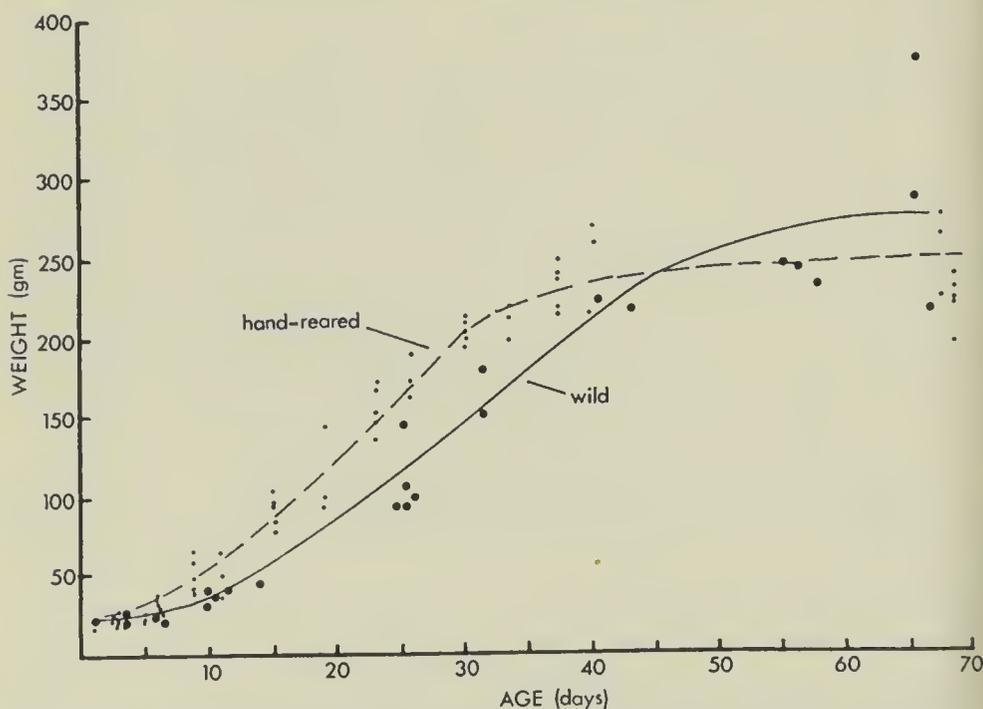


Fig. 12. Comparative weight increases in wild and hand-reared chicks of Moorhens *Gallinula chloropus* up to 70 days, Avon Valley study area, 1968-69

grown juvenile which worked them into the rim of the nest.

The participation of juveniles in feeding younger siblings has also been reported in the North American race of the Moorhen (E. A. McIlhenny in Nice 1943, Skutch 1961), Coot (Ruthke 1939, H. Boyd in Kear 1966) and Southern White-breasted Rail *Laterallus leucopyrrhus* (W. Meise in Nice 1943). Harrison (1970) observed a group of four captive Purple Gallinules co-operating in raising a single brood. Two were siblings of the previous year but in adult plumage. Such a phenomenon is unlikely to occur in European Moorhens, as juveniles are not tolerated after the breeding season.

Growth of the young

The application of fish-fingerling tags to newly hatched chicks made it possible to know the exact age of the birds if subsequently recaptured, when weights and measurements were always taken.

During the chick's first week little weight change occurred, but thereafter their weight increased rapidly until 45 days of age, after which growth continued but at a slower rate; the more rapid growth observed in a group of hand-reared chicks fed 'chick starter crumbs' (19% protein) *ad lib.* illustrates the growth potential when a superabundant food supply is available (fig. 12). The length of the tarsus and middle toe combined was found to increase faster initially than either the wing- or bill-length; this is illustrated in fig. 13 which, however, should be interpreted with caution, since it compares the absolute and not the relative rates of increase.

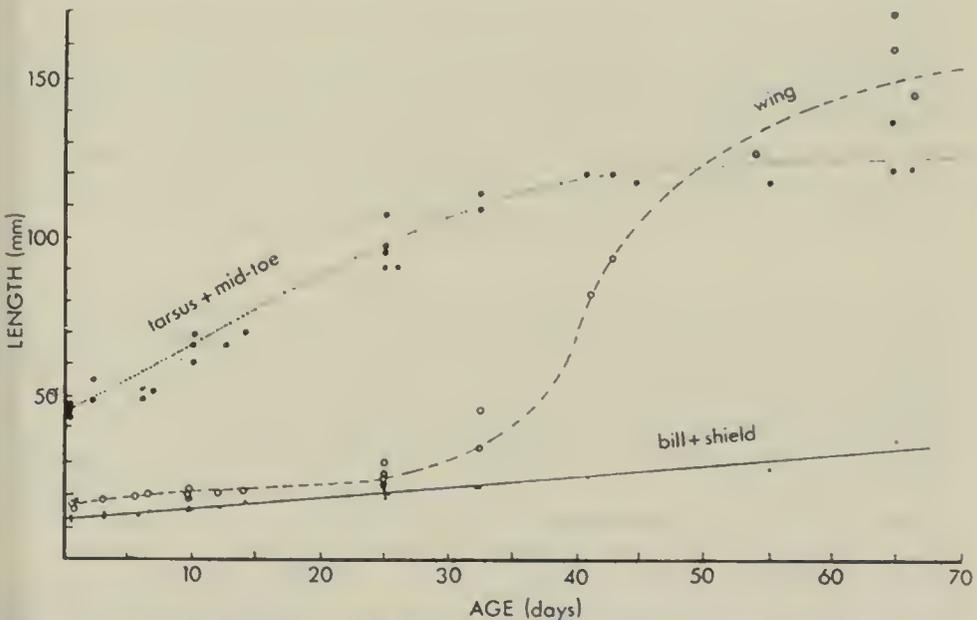


Fig. 13. Growth of wild chicks of Moorhens *Gallinula chloropus* as shown by increase in length of bill and shield, wing, and tarsus and middle toe, Avon Valley study area, 1968-69

Plumage and soft part changes

Days 1-7 When dry the newly hatched chick, except on the head, was covered with black down. That on the upperparts was glossy with long, hair-like tips, while the down on the underparts was shorter and sooty-black. The density of the down was considerably greater on the underparts, providing greater water repellence and insulation when swimming. The down on the back and wings also became denser after a few days, though on the head it remained very sparse, particularly towards the frontal region. The down on the chin, sides of head and throat was tipped with white and coarser, each filament being enclosed with a sheath containing a number of finer filaments of down. On the wing at the end of the first digit or alula there was a distinct elaw, curved at the tip and 1-1.5 mm in length. The legs and toes were black, the skin above the eyes blue, and the bill and shield, as in the adults, bright red and tipped with yellow. About 1 mm from the tip of the upper mandible there was a pale yellow pipping 'tooth' approximately 1 mm in diameter and 0.5 mm in thickness.

Days 8-18 By the eighth day the head had a thicker covering of down, and during the following ten days the blue coloration above the eyes began to fade, but otherwise little change occurred.

Days 19-30 During this period of rapid growth, chicks underwent considerable plumage change, though individual variation occurred in the age of attainment of certain plumage characters, and the heaviest chick in a brood always had the most advanced plumage.

Initially, short quills began to appear on the flanks and back which gave rise to short dark brown feathers, followed in a few days by greyish tufts covering the ears. Cream feathers based with grey developed from both sides of the belly, gradually spreading into the centre and leaving a distinct stripe of black natal down of daily diminishing width. Towards the end of this period more feathers developed on the head and neck and the tail feathers began to grow. The head feathers were whitish on the chin, gradually giving way to white feathers tipped with dark brown on the face and to entirely dark brown ones on the crown and upper surface of the neck. The underside of the neck was greyish to olive-brown.

Natal down persisted throughout this stage only on the tail and wings, but small flakes of it remained for some time attached to the tips of newly developed feathers. Towards the end of this period the red on the bill and shield faded to a more subdued pinkish-red and the pipping tooth gradually wore off. The legs, originally jet-black, became more greyish-black.

Days 31-45 Fewer changes occurred, but as the tail-coverts continued to grow they became more obvious. This period was characterised by the initial development of the primaries, secondaries and wing-coverts. The primary quills protruded through the skin at about 30-35 days of age. The development of all ten primaries was almost simultaneous, there being no more than about two days' difference between the first (outermost) and last (innermost). The secondary quills immediately followed and there was likewise only about two days' difference between development of the innermost and outermost. The wing-coverts developed simultaneously with the secondaries but much faster, their entire growth usually being completed within 15 days of their first appearance.

Upon reaching a length of about 3 mm, the tips of both the primary and secondary quills split, showing the first signs of the actual feathers. Both the quill and feather parts continued to grow, the former to a maximum length of about 30 mm. Primary and secondary feather growth during this period averaged about 1.3 mm per day.

The only natal down still remaining at 45 days of age was confined to the patagium of the wing. The upper part of the bill and shield, originally red, became steadily pinker, in turn changing to dark olive-green, though the yellow tip remained unchanged. The growth of the legs and toes slowed down considerably and the edge of each leg scale turned greenish, this colour change creeping inwards over the scale until at about 40 days of age the legs were entirely dark olive-green.

Days 46-65 The changes during this period were small. Body weight increased only slowly, and wing feather development continued.

Development after 65 days Up to about 15 weeks no further plumage changes were observed. However, the legs became even greener and the bill and shield (except the yellow tip) turned darker olive-green to almost black in some individuals.

The post-juvenile moult took place at 15 to 18 weeks of age. The first-winter plumage developed through only a partial moult of the juvenile feathers, the wing feathers (including the coverts) and tail feathers not being moulted. The head and neck became dark brown, except for the chin and throat which remained buff-white. The base of the neck and the underparts became dark slate blue-black tipped with cream and buff-brown. The overall appearance became similar to that of the adult but more grey-brown. Witherby *et al.* (1938-41) stated that another (first-summer) moult takes place in April, though only partial, being confined to the head, neck and throat.

Dispersal of the young

Little information was obtained on the time of brood dispersal, owing to the difficulties of observation in dense vegetation. During the later stages of development members of any particular brood were, on average, seen on only one visit to the study area in three. Thus the time of dispersal of all members of a brood could only be estimated from the time when no young were seen after frequent and repeated visits to the territory in question. On this basis, the age at dispersal ranged from 52 to 99 days and averaged 72 days. This compares with about 70 days in the Coot (Cramp 1947) and 80 in the American Coot (Gullion 1954).

BREEDING BIOLOGY—DISCUSSION

The numerous nest-like structures built by paired Moorhens are similar to those constructed by at least some other rails, including the American and Eurasian Coots (Gullion 1954, Kornowski 1957), Tasmanian Native Hen (Ridpath 1964) and Takahe *Notornis mantelli* (Williams 1960). Certain others, such as the Virginia Rail *R. limicola*, Clapper Rail, King Rail and Sora Rail *Porzana carolina* (Walkinshaw 1937, 1940, Koziacky and Schmidt 1949, Meanley 1953, Pospichal and Marshall 1954), appear to construct nests only for their eggs. Possibly display platforms and brood nests may be features unique to gallinules and coots: though obviously valuable for their intended use by coots, which occupy open aquatic habitats

such as lakes and reservoirs, their value to the more terrestrial gallinules must be limited to the protection given against ground predators, at least in the case of brood nests on or surrounded by water.

The commonest clutch size found in this study was six, but the number of eggs varied from four to nine and averaged 5.3. As the season progressed clutch size in renesting attempts became smaller (table 4). Renesting had an important influence on the total number of young produced in the study areas in the 1968 and 1969 breeding seasons, but, since the extent of renesting depends on earlier nest losses (flooding or predation), it might not necessarily be significant in areas where nest losses are small. Renesting persistence probably varies between individual females and from season to season: during the warmer summer of 1969 more occurred than in 1968. Sows (1955), in reviewing the physiological process involved in renesting, stated that in single-brooded species the further incubation had proceeded at the time of nest loss the longer the renesting interval would be. However, in double-brooded species the reverse occurs, the renesting interval being shorter if the nest is destroyed late in the incubation period; this is due to a renewed growth of the ovary follicles in preparation for the second nest. Thus, from the data presented (table 5), the Moorhen would seem well adapted to renesting and even to continued nesting following earlier breeding successes.

Only one case of second nesting was recorded in the Avon Valley study area, but this may occur more frequently in other areas; Norderhaug (1962) stated that two broods were usual in Norway. Anderson (1965), in his Aberdeenshire study area, found that pairs with previous breeding experience were generally triple-brooded. Relton (1972) in Huntingdonshire, also working in lowland agricultural habitat, found that 22% of clutches were replacements (renests) and 21% second clutches, but she recorded no third clutches.

Based on the number of eggs laid, hatching success was low in the present study. However, it must be borne in mind that if hatching success had been high fewer eggs would have been laid, since the majority of eggs were produced in renesting attempts. In contrast to hatching success, rearing success was extremely high (97%), and resulted in an average production of 2.1 young per pair over the two seasons. The ability of Moorhens to renest is, at least from this evidence, of great importance in maintaining the population size. Relton, who reported heavy egg predation, also found a high chick survival rate (91%) and estimated a production of 4.2 young per pair in her study area.

Parental care as exhibited by both sexes in the Moorhen is not



PLATE 21. Arctic Tern *Sterna paradisaea*, Northumberland, June 1970 (photo: David and Katie Urry). Typical features are rather short, 'spiky', all blood-red bill, rounded head, 'neckless' appearance, grey underbody, long tapering dark band on trailing edge of all primaries, remiges below otherwise uniformly pale and translucent against light (forming long narrow triangle), and upper-primaries all similar, outer ones no darker than inner; see also plate 24a (pages 133-136)

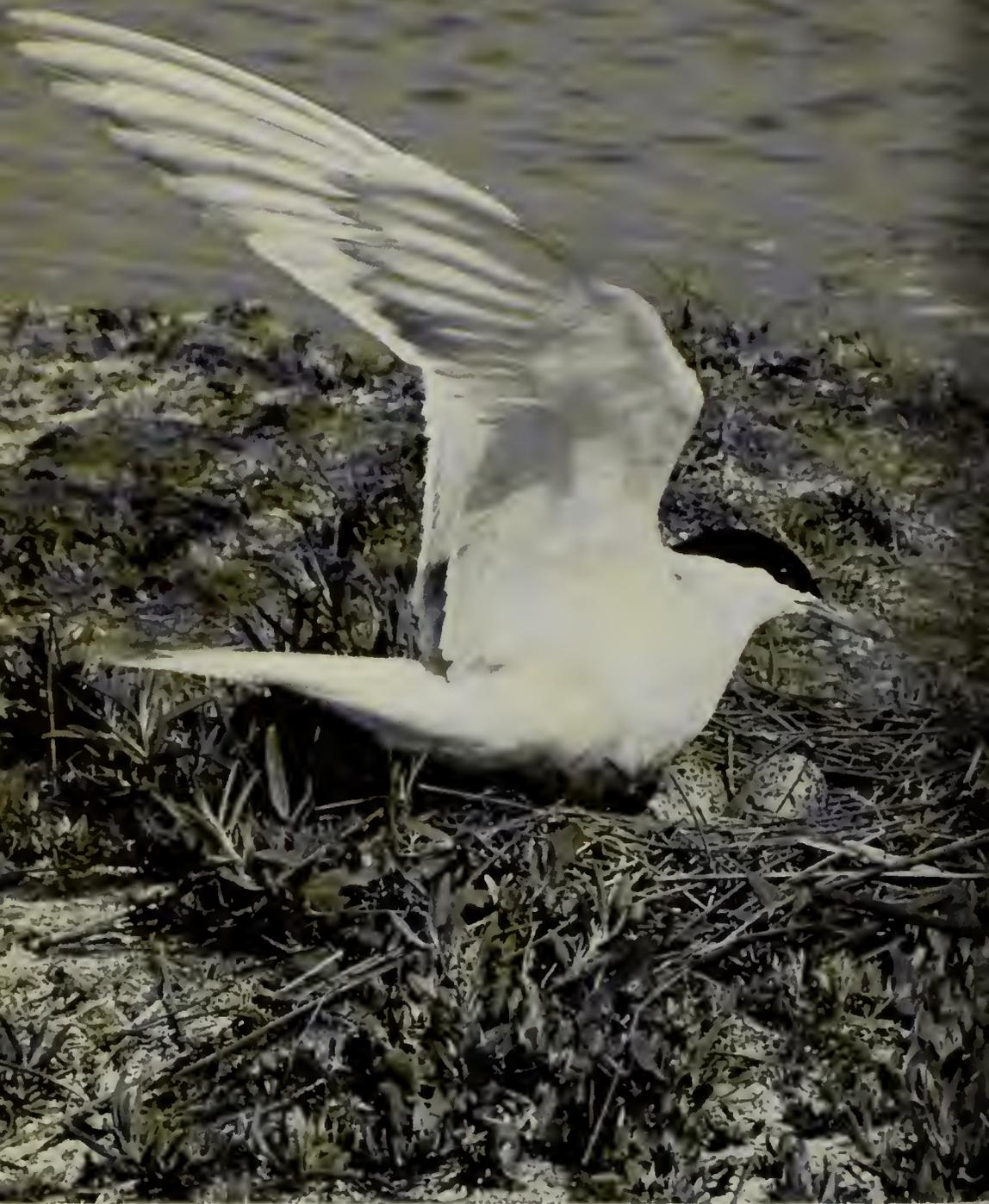


PLATE 22. Common Tern *Sterna hirundo* alighting at nest of Avocets *Recurvirostra avosetta* by mistake (photo: Eric Hosking). Here the outer seven upper-primaries (including the short first) are darker than the rest, though this varies individually and five or six seems more usual; as the summer progresses these tend to darken more than this, the inner ones often showing a darker 'wedge' (page 134)

23. Right, one
mer (at top)
n adult Com-
ns, Cornwall,
9 (photo: J. B.
ttomley), with
y of darker
rimaries and
ng 'wedges';
iling edge to
ng cut square
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dy not diag-
Arctic. Below,
terns, North-
nd, July 1968
David & Katie
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form, wings
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PLATE 24. Above, Arctic Tern, Tiree, Argyll, June 1972 (photo: H. E. Grenfell). Below, Common Tern (in active wing moult) feeding juvenile, with young Black-headed Gull *Larus ridibundus* on far right, Netherlands, September 1972 (photo: Hans Schouten). Arctic's shorter legs a useful point only in ideal conditions





PLATE 25. Above, display platform, and below, egg nest with ramp, of Moorhens *Gallinula chloropus*, Hampshire (photos: N. A. Wood). Display platforms, usually attached to emergent vegetation, seldom last long; about half the egg nests in the study had ramps for entry and exit without damage to the nest (pages 137-138).





PLATES 26 and 27. Male Common Tern *Sterna hirundo* paired with female Roseate Tern *S. dougallii*, Coquet Island, Northumberland, June 1973 (photos: C. Stephen Robbins). Three such mixed pairs each raised one chick to fledging in the main Roseate-dominated part of the ternery, the chicks (left) resembling those of Common Terns (pages 168-170). Note Roseate's long, slender, dark bill, almost white upperparts, five dark outermost primaries, and very long tail-streamers





PLATE 28. Nest of Stone Curlews *Burhinus oedichenus* containing two eggs from each of two females, Kent, May-June 1968 (photo: R. E. Scott) (pages 165-166). Below, Red-throated Diver *Gavia stellata*, Lincolnshire, February 1972 (photo: Keith Atkin): unusually large numbers were reported in January 1974 (page 175)



unique among rails; indeed, even from the limited information available, it seems that this behaviour is common to the majority of species.

Boyd and Alley (1948) reviewed the natal plumage of 61 species and subspecies from 25 genera of rails, from which it may be concluded that the blackish down seems to be general.

The bright head coloration has been the subject of discussion by several authors. Hingston (1933) suggested that in young Moorhens, as in young Coots and spotted woodpeckers *Dendrocopos spp.*, it was a warning coloration to potential predators. Although this may possibly be true of woodpeckers, I can find no evidence to support this hypothesis in the case of Moorhen or Coot chicks. Indeed, their behaviour towards a possible predator or the alarm notes of their parents results in efforts to conceal the coloration. During the first few days of life, in which the young spend most of their time either in the egg nest or in a brood nest, 'danger' results in them scrambling out of the nest to seek dense cover where they remain motionless with heads bowed, giving further concealment of the bright colours.

Steinbacher (1930) suggested that the head colours may act as a stimulus to the adults towards parental care of Coot chicks, a hypothesis analogous to the believed function of the coloured gape, or buccal cavity, of passerine nestlings. Boyd and Alley (1948) expanded upon this and postulated that in Coots 'the brilliant head-markings serve to stimulate the adults to feed the young'. My observations on Moorhen chick behaviour, both in captivity and in the wild, suggest that this hypothesis holds true for the Moorhen also. Bearing in mind that in nidicolous species food is always 'presented' to the brightest region of the nestlings, the gape, it is logical that the adult Moorhen should also present food to the brightest part of its young, in this case the bill. Here, unlike nidicolous young, the chick pecks at the food item being held in the parent's bill, and when it grips it the parent lets go. This hypothesis is further supported by the fact that chicks showed greater reliance on feeding themselves at a time coinciding with a reduction in bill brightness and were totally independent of parental feeding by the time the bill turned dark olive-green.

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SUMMARY

A study was conducted to investigate certain aspects of the Moorhen *Gallinula chloropus*, particularly its breeding biology, from March 1968 until February 1970. Data were obtained in a study area comprising 53 hectares of agricultural land in the Avon Valley, near Fordingbridge, Hampshire, and supported by additional observations at Poole Park, Dorset.

The displays are described; those associated with courtship are relatively simple and their primary function is probably sexual synchronisation. Aggressive displays are more complex and are probably related to the birds' extreme territorial nature. All the postures exhibited by the Moorhen were extremely similar to the corresponding ones found in coots *Fulica spp.* It is suggested that the genera *Gallinula* and *Fulica* may be more closely related than is indicated by the present classification in separate subfamilies.

Defended breeding territories varied in size. During the autumn and winter all the Poole Park birds and a few Avon Valley pairs ceased defending territories. The majority of Avon Valley birds, however, maintained reduced territories or 'core' areas, but often fed in the surrounding 'neutral' areas with wintering flocks.

Three types of nest structures were built by breeding pairs: display platforms, egg nests and brood nests. The first were constructed prior to egg-laying and used as resting structures as well as for coition. Egg nests were more carefully built than platforms, sometimes having a ramp incorporated to prevent damage to the sides. If predated, the next clutch of eggs was laid in a newly constructed nest (re-nest). Brood nests were very similar to egg nests in construction and were built shortly after the young hatched. They were used for brooding the chicks both day and night, and as many as five such constructions were built during the rearing of a brood.

The clutch size in first nests ranged from five to seven (mean 6.1) during the two laying seasons, but as the season progressed clutch sizes in re-nests became smaller, giving an overall mean of 5.3. Up to six nesting attempts by a single pair were recorded during the season, which extended from early April until the end of July. Egg weights ranged from 21.5 to 28.5 gm (mean 24.88).

Incubation in first nests started when the last egg in the clutch has been laid. In re-nests, and also in the single second nest recorded (following the successful hatching and rearing of a first nest), incubation began when only about half the clutch had been laid, so that hatching was spread over several days. However, early-incubated eggs tended to take longer than average to hatch, while the last laid had a reduced incubation period. The average incubation period was 21 days and incubation duties were shared by both parents. Based on the number of eggs laid (267), hatching success in the Avon Valley study area was low (13.6% and 25.8%) during both seasons, but persistent re-nesting attempts resulted in an overall production of 1.6 and 2.6 young per pair during 1968 and 1969 respectively.

After hatching, the chicks were helpless until at least a day old and even after this required much parental care, which was undertaken by both sexes. Initially growth was slow, but from seven to 45 days it was rapid, after which it became gradual again. Parental care decreased with age, and by 25 days the chicks became considerably less dependent upon their parents for food. Most young were able to fly well at 60 to 65 days but remained with their parents for 72 days, on average. Survival rates of young to this age were extremely high—100% and 94% in the two years.

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Food of Bee-eaters in southern Spain

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Despite the fact that many studies on the food of the Bee-eater *Merops apiaster* have been undertaken in several European countries (mostly quoted in Swift 1959) and Africa (e.g. Fry 1973), practically no work has been done hitherto on the diet of this species in Spain. Up to the present study, the only published data are a few field observations (Mountfort 1957, Cano 1960) and analyses of some stomach contents (Gil Lletget 1927-28, 1944-45). In this paper we deal with the food of Bee-eaters in the first stages of their occupation of southern Spanish breeding sites, on the basis of pellet analyses.

MATERIAL AND METHODS

Pellet samples were collected between 29th April and 13th May 1973 at three western Andalusian nesting colonies, as follows:

Locality 1 (sampling dates 29th April, 2nd and 11th May) Close to Villanueva de Córdoba (Córdoba), 700 metres above sea level. The surrounding habitat consists of open woods of evergreen oak *Quercus ilex* with extensive pastures and cultivated farmlands.

Locality 2 (one sample, 13th May) Near Puebla del Río (Sevilla), 5 metres above sea level. Open grasslands with some sparse wild olive trees *Olea europaea* on one side and large open marshlands on the other. This locality is just on the border of the marshes of the River Guadalquivir.

Locality 3 (one sample, 2nd May) El Mustio, in the north of Huelva province, 500 metres above sea level. Habitat a mixture of open evergreen oak woods with variable amount of shrubs, pure shrubs (mainly *Cistus ladaniferus*) with no trees and, to some extent, shrubs afforested with stone pines *Pinus pinea*.

Each sample of pellets was cleaned and dried to a constant weight, the whole sample, as well as individual unbroken pellets, being weighed to the nearest 0.01 gm. Identifiable prey remains were sorted under a low-power binocular-microscope. These were mainly insect heads and wings or fragments of these. Identification was often made by comparing the remains with specimens in the insect collection of the Department of Zoology, University of Sevilla.

The diet of young Bee-eaters is known to differ substantially from that of adults, but we are certain that all the samples we collected were from adults for the following reasons. Because Bee-eater pellets are extremely weak, they are broken down by rain and wind between one breeding season and the next; furthermore, in all three colonies studied, Bee-eaters did not breed at all in 1972. The pellets were therefore all ejected by birds occupying the colonies in spring 1973. Although Bee-eaters arrive in Andalusia from the last week of March and first week of April, arrival at nest-sites occurs later, from mid-April throughout early May. The pellet samples were collected under perches near the nests and never inside the nest-holes and, in any case, by the dates of collecting the birds were still excavating and egg-laying had not yet begun.

Results obtained from pellet analyses of insectivorous birds can be mistaken to some extent, because remains of weak-bodied prey, such as butterflies (Lepidoptera), dragonflies (Odonata) and some flies (Diptera), often might not be detected, whole insects being digested or their remains being too small to be found (Swift 1959). For example, remains of caddis flies (Trichoptera) and mayflies (Ephemeroptera) have been detected in several analyses of stomach contents (Valverde 1967), but we identified none in the pellets; it is possible that they were taken by the Bee-eaters but fully digested. Numbers of weak-bodied prey may therefore have been

underestimated. On the other hand, remains of many very small hard-bodied insects, such as some beetles (Coleoptera) and bugs (Hemiptera), were readily found in the pellets and their numbers correctly ascertained. These sources of bias should be borne in mind when interpreting pellet analyses.

RESULTS

The dry weights of the 28 whole Bee-eater pellets collected by us ranged from 0.10 to 0.55 gm (mostly 0.15-0.30), averaging 0.207 gm (standard deviation 0.088). These data do not agree well with those recorded by Lomont (1946) and Swift (1959), who gave mean weights of about 0.5 gm and 4 gm respectively. This disparity might be due to differences in the moistness of pellets when weighed or to possible individual or seasonal variation in pellet size.

The numerical totals of prey insects revealed by our analyses are given in table 1. No attempt was made to assign a conversion factor to each prey insect and compute the total 'prey units', as is often done in analyses of mammal prey. In many cases identification could not be made beyond the level of genus, family or order, and live weights of all the species taken are not available. Hymenoptera were found in the greatest numbers, forming numerically between 44.5% and 84.8% of the prey in the various samples. Of these, bees (Apidae: *Apis*, *Bombus*, *Xylocopa*, *Andrena*, *Anthophora* and *Eucera*) were the most numerous prey at every locality, the Honeybee *Apis mellifica* being the commonest species found, ranging from 34.1% to 63.8% of all prey insects and accounting for 51.6% of the total. Other Hymenoptera recorded in lesser numbers were ants (Formicidae), true wasps (Vespidae: *Vespa* and *Polistes*), ruby-tails (Chrysididae), perhaps potter and mason wasps (Eumenidae) and ichneumons (Ichneumonidae), though we are not certain of our identification of the last two families.

Beetles (Coleoptera) were also important in the diet, forming 6.3% to 29.9%. The main families involved were dung beetles and chafers (Scarabaeidae: *Onthophagus* and *Aphodius*, to a lesser extent *Potosia* and *Epicometis*, and *Scarabaeus*?) with 10.6% of the total; and ground beetles (Carabidae: mainly *Harpalus*, *Agonum* and *Anisodactylum*, also *Chlaenius* and *Poecilus*) with 2.7% of the total. We also found longhorn beetles (Cerambycidae: mostly *Acmaeops* and *Leptura*), carnivorous water beetles (Dytiscidae: *Brychius*, *Colymbetes fuscus* and *Rhantus pulverosus*), carrion beetles (Silphidae: *Silpha*), silver water beetles (Hydrophilidae: *Hydrophilus* spp. including *H. caraboides*), Histeridae (*Hister uncinatus*), weevils (Curculionidae), nocturnal ground beetles (Tenebrionidae) and rove beetles (Staphylinidae), but none of these families comprised more than 1.4% of the total.

Food taken by Bee-eaters *Merops apiaster* at three breeding sites in southern Spain, spring 1973, from pellet analyses

	LOCALITY (see page 159)						TOTALS
	1	2	3				
Sampling dates (1973)	29.4	2.5	11.5	All	13.5	2.5	29.4 to 13.5
Weight of sample (grams)	11.39	18.05	6.56	36.00	7.36	6.08	49.44
Number of prey insects	483	821	272	1,576	328	237	2,141
DERMAPTERA: <i>Forficula</i> (earwigs)	15	-	32	47	26	-	73 3.4%
ODONATA (dragonflies)	3	3	2	8	29	5	42 2.0%
ORTHOPTERA: Acrididae (grasshoppers)	6	1	2	9	6	7	22 1.0%
HETEROPTERA: Pentatomidae (shield-bugs)	4	4	6	14	5	-	19 0.9%
NOTONECTIDAE (backswimmers)	-	-	1	1	1	-	2 0.1%
HOMOPTERA: Cercopidae (froghoppers)	-	-	-	-	-	2	2 0.1%
COLEOPTERA: unidentified beetles	21	12	15	48	8	2	58 2.7%
Staphylinidae (dung beetles and chafers)	80	110	26	216	11	1	228 10.6%
Coleoptera (ground beetles)	19	6	16	41	16	-	57 2.7%
Coleoptera (longhorn beetles)	5	1	1	7	2	8	17 0.8%
Dytiscidae (carnivorous water beetles)	5	4	4	13	8	-	21 1.0%
Staphylinidae (carrion beetles)	1	-	-	1	1	-	2 0.1%
Haliplidae (silver water beetles)	-	-	-	-	5	4	9 0.4%
Haliplidae	-	2	-	2	1	-	3 0.1%
Coleoptera (weevils)	3	-	7	10	11	-	21 1.0%
Tenebrionidae (nocturnal ground beetles)	-	-	-	-	5	-	5 0.2%
Staphylinidae (rove beetles)	-	-	-	-	30	-	30 1.4%
LEPIDOPTERA (butterflies and moths)	2	2	4	8	15	2	25 1.2%
DIPTERA (flies)	-	12	-	12	2	5	19 0.9%
HYMENOPTERA: unidentified bees, etc.	28	62	7	97	7	55	159 7.4%
Formicidae (ants)	3	4	28	35	2	-	37 1.7%
Apidae (bees): Honeybee <i>Apis mellifica</i>	248	524	99	871	112	121	1,104 51.6%
Other bees	38	60	19	117	22	21	160 7.5%
Vespa (true wasps)	2	11	3	16	1	-	17 0.8%
Potter and mason wasps?	-	-	-	-	-	4	4 0.2%
Campoplexidae (ruby-tails)	-	3	-	3	-	-	3 0.1%
Ichneumonidae (ichneumonids)	-	-	-	-	2	-	2 0.1%
PERCENTAGES							
DERMAPTERA (earwigs)	3.1%	-	11.8%	3.0%	7.9%	-	73 3.4%
ODONATA (dragonflies)	0.6%	0.4%	0.7%	0.5%	8.8%	2.1%	42 2.0%
ORTHOPTERA (grasshoppers, etc.)	1.2%	0.1%	0.7%	0.6%	1.8%	3.0%	22 1.0%
HETEROPTERA (bugs)	0.8%	0.5%	2.6%	1.0%	1.8%	-	21 1.0%
HOMOPTERA (bugs)	-	-	-	-	-	0.8%	2 0.1%
COLEOPTERA (beetles)	27.7%	16.4%	25.4%	21.4%	29.9%	6.3%	451 21.0%
LEPIDOPTERA (butterflies and moths)	0.4%	0.2%	1.5%	0.5%	4.6%	0.8%	25 1.2%
DIPTERA (flies)	-	1.5%	-	0.8%	0.6%	2.1%	19 0.9%
HYMENOPTERA (ants, bees, wasps, etc.)	66.0%	80.9%	57.4%	72.3%	44.5%	84.8%	1,486 69.4%

Insects other than Hymenoptera and beetles made up 9.5% of the total. These were earwigs (Dermaptera: *Forficula*), dragonflies (Odonata), grasshoppers (Orthoptera: Acrididae), bugs (Heteroptera: Pentatomidae and Notonectidae; Homoptera: Cercopidae: *Cercopis*), butterflies (Lepidoptera) and flies (Diptera). Of these, earwigs were the commonest, forming 3.4% of the total and ranging from 3.1% to 11.8% in three of the samples but entirely absent from the other two. The remaining groups together made up 6.1% of the total and accounted for between 2.7% and 17.7% in the five samples, the most numerous being dragonflies which comprised as

much as 8.8% of the prey at locality 2. Fig. 1 compares the percentages of the commonest prey at the three localities.

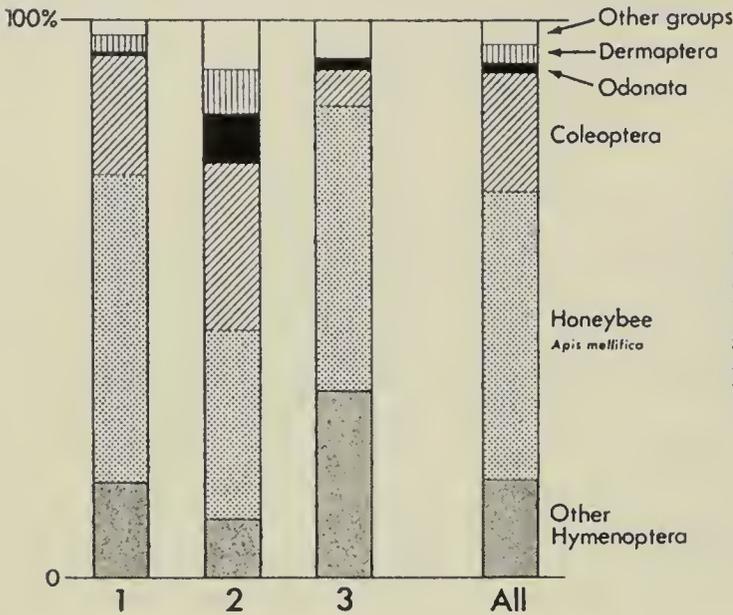


Fig. 1. Percentage totals of main prey of Bee-eaters *Merops apiaster* at three breeding sites in southern Spain (see page 159), spring 1973, from pellet analyses

DISCUSSION

The qualitative composition of the diet does not differ essentially from those reported in several other European countries by, for example, Lomont (1946), Rivoire (1947), Bastien (1957), Le Sueur (1957), Swift (1959) and Alleijn *et al.* (1966). However, we have found no mention in the literature of Bee-eaters taking earwigs, backswimmers, homopterid bugs, nocturnal ground beetles, rove beetles or ants in Europe. The presence of mainly terrestrial prey such as earwigs and ants is especially notable. Although these could have been taken on the ground, we must not reject the possibility of the birds having caught them in flight. Swift (1959) pointed out that Bee-eaters can sometimes take food on the ground, and lepidopterid caterpillars reported in the diet of Bee-eaters in Rhodesia (Fry 1973) were obviously not caught in flight. However, such hunting behaviour is not described at all in the general literature (e.g. Géroudet 1951, Dementiev and Gladkov 1966-68, Valverde 1967). Although Bee-eaters have been recorded diving into water (e.g. Tree 1960, 1961), aquatic insects, such as carnivorous and silver water beetles and backswimmers, must have been captured in the air while in flight.

Because all the samples analysed were collected within a short period (15 days), the quantitative and qualitative composition of the diets at that time of year at the three study localities could be compared to some extent, but in our opinion the data are too few for a full statistical treatment.

Fig. 1 and table 1 show that the proportion of dragonflies in the diet was highest at locality 2 (8.8%) and much lower at the others (0.5% and 2.1%). This was not unexpected, since locality 2 is close to large marshlands (*marismas*) where dragonflies are widespread for much of the year. Moreover, they would be even more common in the diet later in the season (Cano 1960).

Beetles were commonest at localities 1 and 2 (21.4% and 29.9% respectively), the proportion being as low as 6.3% at locality 3. A partial explanation may be that the land around localities 1 and 2 is used mainly for cattle-raising, and dung beetles such as *Onthophagus* and *Aphodius* can find many propitious sites there for living on cattle droppings. Furthermore, marshlands near locality 2 support carnivorous and silver water beetles for the Bee-eaters' diet. However, we can find no explanation for the strong presence of rove beetles at this locality, where they formed 9.1% of the entire diet, and their complete absence from pellets collected at the other two. Presumably this difference must be due to unknown factors connected with the habitat, and the same may be said about the variation between localities in the percentage of earwigs in the diet.

There was a considerable observed difference between localities in the proportion of Hymenoptera in the pellets, the highest value being reached at locality 3, which also showed the greatest species diversity (this is not obvious from table 1, but 'unidentified Hymenoptera', which clearly included many species, formed by far the highest proportion at locality 3). This locality was the least disturbed by man, and the surrounding habitats were more varied than at the other two (see the descriptions on page 159). These factors may have accounted for the greater diversity of Hymenoptera and, perhaps, made these insects more readily available to the birds.

Thus several of the main observed differences in the diet between localities may be explained if one supports the view that Bee-eaters take any available flying insect within a wide size range and do not select food. Further, human practices seem likely to exert a strong influence on the diet, because of inevitable changes in insect populations due to agricultural management. However, as stated above, we believe that our data are too few for a statistical treatment of this subject.

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SUMMARY

Pellets of Bee-eaters *Merops apiaster* were collected at three nesting colonies in western Andalusia, southern Spain, during the spring of 1973. Of the 2,141 prey insects identified in them, the great majority were Hymenoptera, Honeybees *Apis mellifica* forming 51.6% and other species 17.8%. Beetles (Coleoptera, ten families) made up 21.0% of the total, the main families involved being dung beetles and chafers (Scarabaeidae, 10.6%) and ground beetles (Carabidae, 2.7%). The remaining 9.5% comprised earwigs (Dermaptera: *Forficula*), dragonflies (Odonata), grasshoppers (Orthoptera: Acrididae), bugs (Heteroptera: Pentatomidae and Notonectidae; Homoptera: Cercopidae), butterflies and moths (Lepidoptera) and flies (Diptera), the proportions of each of these groups in the diet ranging from 0.1% to 3.4% of the total. Several observed differences in the composition of the diet between localities are discussed, and likely influences of cattle-raising and agriculture are pointed out.

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Notes

Two female Stone Curlews laying in one nest On 11th May 1968 I flushed a single Stone Curlew *Burhinus oedinenus* from a traditional nesting area on the Royal Society for the Protection of Birds' reserve at Dungeness, Kent. Four days later I returned to the site and successfully watched a Stone Curlew back to its nest, which contained four eggs. These obviously constituted two clutches, for one pair was large and marked with heavy, dark blotches, the second pair slightly smaller and paler, with finer streakings (plate 8a). The two clutches had clearly been laid by different females. Since a careful watch revealed only two birds in the vicinity, and since at no time up to this date had I seen or heard display, I doubted if a male was present. On several occasions when I visited the site up to 7th June all four eggs were still being incubated, but never more than two birds were seen and no calling was heard. On this date two Stone Curlews were still in the vicinity of the nest, though three of the four eggs were cold. On 9th June, when three of the eggs were warm, two birds flew away from the area of the nest to a point some 200 metres distant and apparently showed no interest in returning. Both stood and sat there at irregular intervals, appearing to be brooding or incubating. At one time they carried out a partial nest-relief ceremony, one coming up behind the other, which had been sitting and which rose and moved forward in typical manner, with neck extended in front. Throughout this ceremony both birds were silent, and eventually they flew off. On 14th June the two Stone Curlews were back in the area of the nest, but neither was sitting and all four eggs were cold. On 21st June I could locate no birds in the nest area; all eggs were cold and one was some 60 cm out of the scrape. The eggs were taken under a Natural Environment Research Council licence and, from a superficial examination of the contents, all four appeared to be infertile (though embryonic death might have occurred at an early stage). The measurements (in millimetres) of the two clutches were 54.5×40.0 , 53.5×38.5 ; and 53.0×38.0 , 41.5×38.0 .

The Stone Curlew is a decreasing species at Dungeness, where it was not bred successfully since 1964. There were no other records during 1968, and I believe that the most likely explanation for the events described above is that two females, in the absence of a male, had formed a homosexual pair-bond, providing each other with sufficient stimulus for both to go through the egg-laying and incubation pattern of the breeding cycle. Alternatively, the two birds might have been unpaired females, since I cannot be absolutely certain that there was no male involved during the very early

stages of site selection and egg-laying. There is a third possibility that they were a normal pair, and that two of the eggs had been laid by a second female that had left the area before the nest was found. This seems to me very unlikely, owing to the birds' completely silent behaviour (breeding pairs that I had watched previously had always been rather vocal, with one bird, that I had assumed to be the male, doing most of the calling). R. E. SCOTT
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Unprecedented numbers of Little Gulls in Ireland Following a period of south-easterly gales and torrential rain in early January 1974, record numbers of Little Gulls *Larus minutus* in Ireland appeared on the Co. Wicklow coast. They frequented a limited stretch and very few were reported elsewhere in Ireland.

The first were noted on 3rd January; on 5th the number rose to 15, but the gales then moderated and few remained. On 10th, when, gale- and even storm-force winds blew afresh from the south-east, bringing torrential rain, my wife and I counted a minimum of 62 (27 adults, 35 first-winter) along a two-kilometre stretch of coast south of Greystones. On 11th O. J. Merne, travelling by train along the coast, counted at least 86 (three-quarters adults) between Greystones and a point eleven kilometres south of there. The peak, however, came next day following another severe southerly gale: C. D. Hutchinson and I then counted 164 along only two kilometres of coast from Greystones southwards, and again we estimated three-quarters to be adults. None was seen further south.

The gales continued, and on 16th January nine kilometres south of Greystones I counted 60 Little Gulls coasting northwards in half an hour; the movement was already in progress when I arrived. Adult and first-winter birds were about equal in number. By 19th, after an improvement in the weather, only about five were present. A further south-easterly gale on 1st February was followed by the appearance of 32 birds; I counted nine adults, one second-winter and six first-winter in one gathering. Throughout, very few second-year gulls were detected. The birds fed close in along the tideline, just ahead of the breaking surf.

The previous highest concentration of Little Gulls in Ireland was 45 on the very same stretch of coast on 4th February 1972 (*Irish Bird Report*, 20: 17).

R. F. RUTTLEDGE

Doon, Newcastle, Greystones, Co. Wicklow

This species is essentially a spring and autumn migrant in Britain and Ireland, breeding from the Netherlands, Denmark and the Baltic eastwards, and wintering (in the North Atlantic) largely in and west of the Bay of Biscay (see *Dansk Orn. Foren. Tidsskr.*, 62: 126-136). Feeding flocks of any size tend to be extraordinarily local in Britain, occurring regularly in late March-May and late July-November

only off the coasts of Angus, Perthshire and Fife, and Lancashire; elsewhere the few three-figure counts have all been of transient flocks. Spring peaks have included 204 south in only two hours past Freshfield, Lancashire, on 25th March 1972; 180 at Kingoodie, Perthshire, on 26th April 1964; and a quite unprecedented movement of 315 east at Hurst, Hampshire, on 3rd May 1974, with 355 (largely the same birds?) east at Dungeness, Kent, next day. Autumn maxima in various parts of Britain have included 512 at Kilconquhar Loch, Fife, on 18th and 2nd August 1963; 229 at Hightown, Lancashire, on 25th August 1972; 32 at Kenfig Pool, Glamorgan, on 2nd September 1973; 106 at Dungeness on 9th September 1972; 211 north off Teesmouth on 19th September 1973; 96 at Spurn, Yorkshire, on 7th October 1971; 110 at Holme, Norfolk, on 15th October 1972; 17 off Barras Head, Cornwall, on 4th November 1971; and an influx of 50 at Elie Ness, Fife, after easterly gales, as late as 1st December 1963. Even larger numbers of autumn migrants have occurred at Cap Gris Nez in northern France, including over 1,400 during 20th-22nd October 1970. The Irish flocks described by Major Nuttledge are remarkable not only for their size but for the date: January-February British records of more than ten are rare, the largest being 79 at Rossall, Lancashire, on 28th January 1970 and 137 at Freshfield on 24th February 1968 (see *Brit. Birds*, 62: 385-386 for a useful discussion of Lancashire records and age ratios). Eds

Identification of Roseate Terns On 9th September 1972, at Plage de Brest, Finistère, France, I had the opportunity of studying a party of four Roseate Terns *Sterna dougallii* for about two hours. The party consisted of two juveniles which were still being fed by two adults. Common Terns *S. hirundo* were also present for direct comparison.

Firstly, one of the juveniles had a white forehead. This is at variance with the following description given by P. J. Grant and R. E. Scott in their paper on field identification of juvenile *Sterna* terns (*Brit. Birds*, 62: 297-299, plate 53): 'Forehead never white and often, especially in younger individuals, only slightly paler than the rest of the head; in such cases it is frequently very inconspicuous and often the head appears all black.' This discrepancy is probably due to the fact that they described only July birds, and it seems likely that at least some juvenile Roseate Terns develop a white forehead as they get older. The other juvenile completely fitted their description. On 1st November 1970 a Roseate Tern in juvenile plumage at Scheveningen, Netherlands, also showed a white forehead (J. Swaab, verbally). The increasing whiteness of the forehead in juveniles is most probably caused by wear of the dark feather tips, revealing progressively more of the white bases, though very late in the autumn some feathers may actually be moulted and replaced by white ones.

Secondly, I noticed that the build of the Roseate Terns, both adults and juveniles, was unlike that of the Common Terns. The adult Roseates lacked the long tail-streamers that are conspicuous in spring and summer. They were more top-heavy than the Common Terns; this was accentuated by the proportionately longer, black

bill. On the whole, their build was more like that of the Sandwich Tern *S. sandvicensis* than that of the Common, a resemblance strengthened by their whitish appearance. This useful feature is not mentioned in the literature. The resemblance is less obvious during spring and summer when the Roseate's outer tail-feathers are extremely long.

Thirdly, both adult and juvenile Roseate Terns had a considerably faster and shallower wing-beat than the Common Terns. This flight is anything but graceful and is strongly reminiscent of that of the Little Tern *S. albigrons*. Most identification guides describe this characteristic flight inadequately: descriptions are incomplete, inconsistent or even wrong. Often reference is made to the great buoyancy of the flight, but this is probably valid only for the courtship display. D. A. Bannerman's description (1962, *The Birds of the British Isles*, 11: 147-148) is in agreement with my observations.

I thank P. J. Grant, J. F. de Miranda and Dr J. Wattel for reading and commenting upon an earlier draft of this note. G. J. OREEL
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Probable interbreeding of Common and Roseate Terns On 11th July 1973 I was photographing terns from a hide in a mixed colony of Common *Sterna hirundo*, Roseate *S. dougallii* and Arctic *S. paradisaea* on Coquet Island, Northumberland. I noticed that two nests, both with a single egg, were each being attended by a mixed pair consisting of a male Common and a female Roseate Tern, and a single chick was being cared for by a third such pair.

One nest was situated in a small depression some 6 cm deep, probably the remains of a disused excavation made by Puffins *Fratercula arctica*. The ground in this part of the island was virtually bare, except for dead vegetation and odd patches of *Holcus* grass. The other nest was on level ground, and the nest site of the third mixed pair could not be established as the chick had already moved into a nearby disused Puffin burrow when the pair was located. On Coquet Island in 1973, some 90% of the population of about 60 pairs of Roseate Terns nested in small depressions, or in some cases below ground in disused Puffin burrows. Virtually all the Common Terns (1,700 pairs in 1973) used level sites. The three mixed pairs together occupied a small area of some 30 square metres in a part of the island where two-thirds of all the Roseates nested almost to the exclusion of the other tern species.

The two pairs each with a single egg were watched from a hide during succeeding days. The eggs were less boldly marked than the majority of Common Tern eggs and, on the basis of their coloration and marking, had been thought at first to be Roseate eggs.

For convenience, their locations were designated E and W (referring to their compass directions from the hide). Egg W hatched on 13th July and E on 16th; assuming a normal incubation period of some 23 days, the eggs would therefore have been laid about 20th and 23rd June respectively. Both chicks, as well as the third one already hatched on 11th July, resembled those of Common Terns in all respects; there were no signs of the easily recognisable coloration and distinctive spikiness of the down of Roseate chicks.

Mating or attempted mating by pair W was seen on 13th July, and by pair E on 19th and 21st. It was preceded by the male Common Tern bringing food. This was usually offered first to the chick; if refused it was then taken by one of the adults. The feeding over, either the male Common flew off or took over the brooding of the chicks, or, as was usually the case when mating occurred, the brooding Roseate came off the chick and both birds stayed in attendance at the nest. Mating was usually initiated by the male with a 'parading' type of display, followed by a final close approach to the female with bill and neck upstretched. The Roseate then adopted a soliciting posture, with tail raised and wings partially dropped. Thus encouraged, the Common mounted, and after about a minute either mating took place or the attempt was terminated. The Common either took off directly from the Roseate's back or indulged in some displacement activities, such as grass-throwing or scrape-forming movements, before leaving.

Incubation and feeding of the chick were shared by both male and female approximately equally. The behaviour of the birds at the change-over was very similar to that of adjacent normal pairs of terns. Male and female appeared to recognise each other's calls—the brooding bird, whether Common or Roseate, was frequently seen to call to its mate flying overhead with food. There were apparently no behavioural impediments to successful rearing.

On two occasions late in the season, around 20th July, a fourth mixed pair of Common and Roseate Terns was seen apparently prospecting a nest site near the three established pairs. This involved a lot of courtship, 'parading', and exploration of possible nest sites. By this time most of the terns had long since hatched chicks. It is possible that the colony contained more mixed pairs but, as it was necessary to watch the undisturbed birds from a hide to establish cross-pairing, the whole island could not be covered.

In all three cases the single chick fledged, a good success rate since at least two of the pairs had only single-egg clutches when the nests were found. This in itself was unusual, as the average clutch for Common Terns on the island was 2.4 with very few singles, and all Roseate nests inspected (the vast majority) had two eggs. The single-egg clutches could be explained by predation during

incubation, but the clutch sizes everywhere else on the island show that this would be a curious coincidence; another possible explanation is mentioned below.

A number of interpretations could be placed on these facts, none of which can be tested without ringing to give individual and lasting identification. The observations are most easily explained by Common and Roseate Terns interbreeding; it seems that there is no behavioural reason why hybrid chicks should not successfully be reared. Alternatively it is possible that the male Common Terns had lost their mates after the laying of the first egg (the chicks had the external characteristics of Common Tern chicks) and had paired with superfluous female Roseate Terns. This explanation accounts for the exceptional single-egg clutches, but leaves a number of questions unanswered: for example, why were the eggs laid in an area dominated by Roseate Terns, why was one of the nests in a typical Roseate site, and how does the prospecting mixed pair of terns seen late in the season fit into this picture? These questions and others seem to make interbreeding the most likely answer, though obviously the evidence cannot be conclusive.

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Letters

Cyprus cranes and English bird names It gets rather monotonous writing letters to you about vernacular names, so may I refer Sir A. Landsborough Thomson (*Brit. Birds*, 66: 454) and, while we are about it, readers of Professor Dr K. H. Voous' proposed 'List of recent Holarctic bird species. Non-passerines' (*Ibis*, 115: 612-638) to my three previous letters (*Brit. Birds*, 54: 405-408; 57: 436-439; 62: 205) and document them with an example of a case where sloppiness in the use of group names caused serious trouble?

In the late 1950's British servicemen in Cyprus saw a lot of cranes, some of them definitely identified in their notes as Demoiselle Cranes *Anthropoides virgo* and others merely referred to as 'Cranes' or 'cranes', unspecified. At that time nobody had any doubt that, in addition to the Demoiselle, the Common Crane *Grus grus* occurs commonly on passage in Cyprus in the early autumn—in fact, it was thought to be the commoner—so unspecified cranes were usually put down under this heading. In consequence, when it occurred to a subsequent generation to question whether *Grus grus* occurs in Cyprus in the early autumn, in the Cyprus Bird Reports for 1970, it was a little difficult to tell quite how often it had definitely been identified; in fact, since two of the main observers were by

then dead and another untraceable, the only record I am certain of is of six birds I saw myself over Lefka on 24th August 1957, when I noticed the red on the head, in case anyone cares to question them. It might be useful if anyone else who has records of Common Cranes seen in Cyprus in the early autumn would make them known, too.

I fear that Sir Landsborough is not harking back far enough when he returns to the heyday of subspecies in his search for the origin of qualified group names. Originally most of our bird names were applied not to species but to groups of several species wherever a number could be confused, a practice followed for scientific names by Linnaeus, who assigned the first 'official' names to genera and then qualified them when he came to distinguish species, as, for example, with our wagtails *Motacilla* (=Wagtail) *alba*, *flava* and *cinerea* (=White, Yellow and Grey). Is it not perhaps time we caught up with Linnaeus (1707-1778)?

It may be noted that the thirty-second supplement to the American Ornithologists' Union's *Check-List of North American Birds* (*Auk*, 90: 411-419) lists criteria used for modifying vernacular names (a) to qualify group names applied to several species, (b) to facilitate international uniformity in usage for the same species, (c) to avoid misleading taxonomic implications, (d) to prevent confusion with other species called by the same name, (e) to conform to usage in areas where the bird in question is commoner, and (f) to provide a substitute for the unsatisfactory adjective 'common'. Also, in a subsequent review of the British Ornithologists' Union's *The Status of Birds in Britain and Ireland* (*Auk*, 90: 445-446), Stuart Keith remarks that our names disagree with local ones for a number of characteristic American species rare with us: thus they refer to the White-winged rather than the Two-barred Crossbill *Loxia leucoptera*, the Wood and not the Carolina Duck *Aix sponsa*, and the Bohemian Waxwing *Bombycilla garrulus* in the presence of another species, the Cedar Waxwing *B. cedrorum*.

W. R. P. BOURNE

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English bird names May I disagree strongly with the view expressed by Sir A. Landsborough Thomson on English bird names (*Brit. Birds*, 66: 454)? The primary function of a language is to facilitate communication, and this function is severely handicapped wherever different words are used to express the same thing. In effect, using the same vernacular names everywhere opens communications between groups that are not accustomed to using scientific names. It also helps in reading articles where scientific names are not always given. In addition, we all know that scientific names are subject to change, rather more so than vernacular names!

I have no objections to local bird names, but it still helps to know whether somebody is writing or talking about an American Robin or a European Robin. In these times of international bird study, official unambiguous English names used consistently in field guides, journals and other literature have a lot to be said for them. This is not to deny that the introduction of the new names by the American Ornithologists' Union will itself lead to some confusion; the benefits can be seen only in the long run.

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Reviews

Handbuch der Vögel Mitteleuropas. Vol. 5. Galliformes and Gruiformes. Edited by U. N. Glutz von Blotzheim, with K. M. Bauer and E. Bezzel. Akademische Verlagsgesellschaft, Frankfurt am Main, 1973. 700 pages; 5 colour plates; 100 line-drawings and maps. DM 112.00 (subscription price DM 95.00).

This fifth part of the central European handbook, dealing with the Galliformes and Gruiformes, treats just 28 species in a total of 664 pages. Breeding within the central European limits set by the authors are eight species of grouse, partridges and pheasants, and ten of rails, crakes, coots, cranes and bustards; these form the bulk of this volume, an average of 34 pages being devoted to each species and an extravagant 67 pages to the Black Grouse. In addition, several pages are devoted to each of the artificially introduced and locally more or less (usually less) feral species, such as Reeves's Pheasant and Turkey, and to the few stragglers. The latter include the American Purple Gallinule, once recorded in Switzerland (adult female, 1st December 1967), and Allen's Gallinule, probably the only truly 'Ethiopian' species which regularly straggles (if one may say so) to Europe. Apart from the three main editors, more than twelve specialists have contributed to at least part of the text of some species, notably Peter Lüps (Rock Partridge), Paul Feindt and Peter Becker (Water Rail and crakes), and Gerhard Klafs and Hans Winkler (Great Bustard). Further notable contributions are by Professor E. Tretzel, who provided the sound spectrograms, and Dr Ernst Sutter, who supplied much original data on moult and moult sequence in gallinaceous birds.

This work is developing more and more its own unique character, setting high standards for completeness of text and minute details of reference. The result is a series of painstakingly detailed monographs on taxonomy, distribution, ethology and ecology of excep-

tionally high value, rather than the typical 'handbook' treatment in which the data are arranged and summarised for rapid use, easy comparison and simple reference. The authors, apparently, do not attempt to leave out any bit of knowledge or to generalise beyond details. On the other hand, they show great persistence in continuing, at an amazingly rapid rate, what could be considered a lifetime's work. Without doubt the driving force behind this truly central European enterprise is the Swiss Urs Glutz von Blotzheim, but the work done by the Austrian Kurt Bauer and the German Einhard Bezzel should not be underestimated.

Among the monographs, those on the Black Grouse, Pheasant and Coot are of particular significance, each illustrated with excellent line-drawings (28, 16 and 49, respectively) by F. Weick showing movements and behaviour, as well as with numerous maps. Throughout the volumes of this handbook there is an increasing number of detailed illustrations of feathers depicting differences of sex and age, but the number of colour plates is small. Of the five plates in the present volume, that illustrating the ink-black downy chicks of seven ralliform species is by far the most fascinating: it shows different extents of red on the crown and at the tips of the tiny wings, the amount of red being larger and more conspicuous the more ridiculous the chicks are in the first days of their life (largest in the Coot, smallest in the Cornerake).

Even more than the previous volumes, this is a really valuable source, a well-documented storehouse of information for ornithologists and for zoologists in general, besides being a handsomely produced and magnificent work to consult. K. H. VOOUS

News and comment *Robert Hudson*

Tawny Owls and Pheasants The artificial rearing of Pheasants is big business, and each summer (July-August) thousands of young birds are transferred from covered rearing pens to roofless release pens, where they become vulnerable to avian predators. Concerned to reduce such losses, some gamekeepers resort to the illegal use of pole-traps. Recognising that there is a real problem, the Royal Society for the Protection of Birds, the British Field Sports Society, the Game Conservancy and the Gamekeepers' Association have jointly initiated a two-year research programme into predation on Pheasant poults by raptors, notably Tawny Owls. It is hoped that this will lead to a better understanding of the situation, and find an effective deterrent to predation. David Lloyd has begun work as research biologist on the programme.

Another bird strike On 12th December 1973, at Norwich Airport, a French-built fan-jet aircraft, carrying nine people, crashed seconds after take-off. Fortunately, there were no serious casualties. Preliminary investigations by the Department of Trade and Industry indicate that the accident was caused by multiple bird strikes: the plane had flown into a flock of gulls. During the winter months, several hundred gulls fly over Norwich Airport daily, to and from roosts on the Norfolk Broads; the crash occurred at 3.30 p.m. as gulls were flying back to these roosts. (Contributed by G. P. Hooton.)

Foulness Island respite As forecast in this feature in the last issue, the new Labour Government has stopped all preparatory work on the proposed Maplin Airport, pending a complete reappraisal of this and other major development projects. Cancellation of Maplin Airport was promised in the Labour Party manifesto at the last election. Conservationists are likely to be divided in opinion on what ought to happen to Foulness Island now. I should be quite happy to see a continuance of the military presence which has preserved the island from major development for the last four decades.

Obituaries It is with deep regret that we have to record the recent deaths of two prominent East Anglian ornithologists. In March we lost R. J. (Reg) Partridge, who for the last 20 years had been warden of Havergate Island, the RSPB's famous Avocet reserve on the Suffolk coast. A local man, he was appointed for (among other things) his topographical knowledge and skill with small boats—assets which he used to good effect during the east coast floods of early 1953, when he was awarded the British Empire Medal for a rescue exploit. He developed a serious interest in birds early in his wardenship; due to the large numbers of people who made the pilgrimage to see Havergate and its Avocets, he became one of the best known, and liked, reserve wardens in the country.

It came as a great shock, in early April, when we heard that R. P. (Dick) Bagnall-Oakeley had died suddenly, at the wheel of his car, while in Scotland on a lecture tour for the Scottish Ornithologists' Club. He was one of Norfolk's most prominent ornithologists, a schoolmaster by profession, who came to the forefront in the early 1950's as a skilled photographer in still and ciné. He excited many a lecture audience with his photographs of the numerous rarities he had encountered in Norfolk, and he was a regular contributor of natural history items to BBC TV East Anglia. Though not a prolific writer, he contributed many notes to this journal over the last 30 years. At the time of his death, he was Chairman of the Films Sub-Committee of the RSPB, and he leaves a gap that will not easily be filled.

Parakeets in the London area My note on this subject in 'News and comment' in the January issue has prompted two readers, H. B. Fossey of Woodford Green and A. Cluff of Wanstead, to write to me with news of another colony of Ring-necked Parakeets *Psittacula krameri* in the London area. Unlike the others, this one is north of the Thames, in the Woodford Green-Highams Park area of extreme south-west Essex. Apparently parakeets have been present there at least since 1971 (probably earlier), and in increasing numbers, 22 being the largest flock noticed so far. Feral breeding is assumed to have occurred; there is not yet formal proof of this, though Mr Fossey watched a pair prospecting a hole in an oak tree over several weeks in 1973.

Pesticide residues in eggs A recent paper by Dr David Peakall in the American journal *Science* (183: 673-674) has demonstrated for the first time the presence of pesticide residues in Peregrine eggs dating from the very beginning of the pesticide era. Five eggs taken in California during 1948-50 weighed 3.188 to

3.964 gm, and had detectable levels of residues in their dried shell membranes. A control series of eggs taken in California between 1894 and 1940 (before insecticides came into general use) was pesticide-free and weighed significantly more (4.062-5.120 gm). Dr Peakall's technique was to fill the eggshells with a mixture of diethyl ether and petroleum, and maintain them at 45°C for four hours; the solvent was then removed, and the organochlorine residues measured by gas-liquid chromatography. DDE (a metabolite of DDT) was found at levels calculated to have been 22 to 200 parts per million on a lipid basis, indicating that as early as 1948 DDE was present in Peregrine eggs in sufficient concentrations to account for eggshell thinning.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

January reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

This feature will continue to appear every month, though under a new title. The commoner species will generally be omitted from the main text, but will be summarised periodically; where appropriate, there will also be a monthly 'stop press' at the end. We are grateful to the many local societies and individuals who kindly send us their bulletins and lists of recent sightings from which this feature is compiled. There are still gaps in coverage, however, and we appeal especially to coastal ringing groups, migration watchers and seawatchers to send us monthly summaries of their more interesting records.

The first day of the New Year was the only cold day of the month, with heavy overnight frost and freezing fog, but this very quickly changed as a continuous series of deep depressions crossed the North Atlantic, bringing warm air from the south-west. On many days these low-pressure systems produced heavy rain and high winds, particularly in southern parts of Britain, where south-westerly gales dominated the January weather picture.

Coinciding with high winds and unusually abundant shoals of herrings and sprats, large numbers of **divers** were present in the North Sea. Offshore gatherings of **Red-throated Divers** *Gavia stellata* included 120 at Shellness (Kent) on 6th and 119 at Teesmouth (Co. Durham/Yorkshire) on 11th. In Northumberland movement was recorded of all three regular species: at Seaton Sluice/St Mary's Island 19 hours of watching between 3rd and 10th produced totals of 36 **Black-throated** *G. arctica* and eleven **Great Northern** *G. immer*, all flying south, and over 500 **Red-throated** and unidentified divers, again mainly flying south; the majority of 132 divers during 12th-13th flew south, and 185 north on 27th. **Gannets** *Sula bassana* were also plentiful at the same place, 350 moving north and 65 south on seven dates up to 26th, while a **Manx Shearwater** *Puffinus puffinus* heading south on 5th was quite unexpected. A few storm-driven seabirds were found inland: single **Shags** *Phalacrocorax aristotelis* at Walthamstow and Girling Reservoirs (Essex) from 5th and at Cheddar Reservoir (Somerset) on 8th; an unidentified **petrel** at Wraybury Reservoir (Middlesex) on 14th; two **Fulmars** *Fulmarus glacialis* at Walton Dam, Chesterfield (Derbyshire), on 16th which finally flew off north-west (the second county record); and a **Gannet** on floodwater on Wet Moor (Somerset) on 25th.

An immature female **King Eider** *Somateria spectabilis* was found dead at Fenham Flats (Northumberland) on 11th, and the drake **Steller's Eider** *Polysticta stelleri* at Vorrán, South Uist (Outer Hebrides) (*Brit. Birds*, 66: 338) was reported to be still present during January. Few **Smew** *Mergus albellus* were reported, about 35

from ten places, the highest count being a very low maximum of twelve at Brent Reservoir (Middlesex). Counts of certain sea-ducks and the commoner geese will be included in a later summary, but it is worth noting here that the large flock of **Bean Geese** *Anser fabalis* in east Norfolk (*Brit. Birds*, 67:131) had dropped to 80 by 30th and singles were found in January at three other places.

Single **Red Kites** *Milvus milvus* were reported at Cuningdale (Derbyshire) on 13th and in the Iver/Black Park area of Buckinghamshire during the second week of the month. Overwintering waders included a **Little Ringed Plover** *Charadrius dubius* at Manor Farm, Reading (Berkshire), from 20th, ten **Whimbrel** *Numenius phaeopus* at Capel Fleet (Kent) on 2nd and a maximum of six on Alderney on 14th, a **Curlew Sandpiper** *Calidris ferruginea* at Woodbridge (Suffolk) on 8th, and single **Grey Phalaropes** *Phalaropus fulicarius* at Poulshot, Devizes (Wiltshire), from 15th to 17th (feeding on worms in shallow water on the village green) and at Fort le Crocq (Guernsey) from 17th to 20th.

Great Skuas *Stercorarius skua* were noted singly at Dungeness (Kent), off the Hampshire coast, and at Cheddar Reservoir and Steart (Somerset), while 16 flew east at Portland Bill (Dorset) about 10th. In Northumberland a **Pomarine Skua** *S. pomarinus* flew south at Bamburgh on 20th and possibly the same bird went north at Seaton Sluice on 26th. Two **Arctic Skuas** *S. parasiticus* were at Teesmouth on 11th, with eleven there the next day, one moved east at Reculver (Kent) on 13th, and there were 56 sightings of this species off Seaton Sluice/St Mary's Island up to 26th.

Glaucous *Larus hyperboreus*, **Iceland** *L. glaucoides* and **Mediterranean Gulls** *L. melanocephalus* will be summarised later. Single **Little Gulls** *L. minutus* were at Amble (Northumberland) on 12th, at Staines Reservoir (Middlesex) on 16th and at Blackpill (Glamorgan) from 29th, and one was found dead at Felixstowe (Suffolk) on 26th; in the Greystones area of the Co. Wicklow coast unprecedented numbers reached a maximum of at least 164 on 12th (see note on pages 166-167). At Dungeness peak numbers of **Kittiwakes** *Rissa tridactyla* were 800 on 11th. A **Black Guillemot** *Cephus grylle* was in Carrick Roads (Cornwall) from 27th (*cf. Brit. Birds*, 66: 179), but the only **Little Auk** *Plautus alle* reported to us was one flying south at St Mary's Island on 3rd. There were 540 indeterminate **auks** at Teesmouth on 11th, and in southerly movements at Seaton Sluice/St Mary's Island 1,700 were counted between 3rd and 12th.

A **Turtle Dove** *Streptopelia turtur* was reported at Staines Moor on 27th, and the final word belongs to a **Rose-coloured Starling** *Sturnus roseus* discovered at Waterston (Pembrokeshire) on 2nd.

STOP PRESS

Recent reports include an albatross at Portland Bill on 28th April; a White-billed Diver, a Surf Scoter and two King Eiders at Golspie (Sutherland) in mid-April; a Glossy Ibis at Swanscombe (Kent) from 11th April to at least 4th May; American Wigeons at Eye Brook Reservoir (Leicestershire/Rutland) from 18th April to early May and at Welney (Norfolk) on 19th April; a Killdeer at Pagham Harbour (Sussex) about 13th April; a Terek Sandpiper at Radipole Lake (Dorset) on 6th-7th May; a third Ring-billed Gull (this time a sub-adult) at Blackpill from 27th April to at least 6th May; and a male Subalpine Warbler at Lower Bodham (Norfolk) on 10th April.

Photographs of 1973 rarities Good quality black-and-white prints of accepted 1973 rarities are required for possible publication with the 'Report on rare birds in Great Britain in 1973' later this year. The species, place and date, and the photographer's name and address, should be given on the back of each print. All photographs should be sent to the editorial office at Bedford by 21st June.

BINOCULARS of QUALITY from heron

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Volume 67 Number 4 April 1974

- 133 The upperwing pattern of adult Common and Arctic Terns
R. A. Hume and P. J. Grant Plates 21-24
- 137 The breeding behaviour and biology of the Moorhen *N. A. Wood*
(concluded from page 115) Plate 25
- 158 Food of Bee-eaters in southern Spain
Carlos M. Herrera and Adoración Ramírez

Notes

- 165 Two female Stone Curlews laying in one nest *R. E. Scott* Plate 28a
- 166 Unprecedented numbers of Little Gulls in Ireland *Major R. F. Rutledge*
- 167 Identification of Roseate Terns *G. J. Oree*
- 168 Probable interbreeding of Common and Roseate Terns
C. Stephen Robbins Plates 26-27

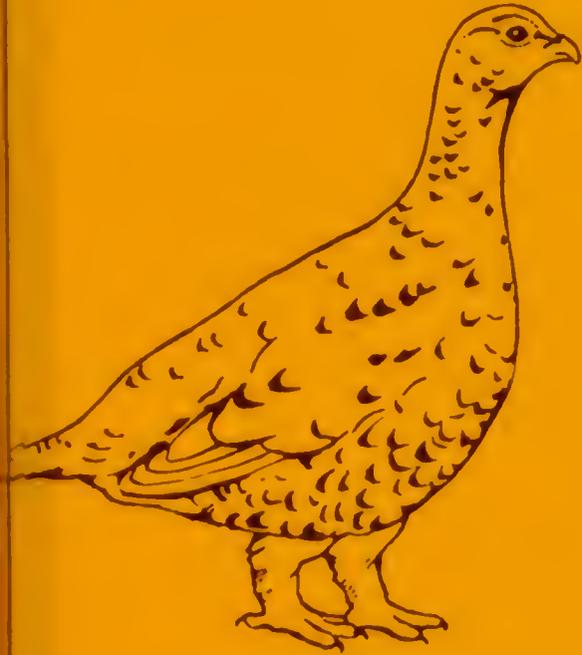
Letters

- 170 Cyprus cranes and English bird names *Dr W. R. P. Bourne*
- 171 English bird names *Dr Robert K. Furrer*

Reviews

- 172 *Handbuch der Vögel Mitteleuropas. Vol 5. Galliiformes and Gruiformes*
edited by U. N. Glutz von Blotzheim, with K. M. Bauer and E. Bezzel
Professor Dr K. H. Voous
- 173 News and comment *Robert Hudson*
- 175 January reports *D. A. Christie* Plate 28b

3 72
Volume 67 Number 5 May 1974



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BRITISH BIRDS

A further review of the problem of 'escapes'

M. D. England

INTRODUCTION

During the twelve months ending 31st December 1972, 791,979 birds passed through the hands of the staff of the Royal Society for the Prevention of Cruelty to Animals' Hostel for Animals at London (Heathrow) Airport on arrival from abroad by plane. (Rather less than 100,000 of these were day-old chicks which are disregarded in this discussion.)

It must be stressed that this was the number passing through the Hostel and not the total number of birds arriving at the airport, since only certain categories of consignments of animals are usually taken to the Hostel: most of those in transit and for which there may be considerable delay before a flight is scheduled for the continuance of their journey (some airlines will accept animals only for a further 'leg' of a journey if they have been checked at the Hostel); those which the addressee has specifically asked the RSPCA to look after; those which the airport staff have noticed contain an unusually high proportion of dead or dying birds or appear especially to need care; those not claimed within a reasonable time; and those in cages or boxes which are broken. A small proportion of birds in transit are transferred to an outgoing flight (especially if it be of the same airline as the flight by which they arrived), without passing through the Hostel. It should be mentioned in passing that, of those in transit which are destined for Germany, the Netherlands and Belgium, not a few will be re-exported back to this country. The majority of those addressed to recipients in Britain are taken direct to the freight sheds in the cargo centre and are collected by the addressee (or his agent), again without passing through RSPCA hands. Despite this,

107,859 birds whose journeys terminated in Britain did pass through the Hostel in 1972, making the (unknown) total for Britain a matter for the mind to boggle at indeed. The grand total number of birds arriving at Heathrow Airport during that year is thus also at present unknown (although it is hoped that such figures may be made available in the not too distant future), but it can be seen that it is unlikely to be less than 1,000,000 and may be much greater.

Although Heathrow handles the greater part of the traffic from overseas, other British airports must not be forgotten. For example, birds from the Far East intended for north-west England are usually sent via Manchester, this route often being via Germany and missing London, and the number is probably higher than it is usually thought to be. Nowadays few are sent by boat for any great distance, although some cross the English Channel in this way.

If to this vast annual figure be added the unknown, but obviously huge, number of birds already in captivity in Britain and also those in captivity on the Continent (but see later), it is perhaps superfluous to add that there must be a risk of a not inconsiderable number escaping and surviving in the wild long enough to stand a chance of being seen by and causing confusion to British birdwatchers. It has been claimed (Blackwell 1972) that 'each week dozens escape', although no supporting evidence was given.

The majority of British ornithologists probably have little knowledge of what has unfortunately but aptly been called 'the appalling bird trade', or indeed of aviculture, and thus find themselves in no position to assess the likelihood or otherwise of a 'rarity' having escaped from captivity. The purpose of this paper is to try in some measure to help by giving an outline of the species and sources of imported birds and some guidance on assessing particular cases of suspected escape. A paper on the same subject and covering much of the same ground has appeared before in this journal (Goodwin 1956). This has been at the same time a help and an embarrassment: a help for reasons which will be obvious to those familiar with it, an embarrassment because it has appeared presumptuous to attempt to 'paint the lily'. Hence the title of the present paper.

It is inevitable that some information, especially that regarding sources and species, will be out of date even before publication, because the position changes continually as more exporting countries impose welcome restrictions and fresh sources open up as a result. Some species which were readily and cheaply obtainable a year or two ago are now never seen. Especially to those readers who already have some knowledge, much of the material may appear redundant or irrelevant, but it has been included in order to give background to the subject.

'Assisted passage' has not been dealt with because it is considered

to be outside the scope of this paper. However, the 'importation' of albatrosses by members of the crew of Scandinavian whaling vessels must be mentioned. Although I have no personal experience of this and can find no published reference, it is frequently said that albatrosses and other similar birds are reared as pets while ships are in southern waters and, proving an embarrassment on arrival at the home port, are liberated to fend for themselves.

SOURCES AND DESTINATIONS

The birds reaching Britain from abroad—whether for the British market, for re-export, or in transit—come from all over the world, but the greatest numbers come from Asia (Bangkok, Calcutta and Singapore providing immense numbers) and many parts of Africa. In parentheses it is fair to say, and a matter for congratulation, that some African countries take considerable trouble to prevent undesirable exploitation of their wild birds for export purposes. For example, Kenya allows trapping and export only under individual licence, with the result that birds from that country are rarely to be acquired in Britain through dealers or on the open market. Unfortunately the neighbours of such enlightened countries are not always so careful (Boyle 1970) and the number of birds exported from Africa as a whole is very large indeed. Until recently South America was among the largest exporters, but during the autumn of 1973 a considerable and very welcome (and it is to be hoped permanent) reduction took place as a result of some of the better-informed countries imposing restrictions.

While in many countries trapping and export continue despite government measures or because officials turn a blind eye, it is greatly to be deplored that the contrary is true in Thailand (see Martin 1973). Here the government has recently published a report entitled *Animal Exportation from Thailand in 1962-71* (using the word 'animals' in its correct sense, to include birds). This is a horrifying document, as the following brief quotation will show: 'Wild animals make up one of the natural resources of the country which are of value to the economy . . . In the past, Thailand has received millions of Baht income from the exportation of wild animals alone. Many species are in demand and therefore commercial business dealing with wild animals seems to be a real promising one.' It is understood that a similar situation exists in North Korea.

As mentioned above, no accurate figures are at present available of the total number which are intended for sale in Britain and of those destined for other countries, although the evidence suggests that the latter greatly exceed the former. While birds which are to remain in Britain obviously present a much greater escape risk,

those in transit cannot be ignored, because accidents can and do occur at airports. For example, at a British airport recently, the driver of a van containing crates of birds en route from plane to reception sheds noticed that a box was broken and that birds were escaping from it into the van. On going to report this *he left the doors of the van open*, with the result that later examination showed the box and the van to be almost empty.

Restrictive legislation has been so successfully implemented in North America that very few birds indeed are imported into this country from there, although no legislation can prevent migration and a few North American breeding species are exported from their winter quarters in Central and South America (see pages 190-192). This is something for which the assessors of British records may be very thankful, since North American birds have always been regarded as among the greatest escape/vagrant problems. However, one cannot be dogmatic even about North American birds, because smuggling is not unknown and licences are occasionally issued for the export of certain species: for example, one British aviculturist is known to have a licence, granted in the United States, to export Sandhill Cranes *Grus canadensis* for his own use in Britain.

Although the total is not large, a surprising number of European birds are imported into Britain and this trade appears to be increasing, if only in a small way. Again, with a few exceptions to be mentioned later, it is not illegal in British law although it all too often contravenes the ill-implemented laws of the countries of origin. Unfortunately from a British record point of view, these are mainly rare or unusual species: for example, Rollers *Coracias garrulus* are popular, as are—surprisingly—small warblers such as the Subalpine Warbler *Sylvia cantillans*.

A large proportion of the birds arriving and unloaded at Heathrow Airport—and to some extent at other British airports—are in transit, a great many being en route for Germany and a surprising number for Italy. Those whose journey ends in Britain are intended for zoological gardens, 'wildlife parks', private aviculturists and, especially, the pet trade.

There are about 4,000 pet shops in Britain. Not all of these sell many birds (a few, none at all), although some sell nothing else. As distinct from the shops, there are a large number of dealers whose premises range from a small spare room or garden shed to stores of considerable size and accommodating many thousands of birds. (In one back street in London is an establishment, known to few save the initiated, which claims with some truth always to have 60,000 birds in stock.) Although irrelevant to this discussion, it is distressing to note that it is not exclusively the dealers with large premises who deal in large birds, since it is not unknown for about

50 cranes to be packed into a room no larger than a bathroom.

Lest the impression be given that all dealers in animals and their premises are as deplorable as unfortunately many of them are, it must be added that the Pet Trade Association—with a membership of 800—is striving hard to improve matters and has instituted a form of voluntary examination which covers not only the housing and feeding of animals but the law regarding them. It is understood that they are trying to obtain statutory legislation to control the animal trade.

IMPORTATION AND THE LAW

In various places in this paper the legality or otherwise of exports and imports has been mentioned and, at the risk of repetition, it may be useful to summarise the present position. It does not seem appropriate here to discuss the taking or keeping of British birds in Britain, the law regarding which should in any case be well known.

Briefly, there is at present no ban on importing into England, Wales or Scotland any species of live bird except ducks, geese, birds of prey (including owls), partridges, quail, pheasants, guineafowl, and all domestic fowls and turkeys. A licence is required, specifying the species and number, for all birds of prey and owls for conservation reasons, and for all the others for health reasons. Quail *Coturnix coturnix* are an anomaly in that they come under both headings and two licences are required for them. A limited number of licences to import birds of prey are issued to falconers, zoos and private aviculturists, and in general licences are issued more freely for the other birds. A ban on the importation of parrots except under licence, hitherto in force, was unfortunately withdrawn several years ago. Northern Ireland is rather more enlightened and, in addition to conservation restrictions in respect of live birds of prey (including owls) identical to those applicable in Great Britain, licences are required for health reasons to import almost all species of live birds from ostriches to hummingbirds.

Britain has therefore a virtually open door, but this of course does not mean that the birds which enter so freely have left their country of origin equally within the law. North America and Kenya have already been mentioned as applying restrictions on export; a number of other countries attempt to control export of their wildlife in varying degrees ranging from a total ban to expressions of pious hope which are in practice meaningless.

The greater part of the large British trade in birds is therefore at present within the law. However, on 2nd March 1973 the 'Convention on International Trade in Endangered Species of Wild Fauna and Flora', drafted by the International Union for the

Conservation of Nature, was signed by representatives of 23 of the 88 countries attending. Others agreed in principle but did not immediately sign. Unfortunately it does not come into effect until at least ten nations have ratified it; however, the fact that a number of countries have already signed it shows at least their eventual intention of ratifying it, and it is greatly to be hoped that Britain will be among the early nations to do so.

When it becomes effective, this Convention will control the trade in three categories of endangered species of animals and plants. A virtually total ban will be imposed on the export and import of some 400 species in the first category, except in very special circumstances. Restrictions on trade in species in the second category will be somewhat less strict, but they will require an export permit from their country of origin. The third category is to enable any country to impose restrictions on the export of its own fauna and flora if those particular species do not come within the first or second lists.

Few will doubt that the signing and ratification of this Convention by a worthwhile number of countries and its eventual effective implementation will be a great milestone in the history of conservation. In the context of this paper, however, it must be pointed out that it is unlikely to have a significant effect on the problem of escapes.

MEANS OF ESCAPE

While it is quite impossible even to hazard a guess at the number of birds which escape from captivity in Britain, it is perhaps useful to discuss briefly how and whence they do so.

Except for those comparatively few which are privately imported and personally collected at airports, most of the immigrants pass through a number of hands between the plane which had brought them to this country and the eventual owner. However carefully they are packed—and this is by no means always the case, many packing-cases or cages being very frail—hazards attend almost every move: removal from aircraft to vehicle, from vehicle to arrival shed, examination, removal to appropriate depot for collection or re-embarkation, even well-meant attempts to give food or water, all may give chances of escape. They may need re-packing at the airport, they will be transported by road either direct to a wholesaler or to a railway station en route for one. On arrival they will be unpacked and caged, only to be re-packed again and sent, again by road or rail, to a dealer or pet shop. Thence they will go, usually in a small cardboard box, to their eventual owner. The tricky lids of these boxes present difficulty even to experienced aviculturists, especially when there is more than one bird in the box, although

they usually remember to close the windows of the room when transferring a bird from box to cage, which the inexperienced very frequently do not.

Wire-netting corrodes, leaving holes; aviary doors may be left open; birds will whistle past one's elbow during feeding or cleaning. A very frequent source of strangers flying free is the keeper of birds in unroofed pens who, although he knows that they should all be permanently pinioned, has merely clipped their wings before the moult and has put off re-clipping some of them after the moult until it is too late. Undoubtedly not a few birds are deliberately set free because their owners have lost interest in them or are unable to look after them, or because they hope they will remain in the garden if they are fed. Apart from wildfowl, these are almost always common foreign birds such as waxbills, munias or weavers which are unlikely to be of significance in the present context, however undesirable the practice may be in the light of possible colonisation. Some are given partial liberty in order to find suitable food for young being reared in an aviary (Anon 1969). There have been a few examples of the release of British species in fresh or deserted localities (e.g. Nuthatch *Sitta europaea* in London) and of winter visitors retained in captivity until after the time of migration in the hope that they will breed in this country when released (e.g. Redwing *Turdus iliacus*, Fieldfare *T. pilaris*).

While it is apparent that there may be many occasions during the captive life of a bird when escape is possible, the risk of escape must not be exaggerated. It should be added that it is remarkable how many birds, having escaped from an aviary, spend a great deal of their time trying to get back into it, and in a high proportion of cases it is only when they have moved so far away that they have lost the ability to orientate themselves that they really begin to wander. Although a still-captive mate or companion obviously provides an inducement to try to rejoin it, in many cases the familiar environment of the aviary and its association with food will prevent wandering, and perhaps even more so will the desire to return to an accustomed roost. However, many—probably most—escapes occur from places where the surroundings are unfamiliar, and in such cases wandering is inevitable. Sometimes these birds find a congenial (if unnatural) habitat such as a garden where food is regularly provided for wild birds, and it is commonplace for them to be reported as being regular visitors over long periods. Generally, escaped and wandering birds tend to search for the type of habitat from which they came when wild, although this is more apparent in the case of large birds (pelicans to estuaries, storks and cranes to fields or marshes, and so on); during their wanderings, however, they may turn up in the most unlikely places.

LOCALITY

Except in the few large areas of Britain uninhabited by man (or nearly so), birds are kept everywhere and escapes may be seen anywhere. More often than not it is impossible to trace the origin of a suspected escape, although there are the exceptional and obvious cases where, for example, a crane is seen within a few kilometres of a zoo which has lost one.

Despite this, the locality in which a bird is seen is of relevance when considering a record. At first sight it may seem that a bird is likely to be wild if it be recorded, for example, on Fair Isle or in the Isles of Scilly. It is, however, interesting that a number of *known* escapes have turned up in just such extremities of Britain. (This may be partly due to intensive coverage: few birds which land, for example, on Fair Isle during the hours of daylight are likely to go unrecorded.) Goodwin (1956) told of a Barbary Dove *Streptopelia roseogrisea* which, having disappeared from his garden in Surrey, turned up in Co. Wexford at the Tuskar Rock lighthouse a fortnight later. Escapes may reasonably be expected to appear at such places while attempting to migrate or while wandering. However, it would be unreasonable not to regard as at least circumstantially good evidence for wild origin the fact that Land's End or the Welsh coast was the place where a certain small North American bird was seen, or Fair Isle a Siberian one.

Their alleged occurrence in south-east England undoubtedly added considerably to the plausibility of the 'Hastings Rarities'; would they have been so readily accepted had it been claimed that they were all 'obtained' near Manchester? Similarly, an eastern European or Asian vagrant, if it came to Britain, might be expected to arrive somewhere in the eastern half of the country, although that is not to say that it will necessarily be first reported from there. Place is relevant, perhaps important, but certainly not conclusive.

The huge consignments of birds passing through London Airport and destined for the Continent have already been mentioned. It is all too easy to think of escapes seen in Britain as originating from captivity in this country, whereas of course continental dealers and bird-keepers are hardly likely to be more careful of their charges, and there is in fact a wider selection of species available from continental dealers. Further, although the Continent has not been spread recently with such a rash of 'wildlife parks' as has Britain, the large collections in private estates appear to have survived better over there than here. The Continent of Europe must therefore be regarded as a most fruitful source of escapes—especially of larger birds—and the south and south-east coasts of England are their likely areas of arrival.

LITERATURE AND INFORMATION

It is remarkably difficult to obtain information about escaped birds and it is too frequently made more so by the apparently inevitable time-lag between the bird's being seen and requests for information reaching the right people. There is no publication which completely bridges this gap, although the weekly magazine *Cage and Aviary Birds* probably comes nearest to doing so, and its editor has expressed willingness to publish both losses and reports of birds seen which are doubtfully wild. However, on the occasions when this has been done little useful has come of it, presumably because (though most aspects of bird-keeping are occasionally dealt with in its pages) the majority of the magazine's readers are interested primarily in canaries, parrots and the common British finches, or in bird shows, and unfortunately very few indeed are field ornithologists. To give credit where it is due, it is obviously current editorial policy to stimulate a greater and wider interest by publishing articles on birds in the wild with increasing frequency.

Unfortunately curators of zoos and similar places, with a few notable and welcome exceptions who have given every possible assistance, tend to adopt a couldn't-care-less attitude to the effect of escapes on field records. It is probable also that some escapes go unreported because of the reluctance of an employee to admit carelessness. The *Zoo Federation News* (published by the Federation of Zoological Gardens of Great Britain and Ireland), despite the cooperation of its editor, is published too infrequently to achieve very much, although such help as it can give is very welcome. The *Avicultural Magazine*, published every two months, has already printed an appeal for help (England 1970) and is the journal most likely to reach the more serious aviculturists. Indeed, its readers volunteered information about two escaped birds, a Barred Warbler *Sylvia nisoria* and a Yellow-breasted Bunting *Emberiza aureola*, neither of which was recorded in the field!

Importers and dealers, from whom a large number of birds may be presumed to escape, are—as might perhaps be expected—very mixed in their attitude to the problem. The writer has had courteous but usually negative replies from a few, while requests to others have been completely ignored. Some withhold information for fear that it is being sought in order to bring home an infringement of the law to which, unfortunately, they do not always adhere so carefully as they should; for example, records of Black Kites *Milvus migrans* have been troublesome for this reason. In any case, even if information were forthcoming from some dealers it would be of doubtful value because of their inaccuracy in naming the birds which they offer for sale.

On the Continent, Paul Vicomte de la Panouse, Secretary-general

of the Association Nationale de Parcs et Jardins Zoologiques Privés, has proved helpful and very willing to assist (though so far negatively); people holding somewhat similar positions in other countries have, on the whole, been as helpful as they were able; while Professor Doctor Heinz-Georg Klos, representing the Berlin zoos, has never failed to respond to appeals for help.

Most unfortunately, again with one or two notable exceptions, the least helpful of all are breeders of wildfowl, who are not only responsible for a great many escapes but appear to care little for their effect on records. Further, it is well known that many favour deliberate releases, while not infrequently articles are published advocating the keeping of full-winged 'liberty birds' (see, for example, D'Eath 1973).

It must in fairness be added that such escapes are not always deliberate nor due to carelessness. While this paper was in draft several Ring-necked Ducks *Aythya collaris* were flying around the neighbourhood of my home in Norfolk. These came from a local breeder who is not only aware of, but deplures, the effect of escaped birds on field records. The Ring-necked Duck is not a very free breeder in captivity and those which escaped were some of a brood hatched in a dense reed-bed in one of his pens and which avoided all attempts to catch and pinion them. Much the same happened with the American Black Duck *Anas rubripes*. As their owner said, 'The only way to stop them confusing the records would be to shoot them, and would you really want me to do that?'

I am therefore reluctantly of the opinion that, save in very special circumstances, practically all records of wildfowl can only be regarded as suspect, because of the very large numbers being kept and bred in captivity of almost all the species which are likely to be recorded wild; because the majority of these are kept in open pens and by no means all are permanently pinioned; because many are kept free-flying (while still being fed) or are deliberately released into the wild; and because many breeders of such birds are not interested in field records.

STATE OF PLUMAGE AND SOFT PARTS

It is often said that a particular bird cannot have escaped from captivity because it was in perfect plumage when seen. An extension of this idea is that birds reared in captivity are never the equals in size, plumage or health of wild ones.

Taking the second point first, it can safely be asserted that it is a quite unjustified generalisation and is unsafe as a criterion so far as escapes are concerned. In some cases it is unhappily true; some Australian 'grass parakeets', for example, have for so many generations been bred in inadequate conditions or have become so

inbred that many offered for sale in this country are mere shadows of their wild relatives. On the other hand, aviary-bred specimens of some well-known birds look to a field ornithologist almost 'too good to be true'.

Perfection of plumage is even more unsafe as evidence of wildness and is an unfortunate indication of ignorance about aviculture. It is, however, quite reasonable to use the opposite argument, namely that the state of the plumage of a given bird was so poor that it may have escaped from captivity, for the following reasons. First, most wild birds (accidents apart) keep their plumage in remarkably good condition except at certain times, for example after the stress of rearing a family or during a heavy moult; indeed they must do so to survive. There are certain exceptions (see also later), perhaps the best example being the Sacred Ibis *Threskiornis aethiopicus*. In the wild, the black 'plumes' of this bird always tend to look unkempt, even immediately after preening, and one might well be excused for thinking that it has recently escaped from rather squalid captivity.

Second, many escapes take place during or shortly after arrival in this country. While a *very* few exporters from other countries take a great deal of trouble over the birds in their care, as regards both health and packing for transportation, the majority, unfortunately, care no further than that the birds should arrive alive (and not always that). As a result freshly imported birds may be in a very bedraggled state due to stinky food, dirty and overcrowded boxes, and the 'bird-lime' with which they have been caught and which is usually lost only after a complete moult. All too often their lot in the hands of dealers after arrival is little better, although it may justly be said that a few dealers have an enviable reputation for keeping and supplying birds in first-class order.

Further—and this is one of the safer criteria—a bird showing wear about the face is more likely to have acquired this through trying to escape from captivity than in the wild. However, an experienced observer will beware of applying this, for example, to bee-eaters at hole-boring time, or to fruit-eaters such as thrushes, since in both cases the plumage of the face may temporarily get into a deplorable state, though not usually so much so that loss of feathers takes place, less still that bare patches will be seen around the base of the bill. For a detailed discussion of worn or broken wing-feathers see Goodwin (1956).

It is usually true that a badly worn or bedraggled tail is more likely to be seen on an escaped bird than on a wild one. It is not only frightened and closely confined birds which spoil the ends of their tails in their efforts to escape or from sheer lack of space; tame or fearless birds in large aviaries frequently break up their tails through clinging to wire netting in attempting to reach human

bcings whom they know to be potential providers of food. Some birds, such as rollers, are inveterate wire-clingers and may be the despair of those who try to keep them in good plumage. This is not often seen in the wild; broken, loose or missing tail-feathers may frequently be encountered, but not worn tail ends except in some immature birds and birds of prey. Not infrequently a photograph of a wild bird of prey is spoilt because the end of the tail is, to say the least, untidy. Steppe or Tawny Eagles *Aquila rapax* and Black Kites, among others, seem especially prone to this disfigurement.

It is thus safer to use the argument of bad plumage as evidence of escape than that of good plumage as evidence of wildness, with certain exceptions. The state of the bill and claws may be useful points: both may become overgrown in captivity as a result of an absence of those conditions which lead to wear; and it is not uncommon for small birds which have been caged for a long time to have claws so long that they experience difficulty in taking off from a perch. However, excessive growth of the bill, which is relatively easy to see, is less common than overgrown claws, which may be impossible to note except in the hand. In addition, overgrown and abnormal bills occur in the wild (Pomeroy 1962). Although deformed toes are not unknown in wild birds (being common, for example, in feral pigeons *Columba livia*), birds captured with 'bird-lime' not infrequently have distorted digits (sometimes grossly so) with lumps or swellings on or between the joints. Somewhat similar lesions may appear as a result of unsuitable food, perches or floor material. These seldom completely recover. Scaly legs may be seen both in wild birds (Blackmore and Kcymer 1969) and—probably more commonly—in captive ones, and are usually due to infestation with a mite, although they may appear with old age.

Hitherto, a messy ventral area or repeated jerky motions of a bird attempting to defaecate were indications of the likelihood of unsuitable food in captivity but, although such points should not be ignored, contamination of the environment has unfortunately rendered them less useful as evidence than formerly.

The colour, as distinct from the quality, of a bird's plumage is sometimes useful evidence but must be treated with caution. It is well known that some birds tend to lose the red in their plumage in captivity; this occurs, for example, in Linnets *Acanthis cannabina* and Rose-coloured Starlings *Sturnus roseus*. Although useful, this is not completely reliable; as has been mentioned, many birds escape shortly after being imported when their colours have not had time to deteriorate. On the other hand, my only experience of the Rose-coloured Starling in the field was of a very tatty-looking specimen with a complete absence of 'rose'; however, since it was in a clearing in the Indian forest it was not likely to have escaped.

APPROACHABILITY

Tameness, approachability and fearlessness, although similar, are not necessarily the same and in any case must obviously be considered in relation to the particular species. For example, while a phalarope would be expected to allow an approach to within ten metres, a Peregrine *Falco peregrinus* which did this is hardly likely to be a healthy wild one. With certain exceptions, and provided there is no reason to suppose that it has just completed a long flight across the sea, an alert bird which allows an unreasonably close approach may be considered to be suspect. However, hunger, exhaustion, sickness and injury must not be forgotten, since they govern approachability to a great extent, and in my view this is at best an uncertain guide, although of course it is useful as an addition to the total of the evidence to be considered.

FAMILIES AND SPECIES IMPORTED

It has been said that, given sufficient financial resources, it would be possible to obtain in Britain any species of bird in the world. This is, unfortunately, not far from the truth, although there are some which would prove very difficult indeed, either because—however good avicultural techniques have become—they are unlikely to survive the journey from their native land (or indeed survive captivity at all), or because they are few in number in the wild and sufficiently localised and well protected to make trapping and export well-nigh impossible. An obvious example of the latter is the Takahē *Notornis mantelli* of New Zealand. However, it must be noted that rareness, of itself, is no safeguard that a species will not reach Britain in a captive state: for example, a pair of wild-trapped Siberian White Cranes *Grus leucogeranus*, which are, of course, very much in the 'Red List', were recently imported for a private collection. However, such birds do not concern us here, and it is almost certainly true to say that any species likely to cause escape confusion in Britain is obtainable by a determined importer.

Stated baldly like this, it appears to make the problem of escapes insoluble and it must hastily be added that, although all may be possible, fortunately only few are likely.

In attempting to compile a list of species which might be, or might be mistaken for, wild vagrants and which are imported into Britain or the adjacent parts of the Continent in numbers sufficient to make them an 'escape risk', it cannot too often be repeated that the position is continually changing and that the availability of species ebbs and flows. The following birds, therefore, are those currently being imported (or known recently to have been) which may cause confusion either in their own specific right or because they may be said to resemble possible immigrants, even though such

a mistake appears unlikely in the extreme to an experienced person. Ducks and geese have been omitted for reasons given above, although it may not be out of place to repeat the classic warning about reporting Ruddy Ducks *Oxyura jamaicensis*, which are now fairly common in Britain in a feral state, as White-headed Ducks *O. leucocephala*. Species which are imported so seldom, or in such small numbers, as to make the risk of escape negligible have been omitted, although this must not be taken to mean that such a thing is impossible. To avoid constant repetition of such phrases as 'moderate numbers', 'only occasionally', and so on, the numbers 1, 2, 3 and 4 have been used to indicate *very roughly* the relative numbers being imported from the area named (1 meaning few, 4 very many), although it will be appreciated that numbers alone do not accurately indicate the likelihood of escape. For example, an escape is more likely from among ten pelicans, which are often only wing-clipped and kept in open pens, than from four times that number of rollers, which are always in cages or aviaries. Countries named are probable areas of origin.

Pelicans *Pelecanus spp.* (America, Africa and Asia 2). Mainly White *P. onocrotalus* and Dalmatian *P. crispus*.

Purple Heron *Ardea purpurea* (Asia 1).

Little Egret *Egretta garzetta* (Asia 2, Africa 1).

Great White Egret *Egretta alba* (Asia 2, Africa 1).

Squacco Heron *Ardeola ralloides* (Africa 1).

Indian Pond Heron *Ardeola gravii* (Asia 1). More commonly imported than Squacco, especially out of breeding season. Great care needed to distinguish the two species.

Cattle Egret *Bubulcus ibis* (Africa and Asia 2).

Night Heron *Nycticorax nycticorax* (mainly Asia 2). It should be noted that there is a free-flying colony at Edinburgh Zoo.

White Stork *Ciconia ciconia* (Africa, Asia and Europe 2).

Black Stork *Ciconia nigra* (Africa and Asia 1).

Spoonbill *Platalea leucorodia* (Asia 2).

African Spoonbill *Platalea alba* (Africa 1). Has red face.

Glossy Ibis *Plegadis falcinellus* (Africa and Asia 2).

Flamingos *Phoenicopterus spp.* (America, Africa and Asia 3). All species have been imported, the Greater Flamingo *P. ruber* quite commonly.

Birds of prey. See page 193.

Crane *Grus grus* (Asia 1). Surprisingly few imported.

Sarus Crane *Grus antigone* (Asia 2). Common in captivity.

Demoiselle Crane *Anthropoides virgo* (Asia 2).

Purple Gallinule *Porphyrio porphyrio* (Asia 2, Africa 1). The Indian race *poliocephalus* is the one most commonly imported, but this has a greyish head and is easily distinguishable from the nominate form.

Allen's Gallinule *Porphyryula alleni* (Africa 1).

(Various rails and gallinules are frequently available from Central and South America and from Asia, most of which are hardly likely to be confused with species which might occur as genuine vagrants. However, consignments occasionally include such species as Sora Rail *Porzana carolina*, even if only in small numbers.)

- Great Bustard *Otis tarda*. Private importations only; a few pinioned birds on Salisbury Plain, Wiltshire.
- Kori Bustard *Ardeotis kori*. A few in captivity (and not expensive in African dealers' lists), which should be remembered when a possible Great Bustard is seen.
- Spur-winged Plover *Vanellus spinosus* (Asia 2, Africa 1). Breeds freely in captivity, and in Lancashire has been reared by incubator in surprising numbers.
- Three-banded Plover *Charadrius tricollaris* (Africa 1). Might be confused with Killdeer *C. vociferus* but is much smaller (size of Ringed Plover *C. hiaticula*) and has red eye-ring and very conspicuous red base to bill.
- Black-winged Stilt *Himantopus himantopus* (Asia 2, Africa 1).
- Pratincoles *Glareola spp.* More imported than might be expected, chiefly from Asia, though perhaps a few from Africa. Rarely correctly named by dealers, sometimes called 'Eastern Pratincoles'. Probably chiefly Collared *G. pratincola* or Eastern Collared *G. maldivarum*, but Black-winged *G. nordmanni* not impossible.
- Rufous Turtle Dove *Streptopelia orientalis* (Asia 1). Intermittent, often wrongly named in dealers' lists.
- Namaqua Dove *Oena capensis* (Africa 1).
- (Budgerigar *Melopsittacus undulatus* and Ring-necked Parakeet *Psittacula krameri*. Colonies of both species breeding at liberty at several places in Britain.)
- Owls. See page 193.
- Bee-eaters. Various species imported from Africa and India, chiefly those unlikely to occur wild, although there are quite a number of European Bee-eaters *Merops apiaster* in captivity in Britain. The colour of the last-named tends to fade considerably.
- Roller *Coracias garrulus* (Spain 1).
- Indian Roller *Coracias benghalensis* (Asia 2). Easily confused with Roller, but adults have reddish, not blue, face and breast; juveniles more difficult.
- White-bellied Black Woodpecker *Dryocopus javensis* (Asia 1). White belly distinguishes this species from the Black Woodpecker *D. martius*.
- Azure-winged Magpie *Cyanopica cyanus* (Iberia 1). Being bred in captivity.
- Crested Tit *Parus cristatus*. Seldom imported, but see next species.
- Yellow-cheeked Tit *Parus xanthogenys* (Asia 3). Might be mistaken for Crested Tit, but has yellow cheeks and variable black band down belly.
- American Robin *Turdus migratorius*. Very seldom imported.
- Whistling Thrush *Myophonus caeruleus* (sometimes called Blue or Violet Whistling Thrush or even simply Blue Thrush) (Asia 1). Might be mistaken for Blue Rock Thrush (see below), but is larger, slimmer, and usually appears very dark except in brilliant light; very shy. Attempted to breed in Upper Weardale, Co. Durham, in 1970—probably deliberately released (Dr H. M. S. Blair *in litt.*).
- Rock Thrush *Monticola saxatilis* (Spain, Italy and Africa 1).
- Blue-headed Rock Thrush *Monticola cinclorhynchus* (Asia 2). Has black eyestripe, rufous rump, white patch on dark wings.
- Chestnut-bellied Rock Thrush *Monticola rufiventris* (Asia 2). Larger than preceding species, with no rufous on rump and no white in wings. (African rock thrushes are seldom imported.)
- Blue Rock Thrush *Monticola solitarius* (Asia 1). Mostly *M. s. pandoo*, which is slightly smaller and darker (less blue) and generally a duller-looking bird than the nominate European race. See also Whistling Thrush above.
- Red-flanked Bluetail *Tarsiger cyanurus* (Asia 1—very few). See also Rainbow Bunting on page 192.
- Spotted Morning Warbler *Cichladusa guttata* (Africa 1). Has bred in England several times. Actually a thrush, and might be confused with some other thrushes, possibly Hermit Thrush *Hylocichla guttata*, but has more upright, flycatcher-like stance.
- Red-spotted Bluethroat *Luscinia svecica svecica* (also *L. s. pallidogularis* and *L. s.*

- 'robusta' (Asia 2). Throat pattern of males very variable.
- Siberian Rubythroat *Luscinia calliope*. See next species.
- Himalayan Rubythroat *Luscinia pectoralis* (Asia 2). More commonly imported than Siberian. Has black surrounding the 'ruby' throat.
- Brown Flycatcher *Muscicapa latirostris* and Red-breasted Flycatcher *Ficedula parva*. Formerly fairly frequent from Asia, less now, but a few included among batches of small flycatchers (mainly blue with red and brown—e.g. Tickell's Blue Flycatcher *Niltava tickelliae*) which are still commonly imported. The females of some of these are very confusing.
- Wagtails *Motacilla* spp. (Asia 2-3). Some confusing black- and grey-headed examples. See also next species.
- Citrine Wagtail *Motacilla citreola* (Asia 1).
- Shrikes *Lanius* spp. (Asia 1). Chiefly Great Grey *L. excubitor*, Bay-backed *L. vittatus* and Rufous-backed or Black-headed *L. schach*: last two should be considered if unfamiliar shrike is seen.
- Rose-coloured Starling *Sturnus roseus* (Asia 2) Does not deserve its reputation as 'inevitably an escape', though possible. Dullness or absence of pink not a sure criterion for captive origin. Not a ready breeder in captivity, so immatures less suspect.
- Bobolink *Dolichonyx oryzivorus* (America 1).
- Yellow-headed Blackbird *Xanthocephalus xanthocephalus* (America 2).
- Yellow-headed Marsh Blackbird (also known as Yellow-hooded (Marsh) Blackbird) *Agelaius icterocephalus* (America 2). Not to be confused with *Xanthocephalus xanthocephalus*, which is more likely to occur as a vagrant.
- Red-winged Blackbird *Agelaius phoeniceus* (America 1).
- Baltimore Oriole *Icterus galbula* (America 1). Intermittent.
- Evening Grosbeak *Hesperiphona vespertina* (America 2).
- Serin *Serinus serinus*. Very seldom imported, but see next species.
- Green Singing Finch *Serinus mozambicus* (Africa 4). Male differs from Serin in well-marked facial pattern; female more easily confused. Tail *not* forked.
- Scarlet Rosefinch *Carpodacus erythrinus* (Asia 3).
- Scarlet Tanager *Piranga olivacea* (America 2).
- Summer Tanager *Piranga rubra* (America 1).
- Red-headed Bunting *Emberiza bruniceps* (Asia 4).
- Black-headed Bunting *Emberiza melanocephala* (Asia 2).
- Yellow-breasted Bunting *Emberiza aureola* (Asia 1-2).
- Rock Bunting (African) *Emberiza tahapisi* (Africa 2). Dark throat and less barring in wings than in Rock Bunting *E. cia*.
- Cardinal *Richmondia cardinalis* (America 2).
- Rose-breasted Grosbeak *Pheucticus ludovicianus* (America 2).
- Blue Grosbeak *Guiraca caerulea* (America 2).
- Indigo Bunting *Passerina cyanea* (America 2).
- Lazuli Bunting *Passerina amoena* (America 2).
- Painted Bunting *Passerina ciris* (America 1).
- Rainbow Bunting *Passerina lechlancheri* (America 2). Has orange breast on arrival, but this soon fades in captivity (unless bird fed on insects, which is very seldom the case), and confusion then possible with Red-flanked Bluetail on plumage characters.
- Yellow-throated Sparrow *Petronia xanthocollis* (Asia 2). Slimmer and neater than Rock Sparrow *P. petronia*, but has yellow throat and rather similar body markings. Bill much finer: looks 'insectivorous' in field.

Domestic Canaries *S. canaria* are now produced in so many colours and sizes that they should be remembered when an unrecognisable

finch- or bunting-like bird is reported. Colour-feeding is common and colours may range from red and chestnut to green and yellow, with or without dark markings. Streaking is common and the rump is often yellow. Various finch hybrids and canary-finch 'mules' are surprisingly popular and very numerous, but in most a trace of Goldfinch *Carduelis carduelis*, Bullfinch *Pyrrhula pyrrhula* or Linnet will be apparent (the red 'blaze' of the Goldfinch is seldom completely lost) and snatches of song may reveal the parentage. However, any of these birds may be puzzling in the field, and those considered useless for show purposes are not infrequently liberated.

BIRDS OF PREY AND OWLS

Since 1970 it has been illegal to import into Britain, without a licence from the Home Office specifying the species and number, all birds of prey and owls. Despite these restrictions a considerable number are still appearing on the market. However, the Continent is probably one of the main sources of escapes of such species. The commonest eagle is almost certainly the Tawny, although some Spotted *Aquila clanga* or Lesser Spotted *A. pomarina* (not necessarily distinguished) appear from time to time. Various vultures are in surprising demand, as are Black Kites, the latter mainly from Asia though a few are of the African yellow-billed forms.

The two most difficult owls are the Scops *Otus scops* and Eagle Owls *Bubo bubo*. Before the restrictions were imposed, very large numbers of scops owls of various species and subspecies were imported (one dealer in the Midlands was receiving 100 a week) and the Continent still receives a number. The main forms involved were *Otus scops* (Asia 1), the White-faced Scops *O. leucotis* (Africa 1), the Bare-toed (or Bare-legged) Scops *O. bakkamoena glabripes* (South China and Taiwan 1), and, commonest of all, other races of *O. bakkamoena*, known as Collared Scops Owls, which are very variable in colour and might even be mistaken for the Screech Owl *O. asio* of North America. The eagle owls are also very difficult. Many are (or were) imported and a number are bred in captivity each year. Several species are involved, not all so easily identifiable as might be thought. In addition, the Brown Fish-Owl *Ketupa zeylonensis* came in from southern Asia in some numbers and was often euphemistically named 'Great Horned Owl' by dealers.

OTHER GROUPS AND GENERAL COMMENTS

It will be noticed that no divers, grebes or seabirds appear in this list (although a very small number of gulls are imported and a fair number—chiefly common species—are kept in some of the larger collections). Nightjars, swifts and hirundines are also absent, chiefly because they do not appear very suitable for aviary life,

although swallows and martins which fall from the nest and are hand-reared do surprisingly well and may live to a considerable age. Larks and pipits are not very popular and, most fortunately, neither waders nor warblers come from America in sufficient numbers to raise serious doubts, except in a very few species.

Dealers' lists offering birds for sale may be misleading in two ways. First, because a certain species is listed and priced it does not necessarily follow that it is actually in stock; it may merely indicate that it is obtainable on demand, either from its country of origin or from that avian clearing-house Bangkok or, more likely, from a wholesaler on the Continent. A very undesirable corollary to this is the advertiser who offers to obtain to order especially difficult or rare species. Second, many birds are listed under euphemistic names (see, for example, Great Horned Owl above), some in order to make them sound more attractive, others because the dealer has no idea what they are and has to invent likely-sounding names. (The fact that a particular species is ordered is no guarantee that the birds which arrive bear any resemblance to what has been asked for.) Not infrequently males and females of the same species are listed as two different species; and where the male of a species is colourful and the female drab, importations often consist of practically nothing but males (as in the Red-headed Bunting).

It is my opinion that, while in the last resort each suspected case must be considered on its merits, the risk of vagrants being in fact escaped birds is not so great as is sometimes imagined, except in a few cases such as pelicans, herons, egrets, storks, flamingos, waterfowl and birds of prey. The 'problem of escapes' thus arises from the fact that the very wide range of imported species necessarily means that almost every recorded rarity is, to however infinitesimal a degree, tainted with suspicion, and I do not pretend that I have been able to remove this suspicion. However, some comfort may be taken from the fact that, with the exceptions named above, I find it necessary to question from an escape point of view only a very small proportion of the records submitted to the Rarities Committee.

A NOTE ON AVICULTURE

It will not have needed much imagination for the reader to have become aware of the fact that I am very much opposed to the almost worldwide and to a large extent unrestricted traffic in wild birds. I might add that I am equally opposed to the keeping of birds in small cages for any length of time. The advertisement pages of such a journal as *Cage and Aviary Birds* cannot fail to appal anyone with the slightest interest in conservation, nor indeed any thoughtful person with a conscience at all.

However, I am an aviculturist and I should indeed be doing a

disservice to my fellow aviculturists and to the minority of conscientious dealers were I to write no more than the paragraph above. It would be difficult to find better words than those used by Seth-Smith (1964) as a dictionary definition of aviculture. What he wrote cannot be quoted in full here, but his opening sentences give an indication of his theme: 'AVICULTURE: term applied to the practice of keeping birds of wild species in aviaries or enclosures, with the object of studying their habits and, if possible, inducing them to breed successfully under conditions as nearly as practicable approaching those found in nature . . .'. It must be admitted that in elaborating his excellent definition he tended to consider the subject (perhaps properly in the context) only from the point of view of its advantages and wrote nothing of the fact that a considerable number of ornithologists and probably more of 'bird-lovers' are opposed to the keeping of birds in captivity in any circumstances. This is not the place to embark on a discussion on the ethics of bird-keeping, but it seems appropriate at least to make some attempt to present briefly a balanced picture.

It is difficult to understand how anyone can fail to be appalled at the widespread depletion of wild stock that is going on, or at the conditions in which birds are trapped and transported. Harrowing details would be out of place here: suffice it to say that huge numbers of birds arrive in Europe dead or dying and that a great many more which are just alive on arrival have suffered so much that they will shortly die even in the hands of the most expert aviculturist, hands into which they stand very little chance of falling.

Fortunately the picture is not all black. Some of the better public zoological collections and a very few private aviculturists import their birds personally direct from a reputable trapper or dealer in the country of origin. The birds are ordered—under licence where necessary—by species and often in pairs only, from people who are prepared to take trouble to ensure that trapped birds are feeding properly, are in good health, are properly packed for travelling (with instructions for feeding) and are despatched by a suitable route in the care of an airline with a reputation for reliability in the handling of livestock. In such cases it is the rule rather than the exception for the birds to arrive in immaculate condition.

Also on the credit side it is not necessary to look further than Britain—although valuable work is being done on the Continent, in the United States and elsewhere—to find examples of aviculture so obviously advantageous as to make sweeping condemnation ridiculous. The work of Professor W. H. Thorpe and others at Cambridge on song (e.g. Thorpe 1961) and of the Wildfowl Trust in saving the apparently doomed Hawaiian Goose *Branta sandvicensis* show that it is not going too far to say that, for the full under-

standing of birds and for the ultimate benefit of the avifauna of the world, a certain amount of aviculture in the true sense of the word is essential.

Following from this it would be all too easy to adopt a holier-than-thou attitude and suggest that bird-keeping is permissible only if it serves an immediate and obvious scientific purpose. But who is to say that it is wrong for a few pairs of common birds to be kept in an aviary *for the sheer pleasure which they give*? Somehow the decimation must be controlled: rarities must be protected; the implementation of international legislation is desperately needed to prevent the recurrence of such events as the arrival in England of the cranes mentioned above. But there are far worse things which the owner of the few common birds might be doing and, since he must already be a lover of birds, it may be only a short step for him to join the ranks of the conservationists.

ACKNOWLEDGEMENTS

M. H. Whittaker, in charge of the RSPCA Hostel for Animals at Heathrow, has been most helpful in providing information, and T. P. Inskipp, at present undertaking a survey of the question of imported and captive birds on behalf of the Royal Society for the Protection of Birds, has allowed full use of his notes and the information which he has so far gathered, and has proved helpful in discussion. B. Riley has willingly answered many questions about the sources of imported birds. I gladly express my thanks to a gentleman in the Department of Customs and Excise, who prefers to remain anonymous, for advising on and checking the section on the law. To James Ferguson-Lees must go a great deal of the credit for the fact that this paper was ever completed, since only his continual persuasion overcame the reluctance to rewrite, time after time, matter which became out of date before it could be published. I am grateful to Peter Olney for taking considerable trouble in helping me to avoid mistakes and irrelevancies. Most of all, thanks are due to Stanley Cramp for reading through more than one draft and making many invaluable suggestions for improvement.

SUMMARY

The problem of escapes and its magnitude are discussed and some indication of numbers and sources given. Methods of escape are outlined and various aids to differentiation between wild and escaped birds are suggested. A list of birds imported which may occur as wild vagrants, and others which may be confused with these, is included. There is a brief comment on aviculture.

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More examples of the best recent work by British bird-photographers

Plates 29-36

It is now fifteen years since we first published this annual feature on the best contemporary black-and-white bird photographs, and during that time we have shown 137 species by 72 photographers. Although we show the work of only two new photographers on this occasion, ten of the fourteen photographs are of species not published before. As we have already mentioned, the photographic process is not permanent and after perhaps 60 or 70 years the majority of photographs taken during this decade will no longer be in existence.

A record number of 203 prints was submitted by 41 photographers and we much regret bring unable to publish more of them. In our choice we have been influenced partly by whether we have already used photographs of the species concerned. For instance, five excellent pictures of Barn Owls *Tyto alba* have appeared in the series; this time no fewer than seven were sent to us, several of which were very fine indeed, but we decided that it would be more sensible to give preference to species not shown before.

Some of the work submitted was not of the highest photographic quality but was of outstanding interest for one reason or another. We hope to publish a selection of such prints at a future date. Another point of interest is that eight of the fourteen photographs on plates 29-36 were taken away from the nest, an encouraging trend. There is still a great deal of work to be done on birds flying, feeding, displaying, and so on, and obtaining such pictures is nearly always a greater challenge than taking portraits at the nest.

As we mentioned last year, we have published very few photographs of warblers in this series—in fact, only seven, of five species. It is therefore appropriate to start this selection with a shot of a

Marsh Warbler *Acrocephalus palustris* taken in Somerset by G. H. E. Young (plate 29). This shows the bird and its straggly nest very well indeed. We always look forward to seeing the work of David Gowans because it is usually very different from the general run of bird photographs: his Barnacle Geese *Branta leucopsis* in flight (plate 30a), with a scattering of snow on the mountains of Wester Ross forming a wild background, is no exception. By complete contrast we show Bill Paton's perfect portrait of a single Canada Goose *B. canadensis* stepping ashore from an Ayrshire loch (plate 30b). Brian and Sheila Bottomley can always be counted upon to produce something out of the ordinary, and again they have not failed us this year. Their Common Sandpiper *Tringa hypoleucos* pulling a worm out of the mud, with the wind ruffling some shoulder feathers, is a fine example (plate 31a). One of the two photographers new to this series is Rodney Dawson, who visited the Coto Doñana in southern Spain in September 1972 and secured a shot of a Little Egret *Egretta garzetta* with a *Dytiscus* water beetle in its bill (plate 31b). We hope to be able to publish more of his photographs in future selections.

The next three pictures are all of birds at their nests. It would be almost impossible to obtain a better portrait of a Purple Heron *Ardea purpurea* than the one by Dr Kevin Carlson shown on plate 32—the clearing of the nest has been skilfully done and everything is in critical focus. The second photographer new to the series is Bryan Sage, who has been taking bird photographs for many years. His pair of Long-tailed Skuas *Stercorarius longicaudus* at their nest (plate 33a), taken on the Arctic Slope of Alaska, is in the finest tradition of bird photography. An almost perfect match for this photograph is Dr David Cooke's superb pair of Arctic Terns *Sterna paradisaea* (plate 33b).

We cannot imagine anything more difficult to photograph than a Swift *Apus apus* in flight (plate 34a), and indeed can recall only two previous good examples, one of which was taken before the war by John Barlee. It is a great achievement by Keith Atkin not only to get a photograph at all, but to succeed in getting a highlight in the eye and detail in the wings. The shot was taken from the open concrete bank of Covenham Reservoir in Lincolnshire.

During the past year or two Frank Blackburn has been using a 1,000 mm mirror lens for some of his photographs of birds, and his picture of a male Crossbill *Loxia curvirostra* taken from a distance of ten metres (plate 34b) just shows what can be done. Roy Blewitt's work on Sparrowhawks *Accipiter nisus* is now familiar to us all—we published a series in colour and monochrome only last June—but the example we now show (plate 35a) is quite remarkable in that it depicts the cock flying from the nest after visiting the



PLATE 29. Marsh Warbler *Acrocephalus palustris*. Somerset, June 1967 (G. H. E. Young) (pages 197-199)



PLATE 30. Above, flock of Barnacle Geese *Branta leucopsis* against mountains and moorland, Wester Ross, December 1972 (photo: David A. Gowans). Below, Canada Goose *B. canadensis* by an Ayrshire loch, April 1973 (photo: William S. Paton)





PLATE 31. Above, juvenile Common Sandpiper *Tringa hypoleucos* pulling worm, Cornwall, September 1970 (photo: J. B. and S. Bottomley). Below, Little Egret *Egretta garzetta* with *Dytiscus* water beetle, Spain, September 1972 (photo: Rodney Dawson)



PLATE 32. Purple Heron *Ardea purpurea*, Portugal, May 1973 (Kevin J. V. Carlson)





PLATE 33. Above, pair of Long-tailed Skuas *Stercorarius longicaudus* at nest, Alaska, June 1971 (photo: *Byran L. Sage*). Below, pair of Arctic Terns *Sterna paradisaea* at nest, North Uist, Outer Hebrides, also June 1971 (photo: *D. A. P. Cooke*)





PLATE 34. Above, Swift *Apus apus*, Lincolnshire, June 1973 (photo: Keith Atkin).
Below, male Crossbill *Loxia curvirostra* photographed while accompanying his mate
during nest-building operations, Surrey, April 1973 (photo: Frank V. Blackburn)



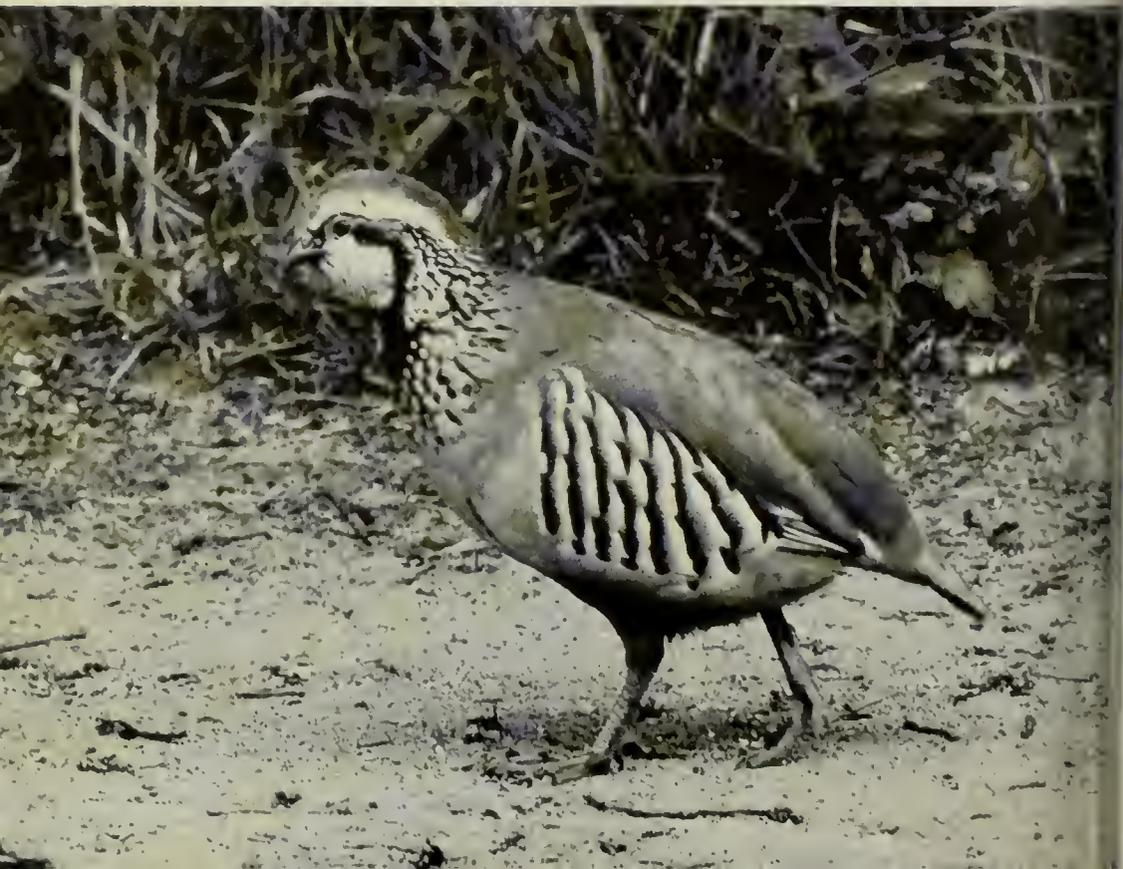


PLATE 35. Above, male Sparrowhawk *Accipiter nisus* flying away from incubating female, Staffordshire, May 1973 (photo: R. J. C. Blewitt). Below, Azure-winged Magpie *Cyanopica cyanus* at hidden nest, Portugal, June 1973 (photo: R. G. Carlson)





PLATE 36. Above, herd of 26 Whooper Swans *Cygnus cygnus* walking across the surface of a frozen lake, Lancashire, February 1973 (photo: Dennis Green). Below, Red-legged Partridge *Alectoris rufa*, Suffolk, July 1973 (photo: S. C. Porter)



incubating hen. His reactions to catch the bird before it left the field of view must have been extremely fast.

We hope that the time will soon come when we can reproduce part of this feature in colour: a species such as the Azure-winged Magpie *Cyanopica cyanus* (plate 35b), for example, would look far better in colour than it does in black-and-white. Dr Rudolf Carlson has managed to obtain a beautiful portrait, though in this instance the nest was not in an easy situation for photography. We like Dennis Green's quiet study of Whooper Swans *Cygnus cygnus* walking on a frozen lake on a cold, misty February day in Lancashire (plate 36a); and lastly we show Stanley Porter's close-up of a Red-legged Partridge *Alectoris rufa*, a shy gamebird that is far from easy to photograph.

The selection this year was more difficult than ever. We hope that photographers whose work we were unable to include will not be discouraged from continuing to submit their best results, and we ask for prints for next year's selection to be sent to us not later than 18th February 1975.

In conclusion we should like to remind all bird-photographers that birds on Schedule 1 of the Protection of Birds Act 1967 (listed in *Brit. Birds*, 61: 215; 64: 189) may not be disturbed at the nest unless approval is first obtained from the Nature Conservancy Council at 12 Hope Terrace, Edinburgh EH9 2AS. ERIC HOSKING

Breeding biology of the Buzzard in Speyside

N. Picozzi and D. Weir

INTRODUCTION

This paper gives data on breeding by Buzzards *Buteo buteo* in 17,800 hectares of the Spey valley, east Inverness-shire, between Kingussie and Boat of Garten. Most work was done during 1969-72, supplementing an earlier study by DW from 1964 to 1968. Other aspects of the study dealing with population dynamics and the effects of social behaviour on density and distribution will be described elsewhere.

STUDY AREA

The River Spey runs 27 km south-west to north-east through the study area, falling from 222 metres above sea-level at Kingussie to 205 metres at Boat of Garten. The boundaries were the 380-metre

(1,250-foot) contour on either side of the valley, as only exceptionally were Buzzards known to nest above that altitude, together with natural features at the south-west end and a combination of natural features and an arbitrary boundary at the north-east end. The average width of the valley between the 380-metre contours is about 6.5 km.

The study area is a good habitat for Buzzards, as there are suitable nesting woods throughout it, a wide variety of land use which ensures a diversity of prey, plenty of open areas for hunting, and an uneven terrain leading to good soaring conditions.

HISTORY OF THE BUZZARD IN SPEYSIDE

Buzzards were once common in the neighbourhood of the study area wherever there were suitable tree or cliff nest sites (Harvie-Brown and Buckley 1895), but by 1850 they bred rarely, probably because of severe persecution by gamekeepers (Moore 1957). Records from Glengarry, a large upland valley in the Central Highlands comparable with the study area, listed 285 Buzzards killed between 1837 and 1840 (*Gazetteer of Scotland*, 1853). During 1919-30 S. Gordon (*in litt.*) saw few birds and found no nests. D. Nethersole-Thompson (*in litt.*), who lived in the area, knew of one nest from that period but of no others until 1945. Subsequently, Buzzards increased: in 1955 only one breeding pair was known on an estate where there were five in our study (A. Forbes-Leith, verbally), and DW noted an increase throughout Speyside during 1964-68. Our study was thus of a once-common resident which was lost as a breeding species in the 19th century, probably through severe persecution, but which recolonised the study area in the late 1940's.

METHODS

Finding nests

Nests were first found by systematically searching woodlands, and only rarely by watching adults which were soon lost to sight within woods and seldom seen carrying material. Occasionally the approximate position of a nest was indicated by spring displays of the male which ended with a steep dive into a wood. We aimed to visit all known sites in each territory in mid-March and again in early April. If none of the known nests in a territory had been occupied by late April, a thorough search was made for a new one, but failure to find a built-up nest was not taken as conclusive evidence of non-breeding. A pair was assumed to have failed early in incubation if there were no eggs or young but the nest cup was filled with green material, the lining was compressed and there was much down on the nest edge. Searches for a repeat nest were made following known early nest failures, and all territories were revisited

in July or August when fledged young were very noisy and could be heard for up to 1 km from the nest.

Nest inspection

We visited nests at two-week intervals, inspecting those in difficult trees with a mirror measuring 20 cm × 15 cm attached to a light aluminium pole (Milstein *et al.* 1970) to minimise disturbance. The pole was in 1.5-metre sections and extended to 15 metres. Most nests could be reached and the contents clearly seen from the ground. As it was possible to complete a visit in 15 minutes, we caused relatively little disturbance in the critical period of laying and early incubation. All trees were climbed when the brood was old enough to ring and colour mark. The number of sections in the pole and the length of the safety rope used during climbs enabled us to assess the height of nests above ground.

Mapping of territories

In each year of the study, Buzzard territories were plotted on an Ordnance Survey map. Full details will be published elsewhere.

RESULTS

Nest locations

We knew of 96 nest sites in 1969, and 164 by the end of the study; this averaged about five per territory. Of 102 lined nests (nests used in more than one year being counted only once), 62% were in Scots pine *Pinus sylvestris*, 19% in birch *Betula*, 5% in oak *Quercus*, 4% in larch *Larix decidua*, 3% each in alder *Alnus glutinosa* and Norway spruce *Picea abies*, and 1% in sycamore *Acer pseudoplatanus*, Corsican pine *Pinus nigra* and beech *Fagus sylvatica*, and on a crag. In 1969 and 1970, 25% of the nests used were in new sites, and in 1971 and 1972 about 40% were new. Possibly our activities caused the increased use of new sites.

Scots pine was the commonest tree by far in our study area, so that, even if nest site selection by Buzzards was random with respect to tree species, it would have been chosen most frequently. However, it certainly appeared to be preferred to birch, since, although half the territories contained apparently suitable birches, two-thirds of the nests were in pines and only one-fifth in birches. Dare (1961) in Devon, and Joensen (1968) in Denmark, also concluded that conifers, which were not common in their study areas, were preferred to hardwoods.

The mean height above ground for a sample of 50 occupied nests was 11 metres (range 4.6-21.4 metres). Nests were usually close to the main trunk and up to a metre or more in both depth and diameter. Most were lined with green foliage, usually pine, larch or

birch, which was renewed until the young fledged. Dry bracken *Pteridium aquilinum* was sometimes used instead of green material. New nests were often built on dreys of Red Squirrels *Sciurus vulgaris* or old nests of Crows *Corvus corone*. Most nest trees (about 85%) were on a slope: this was almost inevitable in many territories, but it also gave easy access to the nest from plucking posts which were always uphill from the nest. Most nests were within 50 metres of the woodland edge or, if situated further in a wood, were near a ride or clearing.

In six territories, the nests used within each territory in successive years of the study were less than 0.5 km apart, but in all other territories there was no general pattern; the nest in any year could be adjacent to that of the previous year or up to 2.7 km from it. The spacing of nests between territories in any one year showed no consistent pattern.

Causes of breeding failure

The 65 breeding failures during the study (table 1) represented 45% of the possible 145 nestings (this latter figure including known repeat nests and territories with two females present). Eight failures certainly resulted from the deliberate destruction of nests and adults by man and there was strong circumstantial evidence of this to explain a further 23 failures. People were responsible directly and indirectly for another twelve failures. The cause of failure was unknown in 20 territories: in some no nesting activity was recorded, and in others nests were lined but apparently no eggs were laid. Most of these probably represented non-breeding. One desertion was caused by a Golden Eagle *Aquila chrysaetos* which partly built a late

Table 1. Causes of nest failure of Buzzards *Buteo buteo* in Speyside, 1969-72

Cause	1969	1970	1971	1972	TOTALS	Percent of total
Egg collectors	1	1	—	—	2	3
Other birds	—	1	—	1	2	3
Casual disturbance	—	2	1	1	4	6
Probably deliberate disturbance	5	7	5	6	23	35
Forest operations	—	2	3	1	6	9
One bird shot or poisoned, or nest shot through base	2	1	2	3	8	12
Unknown	7	2	8	3	20	31
Total breeding failures	15	16	19	15	65	100
Total nests possible (incl. known repeats and bigamy)	32	36	41	36	145	
Percent breeding failures	47	44	46	42	45	

nest on a Buzzard nest with chicks, in the only shared nest wood in the study area; and another was presumed to be associated with an egg from a Mallard *Anas platyrhynchos* found among the clutch. The loss of a single egg from a clutch was noted four times and in each case the cause was unknown.

Destruction and disturbance of Buzzards by man is widespread and was the chief cause of breeding failure in our study, and in studies in Germany (Wendland 1952, Mebs 1964) and the New Forest, Hampshire (Tubbs 1972).

Bigamy

Cases of one male mated to two females were recorded twice in 1970, twice in 1971 and once in 1972. DW had two earlier records, both in 1967, in Territories 14 and 30. In every case, two females had been observed together with a male on several occasions during the previous winter, but in Territory 14 in 1970 the winter females, which were both colour-marked, were replaced by two new unmarked females in March. The seven examples referred to four territories. We know that on each territory where bigamy was recorded twice at least one of the females was different on the second occasion, but we were in no case certain about the males.

On plumage characteristics, two of these 'triangles' were known to involve one two-year old female (probably nesting for the first time) and one older female. Successful nesting by one of these younger females took place in the same nest from which the older female had recently been shot. The nest was relined so that the single egg laid up to that time by the older female was buried. The age of the females in the other cases was not known.

Not less than twelve of the 14 females involved in the seven 'triangles' laid eggs (see data for 1969-72 in table 2 on page 204), but only once did both females in a territory fledge broods (a total of four young from broods of one and three in Territory 30 in 1967). Others may have been prevented from doing so by human disturbance at one of the nests. In all but one case, at least one of the two females fledged young.

Breeding performance

The mean clutch size, calculated from all 72 completed clutches irrespective of whether they hatched, was 2.96 (S.D. ± 0.72) (table 3c). This figure includes two repeat clutches and the clutches of both females in Territory 28 in 1972. All five instances of a single egg, and two of two eggs, were excluded as they were found in circumstances which suggested the clutch was incomplete when deserted. In 1971 an unusually high proportion of clutches of three and four eggs resulted in a mean clutch size (for 21 clutches) of

Table 2. Occupancy, clutch size (C) and numbers of young hatched (H) and fledged (F) in 38 territories of Buzzards *Buteo buteo* in Speyside, 1969-72

— Territory not occupied — Presence/number of eggs or young unknown
 †Bigamy () Clutch believed incomplete when deserted *Repeat nest

Territory	1969			1970			1971			1972		
	C	H	F	C	H	F	C	H	F	C	H	F
1	—	—	0	4	4	4	4	4	4	4	3	3
2	4	4	4	4	4	4	3	3	3	4	4	3
3	—	—	0	3	3	3	4	4	4	2	0	0
4	—	—	0	—	3	3	3	3	3	3	3	3
5	—	—	0	2	2	2	4	4	4	—	3	3
6	—	—	—	—	—	2	4	0	0	4	4	4
							—	—	2*			
7	4	4	4	3	3	3	3	3	2	—	—	2
8	3	3	3	4	3	0	4	4	4	2	1	1
9	—	—	0	—	—	2	—	—	2	4	4	4
10	—	0	0	3	3	3	3	3	3	2	2	2
11	2	2	2	(1)	0	0	—	—	0	4	4	4
				2	2	2†	—	—	2†			
12	3	2	2	3	3	3	3	3	2	—	0	0
										—	3	3*
13	3	3	3	(1)	0	0	—	—	0	3	3	2
14	—	0	0	0	0	0	3	2	2	4	4	3
			2*	3	3	3†						
15	—	3	3	2	2	2	4	4	2	2	2	2
16	—	2	2	2	2	2	3	3	3	2	2	2
17	—	2	2	3	2	2	3	3	3	2	2	2
18	3	3	3	2	2	2	3	0	0	3	2	2
19	3	3	3	—	0	0	3	2	2	2	2	0
				3	2	1*						
20	—	—	2	2	2	2	—	—	2	2	2	2
21	2	2	2	2	1	1	2	2	1	3	3	3
22	2	2	2	3	2	1	—	—	0	—	0	0
23	—	—	—	(2)	0	0	3	3	3	—	0	0
24	—	3	3	(2)	0	0	—	—	0	—	—	0
25	—	—	0	—	—	0	—	—	0	3	3	3
26	3	3	3	—	0	0	—	—	0	—	—	0
27	—	—	0	—	—	0	3	3	3	—	—	0
28	—	—	0	—	—	0	3	1	0	3	0	0
							—	—	2†	2	0	0†
29	—	—	—	—	—	—	—	—	0	3	2	2
30	(1)	0	0	—	0	0	3	0	0	—	—	0
				(1)	0	0*						
31	—	—	—	—	—	—	—	0	0	(1)	0	0
32	—	—	0	—	—	0	—	—	0	—	—	0
33	—	—	0	—	—	0	—	—	0	—	—	0
34	—	—	0	—	—	0	—	—	0	—	—	0
35	—	—	0	—	—	—	—	—	0	—	—	—
36	—	—	—	—	—	—	—	0	0	—	—	—
37	—	—	—	—	—	—	0	0	0	—	—	—
38	—	—	—	—	—	—	0	0	0	—	—	—

Table 3. Summary of breeding data for Buzzards *Buteo buteo* in Speyside, 1969-72

data	1969	1970	1971	1972	TOTALS
occupied territories	31	32	38	34	135
territories in which no breeding					
breeding failed	15	16	19	15	65
cases of bigamy in which:					
one hen fledged young	0	2	2	0	4
other hen fledged young	0	0	0	1	1
Result nests:					
successful	1	1	1	1	4
unsuccessful	0	1	0	0	1
territories from which young fledged	17	20	22	21	80
young fledged	45	47	58	55	205
young fledged per successful nest	2.65	2.35	2.64	2.62	2.56
standard deviation	± 0.70	0.87	0.85	0.80	0.81

data from territories in which young fledged and prior details known

	1969	1970	1971	1972	TOTALS
Number of territories	11	17	17	18	63
Eggs	32	46	55	54	187
Young hatched (% eggs laid)	31 (97%)	42 (91%)	53 (96%)	50 (93%)	176 (94%)
Young fledged (% eggs laid)	31 (97%)	40 (87%)	48 (87%)	47 (87%)	166 (89%)

clutch size in all nests where complete clutches counted

	1969	1970	1971	1972	TOTALS
Number of nests	11	18	21	22	72
Number with 2 eggs (% of total)	3 (27%)	7 (39%)	1 (5%)	9 (41%)	20 (28%)
Number with 3 eggs (% of total)	6 (55%)	8 (44%)	14 (67%)	7 (32%)	35 (49%)
Number with 4 eggs (% of total)	2 (18%)	3 (17%)	6 (28%)	6 (27%)	17 (24%)
Mean clutch size	2.91	2.78	3.24	2.86	2.96
standard deviation	± 0.70	0.73	0.54	0.83	0.72

3.24 (S.D. ± 0.54) (table 3c). Nestling losses among 176 chicks hatched from nests with two, three and four eggs (tables 3b and 4) were only 6% and there were no significant differences between the numbers of young hatched and fledged from large and small clutches. The mean number of young which flew from all 80 successful nestings varied little from year to year (table 3a) and the overall mean was 2.56 (S.D. ± 0.81).

Experiment to increase clutch size

Mebis (1964), Holdsworth (1971) and D. Nethersole-Thompson (*in litt.*) each recorded a clutch of five eggs. Bannerman (1956)

Table 4. Hatching and fledging data for successful nests of Buzzards *Buteo buteo* in Speyside, 1969-72, for clutches of two, three and four eggs

	Year	No. of clutches	EGGS HATCHED				YOUNG FLEDGED			
			1	2	3	4	1	2	3	4
Clutch size 2	1969	3	—	3			—	3		
	1970	7	1	6			1	6		
	1971	1	—	1			1	—		
	1972	6	1	5			1	5		
	TOTALS	34		32	(94%)			31	(91%)	
Clutch size 3	1969	6	—	1	5		—	1	5	
	1970	8	—	3	5		2	1	5	
	1971	11	—	2	9		—	4	7	
	1972	6	—	2	4		—	3	3	
	TOTALS	93		85	(91%)			80	(86%)	
Clutch size 4	1969	2	—	—	—	2	—	—	—	2
	1970	2	—	—	—	2	—	—	—	2
	1971	5	—	—	—	5	—	1	—	4
	1972	6	—	—	1	5	—	—	3	3
	TOTALS	60		59	(98%)			55	(92%)	
GRAND TOTALS	187		176	(94%)			166	(89%)		

wrote that several sets of five eggs had been recorded in Somerset and in the Pennine and Lakeland fells, and that a clutch of six had once been recorded in Somerset. There are at least two other records of clutches of six eggs, both prior to 1951, from Exmoor (Dr I. Newton, verbally). The outcome of these nests is not documented, but Lewis (1934) recorded a brood of five young in Cornwall.

In 1971 we transferred two of the four eggs from a nest in Territory 6, where we correctly anticipated desertion due to tree felling, to the nest in Territory 4 which contained three eggs. All five eggs hatched and all the young fledged. No fault bars (Hamerstrom 1967) were seen on the feathers of the young, suggesting that none was underfed. These two additional young are not included in tables 2-4.

Breeding performance in relation to territory

The problem initially was whether the number of young fledged each year was greater in some territories than in others (see appendix). Unfortunately, there were insufficient data for detailed tests, as so many nests failed (see above). However, with the limited data available, we were able to test whether successful breeding was related to certain features of the territory. The 22 territories chosen

Table 5. Mean number of young fledged per successful nest, territory size and proportion of farmland in 22 territories of Buzzards *Buteo buteo* in Speyside in which young fledged in two or more years, 1969-72

Territory	Mean young fledged	Area (ha)	Percent farmland	Territory	Mean young fledged	Area (ha)	Percent farmland
1	3.7	316	50	12	2.5	435	25
2	3.5	293	30	13	2.5	614	20
3	3.5	583	45	14	2.5	472	50
4	3.0	479	55	15	2.3	552	10
5	3.0	259	40	16	2.3	440	15
6	2.7	360	30	17	2.3	428	15
7	2.7	259	65	18	2.3	391	30
8	2.7	767	15	19	2.0	650	5
9	2.7	337	20	20	2.0	233	0
10	2.7	288	30	21	1.7	295	10
11	2.5	469	35	22	1.5	687	5

for this analysis were those in which young fledged in at least two years. The mean number of young fledged per successful nest is given in table 5; years in which no young were reared nor eggs laid were discounted, though some of these failures were probably due to natural causes. If deliberate and indirect disturbance by man had not been the cause of many nest failures, we could also have used and modified the composite index for the breeding history of a territory described for the Tawny Owl *Strix aluco* by Southern and Lowe (1968, table 4), which uses data from all years.

The annual maps of the 22 Buzzard territories were combined for this analysis, as boundaries change little from year to year (Dare 1961) and our maps of many territories were incomplete for individual years. From the composite map we measured the area of each territory (table 5) and the proportion of each habitat within it; the figures for farmland are given in table 5.

Our main conclusions were that, when birds bred successfully, the mean number of young fledged was correlated with both the proportion and extent of farmland in each territory.* Farmland therefore appears to be the most important feature of a territory. However, the mean number of young fledged was not associated with territory size *per se*.

DISCUSSION

Tubbs' (1972) analysis of 641 Buzzard nest record cards for 1948-69 (which included data from Speyside) showed that the biggest

*The Spearman Rank Correlation test was used in this analysis and the associated values of t were also calculated (Siegel 1956). For the proportion of farmland, $r_s = 0.771$ ($P < 0.01$), $t = 5.414$ ($P < 0.001$); for the extent, $r_s = 0.668$ ($P < 0.01$), $t = 4.014$ ($P < 0.001$)

British clutches were in the Scottish Highlands, where the overall mean was 2.7 eggs per clutch. This was similar to our results for 1969, 1970 and 1972 (table 3c). In 1971 the mean in Speyside was 3.24. In Germany Mebs (1964) recorded large clutches in two years when Common Voles *Microtus arvalis* were unusually abundant, with means of 3.14 (seven clutches, S.D. \pm 0.69) and 3.17 (23 clutches, S.D. \pm 0.58). The overall mean clutch size in Speyside was 2.96 which is greater than in any comparable study in Europe, except for a mean of 3.07 for 42 clutches in Czechoslovakia quoted by Glutz von Blotzheim *et al.* (1971, table 11). Large clutches from the north and east of the European range are consistent with the general phenomenon concerning clutch size described by Lack (1947). Henny and Wight (1972) also showed an increase in clutch size with latitude for the Red-tailed Hawk *Buteo jamaicensis* in North America, but unlike European birds the longitudinal increase was from east to west.

Although 1971 was exceptional, Buzzards in Speyside had high productivity in general. Previous studies considered repeat clutches to be rare, but we recorded them five times. Both Dare (1961) and Mebs (1964) considered that broods of four young were too large for a Buzzard to rear even in a good vole year. In Speyside, four young fledged on eleven occasions and our experiment in 1971 showed that a pair could rear five young. Bigamy in the Buzzard has apparently not been reported by other workers, but might have been overlooked. A possible advantage appeared to be that, if one female failed to nest successfully, the other usually fledged young. The failure of one or (once) both birds was often known to be due to deliberate disturbance so that it was uncertain if both females normally would fledge young and, if so, whether the total could be greater than the four fledged from Territory 30 in 1967. In some cases, the female which fledged young may not have laid until the first one's clutch had failed.

The nest record card data (Tubbs 1972) showed that the highest recorded mean number of young fledged per successful nest (2.2) was in the Scottish Highlands. In Speyside, the overall mean per successful nest for 1969-72 was 2.56 (table 3a), greater than the means given for any comparable study—for example, 2.2 in Yorkshire (Holdsworth 1971), 1.9 in Germany (Mebs 1964) and 1.4 in the New Forest (Tubbs 1967).

Many factors are known to influence clutch and fledged brood size, but other studies of the Buzzard have emphasised food in particular (Schmaus 1938, Wendland 1952, Bannerman 1956, Dare 1961, Holdsworth 1971). In most of these studies, a general relationship is shown between the mean annual breeding performance of Buzzards and the abundance of their favoured prey. We did not

measure food, but presumably it was more abundant or more efficiently exploited (or both) in Speyside, particularly in 1971, than elsewhere. The importance of food to the breeding performance in individual territories is implied by the relation between the mean number of young reared in successful years and the amount of farmland. While it must be emphasised that we could not make an allowance for years in which breeding failed, the result is not surprising; favoured prey species, such as Rabbits *Oryctolagus cuniculus*, Short-tailed Voles *M. agrestis* and ground-nesting birds, are all common on farmland and must be particularly vulnerable to hunting birds owing to the open nature of the ground. Dare (1961) considered that Buzzard territories might possess a definite, if undetermined, food value. Our results suggest that further research on Buzzards could profitably give greater emphasis to this possibility.

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It is a pleasure to acknowledge the encouragement given to us by Drs D. Jenkins, C. J. Cadbury and I. Newton throughout this study and to thank them for their comments and suggestions on drafts of this manuscript. We also benefited from discussions with other colleagues on certain aspects of the data and particularly from the advice and assistance with statistical problems given by D. Brown. We are most grateful to H. Burton for assistance in the field, particularly in 1971. Finally, we are indebted to those landowners, factors and gamekeepers in the study area without whose co-operation this study would have been impossible.

SUMMARY

Buzzards *Buteo buteo* were studied from 1969 to 1972 on 17,800 hectares of the Spey Valley, east Inverness-shire. The mean of the 72 completed clutches found during the four years was 2.96 (S.D. ± 0.72), and the mean number of young fledged from the 80 successful nests was 2.56 (S.D. ± 0.81). In 1971 the mean clutch size of 3.24 (21 clutches, S.D. ± 0.54) was unusually high. The main cause of nest failures was accidental disturbance and deliberate destruction by man. Eleven broods of four fledged young were recorded and in an experiment a pair of Buzzards reared five young. Bigamy was recorded five times during the study and twice in 1967, but both females fledged young only once. The mean number of young fledged per successful nest in 22 territories was significantly correlated with the amount of farmland in each territory.

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Notes

Little Ringed Plover with red legs In 1972 three pairs of Little Ringed Plovers *Charadrius dubius* bred at Ladywalk Nature Reserve in Warwickshire, on Central Electricity Generating Board land which is completely covered by grey fly-ash. Both H. T. Lees and I noticed that one of the females had pinkish-red legs. This bird was observed over a period of ten weeks and there was clearly no possibility of its legs being discoloured by mud. B. L. KINGTON

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Leg colour of Greenshank S. C. Madge (*Brit. Birds*, 66: 397) saw a Greenshank *Tringa nebularia* with yellow legs at the Amble Dam, Cornwall, on 1st October 1966. On 6th September 1973, at Cheddar Reservoir, Somerset, I observed a wader some distance away with noticeably yellow legs. I approached to within 30 metres and watched the bird for some ten minutes in excellent light conditions. It resembled a Greenshank in every other aspect, and when it flew

off and called my identification was confirmed. On plumage characteristics it was probably an immature. Like the Cornish bird, its legs showed no hint of green but appeared bright pale yellow. The leg colour of many wader species, especially that of young birds, can vary a fair amount, occasionally to a marked degree as in this instance.

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In the *North-Western Bird Reports* for 1960-62 and 1963-66 there are several references to Greenshanks with yellow legs. On page 24 in the first of these reports, details were given in square brackets of a wader seen by J. P. Wilkinson on the Dee marshes, Cheshire, on 23rd July 1961, which had been suggested as a possible Greater Yellowlegs *T. melanoleuca*. The legs were described as 'conspic. yellow, tending to orange-yellow'. It continued: 'Observers on 3 subsequent occasions saw a bird with yellowish legs, one flushed by GW, etc., rising with a normal Greenshank and calling similar to Greenshank voice, had browner wings and more restricted white rump. Two seen by THE on Aug. 21 had duller yellow legs than JPW's bird. JPW found his bird conformed with illust. in Pearson's "Birds of America" [1917] and descriptive text for *melanoleuca*; it is assumed that the birds subsequently seen were aberrant *nebularia*.' (The observers involved were T. H. Ellis and G. Williams.) On page 25, under Greenshank, was stated: 'During the scrutiny of Dec marshes for *melanoleuca*, aberrations of *nebularia* were observed by GW, THE and others, in which 2 or 3 specimens, possibly imm., had dull yellow legs, but the normal extension of white from rump up the back, call, and other features. This is not mentioned in Nethersole-Thompson's handbook on the Greenshank [1951, *The Greenshank*], nor Witherby's and other handbooks which give olive-green for the young bird's legs.'

Under Greenshank in the 1963-66 report (page 23) appeared the statement: 'Yellow legs of imm. freq. seen.'

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Sharp-tailed Sandpiper with flesh-coloured legs and feet

From 1st to 26th November 1969 a Sharp-tailed Sandpiper *Calidris acuminata* was present in Zuidelijk Flevoland, Netherlands. This was the first Dutch record (*Limosa*, 43: 132-135). The bird had flesh-coloured legs and feet, instead of olive-green to yellowish as stated in the literature. It was injured in the right foot and wing. Whether the poor condition was responsible for the aberrant colour of the legs and feet is unknown.

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Behaviour of Long-eared Owls in presence of dog The observations on which this note is based were made in a forest in Ost Friesland, West Germany, between November 1969 and March 1972, mainly in the winters of 1970-71 and 1971-72, on a total of 21 separate nights. The forest is mixed but predominantly coniferous; it contains blocks of mature trees, plantations of different ages and cleared areas. The surface is level and mostly sand. Long-eared Owls *Asio otus* bred regularly in small numbers and formed a roost in winter totalling approximately 50 birds. This roost was in a rectangular plantation of pines measuring 300 metres \times 200 metres; two sides were bounded by mature conifers, two by mature mixed trees. The area was divided by straight rides at intervals of 100 metres and 300 metres. The pines in the plantation were about six metres high.

The dog in question was a dachshund bitch, smooth-haired, black and tan, weighing $6\frac{1}{2}$ kg. The interest of the owls in the dog began the first time a Long-eared Owl was seen in the forest. It was dusk when the dog and I were walking steadily along a ride subsequently found to divide the roost. The owl flew low over the dog from behind and then perched half-way up a pine about 30 metres along the ride; it remained still while no movement of dog or man took place, later allowing an approach to ten metres; at this range it flew along the ride again to about 30 metres' range and again permitted approach to within ten metres, when a repeat performance occurred. During the next three night visits to the area it became obvious that the owls were attracted by the dog. Single birds and groups of up to four flew low over it and settled into a regular pattern of repeated low passes for up to ten minutes' duration. On one occasion an owl momentarily hovered immediately over the dog.

On subsequent visits I was partially concealed in a ditch at a crossing of two rides, one dividing the plantation from mature trees, the other dividing both plantation and roost. The main concentration of the roost was 120 metres from me. The dog was allowed to move about within the rides on the crossing. I took up this position a few minutes before sunset in anticipation of the owls, emerging from the roost soon after sunset.

The majority of the owls seen flying from the roost were attracted by the dog and either adopted a regular flight pattern over the dog or perched in nearby trees watching the dog and myself. Frequently, pattern flying was followed by perching and vice versa. The patterns were 'racetrack' or 'dumbbell' in plan, about 20 metres long, and included a low pass over the dog along the direction of one of the rides. The owls descended to heights as low as half a metre above the dog's back, sometimes descending steeply, sometimes making a gentle descent. Rarely, descent was made at the beginning

of the approach path and a level overflight made. Turns at the end of the patterns were made either just above or between the plantation tree tops. Occasionally the legs were dropped and claws extended during descent. Perching was in the top branches of the plantation trees or the lower branches of the mature trees, five to 20 metres from the dog. Pattern flying and perching usually continued for as long as the dog and I remained in the area of the plantation, the numbers of owls present decreasing after ten to 15 minutes. Observation was normally stopped by the onset of total darkness, but in very cold weather, when it was necessary to move to avoid freezing the dog, the owls continued their routine of low passes and watching from trees, moving along the ride with the dog and continuing to fly very near to it. The total numbers of owls seen were difficult to assess because of their agility and the poor light conditions, but the maximum number seen performing simultaneously was 16, the average in 19 visits being six. 'Ears' were occasionally lifted slightly, never fully, by perched birds. Sounds were heard only three times: once a succession of soft, monosyllabic 'tup', once a disyllabic 'mew-ew' and once a squeaking sound, quite different from the usual juvenile creaking.

Two visits were made without the dog to confirm that the dog and not its owner was the attraction. On the first, six owls were seen; five ignored me while one perched and watched momentarily after I had begun to move from the ditch. On the second occasion I saw ten owls; eight ignored me, one perched to watch momentarily and one moved from perch to perch ahead of me as I walked away. There were no low passes and a general lack of interest which contrasted markedly with the owls' behaviour when the dog was present.

When I attempted to photograph their behaviour, the owls became reluctant to come close but perched at greater distances than usual or flew past outside the range of the flash unit. It appeared to be the noise of the electronic flash which repelled them. The attempt was unsuccessful.

This method of observation can be recommended to anyone who wishes to see Long-eared Owls at close range: their behaviour was like an air display. The dog ignored the owls and I must conclude this note with a tribute to her steadiness and patience, without which qualities some interesting and entertaining birdwatching would not have been possible.

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Rooks feeding on suspended fat I have observed string-pulling behaviour by the Rook *Corvus frugilegus* similar to that reported by M. L. Richards (*Brit. Birds*, 66: 365-366), and also three other methods used by this species to tackle hanging food.

On 18th March 1973 three Rooks visited my garden at East Grinstead, Sussex, to feed on a large piece of bacon fat hanging from a tree close to the house. The fat was about 1.5 metres above the ground, and was tied to a length of thick binder twine (not the plastic type) about 1.2 metres long. One Rook attempted to feed while the other two stood on the ground.

During a period of about 30 minutes I observed four feeding methods in the following sequence:

(1) A Rook flew up from the ground and grasped the fat with its bill. It remained hanging with its wings closed for about a minute, presumably hoping to pull off a morsel. It seemed unsuccessful and returned to the ground.

(2) A short while after I noticed a Rook clinging to the fat with its feet. It was hanging, tit-like, upside-down, pecking vigorously at the food.

(3) Subsequently I saw a Rook hanging sideways on the string which it gripped with both feet while pecking at the fat.

(4) The final method involved standing on the branch and pulling the string up with its bill. It then used its foot to clamp the string against the branch, while reaching down to pull up more string with its bill, and so on. It made five pulls before it could reach the fat which it then pulled up on to the branch to eat.

Unfortunately I did not note if the same Rook was involved in each case.

D. WASHINGTON

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Further interesting observations of Rooks pulling up hanging bones were recorded by Dr Monica F. White in the *Surrey Bird Report* for 1971, pages 77-78. Eds

Food-burying and recovery by Rook On 23rd October 1973 I had a telephone call from R. Atkinson, the manager of a sand quarry at Lazonby, near Penrith, Cumberland. He related to me how he had thrown a piece of bread to a Rook *Corvus frugilegus* at approximately 11.45 hours that day, and how the Rook had taken the bread to a place in the quarry and buried it in the sand. He went to the place and uncovered the bread which had been completely covered. He then re-buried the bread and left it. At 15.30 hours he saw the Rook, which he was convinced was the same bird, go and uncover the bread and swallow it.

This Rook is known to him by its tameness, voice and mannerisms, coming close to be fed whenever people are throwing food out. He had suspected it of burying food before, but this was the first proof he had had of recovery of food it had buried.

I have checked the many records in this journal of food-hiding by

Rooks, but none specifies the exact time of recovery (see especially *Brit. Birds*, 51: 500-502; 60: 137-138; 61: 228-229; 62: 334-336; 63: 174-177). The most relevant note comes from more than 20 years ago (*Brit. Birds*, 45: 68), in which extensive food-hoarding was reported by Mrs F. M. Neill Watson from Greystones, Co. Wicklow. She saw 'a Rook bury picces of food, especially old crusts of bread, in the ground and subsequently dig them up, either for itself or for its young'. The recovery of buried food by Rooks may be more common than the paucity of records suggests.

Incidentally, E. Garbutt has told me that he has noticed Rooks which he had in captivity, while recuperating from injuries, burying food (crusts, and so on) in cracks in paving stones and rockeries.

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A. R. Fairhurst, who hand-reared a Rook in Lancashire in 1969, writes as follows: 'This bird has many methods of food-hiding: when near long grass it simply thrusts the food down into the 'mat'; on the lawn it disgorges the food first, digs a hole with its beak, places the food in the hole, puts the soil back and often covers it with short grass-stems picked from nearby; on bare earth the last operation is omitted. Food is also hidden under loose bark of trees. What is more, my bird returns to hiding spots days after the initial burying, retrieves the food and consumes it.' He suspects that Rooks hide food only when replete or when food supply exceeds appetite. Dr P. R. Richards has also written, in reply to our enquiries on this subject, as follows: 'I keep Rooks in captivity, and it is their usual practice to hide any food in excess of their immediate consumption. Often they will hide living insects without killing them, such as maggots and caterpillars, which is rather pointless as they quickly disperse. The usual method of hiding is by digging a small hole with the beak, placing the food in the bottom, and then covering the hole over with earth, a small stone, grass, or any other covering to hand. An existing hole or crevice is frequently used if one is available. The birds often do seem satisfied with their first effort in hiding their food and will sometimes dig it up again and hide it elsewhere. Exactly similar behaviour occurs with my Ravens *C. corax*, Magpies *Pica pica*, Carrion Crows *C. corone* and Jays *Garrulus glandarius*. Jackdaws *C. monedula* prefer to hide their food in their nestbox, and I have not seen them dig a hole with their bill to hide food.' EDs

'News and comment' has had to be held over to the next issue.

Reviews

Breeding Birds of Britain and Ireland. By John Parslow. T. and A. D. Poyser, Berkhamsted, 1973. 272 pages; 12 text-figures; 225 maps; 21 line-drawings. £3.60.

It is now almost ten years since the editors of this journal convinced the Nature Conservancy of the need for an up-to-date study of changes in the status of British and Irish breeding birds. As a result, funds were provided enabling John Parslow to be based at the Edward Grey Institute for more than two years, during which time, supervised by the late Dr David Lack, he carried out what must be one of the most comprehensive literature surveys ever undertaken and additionally corresponded widely with county recorders.

The results of the study started to appear in this journal in January 1967 and the editors could be excused their hint of self-congratulation when they wrote '... we believe that his paper reaches a standard rarely equalled elsewhere in studies of this kind', for this was no more than the truth. Succeeding issues revealed that it was indeed an admirable piece of research: lucid, refreshingly unpretentious ('Intuition played a large part in many final decisions'), yet meticulous in judgement.

Each breeding species was placed in one of six orders of magnitude, based on the possible number of pairs in Britain and Ireland, as follows:

very scarce	1-100	fairly numerous	10,000-100,000
scarce	100-1,000	numerous	100,000-1,000,000
not scarce	1,000-10,000	abundant	over 1,000,000

and changes in status and range were reviewed with great thoroughness. The completed work was extraordinarily stimulating, and if one had any regret at all it was that distribution was not spelled out in greater detail.

Now even that small reservation has been put right, for the eight papers have been brought together in book form, updated with a postscript chapter and rounded off with distribution maps for 225 species. These maps, first compiled for the *Reader's Digest* and here appearing in their latest form, must represent a high point in distributional surveys derived from random observations made over a long period of years. It will be of great interest to see how they compare with the maps now being prepared by the British Trust for Ornithology after five years' intensive fieldwork by 8,000 observers participating in the *Atlas in Breeding Birds in Britain and Ireland*. Some discrepancies are inevitable, one supposes, but they will in some ways enhance rather than detract from the importance of this

present work: comparisons will, for example, reveal which species tend to be under-recorded by conventional means.

The author, the publishers, and indeed the editors of this journal whose brainchild it was, are to be congratulated on adding a valuable book to the library shelf. It deserves to be well thumbed.

ROBERT SPENCER

Der Zug Europäischer Singvögel: Ein Atlas der Wiederfunde Beringter Vögel. Part 1. By Gerhardt Zink. Vogelwarte Radolfzell, 7761 Schloss Möggingen, über Radolfzell, West Germany, 1973. 125 pages, including 85 full-page maps. IDM 48.

This useful new atlas of passerine ringing recoveries is in many respects a successor to the *Atlas des Vogelzugs nach den Beringungsergebnissen*, by E. Schüz and H. Weigold (1931). It is to be issued in three parts; the first, now available, contains 85 maps of recoveries plus 40 pages of text, covering 30 species in the families Turdidae and Sylviidae. It is 34 × 27 cm in size, in loose-leaf format, with separate pagination for each species. Thus maps can be laid side by side for comparisons, though there is the disadvantage that individual sheets may become misplaced or dog-eared with frequent use; and if sets are bound later, the lack of a continuous pagination may prove irritating. Dr Zink's Atlas will treat fewer species than did the 1931 Schüz and Weigold work, for some, since ringed in large numbers, have now yielded too many recoveries for this kind of mapping. In his introduction, the author names the passerines he will not be treating, and gives references to published analyses for them.

For the 30 species treated in part 1 of *Der Zug Europäischer Singvögel*, Dr Zink maps all European and African recoveries of over 100 km known to him, and his literature search has evidently been thorough. The amount of space allotted to each species varies; thus the Moustached Warbler, having few records, occupies but a single leaf, while the Blackcap has two pages of text and nine of maps, the latter segregating data by region as well as by season. Even those unfamiliar with the German language should be able to cope with the generally brief text, which is standardised under eight headings: Herbstzug (autumn migration); Überwinterung (winter range); Frühjahrszug (spring migration); Erläuterungen (comments); Material (numbers of recoveries used and overall recovery rates); Quellen (sources of the recoveries used); Auswertungen (references to published analyses); and Sonstige Literatur (other literature). This atlas is essentially a visual presentation of recoveries, not an analysis in the usual sense, providing graphic indications of what ringing has revealed about migration routes and winter-

quarters, and confirming that west European populations of most species migrate in autumn south to south-west via Iberia. Yet there are some interesting exceptions. Though the Nightingale and Reed Warbler migrate south-west, their close relatives the Thrush Nightingale and Marsh Warbler migrate south-east; similarly, the Melodious Warbler and Whitethroat move south-west, while the Icterine Warbler and Lesser Whitethroat head south-east. The maps well illustrate the spectacular migratory divide in the Blackcap, British and west European breeders migrating south-west, those of Fenno-Scandia and central and eastern Europe heading south-east. It is particularly useful to have brought together the scattered recoveries in the African presumed winter-quarters of the various trans-Saharan migrants. Anywhere in it one may find one's attention drawn to some aspect not previously appreciated properly: perhaps the paucity of Iberian Sedge Warbler recoveries (do they overfly Iberia as well as the Mediterranean and Sahara?), or the absence of autumn Greenland Wheatear recoveries north of Brittany (direct transoceanic flight from Greenland to south-west Europe in autumn is indicated). Most British ringers and migration enthusiasts will have a good idea of the routes used by migrant British birds, but they may not appreciate the similarities and differences apparent in other European populations; it is in putting the ringing results of individual countries into a continental perspective that is the strength of this Atlas.

ROBERT HUDSON

Letters

Redpolls feeding from floating vegetation Although I have never seen Siskins *Carduelis spinus* feeding from floating vegetation (*Brit. Birds*, 66: 231), I frequently see Redpolls *Acanthis flammea* feeding in a somewhat similar manner. For a short period during each autumn the surface of the water in the dyke which flows under the windows of my home near Norwich becomes covered with the seeds of silver birch *Betula* and possibly also alder *Alnus glutinosa*, at a time which coincides with the arrival of large flocks of Redpolls from the north and east. Singly or in small parties the birds flutter down to the surface of the water, apparently under the impression that they can alight on it. Unless there is some flotsam which will bear their weight, they are compelled to feed by fluttering (one might almost say hovering) over the water, and this they successfully do.

M. D. ENGLAND

Mashobra, Neatishead, Norwich NOR 37Z

County boundary changes I read with interest the paragraph in 'News and comment' on the new county boundaries (*Brit. Birds*,

67: 33). These present no difficulties to the many naturalists who have recorded plants and animals using the Watsonian Vice-County boundaries, which were originally defined in 1852. These boundaries are unchanging, with the result that records made over 100 years ago are strictly comparable with today's. For recording, the Vice-Counties are the obvious answer if National Grid squares are not to be used. The definition of the territories to be covered by the various bird reports remains a matter to be arranged by mutual consent between the major natural history societies and, where appropriate, the nature conservation trusts.

In 1969 the Ray Society published maps showing the Vice-County boundaries overprinted in red on the two sheets of the Ordnance Survey 10 miles to 1 inch map of Great Britain, accompanied by a small booklet by J. E. Dandy which explains certain details of the boundaries where they are not obvious from the maps. These maps are obtainable from the Assistant Secretary, The Ray Society, c/o British Museum (Natural History), Cromwell Road, London SW7 5BD.

E. MILNE-REDHEAD

1 Parkers, 43 Bear Street, Nayland, Colchester, Essex CO6 4HX

Request for information

Colour-ringed and dye-marked waders from Greenland From 22nd June to about 17th August 1974 a Joint Biological Expedition, formed by the Wader Study Group and a party of biologists from Dundee University, will be visiting north-east Greenland. The Wader Study Group programme will include colour-ringing and dye-marking the waders caught. In 1972 two out of five Ringed Plovers *Charadrius hiaticula* marked in this way during a previous expedition to Greenland were recorded in Britain. It is expected that many more birds will be marked this year—mainly Ringed Plovers, Dunlins *Calidris alpina* and Sanderlings *C. alba*, and perhaps also Turnstones *Arenaria interpres* and Knots *C. canutus*—and we appeal to all birdwatchers to look out for them, both on the coast and at inland waters. Details of rings and dye marks seen should be sent as promptly as possible to **A. J. Prater, British Trust for Ornithology, Beech Grove, Tring, Hertfordshire HP23 5NR.**

February reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

Early in the month huge seabird movements were recorded off the Cornish coast. At St Ives on 2nd three hours' watching produced 50 **Fulmars** *Fulmarus glacialis*, 1,750 **Gannets** *Sula bassana*, seven **Great Skuas** *Stercorarius skua* and an immature **Arctic S.** *parasiticus*, 2,000 **Kittiwakes** *Rissa tridactyla* and 12,000 **auks**. At Porthgwarra a **Manx Shearwater** *Puffinus puffinus* flew west with 120 **Gannets**, 120 **Shags** *Phalacrocorax aristotelis* and 1,500 **Kittiwakes** on 9th, and in a south-west force 9 storm on 10th movement over two hours included three **Manx Shearwaters**, 14 **Fulmars**, 1,203 **Gannets**, three **Great** and three **Arctic Skuas**, 1,605 **Kittiwakes**, a **Little Gull** *Larus minutus*, a **Little Auk** *Plautus alle* and 510 indeterminate **auks**, with 500 **Gannets**, 1,000 **Kittiwakes** and 500 **auks** remain-

ing offshore. An unidentified **shearwater** was at Foreness Point (Kent) on 15th and a **Gannet** was found dead inland at Meverley (Shropshire) following gales at the end of the month. At Chew Valley Lake (Somerset) a **Shag** was seen on 22nd. Single **Great Skuas** were also seen at Weymouth (Dorset) on 2nd, at Colne Point (Essex) on 9th, at Dungeness (Kent) on 13th, and found dead in Sand Bay (Somerset) on 19th; and single **Arctic Skuas** were at Broadness (Kent) on 10th and off the Mersey Bar (Lancashire) from 17th to 21st, while at Seaton Sluice (Northumberland) three were recorded with one unidentified skua during 2nd-3rd, and another **Arctic** or a **Pomarine** *S. pomarinus* went north at Rattray Head (Aberdeenshire) on 3rd.

An **American Wigeon** *Anas americana* which appeared at Covenham Reservoir (Lincolnshire) on 11th stayed until 24th. **Smew** *Mergus albellus*, though reported from 18 localities, were present only in very small numbers. **Bean Geese** *Anser fabalis* returned to a formerly regular site in Northumberland, Grindon Lough, eight on 12th increasing to a maximum of 18 on 24th. A **Goshawk** *Accipiter gentilis* was seen near Greenhead (Co. Durham) on 24th, a day after a **Gyr Falcon** *Falco rusticolus* had appeared in the Glen Tig area of Ayrshire.

Following the wintering of a **Little Ringed Plover** *Charadrius dubius* in January (*Brit. Birds*, 67: 176), another was reported in west Kent on 23rd February. Perhaps more surprising was the arrival of a **Kentish Plover** *C. alexandrinus* at Hoylake (Cheshire) on 24th, which was still present in the wader roost in March. There were three single **Grey Phalaropes** *Phalaropus fulicarius*, at Dawlish Warren (Devon) on 10th, west at St Ives on 17th, and at Formby (Lancashire) on 24th.

An **Arctic Tern** *Sterna paradisaea* was seen well at Hayle (Cornwall) in the middle of the month, a quite unprecedented time for this species. **Sandwich Terns** *S. sandvicensis* (some again preceding the previous earliest date of 13th February) were seen at St Ives on 3rd (three) and in Southampton Water from 18th, and recovered at North Berwick (East Lothian) on 12th and at Happisburgh (Norfolk) on 13th, both having been ringed as pulli on the Farne Islands (Northumberland). Equally unexpected was a **Sabine's Gull** *Larus sabini* at Flamborough (Yorkshire) on 10th. A **Little Auk** picked up at Brean Down Farm (Somerset) on 9th was later released at the Axe estuary nearby.

A **Hoopoe** *Upupa epops* was at Stratford upon Avon (Warwickshire) on the very unusual date of 16th. At Reydon marshes, near Southwold (Suffolk), as many as 62 **Hooded Crows** *Corvus corone cornix* were counted moving north-by-west on 22nd, a surprisingly large concentration in view of the low numbers recorded in recent winters in south-east England. A small passage of **Ravens** *C. corax* was noted at Hengistbury Head (Hampshire), with one on 20th and four on 24th all going east. A **Ring Ouzel** *Turdus torquatus*, another early arrival (or wintering bird), was watched at Stockbury (Kent) on 24th. **Waxwings** *Bombycilla garrulus* were reported from only five places: one was in Aberdeen on 4th and 5th, and one at Calverton (Nottinghamshire) on 7th; one at Newthorpe (also Nottinghamshire), found with a broken wing on 24th, died on 11th March; two were in Edgbaston Park (Warwickshire) during February and March; while in the Tyneside area one to six were noted at four sites between 15th and 25th February.

STOP PRESS

Among recent sightings are Great White Egrets in Yorkshire at Sealing Dam Reservoir from 28th May to 6th June and at Spurn on 1st June; a Little Egret and a White Stork at North Slob (Co. Wexford) on 6th June; Red-footed Falcons in Suffolk during 1st-2nd and on 7th June, and in Kent during 1st-2nd and from 7th to at least 10th; two Pratincoles in Lancashire and one in Hampshire during the last week of May; two Black-eared Wheatears near Dungeness on 21st May, one of which stayed until 29th; and a Scarlet Rosefinch trapped on Bardsey (Caernarvonshire) on 31st May.

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BRITISH BIRDS

Volume 67 Number 5 May 1974

- 177 A further review of the problem of 'escapes' *M. D. England*
- 197 More examples of the best recent work by British bird-photographers *Text by Eric Hosking* Plates 29-36
- 199 Breeding biology of the Buzzard in Speyside
N. Picozzi and Hon. D. Weir

Notes

- 210 Little Ringed Plover with red legs *B. L. Kington*
- 210 Leg colour of Greenshank *Brian Rabbitts, and Eric Hardy*
- 211 Sharp-tailed Sandpiper with flesh-coloured legs and feet
G. J. OreeI
- 212 Behaviour of Long-eared Owls in presence of dog
Wing Commander T. R. Holland
- 213 Rooks feeding on suspended fat *D. Washington*
- 214 Food-burying and recovery by Rook *R. W. Robson*

Reviews

- 216 *Breeding Birds of Britain and Ireland* by John Parslow
Robert Spencer
- 217 *Der Zug Europäischer Singvögel: Ein Atlas der Wiederfunde Beringter Vögel* (part 1) by Gerhard Zink *Robert Hudson*

Letters

- 218 Redpolls feeding from floating vegetation *M. D. England*
- 218 County boundary changes *E. Milne-Redhead*

Request for information

- 219 Colour-ringed and dye-marked waders from Greenland
G. H. Green
- 219 February reports *D. A. Christie*

5 72
Volume 67 Number 6 June 1974



BRITISH BIRDS

PREDATION BY BIRDS ON WASPS

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BRITISH BIRDS



Predation by birds on social wasps

T. R. Birkhead

INTRODUCTION

It is well known that bee-eaters (Meropidae) and the Honey Buzzard* prey extensively on stinging Hymenoptera. However, the extent to which other birds feed on stinging insects is poorly known. This paper examines published records of birds feeding on the social wasps of the genus *Vespula* and on the Hornet *Vespa crabro* (Hymenoptera, Vespidae) and draws attention to the various reactions of the birds to their stinging mechanism and toxicity. It is confined mainly to birds of Europe and the USSR feeding on European species of wasps.

The following social wasps occur in Britain and Ireland and over much of Europe: Common Wasp *Vespula vulgaris*, German Wasp *V. germanica*, Red Wasp *V. rufa*, Norwegian Wasp *V. norvegica*, Tree Wasp *V. sylvestris* and Cuckoo Wasp *V. austriaca*.

In the present paper much of the information collected is of incidental observations, recorded as short notes. Although a large amount of work on the relationships between birds and distasteful insects has been carried out, the social wasps have received little attention. Hesse (1916) recorded a list of birds predatory on social wasps, and Charlemagne (1954) commented on the predation by birds on stinging Hymenoptera, but there have since been a number of further records. In North America, McAtee (1932) collected 822 records of Vespoidea being eaten by a total of 140

* Scientific names of birds feeding on wasps are given in the appendix on page 229.

(unnamed) species of birds, and used this, together with other information, in an attempt to demonstrate that protective adaptations in animals are not effective. These suggestions were subsequently criticised by a number of workers (Anon 1934), and Cott (1940) came to the opposite conclusion.

WARNING COLORATION

All social wasps have a striking black and yellow pattern which is generally regarded as an aposematic (warning) coloration, and all females (queens and workers) possess powerful stings. I have suggested (Birkhead 1973a) that the similarity of the colour markings among social wasps prevents potential predators from distinguishing the species, so that the group probably forms a series of Mullerian mimics. If this is so, a predator may learn to avoid all the species as a result of one or a few encounters with individuals of any species. In certain groups of insects, such as danaid butterflies (Danainidae), the whole creature may be distasteful, but other insects, such as the social wasps and bees (Apoidea), may be quite palatable except for the stinging mechanism. Therefore, if a particular predator can overcome the sting either by removing or destroying it, or by being sufficiently protected not to be stung, or through possessing some degree of immunity to venom, the aposematic coloration would cease to operate protectively for the insect in question.

PALATABILITY AND WASPS AS AVIAN PREY

There is good evidence that at least some birds find social wasps palatable; in fact, a few habitually feed on stinging Hymenoptera and have developed methods of avoiding the insects' stings.

1. Bee-eaters. All species take stinging Hymenoptera, though as their name suggests these are usually bees *Apis spp.* The European Bee-eater also takes social wasps (Witherby *et al.* 1938-41, Matoušek 1951, Hachler 1958, Maran 1958, Fintha 1968, Herrera and Ramírez 1974). Charlemagne (1954) recorded that during August near Kiev, USSR, the stomachs of Bee-eaters contained Hornets and wasps exclusively. Bee-eaters have a highly stereotyped and efficient method of dealing with venomous insects, which Fry (1969) has described in detail. Stinging insects are de-venomed by a sequence of beating and rubbing the prey rapidly against the perch. This treatment discharges the venom on to the perch and apparently renders the insect harmless and edible. Bee-eaters are able to recognise drone bees and non-stinging insects, which they do not subject to such severe treatment as venomous forms (Fry 1969, 1972).

2. Shrikes (Laniidae). Three species have been recorded feeding on social wasps: Great Grey (Witherby *et al.* 1938-41, Boháč 1964, Cade 1967), Lesser Grey (Hesse 1916, Charlemagne 1954) and Red-backed (Owen 1929, Necas 1942, Charlemagne 1954). The food and hunting techniques of the Great Grey Shrike in North America have been examined by Cade (1967). He found that this species took large numbers of social wasps and that these and other insects were always caught in the beak (while bird or mammal prey was sometimes taken in the feet). Cade also suggested that after locating a wasps' nest this species may systematically take all the adult (flying) members.

Gwinner (1961) made a detailed study of sting removal from Hymenoptera by Red-backed Shrikes. He found that they destroyed the stinging apparatus by squeezing the tip of the abdomen and rubbing it against the perch. Gwinner stated that this pattern of behaviour was apparently elicited by the specific elasticity of the insect's thorax, though the size and movements of the prey animal were also important. In addition, the moving sting was found to intensify the bird's reaction. I can find no record of Great Grey or Lesser Grey Shrikes preparing hymenopterid prey in this manner, though it seems highly probable that they do so.

3. Honey Buzzard. Despite its name, the main foods of the Honey Buzzard are the immature and mature stages of social wasps (Thorburn 1925, Witherby *et al.* 1938-41, N. N. Somov in Charlemagne 1954). Hagen and Bakke (1958) found that in southern Norway the Common Wasp was the main prey species, and most other authors refer to Honey Buzzards taking the nests of ground-nesting social wasps, digging them out with their feet, but Voous (1960) also mentioned nests of arboreal wasps—Norwegian and Tree Wasps—being raided. According to J. G. Millais (in Thorburn 1925), Honey Buzzards follow wasps to their nests and then excavate and consume the contents. This author also recorded that birds appeared indifferent to the attacks of the wasps, but Trap-Lind (1962) observed a Honey Buzzard attacking a wasps' nest and, on examining the remains of the nest later, he found many decapitated wasps. Wood (no date) suggested that Honey Buzzards are vulnerable only at the base of the beak and around the eyes but, as Willis (1972) pointed out and my own examination of museum specimens confirms, the feathers around the head are small, stiff and close fitting, presumably forming an efficient barrier against the stings.

In addition to those commonly known to take adult wasps, many other species of birds have been recorded eating these insects (see appendix). Some of these are of particular interest.

Fincher (1951) described how a first-year Great Tit took a wasp

(probably either Common or Norwegian), held it with its foot and pecked at it. The first beakful was not eaten, but he could not determine whether this was the sting; succeeding beakfuls were eaten. Tutman (1949) recorded Great Tits removing the stings of dead Honeybees *A. mellifera*. C. Elmhirst (in Knubley 1889), Hesse (1916), Charlemagne (1954) and S. M. Pospelov (in Dementiev and Gladkov 1966-68) recorded Great Tits eating wasps, and there are also references to bees found in the stomachs of Great Tits (Newman 1863, Norgate 1881, Pospelov *loc. cit.*), indicating that these birds are capable of coping with venomous Hymenoptera. These observations contrast with those made by three independent observers of Blue Tits *Parus caeruleus*, which avoided social wasps. Rankin (1950) and Powne (1951) both noted that, when Blue Tits approached a bone upon which wasps were already feeding, they appeared to be wary and did not alight on the bone. Rogers (1951) also observed wasps driving Blue Tits off ripening fruit. Although these observations differ from those on Great Tits, the latter are not adequate to suggest that this would not be a normal response from them also, in similar situations.

Some observations of birds feeding on Honeybees are enlightening. Tutman (1949) recorded Great Tits entering beehives on very cold days to feed on dead bees, when the live occupants were in a torpid condition. He also noted that at other times Great Tits were apparently 'afraid' of live bees. Manley (1948) recorded Great Tits, Blue Tits and sparrows (House Sparrows *Passer domesticus*?) taking bees in the vicinity of hives. These observations raise the possibility that birds may take advantage of torpid insects. Under certain weather conditions, particularly on damp, misty days, I have observed torpid social wasps and bumblebees on flower heads. Stinging insects in a torpid condition would be relatively easy prey for birds.

There are several records of crows (Corvidae) eating social wasps. There are references to Rooks (Anon 1916, Marie 1923, Holyoak 1972) and Magpies (Csiki 1919, Goodwin 1952, Bährmann 1968) with wasp remains in their stomachs. Jays have been recorded feeding on a variety of wasp species, including Hornet (Stachanoff 1928) and Red Wasp (Inozemtsev 1965), and may regularly do so (Goodwin 1952). Owen (1956) found that wasps were fed to nestling Jays, and Campbell (1936) and Keve and Sterbetz (1968), during their analyses of stomach contents of adult Jays, found remains of social wasps. Charlemagne (1954) recorded that in the autumn, when wasps emerge *en masse* in the USSR, the stomach contents of 47 Jays contained 70% wasps. Goodwin (1952) found that his captive Jays readily ate wasps, and described how the birds dealt with them. The wasp was bitten hard as the bird seized it and thus disabled it, after which the Jay directed several pecks at the posterior

end of the abdomen before eating the insect. It is of interest that Goodwin also suggested that this behaviour is innate in Jays, since two naïve birds treated wasps in a way similar to that seen in experienced birds.

WASP LARVAE AND PUPAE AS BIRD FOOD

Gilbert White (1789) recorded that his bantam fowls were particularly fond of the 'young wasps in their maggot state' when a wasps' nest was provided for them. There is evidence to suggest that other bird species find the immature stages an attractive food. J. F. Naumann (in Dresser 1881) stated that Green Woodpeckers sometimes raid wasps' nests, and there is also a record of a Grey Heron feeding on wasp larvae (Witherby *et al.* 1938-41). R. L. Winter (verbally) has observed a Jackdaw tearing at the nest of a ground-nesting wasp and noted that the bird did not appear to be bothered by the adult wasps which were flying around the damaged nest. A group of eight Magpies was seen tearing at a nest (Mather 1971), and I watched nine Magpies gorging themselves on the combs and their contents of two nests of Common Wasps, which had been placed on the lawn of a garden (Birkhead 1973b). Although the latter situation was artificial, the behaviour demonstrated that Magpies find this food attractive. It would be of interest to know whether Magpies regularly attack wasps' nests.

While some birds may be capable of killing and eating isolated wasps, a collection of larvae and pupae poses a particular problem, since the predator is likely to encounter large numbers of aggressive adult wasps when attempting to raid a nest. The Honey Buzzard is apparently sufficiently protected to do this, and other birds such as Magpies and Jackdaws may also be. Some birds may also take advantage of wasps' nests which have already been broken into by Badgers *Meles meles* or by man.

TOXICITY OF WASPS

Leipelt (1963) observed the reactions of captive Redstarts and Pied Flycatchers to social wasps and their venom. He provided mealworms covered in venom, which the birds clearly found distasteful, reacting by head-shaking and bill-wiping. Apparently the birds' buccal mucosa was sensitive to the venom. During some experiments in which he presented live wasps, two Redstarts were stung in feeding attempts. In the first case the bird fluttered wildly about its cage, but Leipelt removed the sting from its tongue and it soon settled down. In the second case the bird was stung near the base of the bill, and reacted by fluttering excitedly; this was followed by a six-hour period of apathy, but after seven hours Leipelt considered

the bird to have recovered. Although the effect of the sting was not fatal, if a wild bird were stung during the afternoon and were unable to feed for six hours it would probably not have sufficient food reserves to survive the night. In addition, a bird which has been stung may be more vulnerable to predation. It is interesting that Leipelt also recorded that some naïve birds captured wasps, and although they were not stung they showed distress symptoms as a result of the venom coming into contact with the buccal mucosa.

In an experiment recorded by Cott (1940, page 293), it was observed that Coots *Fulica atra* ignored wasps floating on the water. However, on one occasion wasps were taken by both a Coot and a Mallard *Anas platyrhynchos* when a mixed group of these species was excitedly fighting over floating food. The insects were immediately rejected and head-shaking and bill-wiping followed. These are the only examples I could find of birds apparently stung by wasps. There are few records of birds apparently stung by other Hymenoptera, but Fry (1969) observed an immature Red-throated Bee-eater *Merops bullocki* exhibiting distress symptoms after eating its first few bees, and suggested that it had been stung.

A number of authors have recorded that birds are able to distinguish between stinging and non-stinging insects (Lacey 1910, Grant 1945); and Swifts *Apus apus* (Lack 1956) and Red-throated Bee-eaters (Fry 1969) can recognise male (non-stinging) bees from female (stinging) castes. Leipelt (1963) noted that his captive Redstarts and Pied Flycatchers could distinguish male wasps. However, it is not known how birds are able to recognise stinging insects. In several families of Vespoidea the male caste has developed a pseudo-sting (Evans and Eberhard 1970); this is particularly noticeable in the potter and mason wasps (Eumenidae) but less obvious in the social wasps. It seems probable that, by mimicking the females' sting, the pseudo-sting may confer some additional protection to male wasps.

The principal components of venom of vespid wasps are a protein which produces allergic reactions in man, an acetylcholine-like substance, histamine, serotonin and kinin, and the amount of venom injected in a single sting varies from 0.05 to 0.3 ml (Spradbery 1973). The variation in human reaction to wasp stings is well known and birds may be equally variable in their reactions. Clearly, however, because of their smaller size birds may be more sensitive to sting effects unless they possess some immunity.

Phisalix (1935) is apparently the only worker to have examined the effects of insect stings on birds. He found that 0.6 mg of *Apis* venom per 100 gm of body weight proved fatal to sparrows. Fry (1969) calculated that on this basis a single sting would prove fatal to the Red-throated Bee-eater if it possessed no physiological immunity.

DISCUSSION

Feeding on isolated wasps and raiding nests in order to feed on larvae and pupae require different strategies. In the first situation birds must overcome the mechanical effect of the wasps' stings in the mouth and gut, and the physiological effect of the venom. In the second situation a bird must be sufficiently protected to avoid being stung while attacking a nest.

Birds which regularly feed on isolated wasps, such as bee-eaters and shrikes, have specialised behaviour patterns enabling them to disarm their prey. It is interesting that the Jay shows a similar pattern of preparatory behaviour. In contrast, Honey Buzzards apparently ingest wasps without any preparation, though they have been recorded decapitating them. However, decapitation would not prevent a wasp from stinging once inside the predator's mouth or gut. Apparently there is no record of an examination of the mouth or alimentary canal of the Honey Buzzard to determine whether it shows any adaptations. In view of the large numbers of wasps that Honey Buzzards eat, it seems likely that they possess either morphological adaptations of the mouth and oesophagus or some immunity to venom. On the other hand, bee-eaters' apparent immunity to Hymenoptera venom in general (Fry 1969) may be more of a safeguard, in view of their elaborate preparatory behaviour. It has not been demonstrated whether shrikes possess any immunity.

The small number of bird species that has been recorded raiding nests of social wasps indicates that the insects' defence (see Spradbery 1973) is highly effective. Wasp larvae and pupae are probably an attractive food, but in order to predate a nest successfully a bird must be sufficiently protected to avoid being stung. It is interesting that I have found no records of small birds attacking wasps' nests. The relatively thicker plumage of larger birds may provide protection, though Skutch (1971, pages 270-271) recorded tanagers *Piranga spp* in the tropics and USA attacking wasps' nests. Three of the records of birds feeding on nest contents involve corvids: these are well known to be opportunists, ready to take advantage of any such abundant supplies of food.

In conclusion it may be said that, although a wide range of bird species has been recorded preying on social wasps, only very few regularly do so, indicating that the insects' defence mechanisms, on both an individual and a co-operative basis, are effective.

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SUMMARY

Predation by European and Russian birds on social wasps (Vespidae) is reviewed. At least 37 species have been recorded feeding on social wasps, but only a few do so regularly, namely bee-eaters (Meropidae), shrikes (Laniidae) and the Honey Buzzard *Pernis apivorus*. Jays *Garrulus glandarius* and Great Tits *Parus major* may also take these insects more frequently than is supposed. All species which regularly feed on stinging insects have behavioural or morphological and physiological adaptations, or both. The few records of birds stung by wasps indicate that venom is not necessarily fatal, though birds which have been stung are at a disadvantage.

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Appendix. European and Russian bird species recorded as having eaten social wasps (Vespidae) in adult (A) and larval (L) stages

(1916) recorded the Common Wasp *Vespula vulgaris*, German Wasp *V. germanica*, Tree Wasp *V. sylvestris*, *V. (polistes) gallica* and Hornet *Vespa crabro* in avian crops, stomachs or pellets, but did not specify which birds had eaten which wasp species. Vaughan (1961) and Dementiev and Gladkov (1966-68) recorded only 'wasps', with neither generic nor specific names

Great Heron <i>Ardea cinerea</i> (A, L)	Vasvari 1948-51, Witherby <i>et al.</i> 1938-41
Great Stork <i>Ciconia ciconia</i> (A)	Hesse 1916
Great Owl <i>Buteo buteo</i> (A)	Hesse 1916
Great Grey Buzzard <i>Pernis apivorus</i> (A, L)	Witherby <i>et al.</i> 1938-41, Hagen and Bakke 1958
Great Spotted Woodpecker <i>Falco subbuteo</i> (A)	Hesse 1916
Great Northern Diver's Falcon <i>Falco eleonorae</i> (A)	Stresemann 1943, Vaughan 1961
Great Crested Newt <i>Falco vespertinus</i> (A)	Charlemagne 1954
Great Grey Woodpecker <i>Falco naumanni</i> (A)	Charlemagne 1954
Great Grey Partridge <i>Perdix perdix</i> (A)	Hesse 1916
Great Grey Partridge-winged Pratincole <i>Glareola dmammi</i> (A)	Dementiev and Gladkov 1966-68
Great Grey Owl <i>Athene noctua</i> (A)	Hesse 1916
Great Grey Swift <i>Apus melba</i> (A)	Witherby <i>et al.</i> 1938-41
Great Grey-tailed Swift <i>Hirundapus dacotus</i> (A)	Zolotarev in Dementiev and Gladkov 1966-68
Great Grey Water Thrush <i>Merops apiaster</i> (A)	Hesse 1916, Witherby <i>et al.</i> 1938-41, Dementiev and Gladkov 1966-68, Fry 1969
Great Grey Woodpecker <i>Coracias garrulus</i> (A)	Bernáth 1958
Great Grey Woodpecker <i>Picus viridis</i> (A, L)	J. F. Naumann in Dresser 1831, Hesse 1916
Great Grey Woodpecker <i>Dendrocopos major</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Corvus corone cornix</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Corvus frugilegus</i> (A)	Anon 1916, Hesse 1916, Marie 1923, Holyoak 1972
Great Grey Woodpecker <i>Corvus monedula</i> (A, L?)	R. L. Winter verbally
Great Grey Woodpecker <i>Pica pica</i> (A, L)	Hesse 1916, Goodwin 1952, Mather 1971, Birkhead 1973b
Great Grey Woodpecker <i>Nucifraga caryocatactes</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Garrulus glandarius</i> (A)	Hesse 1916, Campbell 1936, Goodwin 1952, Owen 1956, Dementiev and Gladkov 1966-68
Great Grey Woodpecker <i>Tit Parus major</i> (A)	Hesse 1916, Fincher 1951, S. M. Pospelov in Dementiev and Gladkov 1966-68
Great Grey Woodpecker <i>Turdus merula</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Thrush Monticola saxatilis</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Wheatgrass Oenanthe leucura</i> (A)	Richardson 1965
Great Grey Woodpecker <i>Phoenicurus phoenicurus</i> (A)	Leipelt 1963
Great Grey Woodpecker <i>Sylvia atricapilla</i> (A)	Witherby <i>et al.</i> 1938-41
Great Grey Woodpecker <i>Green Warbler Sylvia borin</i> (A)	Charlemagne 1954
Great Grey Woodpecker <i>Throat Sylvia communis</i> (A)	Charlemagne 1954
Great Grey Woodpecker <i>Red Flycatcher Muscicapa striata</i> (A)	Owen 1914
Great Grey Woodpecker <i>Flycatcher Ficedula hypoleuca</i> (A)	Leipelt 1963
Great Grey Woodpecker <i>Grey Shrike Lanius excubitor</i> (A)	Witherby <i>et al.</i> 1938-41, Cade 1967, Grönlund <i>et al.</i> 1970
Great Grey Woodpecker <i>Grey Shrike Lanius minor</i> (A)	Hesse 1916
Great Grey Woodpecker <i>Black-backed Shrike Lanius collurio</i> (A)	Cajander 1929, Owen 1929, Witherby <i>et al.</i> 1938-41, Gwinner 1961
Great Grey Woodpecker <i>Starling Sturnus vulgaris</i> (A)	Hesse 1916, Szijj 1956-57

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The Purple Gallinule in the *marismas* of the Guadalquivir

Jacques Vielliard

Plates 37-40

Among the birds of Europe one species, the Purple Gallinule *Porphyrio porphyrio*, attracts the eye by the brilliance of its plumage and at the same time shocks it through its grotesque shape: it seems to be both an intruder from the tropics and a relic from prehistory. Three times the bulk of the Moorhen *Gallinula chloropus*, its plumage a silky purple-blue with metallic reflections, save for the white undertail, this monster sports an enormous, bright red, triangular bill, red frontal shield and eyes, and gnarled feet with disproportionately long toes as glowing red as the bill (plate 37).

DISTRIBUTION

The genus *Porphyrio* ranges over the Old World in four basic types of coloration. The nominate form, entirely violet, is endemic to the western Mediterranean region; and the *madagascariensis* group of tropical Africa, Madagascar and Egypt has a green back contrasting with blue remiges and underbody. The *poliocephalus* group, from Turkey to Indo-China, is light blue with the head pale grey; this passes, in Malaysia, into the *melanotus* group of very pigmented forms, the head and back becoming almost black, across the Australasian region. Vaurie (1965) and some other workers have united them all in one superspecies but, taking into account the remarkable isolation around the Mediterranean between *porphyrio* of the western basin, *aegyptiacus* (in the *madagascariensis* group) of Egypt and *seistanicus* (in the *poliocephalus* group) of Asia Minor, I prefer to follow Peters (1934) in regarding these groups as separate species. Whatever subtle arrangements are proposed, all authors agree in recognising the distinctness of the violet Purple Gallinule of the western Mediterranean. The present distribution of this form is extremely limited: a few favourable sites in northern Morocco, Algeria and Tunisia; the *marismas* of the Guadalquivir in Andalusia; and the marshes of Sardinia (Mocci Demartis 1973). In recent decades the species has been noted in the Rharb and lower Lucus (Morocco), in large numbers at Lake Fetzara (Algeria), and on Lakes Ischkeul and Kelbia (Tunisia), as well as in south-west Spain as far as Valencia, but it has become very rare with draining. It has probably disappeared recently from Sicily, and longer since from southern Portugal. It certainly occupied the Camargue in southern

France in recent times, where it was seen in 1969 (Hovette 1972), and likewise the west coast of Italy.

HABITAT IN ANDALUSIA

My observations took place in the *marismas* of the Guadalquivir during 1962-65. This region, famous among ornithologists, has been described in detail by Mountfort (1958) and Valverde (1958). It consists of an immense stretch of alluvia accumulated by the River Guadalquivir, 'Father of Andalusia', against an arrowhead of littoral sand dunes which it meets at its mouth. These marshes are, or rather were, a vast, level mosaic of beds of rushes *Scirpus* and sedges *Carex* subjected to strong drying out in summer; small natural channels overgrown with reedmace *Typha* and reed *Phragmites* drain the ground but, at the edge of the dunes, a series of deeper lagoons normally holds water permanently.

In such conditions the Purple Gallinule has developed a particularly well-adapted biological cycle. As soon as the marsh, which has been baked dry by the Andalusian summer sun, is returned to water by storms and the flooding of the Guadalquivir, normally at the end of the autumn, it settles in and begins to nest even before the vegetation has completely regrown. Hardly are the young capable of flight when the mud dries out and the *Scirpus* begins to die; the birds then take refuge in the *Typha* beds (plate 40a) where water lies stagnant longer, and later they must withdraw as far as the littoral lagoons to spend the rest of the summer and autumn until the marsh is flooded anew. Such are the stages in the annual cycle of the Purple Gallinule in the *marismas*.

REPRODUCTION

Elsewhere in the Mediterranean region, the beginning of laying extends from the end of March up to June (Heim de Balsac and Mayaud 1962). In the *marismas*, however, clutches as late as this would not allow the young to become independent before the marshes dry out. In fact, of the five nests which I found on 15th April 1965, three had already been vacated by the young and the other two contained hatched clutches. With an incubation period of about 25 days, this indicates that laying was completed before 20th March; according to wardens it may begin in February or even January, with the first normal hatchings at the end of March. Replacement clutches and perhaps even normal second clutches are not out of the question. The speed of development of the chick is not known, but it seems quite slow and it is probable that *all* clutches are normally completed by April (though see pages 232-233).

It would be very interesting to relate the reproductive timetable of the Purple Gallinule in the *marismas* to variations in the water

cycle. In certain years water levels are low in the *Carex-Scirpus* beds at the beginning of spring; the thousands of ducks, rails, crakes, waders, gulls and terns which usually nest there at that time do not do so, and summer visitors such as Black-winged Stilts *Himantopus himantopus* and Collared Pratincoles *Glareola pratincola*, which normally settle in thousands, search farther north for more favourable sites. The intense evaporation rapidly dries out the open marsh before the chicks have had time to become independent. In such years few species but the Purple Gallinule breed, and the latter is successful (with local exceptions) because of its early laying and the refuge provided by the denser *Typha* clumps where the chicks hide.

The nest of the Purple Gallinule is an enormous construction, concealed in the clumps of *Typha* or the densest beds of *Scirpus*. It is very easy to find if one moves about on horseback (which is, besides, the only practical means of locomotion in this marsh), for one then looks down on the tall *Typha* and *Phragmites*; what is more, one is put on the trail by the presence near the nest of a wide, floating carpet of fresh *Scirpus* cut off level with the water by the Purple Gallinules, which chew the pith and use the stems for nest construction. In a few hundred metres I have rapidly found five nests in this way and it is tempting to speak, following numerous authors, of a loose colony; in fact, the high density in such places is due to the localisation of the dense stands of *Typha* and *Phragmites*. One large stand of *Typha* held two nests at opposite ends while many isolated clumps were not occupied, leaving a regular spacing between each nest. The nest is a pile of dead *Typha* stalks supported on the bottom and initially emerging only a few centimetres above the water surface; the eggs are laid in the cup of dry stalks. Each nest possesses one or sometimes two access ramps, made from a bundle of fresh *Scirpus*.

The eggs (plate 40b) resemble those of the Coot *Fulica atra* but are larger and more brightly coloured, with underlying blotches of pale violet and superficial ones of bright maroon; the ground colour is usually more solid, but of the clutch of six shown in plate 40b one egg was distinctly faded and another slightly. The chick on hatching is covered in long black down; its bright pink feet and toes, with black nails, are already enormous; the bill, also remarkably strong for a chick, is lead-grey with the base and nostrils blood-red and a white egg-tooth. A large chick, almost the size of a fully grown Coot but still incapable of flight, was caught by hand on 2nd August 1964 (plate 37b). Although we have no standards for estimating its age, it indicates an abnormally late clutch made possible by the very long flooding period of the marsh that year but nevertheless very delayed behind other clutches, since all the other

immatures I observed at that time could fly and had the build of adults. This bird shows that the first plumage following the neoptile down already has the pigmentation of immatures, dark matt blue above and light greyish below, and that the legs and feet, red from the outset, grow rapidly to allow a fast run before the wings have grown; the bill and frontal shield, still growing, are lead-blue. I have been able to recognise several stages of immature pigmentation, which I suspect correspond only to subtle variations of the first plumage but which have enabled me to make local censuses. The red of the rhamphotheca starts at the frontal shield where at first it forms an edging, gradually reaching the tip of the bill by August. Body moult is noted from October. I suspect that immatures resemble adults before the end of their first year.

VOICE

At the time of my observations nothing was known of the voice of the Purple Gallinule but the alarm cry, emitted sometimes when taking flight and vaguely described as like a blast on a trumpet. The vocal repertoire is, however, extremely rich and varied, but it is uttered from cover, often at night and during occasional short periods of excitement, especially in April. I made the first recordings of 'song' in 1965 and Roché (1966) completed them the following year. One vocal emission consists of a wailing which has something in common with that of the Water Rail *Rallus aquaticus*: it is a long, unbroken series of powerful but very plaintive rattles, without preamble and reaching a crescendo, the veritably human tone of which is striking. This is emitted at the end of the afternoon and at dusk by an isolated bird and plays, it seems, the rôle of a song. Other calls are, on the contrary, short and sharp, like brief blasts on a whistle, but all kinds of variations may be heard: brief gruntings, horn and trumpet blasts, and sounds like the ringing of a small bell which become gradually sharper and more nervous-sounding until their tone is more like the trumpet blasts. This repertoire of calls is emitted at night in chorus and increases in intensity as excitement grows.

FEEDING BEHAVIOUR

Nowadays it is well known that Purple Gallinules feed on vegetation and sometimes animal matter and that they use their feet as gripping devices (Glutz von Blotzheim *et al.* 1973). My original observations give several precise details. In August, when the *Scirpus* beds are dry, the Purple Gallinules, especially juveniles, gather in the *Typha* jungle of the channels which are still wet; these dense bands of reedmace are bordered by a bare, muddy beach which one can easily watch over hidden in one of the clumps of rushes *Juncus* which

border the dry *Scirpus* marsh. The Purple Gallinule seeks its food on foot and, by preference, when it feels it is safe, walks along the mud beach. Food items are seized first in one foot, more often the right foot; the basic diet is pith extracted from fragments of *Scirpus* and especially from shoots, as well as rhizomes, of *Typha*. These vegetable fragments are grasped between the toes, which are clenched a little, and lifted up halfway (with tarso-metatarsus held horizontally) towards the bill; if they fall to the ground they are picked up again with the foot and not the bill, even if the efforts to grip them turn out to be in vain. Pieces which cannot be grasped between the toes, such as rhizomes, are held by a foot while being torn with the bill.

The impact of the Purple Gallinules on the *Typha* appears to be very important, sometimes with signs of spectacular uprooting, to the point that I have wondered whether they were not risking destroying their own habitat. The regenerative power of *Typha* makes this improbable, but the birds are certainly containing the spread of the *Typha* and playing a part in maintaining the borders and openings which favour their movements in this jungle.

The animal part of the diet is improperly known but substantial, including many dead fish taken from small pools that are drying out. This was well illustrated by the following experience I had in the *marismas*. A semi-automatic camera was baited with a Mullet *Mugil* *sp* about 30 centimetres long, freshly killed. The Purple Gallinules which passed nearby, walking slowly along the reed-bed in search of food, were immediately interested, and several different individuals approached in turn throughout that day and the next (plates 38-39). Each feeding bird remained wary and took its time to eat small beakfuls of flesh: one foot was quickly placed on the fish, then the branchiae under the gill cover were attacked with the bill; later the pectoral fin was torn off to reach the flesh. At the beginning one bird, made uneasy by the noise of the camera shutter, seized the fish by the tail with its bill, tore it up from the mud and, despite its weight, ran off with it swinging to and fro between its feet; I had to rush out from my hide to make it abandon my bait. (The formidable strength of the bill can also leave smarting marks on the ringer.) The feet continued to play a rôle in this feeding behaviour, though they quickly became slimed over through trampling in soft mud. As always in birds, behaviour patterns are stereotyped and their vain repetition becomes comical: this was the case when one individual was trying to pick up, between its toes, a piece of flesh hanging from its bill which could not be seized like a stiff reed stem.

MOVEMENTS

The Purple Gallinule is very much a stay-at-home bird. During

uninterrupted observations I have recognised some individuals coming and going along a course of only a few tens of metres for several days on end. In the evenings the birds settle down in small groups in the reeds, which they clutch with their toes and where they spend the night safe from terrestrial predators. In the morning they are slow to resume daytime activities and sometimes allow themselves to be closely approached. Sun-baths are appreciated in the middle of the day.

Though reputed to be sedentary, in the *marismas* the Purple Gallinule makes cyclic seasonal movements. The most typical occurs after breeding, when the *Typha* beds to which the birds have retreated in turn begin to dry out; late, unfledged young have already rejoined the adults at the residual waterholes; now there is a general exodus towards the coastal lagoons and, no doubt, to the arms of the river. These movements take place at night over open ground—cracked marsh and sparsely vegetated grassland—and observations indicate that they are made entirely on foot: the Purple Gallinule could thus be classed as a pedestrian migrant! Even when disturbed on open ground it is loath to fly but runs very fast. On the deep lagoons where it awaits the re-flooding of the marsh, it does not swim out in the open; if it has to move away quickly it flies heavily, dropping feet-first into the first thick reed-bed it finds.

PROTECTION

Through its robustness, its secretive nature, its wide-ranging diet and its adaptable biological cycle, the Purple Gallinule seems destined for a good future. Not only does history show us the contrary but present-day circumstances render its survival more and more precarious. Certainly the species was, at the time of my studies, very abundant in the *marismas*, but I saw it also to be very vulnerable to predation, despite appearances. Its flesh is highly esteemed by man and it is the easiest bird to catch, even by hand, with a little patience: some workmen came to repair a dyke near the site of my observations, and on the following day I found traces of a small fire beside a pile of Purple Gallinule feathers! The semi-domesticated pigs being released in ever larger numbers on the marsh to fatten up must often be doing so to the detriment of the Purple Gallinules. The *Typha* is a flourishing plant but demands precise conditions of flooding. It is no secret that the *marismas* are plundered, while the Coto Doñana reserve itself includes only a small proportion of the marshes, very insufficient for the maintenance of aquatic fauna. Reintroduction in the Camargue seems to me very feasible and might be a success; otherwise one of the most extraordinary birds of Europe may even now be heading fast towards extinction.

ACKNOWLEDGEMENT

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Notes

Black Storks wing-spreading while feeding Since I can find no published reference to the habit in Black Storks *Ciconia nigra* of spreading their wings to shade the water in which they are fishing, the following may be worth recording.

In June 1973, during a trip to north-east Portugal—the principal object of which was to confirm that Black Storks still nest there—it was noticed that birds of this species frequented a small area of beach on the bank of the River Douro to feed. The food consisted almost entirely of fish 15-25 cm long (sometimes larger) and was easily obtained because vast shoals were continually cruising up and down that part of the river.

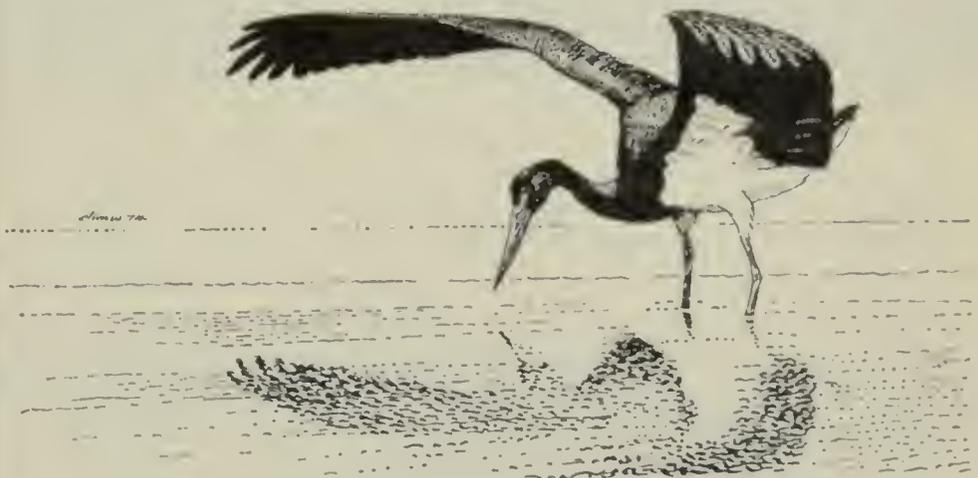
The fishing bird stood or walked in shallow water, every few moments raising and spreading its wings wide and bringing them forward of the normal flying position, bowed and inbent, while it darted its head into the water to grasp a fish. In this it was never seen to fail, so abundant was its prey and so effective its method. Occasionally the catch was made after a forward run of two or three steps. From ten to twenty or more fish were caught on each visit, after which the bird always flew off in the same direction, presumably to a nest holding fairly large young.

Ordinary fishing methods were also seen and the choice of method did not appear to be related to the brightness of the light, since wing-spreading was seen in light so poor as to make photography virtually impossible.

The spot was visible, from the opposite side of the river, from the balconies of the rooms of all members of my party, and thus feeding was often watched. Being just above a dam, the river was very wide at this point and the birds were far too distant for satisfactory photographs to be obtained. I am therefore grateful to D. I. M. Wallace for preparing the sketch below from enlargements of three negatives taken with an 800 mm lens. An equally distant ciné film was also taken.

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This habit is well known in the Black Egret *Egretta ardesiaca* of Africa. In *A New Dictionary of Birds* (1964) Sir A. Landsborough Thomson described it as follows: ' . . . the bird stands motionless in the shallows, with bill directed downwards, while the wings are held extended in a forward position so that they form a canopy over the head. The tips of the wing feathers may be in the water, if the latter is deep enough, as some published photographs show. It is thought that the patch of shade constitutes a false refuge into which the fish are lured; it has also been suggested that the bird's vision is helped by the cutting out of reflections from the surface in a bright light'. The Black Egret forms a more complete 'umbrella' in front than did the Black Storks in Portugal. The above observations do not support the idea that this behaviour is related to the intensity of light falling on the water surface or to the effect of reflections. EDS

Aggressive behaviour by Buzzards at nest Reports by G. A. Williams and D. Coan, and Dr K. W. Brewster (*Brit. Birds*, 66: 31-32, 279), of aggressive behaviour by female Buzzards *Buteo buteo* prompt me to record the following notes. I was attacked by Buzzards in a Lakeland valley in 1972, 1973 and 1974. In 1972, on each of two visits to the vicinity of a nest in a Scots pine in a small wood, to which I did not ascend, the presumed female was extremely bold. She perched conspicuously on adjacent trees, calling and from time to time swooping at me, and also followed me, swooping every now and then, as I left the wood and crossed open ground.

In 1973 I made more detailed observations on an aggressive female which was nesting on a crag about $1\frac{1}{2}$ km from the 1972 nest. Whether this was the bird mentioned above is not known, but observations made in 1974 (see below) suggest that it was. On 15th May she was sitting tight and left the nest only when I approached closely. Although I began to leave immediately after ascertaining her presence, and without examining the nest, I was repeatedly attacked. Each attack was pressed home as the bird swept down the craggy hillside, passed very closely over my head (the draught of her passing being clearly felt) and rocketed steeply upwards on outstretched wings, much like a swooping gull. Always was I attacked from behind, as Williams and Coan almost invariably were. If I turned towards the bird as she approached, she invariably passed over much less closely. An oblique glance revealed lowered talons as she appeared over a rock and began her descent. Even after I had left the site and was walking around the bottom of the crag at least 200 metres from the nest, I was occasionally attacked.

On 22nd May the female again left the nest as I approached, but I immediately and quickly withdrew and no attack was made; but on 15th June, when two young not greatly dissimilar in size and perhaps 15 to 16 days old were in the nest, I was persistently and vigorously attacked. This time the attacks, mostly silent, were made both down and, more often, across the crag, though some descent was always involved. Ironically they were less intense as I looked into the nest from above, perhaps because it was near the top of the crag and little cover was available for the early part of the bird's approach. Both parents were vociferous at this stage and remained much nearer the nest than is often the case. Aggression was displayed again on 25th June.

Such behaviour differed markedly from that displayed, for example, by three other pairs of Buzzards observed in the same region in 1973, two with nests on crags, one in a tree. None of these ever attacked me, and one pair in particular was notable for the way in which both birds departed to considerable distances long before the nest was approached closely and never returned to within 100 metres of



PLATE 37. Young Purple Gallinules *Porphyrio porphyrio*, Spain, 1964 (photos: Jacques Vielliard). Above, immature, October: the bill by this time is red, like the irides. Below, very late juvenile incapable of flight, caught by hand, August: matt dark blue above, bright greyish below, bill and frontal shield (both still growing) lead-blue, huge feet and toes red from the start (pages 230-236)





PLATE 38. Immature Purple Gallinule *Porphyrio porphyrio* coming at dawn to fish bait, Spain, August 1964 (photos: Jacques Vielliard). These two photographs and those opposite show different attitudes of the same individual (page 234). Below, note well-developed red frontal shield; bill, eyes and legs are also red





PLATE 39. Purple Gallinule pecking at dead fish and walking away: the long toes are buried in the soft, sticky mud. Note white undertail-coverts. Basic diet is pith extracted by the birds from *Scirpus* fragments and *Typha* shoots and rhizomes, but animal matter is also taken. The plant in the background is *Typha*





PLATE 40. Typical post-breeding season habitat of Purple Gallinules *Porphyrio porphyrio* in *marismas* of Guadalquivir, Spain, August 1964, showing bare, muddy patches from which the last remaining pools are evaporating, and a thick bed of *Typha*. Below, clutch of six well-incubated eggs laid in huge nest made of dry fragments of *Typha*, April 1965 (pages 231-232) (photos: Jacques Vielliard)



it while I was in the vicinity.

In 1974 a pair of Buzzards, including what was almost certainly the aggressive bird of the previous two years, nested on a crag less than 500 metres from the 1972 nest, the wood containing which it overlooked, and about 2 km from the 1973 nest. Here aggression identical with that shown in 1973 was displayed, first on 21st May, when eggs must have been in the nest, and on subsequent occasions when it contained young. Vigorous dive-bombing occurred while I was on the crag, and the bird frequently swooped and virtually skimmed my head while I was in the open below it, sometimes at least 200 metres from the nest. Less interest was shown while I was above, and nearer, the nest but not in sight of it. To look into the nest was a somewhat hazardous undertaking on account of the very steep, sometimes almost vertically downward, diving attacks. The bird also displayed a proprietary interest in the small wood containing the 1972 nest, flying through it while I was present and at times perching on trees not more than 20 metres away.

Aggression by Buzzards was reported by W. R. Philipson (1948, *Birds of a Valley*), whose experience in Lakeland was apparently similar to mine. When, on one occasion, he covered his head with a coat and stood still, he was struck by a bird's talons. His account suggests that more than one pair displayed such behaviour, which apparently he did not regard as unusual in the area. On the other hand F. Wenzel (1958, *The Buzzard*) was attacked only once during observations on over 100 pairs in Denmark, but was told of similar aggression displayed by a pair in two successive years. Likewise, although M. Melde (1971, *Der Mäusebussard*), referring particularly to German birds, noted that some Buzzards become aggressive and molest climbing would-be ringers, he did not indicate that, in his considerable experience, he had seen such behaviour himself and merely cited W. Kirchhof (*Vogelzug*, 8: 30) to this effect. J. Walpole-Bond (1914, *Field-Studies of Some Rarer British Birds*) also mentioned aggressive pairs that 'very exceptionally' attack an intruder, though according to him with the male as leading protagonist. Although he referred to the same pair as 'resorting to these drastic measures year after year', he had never himself been so attacked. Variation in aggressiveness, like that of coloration, appears to be an attribute of this species, the proportion of aggressive individuals perhaps differing in different regions.

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Territorial display by Sparrowhawks Dr I. Newton (*Brit. Birds*, 66: 274-275) described several forms of aerial display by Sparrowhawks *Accipiter nisus* and suggested that, as well as functioning in courtship, they probably serve to advertise the nesting area to

other Sparrowhawks, thus helping spacing. Since starting a general study of birds of prey in the Ilfracombe area of Devon in late 1972, I have witnessed many such displays, although none has been identical with any which he detailed and only a very few have seemed to be spontaneous or a part of courtship. Most have followed a fairly set pattern: display by a single, presumably unmated bird, usually female, possibly trying to establish itself in the area, evoking a spirited and sometimes quite aggressive response from the resident of the (almost invariably) same sex. The mate of the resident bird often joins in, and up to four birds have been seen together, but in most incidents females are dominant and in the majority no males have been involved. Single birds, particularly females, do sometimes appear to be performing alone, but experience has taught me that in most cases (though not invariably) a check on the surrounding area will reveal another of the same sex. Such displays end only when the 'intruder' resumes normal flight and leaves the area. Local conditions probably determine the type and intensity, and particularly the seasonal incidence, of display, since in this area, where Sparrowhawks are breeding residents, display coincides to a marked degree with the presence of birds surplus to local breeding stock, although such birds are tolerated even after breeding has started so long as they make no attempt to display. I have as yet no records of display in the period July-September, but it is seen quite regularly from October onwards as overwintering birds arrive. There is often an increase in activity in March and April when there is a variable, weather-dependent, easterly passage through the area, mainly of females, both adult and immature. Display decreases quickly in May as incubation starts, and I have only three records for June.

Two types of display seem to be particularly favoured in this area, 'slow-fighting' and 'dive-displaying'. Some displays may consist simply of a spell of slow-fighting, when the flight is quite distinctive. The wing beats are slow, deep and deliberate, and continuous, with no intervals of gliding as the bird flies around rather aimlessly, usually at a constant height and often over a quite small area. Superficially the outline is similar to that of a bird in normal level flight, the tail being closed and the primaries not separated; but at close quarters the white undertail-coverts are seen to be fanned out on either side of the body, the extent to which the feathers are separated being varied according to the intensity of the display and possibly by the status of the bird. Frequently, while slow-fighting in this way, a variation is introduced in which the bird suddenly closes its wings and dives almost vertically for five to ten metres, then spreads its wings and tail for a fraction of a second to check the fall and pivot it back upwards, again almost vertically and with wings

and tail closed. The change of direction is accomplished so abruptly that the bird seems to bounce. When upward momentum is lost, the hawk tilts gently forward and the slow wing-beating is resumed until the next dive. Spontaneous displays involving a pair are usually ended by the birds' diving at speed down into the breeding wood, where the male may chase the female in and out of the upper branches before each settles, but when a territory-holding bird and another are involved display-flight changes quite suddenly into normal flight and the participants usually leave in different directions, the resident bird always finishing last after a final short spell of slow-fighting in which the head can be seen turning from side to side as the bird checks for further rivals.

Most displays have some unique quality, but a particularly interesting sequence was seen on 28th April 1973 in a territory on the western side of Ilfracombe, a favourite area since birds can be watched at very close quarters and the resident female, an unusually well-marked bird barred below with dark coppery-red, readily identified. I was seated in the early morning on a hill above the coast, looking inland, and for some time had been watching a male Sparrowhawk as it 'played' with a Carrion Crow *Corvus corone* over the bracken- and scrub-covered side of a small valley, or cleave, running parallel with the coast and about 700 metres away from me. The Sparrowhawk then broke away to settle in a small hawthorn near the top of the slope. For a few minutes there was no activity, then I saw two adult female Sparrowhawks circling quite close together in slow display flight over the valley side. One, as it passed above, dipped down briefly towards the hawthorn in which the male had settled, then the two females headed directly towards me over the valley and nearer open downland, flying parallel to one another and about 20 metres apart. Having both in my field of view at the same time, I could see that, although each was displaying continuously, their behaviour differed. The bird on my right (that nearer the perimeter of this particular territory and the farther from the breeding wood) was freely slow-fighting and dive-displaying; while the other (which I now saw was the resident female), although slow wing-beating only, had adopted an exaggerated posture with the wings very bowed and beating unusually slowly and deeply, the head held up and back and the breast thrust forward, to give it at times a quite startling resemblance to a Woodpigeon *Columba palumbus*. As they approached, this latter bird also started to dive-display; then, still in the same relative positions, they reached me and started to circle around above me at a height of perhaps 50 metres, displaying continuously and, as is usual at such times, quite indifferent to my presence. As they passed over my head I was able to see that the white undertail-coverts of the resident bird were

widespread, each feather being clearly separated from the next, while those of the other bird seemed to be closed. For perhaps a minute they circled above in this way, then the behaviour changed: the resident female started to circle more widely and dive more freely, and I could see that the other had now stopped displaying and was gradually drifting westwards, still circling, along the coastal downs. Then, changing to a long glide, it went steadily away along the coast before turning inland about a kilometre away. The resident bird had now left and I saw no further activity during the rest of my watch.

Such incidents rarely last more than five minutes, but exceptionally, on 5th April 1974, a display of a rather different nature involving this pair and another female persisted for more than ten minutes without pause.

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Coot attacking Herring Gull On 13th May 1973, a windy, fairly bright day, I was seated in a hide overlooking a gravel pit reserve near Dungeness, Kent. A pair of Coots *Fulica atra* was swimming about in front of the hide. One of the Coots swam towards a small group of gulls about 50 metres away and, on reaching them, attacked an immature Herring Gull *Larus argentatus* in the water, feet first, both birds thrashing about on the surface for a few seconds before the Coot disengaged and swam back towards the hide. The gull was left floating with its wings half open and its head sunk beneath the surface. The wind blew the gull on to the shore where it flapped its wings but could not move up the bank. It slipped back into the water, to be blown about at random while flapping its wings feebly and trying to keep its head above water. Quite suddenly, however, it seemed to recover and took off.

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Great Black-backed Gull attacking Common Gull On 23rd October 1973 Alan Brown and I were observing waders at Budle Bay, Northumberland, when my attention was suddenly drawn to a scuffle on the mud, about 200 metres from us. Some 25 to 30 Common Gulls *Larus canus* and Black-headed Gulls *L. ridibundus* were flying about above an adult Great Black-back *L. marinus* which had just grabbed an adult Common Gull with its bill, grasping it firmly behind the head. The Great Black-back paid no attention whatsoever to the screaming gulls overhead. The Common Gull opened its wings to their full extent and remained on its feet, but was led by the larger bird into the water. When the water was breast-deep, the Great Black-back tried to force its victim under, and the latter made its first serious attempt to escape. This it

achieved, but it was immediately recaptured and the same move repeated. The Common Gull now became more determined and finally shook itself free from what appeared to be a very strong hold. Once on the wing it flew off, apparently unharmed and showing no visible signs of weakness or distress. The Great Black-back did not pursue it and indeed appeared to lose interest in the whole matter almost instantly.

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Direct head-scratching by Rook in flight The Rook *Corvus frugilegus*, like other corvids and the majority of other passerines, habitually head-scratches 'indirectly' by lowering the wing and bringing the foot up to the head over the humerus (see *Ibis*, 99: 178-181; 103a: 37-49). On 18th January 1968, however, at Chew Valley Lake, Somerset, I clearly saw one of the Rooks that I regularly provisioned with peanuts briefly head-scratch 'directly' in the air as it flew off with food, bringing the foot straight up to the head under the wing while lowering the other foot, presumably in balance. As I have pointed out elsewhere (*Avic. Mag.*, 80: in press), in a discussion on apparent exceptions to the rule that the head-scratching method is a fixed, species-characteristic behaviour pattern, direct head-scratching in flight by birds that otherwise scratch indirectly would seem to occur mainly in such aerial species as the frigatebirds *Fregata spp* (see, for example, *J. Orn.*, 105: 340-343) and hummingbirds (Trochilidae) (*Avic. Mag.*, 79: 200-202), though there is also one record for the Avocet *Recurvirostra avosetta* (*Ardea*, 25: 1-62).

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Reviews

The Naturalist in Majorca. By James D. Parrack. David & Charles, Newton Abbot, 1973. 224 pages including 16 black-and-white plates; 14 line-drawings; one map. £3.95.

In recent years Majorca has often been considered a lost paradise, its scenery scarred by tourist developments, its roads and beaches grossly overcrowded and its wildlife dissipated. This is a partial truth. The magnificent mountains and sea cliffs of the north and west are still largely unspoiled, the hotels and swarming beaches are confined mainly to the south and east, while, as Dr Parrack makes clear, the island offers the naturalist some rare and easily accessible delights. To these he provides a lucid and remarkably full guide, covering all aspects of Majorcan wildlife from geology, plants, insects, other invertebrates, amphibians, reptiles and mammals to birds. On

all these he gives much information not readily available, and shows that even in this much visited island there are many discoveries yet to be made.

For the birdwatcher there is a long chapter surveying the breeding species in the main habitats, the wealth of migrants and the winter visitors. The nesting birds include a number rarely seen so readily elsewhere, from Eleonora's Falcon, Black Vulture, Audouin's Gull (whose breeding sites still remain to be discovered) and Cory's Shearwater to Thekla Lark and Marmora's Warbler. This chapter is supplemented by a concise checklist, but in view of the wealth of material, much unpublished, provided by the many visiting ornithologists in recent years, it is to be hoped that, as was apparently originally intended, the author will soon proceed with a much fuller version.

Majorca, despite development, remains a paradise for the naturalist, but there are pressing dangers. Shooting, though reduced, is still widespread; the wetlands are under serious threat, and the excellent roads which have opened up the mountain areas could lead to undue disturbance to the wealth of breeding predators. Perhaps this stimulating and wide-ranging guide will lead to further support for the moves already being made to establish national parks and reserve areas before it is too late.

STANLEY CRAMP

The Countryman Bird Book. Edited by Bruce and Margaret Campbell. David & Charles, Newton Abbot, 1974. 194 pages; 17 black-and-white plates; 43 line-drawings. £3.50.

How nice for the omnivorous reader of bird books to meet so many old friends: Arthur Gilpin crouching happily with camera in an Orcadian peat bog; Bill Condry writing lovingly of Redstarts in that cottage garden of his at Ynys-hir; Dugald Macintyre listening to the music of the Whoopers, while sheltering from an Atlantic storm; Bruce Campbell himself, brooding on the relationships between Turnstones and Purple Sandpipers. And nice, too, to find so many new names writing compellingly about their birds.

Anthologies divide into two groups: those akin to the glossy weeklies, to be flipped through, a picture to be savoured here and there, the odd piece read because the title or subject catches the eye; and those that demand to be read like a narrative because they are so obviously full of interest. The deft touch of the Campbells ensures that their book falls with a solid thump into the second group.

Arranged in alphabetical order from Bitterns to Wrens, species, families and groups are covered either by way of illustration or by extracts from past issues of *The Countryman*. Much of the information has an original flavour. Robert Gillmor (his Robin anting is delightful), Donald Watson, Richard Richardson and many others have

sprinkled the pages with pleasure for us. Particularly, I liked Edward Bradbury's drawing of a tree-nesting Shelduck and his accompanying text.

The photographs are conventionally good and a notable gem is Stephen Dalton's Grasshopper Warbler pretending to be a Water Rail. I do give notice, however, that for the time being I have seen quite enough of 'that' Spotted Crake and 'that' decelerating Barn Owl, splendid photographs though they be. But that is a minor bit of carping about a book that, in its class, qualifies for a rosette.

DEREK BARBER

Seventy Years of Bird-Watching. By H. G. Alexander. T. & A. D. Poyser, Berkhamsted, 1974. 264 pages; 14 black-and-white photographs; 6 maps and 26 line-drawings by R. Gillmor. £3.80.

Twenty years ago in September I stepped ashore on Fair Isle and spotted among the observatory incumbents intent on Britain's first Citrine Wagtail a tall, fragile-looking man with the stamp of a veteran ornithologist. On enquiring who he was, two letters were my swift admonishment—'H. G.'. I choked back my ignorance of what they meant. I soon knew, however, for over the next ten days I watched his great experience prove to be the catalyst of the wagtail identification. I also admired his considerable toughness as he went after a newly arrived Scarlet Rosefinch with a freshly broken arm calmly strapped out of the way. My first meeting with H. G. Alexander was one of the most important checkpoints along my ornithological way. It was therefore with real pleasure that I took up this book.

Essentially the chapters are particles of an ornithological autobiography, but the scenes and acts are changed so freely that there is no regular sequence to the record of a lifetime's birdwatching. Some might find this confusing, but I enjoyed the freedom to sample the evocative vignettes and share in the acutely remembered successes (and failures) in discovery and knowledge logged over seventy years. Through this book, those who fret about modern ornithological disciplines can understand what it was like to be judged by H. F. Witherby, and those who depend on high-powered glasses can sense the limits of a $\times 4$ telescope—good enough to identify three Pallas's Sandgrouse, though!

Also in this book are many short chronicles of important events and essays on the author's particular interests, for example the demise of the Kentish Plover, bird migration over the Himalayas (sadly incomplete, owing to loss of material), and the making of the Willow Tit into a British bird. If not all the subjects are fully developed, the questions put consistently bear witness to his astonish-

ing power of observation. His overriding enthusiasm for birds and birdwatching, and his underlying humility in ornithology, are visible on every page. This is a book about birds and their students by one of those remarkable gentlemen who virtually founded the hobby and science of birdwatching. What 'H. G.' has particularly given to it is a persistently kind humanity, and this book will stand as a reminder of the importance of such a contribution for future generations.

D. I. M. WALLACE

Letters

Identification of juvenile Arctic Terns In their paper on the identification of juvenile *Sterna* terns (*Brit. Birds*, 62: 297-299, plate 53), P. J. Grant and R. E. Scott emphasised that bill colour is an important character in separating juvenile Arctic *S. paradisaea* from Common *S. hirundo*, the latter's bill having the basal half pale flesh-coloured. This is not invariably a good distinction, at least early in the first autumn, when a significant proportion of young Arctics also have a pale (though orange) base to the bill, easily seen in the field.

On Unst, Shetland, in 1973 at least 560 pairs of Arctic Terns bred in 17 colonies. Very few Common Terns were seen and they were not proved to breed at all: consequently none was present for comparison. Between 5th and 23rd August I obtained excellent views, at close range and in all light conditions, of up to 80 juveniles at one of the larger colonies. They were all flying strongly, though at various stages of parental care and development, and spent much time resting in short-cropped grass on a low cliff-top, where they were frequently visited by adults, and where I was able to take several photographs of them. After 11th August numbers declined considerably, the bulk of the population having left the area entirely.

On 7th August, 55 (69%) of 80 juveniles seen well had a very noticeable orange basal third to the bill, while on one the bill was mainly orange with only a black tip. This orange colour was especially characteristic of the most recently fledged birds. On 10th August another count produced eleven (31%) with an orange base to the bill out of 35 present. This feature was obvious even in flying birds at over 100 metres. The rest had mainly black bills, with a pale crimson to reddish base visible when seen well in good light. The bill presumably darkens during the first autumn and winter.

Some of the juveniles also had a noticeable gingery wash on the mantle. It is difficult to describe the strength of this colouring very satisfactorily, but it was sometimes quite conspicuous in the

field. Furthermore, on 8th August (but not subsequently) a very few birds, probably the most recently fledged, had dark sooty-brown foreheads. The gingery wash, easily discernible in the field, is a character which Grant and Scott referred to the Common Tern but not to the Arctic.

Thus, although about 60% of the juveniles at this colony broadly conformed very well with the description and plate in Grant and Scott (1969), clearly some caution is necessary when identifying recently fledged Common Terns on bill and mantle colour alone. It would appear that in a migrant swarm, where both species might occur, the best characters for separating juvenile Arctic are the translucent underwing, the pure white secondaries and rump when viewed from above, and the lighter build, all well described and illustrated in the paper cited.

GRAHAM BUNDY

Old Manse, Baltasound, Unst, Shetland

We showed this letter and the four transparencies supplied by the author to P. J. Grant and R. E. Scott, and PJG's comments follow. EDS

I am most surprised at the high proportion of juveniles showing extensively pale-based bills. I wonder if this colour is lost rapidly once migration is under way, as hundreds of juvenile Arctics I have seen (all migrants) have had bills which looked all-black at any distance greater than, say, 30 metres. Also I am surprised at the orange colour of the bill base: this, too, is contrary to previously published data which suggest 'dull crimson', 'blood red' or 'red'. Once again, it is possible that the colour darkens rapidly after the birds leave the nesting colony.

The gingery-brown wash on the mantle was mentioned in our paper as also occurring in juvenile Arctic Terns, though very rarely in sufficient strength to be noticeable in the field. Recently fledged Common Terns invariably have this colour very prominently, though in some cases they lose it quite quickly through abrasion; when present it is always a very useful field mark, if only supplementary to other characters.

We stated that some very newly fledged Arctic Terns, still with a little feather down, did not have white foreheads. As Mr Bundy's observations show, in extreme cases the forehead may be sooty-brown, perhaps overlapping with our description of juvenile Roseate Terns *S. dougallii*, so a caveat is required on this score.

These careful observations are most interesting and useful. Clearly, caveats to our paper are needed, particularly for recently fledged birds still at their breeding colonies.

P. J. GRANT

16 Windermere Court, Quantock Drive, Ashford, Kent TN24 8RE

News and comment *Robert Hudson*

World Wildlife Fund expenditure The spring issue of *World Wildlife News* contains a 1973 report of the World Wildlife Fund. Its British National Appeal had a most successful year, raising nearly £800,000, almost 40% more than in 1972; and for the first time the entire costs of administration were covered by dividends and interest. Within the United Kingdom, the biggest British National Appeal grants went to the British Trust for Conservation Volunteers (£6,020) and the Council for Nature (£5,400); while £5,000 each were allotted towards the purchase of Sandwich Bay, Kent, and the provision of an information centre at Paignton Zoo. Internationally, £18,522 went towards an extension of Lake Nakuru National Park in Kenya, and £13,477 towards the purchase of a new reserve at Marchauen in Austria; lesser sums included £3,500 towards conservation of the endangered Bald Ibis in Turkey, £3,000 for bird of paradise conservation in New Guinea, and £2,000 for conservation in the Canary Islands. Internationally-funded WWF projects in Britain, arguably among the more important 1973 tasks, included £26,823 for land purchase and management in the Ouse Washes, £2,733 towards the purchase of Martin Mere Wildfowl Refuge, and £10,000 towards the establishment of Caerlaverock Wildfowl Refuge. From time to time, hard words are used against the WWF for aspects of its publicity and funding; yet it may congratulate itself on having done sterling work in 1973.

RSPB Film Unit awards Three of the top awards at this year's British Sponsored Film Festival have been won by the Royal Society for the Protection of Birds, against competition from some of the country's largest film-making units. The gold award in the top category for prestige films of general interest went to the RSPB's film 'A world within itself', a lyrical look at the plant and animal life of an English oakwood through the four seasons, based on a book by the late H. E. Bates. The other two award winners were 'Look again at garden birds', an in-depth study of some of Britain's commonest species; and 'Farming with wildlife', which describes how three farmers manage to reconcile the need to farm for a living with the desire to enjoy the countryside in the process. These three films will be shown at over 100 RSPB-organised film shows in various parts of the country before the end of the year; while an 8 mm version of 'Look again at garden birds' is to be made available as a home movie.

Whitethroats and arboviruses Some of those who are not content with the easier explanations for the recent decline in Whitethroat numbers have been waiting for more details following a statement by Dr G. E. Watson, in the *Annual Report of the Smithsonian Institution Center for Short-lived Phenomena* for 1969 (pp. 137-138), that a comparatively high rate of infection with arboviruses (that is, arthropod or tick-borne viruses) had been noticed with this species in Egypt in the autumn of 1968: they occurred in 9.3% of Whitethroats examined, compared with an overall rate of only 1% in all birds sampled. On pages 176-180 of the *Proceedings of the Fifth Symposium on the Study of the Role of Migratory Birds in the Distribution of Arboviruses* (Siberian Branch of the publishing house 'Nauka', Novosibirsk, 1972), Drs Watson, R. E. Shope and M. N. Kaiser report that birds were collected for these investigations in Egypt in the autumns of 1966 and 1968 and in the springs of 1967 and 1969, and in Cyprus in autumn 1967 and spring 1968. It was found that 3,300 samples yielded 54 pathogenic agents, presumably viruses, 40 of them belonging to a distinct Bahig complex. Over half came from warblers of the genus *Sylvia*, and eleven from Whitethroats. All but two, isolated from a Swallow and a Song Thrush, were found in the autumn, suggesting that the infections originated

somewhere in eastern Europe or western Asia. As mentioned in the original report, the highest incidence of infection found was the occurrence of five viruses among 54 Whitethroats collected in Egypt in the autumn of 1968. It may be wondered whether they managed to infect west European birds in the winter quarters, but apparently no investigations have yet been carried out to discover whether the latter show signs of past infection. (Contributed by Dr W. R. P. Bourne.)

Salmonella infections in wild birds It has been known for some years that *Salmonella* bacteria are present quite commonly in gull droppings at London area reservoirs and elsewhere (see 'News and comment', *Brit. Birds*, 61: 276); while since 1964 there have been a number of *S. typhimurium* outbreaks among Greenfinches and House Sparrows feeding at bird-tables in southern England, reported by J. W. MacDonald and L. W. Cornelius in *Brit. Birds*, 62: 28-30. Hitherto there has been no positive evidence that this infection has been transmitted to man; but a recent note by Mr MacDonald and D. D. Brown (*Veterinary Record*, 94: 321-322) reports four cases of human salmonellosis, involving the phage-types associated with birds. Two of these cases occurred in Glasgow, and no history of contact with wild birds could be established. However, in the other two, both in Orkney, there was such a link, one through a 'sparrow' caught by the patient's cat, and the other through direct handling of a dying (shot) gull. As the authors remark, it may be relevant that a feature of two *S. typhimurium* outbreaks in southern England was the disappearance of semi-feral cats which had been preying on infected birds.

Some continental news Several brief items in the *Council of Europe Newsletter* 74-3 caught my attention, and may be worth passing on. *Cyprus*: One of the first suggestions made to the government by the new Cypriot Nature Conservation Council was for the establishment of a nature conservation department; meanwhile, a provisional list of potential nature reserve sites has been drawn up by a committee under the Forestry Department. *Spain*: The shooting or other killing of all raptors, as well as certain other scarce species, such as Spoonbill, White and Black Storks, and Marbled Teal, was prohibited by Ministerial decree during the 1973-74 season; also banned was the import, export and internal trade in specimens of the protected species, and it became illegal for taxidermists to possess their skins. *Corsica*: Special measures have been introduced to protect the declining local population of Ospreys; the nesting area in the regional park has been placed strictly out-of-bounds during the nesting season, and will be guarded. *Greece*: A new national park of 19,380 hectares, plus a protection belt of 4,900 hectares, has been established in the Prespa Lakes region; breeding birds of the area include 13 of the 28 species considered by the Council of Europe to require special protection in Europe. *West Germany*: Hunting and shooting has been banned on the east coast of the Waddensee, and the Schleswig-Holstein administration plans to incorporate 140,000 hectares in a proposed new national park. The German Society of Animal Photographers has decided that its members should refrain from nest photography of certain endangered German species, such as the Night Heron, Peregrine and Eagle Owl; and the German Section of the International Council for Bird Preservation has urged magazine editors to refuse publication of nest photographs of these species. *Sweden*: A 1968 Act concerning animal taxidermy has been tightened up; as from 1st May 1974, Swedish taxidermists will have to notify the Ministry for Nature Conservation of all specimens they receive.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

Errata, May issue We apologise for the following typographical errors:
 Page 212, line 35, comma should be apostrophe;
 Page 215, in line 20 of comment, should read 'do not seem satisfied';
 Page 216, in line 3 from foot, should read 'Atlas of'.

March reports and winter summary

D. A. Christie

These are largely unchecked reports, not authenticated records

As announced in the April issue, the commoner species are now generally omitted from the monthly reports and instead will be dealt with separately, season by season. The first of these periodical summaries, covering mainly January-March 1974, follows the March reports below.

A **White-billed Diver** *Gavia adamsii*, the first to be reported in 1974, was on Loch Fleet (Sutherland) from 24th March into April. At Frensham Little Pond (Surrey) three **Bitterns** *Botaurus stellaris* were seen to leave to the north-east on 14th. Two **Spoonbills** *Platalea leucorodia* were in the Sheppey/Swale area of Kent all month, and singles were seen in the Mersey on 17th and at Broomhill Flash, near Barnsley (Yorkshire), on 27th and 28th; one was present on the River Lynher (Cornwall) up to 30th and one on the Exe marshes (Devon) from 31st onwards. A record count of 126 **Goldeneyes** *Bucephala clangula* was made at Belvide Reservoir (Staffordshire) on 27th, while five **Scaup** *Aythya marila* at Drakelow Reservoir (Derbyshire) on 3rd were a little unusual. A drake **King Eider** *Somateria spectabilis* stayed at Culross (Fife) from 10th to 13th, further south than most records of this increasingly frequent visitor, and a drake **Surf Scoter** *Melanitta perspicillata* remained off Loch Fleet Bar from 21st March to 14th April. An early migrant **Osprey** *Pandion haliaetus* appeared at Sevenoaks (Kent) on 23rd, when one was also seen in Langstone Harbour (Hampshire).

Two further reports of **Kentish Plovers** *Charadrius alexandrinus*, both from Kent, followed the exceptional February one (*Brit. Birds*, 67: 220)—two at Sandwich Bay on 28th and one at Bough Beech Reservoir on 29th and 30th. A rather uninspiring month was enlivened by the appearance of a **Killdeer** *C. vociferus* at Sidlesham Ferry (Sussex) on 30th. A **Curlew Sandpiper** *Calidris ferruginea*, perhaps a very early migrant, was at Cliffe (Kent) on 16th. Two **Avocets** *Recurvirostra avosetta* returned to Minsmere (Suffolk) on 5th and 50 were back by the end of the month, while singles were at Brough Haven (Yorkshire) on 9th and at Dungeness (Kent) on 27th. After some unusual winter reports of **skuas** *Stercorarius spp.*, very few were recorded in March—two **Great S. skua** at Fair Isle (Shetland) on 27th and one on 29th (possibly early-returning breeding birds), and a **Pomarine S. pomarinus** at Teesmouth (Co. Durham) all month, and three **Arctic S. parasiticus** flying south and seven north off Seaton Sluice (Northumberland) on 3rd, followed by one south on 16th. A **Little Auk** *Plautus alle* was found dead at Ross (Northumberland) on 12th.

A **Great Grey Shrike** *Lanius excubitor* on Fair Isle from 26th to 28th (trapped) was the earliest spring record there, this species being almost entirely a passage migrant in Shetland. A **Serin** *Serinus serinus* was reported at Twickenham (Middlesex) on 15th March. Lastly, there was a most interesting report from Port Grat (Guernsey) of a **Richard's Pipit** *Anthus novaeseelandiae* which arrived on 24th, the first record for the Channel Islands, if accepted; this vagrant has occurred in spring rather more frequently in recent years (though still exceedingly rarely), but not as early as March. The bird was last seen on 23rd April.

The winter season

In a mild winter, conditions were generally good for wildfowl. There were more **Teal** *Anas crecca* than in any winter since the early 1960's, and more **Wigeon** *A. penelope* than ever before: record counts of these species and of **Pintail** *A. acuta* in the Mersey have already been mentioned (*Brit. Birds*, 67: 131), while the

Ouse Washes (Lincolnshire/Norfolk) held 35,000 **Wigeon** from January to March. Similarly, **Pochard** *Aythya ferina* reached record numbers: Duddingston Loch in Edinburgh (only about 8 ha in extent) held 8,000 in January, and flocks of 1,000 or more were recorded at several other places. **Long-tailed Ducks** *Clangula hyemalis* were particularly widely distributed and well represented inland on the larger lakes and reservoirs; in England the highest count was off Ross, 233 on 23rd February.

British censuses of geese showed increases in peak populations during the last three winters from 22,000 to 39,000 **Dark-bellied Brents** *Branta bernicla bernicla* (the known world population having increased from 34,000 to at least 80,000), from 64,000 to 76,000 **Greylags** *Anser anser*, and from 65,000 to 82,000 **Pinkfeet** *A. brachyrhynchus*. Record numbers of **Dark-bellied Brents** were noted at Foulness (Essex) in November (over 16,000, more than 40% juveniles) and in Langstone and Chichester Harbours (Hampshire/Sussex) in December (about 12,000), though **Pale-bellied Brents** *B. b. hrota* appeared in only slightly above average numbers in north-east England. The regular wintering flock of **Pinkfeet** in south-west Lancashire peaked at 14,000 in the first week of December. **White-fronts** *A. albifrons* at Slimbridge (Gloucestershire) increased steadily from late September to reach a peak of 4,500 on 20th January, including a large percentage of first-year birds; the last were seen there on 14th March. A **Lesser Whitefront** *A. erythropus* stayed with them from 2nd December until late February. **Barnacle Geese** *B. leucopsis* wintered in very high numbers in Scotland—about 18,000 on Islay (Inner Hebrides) and 5,100 (over 20% first-year) at Caerlaverock (Dumfriesshire), including four white birds. Of 350 Barnacles ringed in Spitsbergen in summer 1973 by the Wildfowl Trust, 329 were identified at Caerlaverock.

At their principal wintering site at Welney on the Ouse Washes, **Bewick's Swans** *Cygnus bewickii* reached a peak of 1,100 on 3rd January, including 201 cygnets. At Slimbridge the highest number on any one day was rather low, 294 on the last day of 1973, though 541 individuals (24% cygnets) were recorded during the winter; elsewhere in south-west England a record 358 were counted on Wet Moor (Somerset) on 20th January. We have very little information on **Whooper Swans** *C. cygnus*, but the smaller herds in north-west England included several record counts, and the proportion of cygnets seemed higher than in recent years.

The smaller grebes were generally more numerous than usual, the highest counts of **Slavonian Grebes** *Podiceps auritus* reported being 40 off Ross and 30 in Portland Harbour (Dorset) in February.

After the spectacular influx of **Rough-legged Buzzards** *Buteo lagopus* in October (*Brit. Birds*, 67: 35), there were numerous sightings during the winter from most parts of Britain, including Somerset in January and February and south Wales in March. The most seen together was apparently eight in the Bransdale Valley (Yorkshire), while reports suggest that 15 or so wintered in East Anglia. A **Marsh Harrier** *Circus aeruginosus* was at Seasalter (Kent) on 20th January and up to six wintered at three sites in Suffolk. A **Corncrake** *Crex crex* at Cissbury Ring (Sussex) on 9th December would, if accepted, be the first winter record for that county since 1908.

Away from regular winter quarters in the west, there were 20 **Spotted Redshanks** *Tringa erythropus* and 14 **Greenshanks** *T. nebularia* on the north Kent marshes, while a few **Avocets** were scattered in Yorkshire, Kent, Sussex and Dorset. **Little Stints** *Calidris minuta* were seen at a dozen or more places, mostly in ones and twos, but a flock of 13 wintered at Dibden Bay (Hampshire), temporarily increasing to as many as 18 on 26th January. There was also an unusual report of up to two inland at Staunton Harold (Derbyshire).

The many reports of **Glaucous** *Larus hyperboreus* and **Iceland Gulls** *L. glaucoides* concerned mostly singles, with a high proportion of first- and second-year birds.

Glaucous Gulls were particularly conspicuous and several places had small parties in January-March: at least ten off the Aberdeenshire coast in February was perhaps not unexpected, but further south seven or more were present in Co. Down in January and February, five at St Ives (Cornwall) on 2nd February, and at least five in the Dungeness area from mid-February. Five **Iceland Gulls** were off the Aberdeenshire coast in February, but much more unusual was a report of at least three in the Chesil Beach/Portland area from early February to about 20th March. Three Iceland were recorded in Somerset during March and three at Blackmoorfoot Reservoir (Yorkshire) during January-March; altogether we heard of about 20 Glaucous and twelve Iceland on inland reservoirs. At least four **Mediterranean Gulls** *L. melanocephalus* were seen in west Cornwall in January; while in the Weymouth/Portland area a minimum of eight was estimated during February and five in March, the most seen together being four in Weymouth Bay on 1st March. The few other reports were also mainly from southern Britain. The unprecedented numbers of **Little Gulls** *L. minutus* in Ireland have already been mentioned (*Brit. Birds*, 67: 166); very few were recorded in Britain other than at Formby (Lancashire), where a wintering flock reached 83 on 27th February, and Eglwys Nunydd Reservoir (Glamorgan), which had up to 50 in March.

Shore Larks *Eremophila alpestris* were not particularly numerous, Minsmere holding the largest flock, of 40, for most of the winter. Singles wintered unusually far west in Dorset at Portland and Poole. The largest flock of **Twites** *Acanthis flavirostris* reported to us was 550 at Sandwich Bay on 1st January; 120 at Crossens Marsh on 24th February was a record for the Lancashire coast, while up to 145 at Dibden Bay during the winter were also of note. Gatherings of 400 or more **Bramblings** *Fringilla montifringilla* were reported from nine places, the largest by far being two flocks each of at least 1,000 at Brewood (Staffordshire) on 3rd February (*cf. Brit. Birds*, 66: 240) and at Beddington (Surrey) on 1st March. There were several three-figured flocks of **Snow Buntings** *Plectrophenax nivalis* in eastern Britain in December and January and more inland reports than usual, the latter including sizeable parties on high moorland in Northumberland (25) and Derbyshire (twelve). After a good autumn passage, **Lapland Buntings** *Calcarius lapponicus* were poorly represented, with only very small numbers in Northumberland, Norfolk and Kent, and singles in Cardiganshire, Lincolnshire, Hampshire and Lancashire and on the Calf of Man.

About 15 **Blackcaps** *Sylvia atricapilla* and 20 or more **Chiffchaffs** *Phylloscopus collybita* were reported, though both species were no doubt overlooked; and a **Willow Warbler** *P. trochilus* at Finmere (Oxfordshire) on 7th March was also presumed to be wintering. In the Hampshire river valleys counts of **Water Pipits** *Anthus s. spinoletta* revealed at least 25 along the Itchen and 20 on the lower Test, the county total probably being in excess of 50 birds. At least two **Black-bellied Dippers** *Cinclus c. cinclus* wintered in Norfolk.

Great Grey Shrikes were widely distributed over the whole of Britain and even described as 'common' on the heaths and downs of north-east Hampshire, another reflection of a generally very successful breeding season in the Arctic in 1973. On the other hand, apart from an influx in Norfolk in early December (*Brit. Birds*, 67: 132), **Waxwings** *Bombycilla garrulus* were rare (though widespread): up to six were noted together in Aberdeen in January and in Tyneside in February and all other reports were of one to four birds at 35 localities.

STOP PRESS

In the Teesmouth area there was a Short-toed Lark from 21st June to at least 4th July, a Broad-billed Sandpiper from 23rd to 29th June, and a Lesser Grey Shrike from 29th to 1st July. A Marsh Sandpiper was at Belvide Reservoir on 29th June; a possible Greater Yellowlegs near Sidlesham Ferry on 6th July; and a Ross's Gull in Christchurch Harbour (Hampshire) from 1st to 11th July.

List of county and regional recorders in Britain and Ireland

The main aims of this list of bird recorders and editors are to ensure that observers on holiday away from their home areas send records to the right people, to encourage co-operation at the inter-county and intra-county levels, and to provide a source of reference for those collating records on a national basis. Several counties are divided into areas for recording purposes, but to save space, and because we believe it is less confusing, the list generally includes one name only against each county or region. For the same reasons we have largely discontinued our previous practice of mentioning observatory and other local reports which overlap with the county or regional ones, though some of these contain much important information. Titles of publications are added only when they do not include the name of the county or counties concerned. We shall be glad to know of any errors, omissions or changes of address.

ENGLAND

All counties or regions are now publishing or intending to publish annual reports:

- Bedfordshire* B. D. Harding, 26 Woodlands Avenue, Houghton Regis, Dunstable.
Bedfordshire
- Berkshire* P. E. Standley, Siskins, 7 Llanvair Drive, South Ascot, Berkshire SL5 9HS
- Buckinghamshire* R. E. Youngman, 53 Seymour Park Road, Marlow, Buckinghamshire SL7 3ER
- Cambridgeshire* M. J. Allen, Honey Cottage, Honey End, Fenstanton, Huntingdonshire
- Cheshire* Dr R. J. Raines, 34 Beryl Road, Noctorum, Birkenhead, Cheshire
- Cornwall* N. R. Phillips, Cuccurrian Mill, Ludgvan, Penzance, Cornwall
- Cumberland* R. Stokoe, 4 Fern Bank, Cockermouth, Cumberland
- Derbyshire* David Amedro, 212 Derby Road, Ilkeston, Derbyshire DE7 5FB
- Devon* F. R. Smith, 117 Hill Barton Road, Exeter, Devon EX1 3PP
- Dorset* F. R. Clifton, Portland Bird Observatory and Field Centre, The Old Lower Light, Portland Bill, Dorset
- Durham* I. F. Stewart, 3 Orchard Way, Middlesbrough, Teesside TS5 5PN
- Essex* A. J. Howard, 18 Woodside Close, Colchester, Essex CO4 3HD; J. Thorogood, 49 Oaklands Avenue, Colchester, Essex CO3 5ET; and A. R. Wood, 2 Buxton Road, Monkwick Estate, Colchester, Essex
- Gloucestershire* C. M. Swaine, Mill House, Rendcomb, Cirencester, Gloucestershire GL7 7EY
- Hampshire* J. H. Taverner, 13 Stockers Avenue, Winchester, Hampshire
- Herefordshire* A. J. Smith, 4 The Orchard, Moreton-on-Lugg, Hereford HR4 8DG
- Hertfordshire* M. J. Blindell, 6 Townsend Drive, St Albans, Hertfordshire AL3 5RD
- Huntingdonshire* D. Elias, Monks Wood Experimental Station, Abbots Ripton, Huntingdon PE17 2LS
- Isle of Wight* J. Stafford, Westering, Moor Lane, Brighthstone, Newport, Isle of Wight PO30 4DL
- Isles of Scilly* D. B. Hunt, Pednbrose, St Mary's, Isles of Scilly

- Kent* C. H. Hindle, 42 Glenberrie Drive, Herne Bay, Kent CT6 6QL
Lancashire K. G. Spencer, 3 Landseer Close, off Carr Road, Burnley, Lancashire
Leicestershire K. Allsopp, 81 Uplands Road, Oadby, Leicester LE2 4NT
Lincolnshire K. Atkin, 34 Bassingham Crescent, Ermine Estate, Lincoln LN2 2ET
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Volume 67 Number 6 June 1974

- 221 Predation by birds on social wasps *T. R. Birkhead*
- 230 The Purple Gallinule in the *marismas* of the Guadalquivir
Jacques Viellard Plates 37-40

Notes

- 236 Black Storks wing-spreading while feeding *M. D. England*
- 238 Aggressive behaviour by Buzzards at nest *G. Fryer*
- 239 Territorial display by Sparrowhawks *W. E. Jones*
- 242 Coot attacking Herring Gull *F. W. Hibbert*
- 242 Great Black-backed Gull attacking Common Gull
Raymond H. Hogg
- 243 Direct head-scratching by Rook in flight *Dr K. E. L. Simmons*

Reviews

- 243 *The Naturalist in Majorca* by James D. Parrack *Stanley Cramp*
- 244 *The Countryman Bird Book* edited by Bruce and Margaret Campbell
Derek Barber
- 245 *Seventy Years of Bird-Watching* by H. G. Alexander *D. I. M. Wallace*

Letters

- 246 Identification of juvenile Arctic Terns
Graham Bundy, and P. J. Grant
- 248 News and comment *Robert Hudson*
- 250 March reports and winter summary *D. A. Christie*
- 253 List of county and regional recorders in Britain and Ireland

Volume 67 Number 7 July 1974



BRITISH BIRDS

THE WHITE-BILLED DIVER IN BRITAIN

FULMAR OIL CONTAMINATION

Editorial Address 11 Rope Walk, Rye, Sussex TN31 7NA

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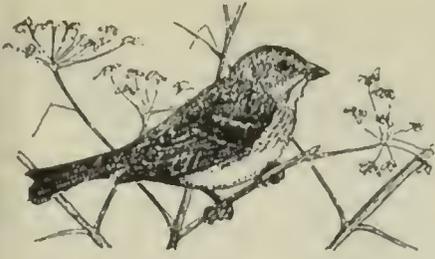
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BRITISH BIRDS

The White-billed Diver in Britain

David M. Burn and John R. Mather

Plates 41-44

	PAGE
INTRODUCTION	258
BREEDING DISTRIBUTION AND RANGE	259
POST-BREEDING DISPERSAL	259
MOULT AND WINTER PLUMAGE	261
THE IDENTIFICATION PROBLEM	262
EXAMINATION OF PRESERVED SPECIMENS	
Birds in breeding plumage	264
Birds in non-breeding plumage	267
SUMMARY OF IDENTIFICATION CHARACTERS	269
MEASUREMENTS	272
SUMMARY OF BRITISH OCCURRENCES	
Numbers, distribution and status	276
Spring moult in Britain	279
ACKNOWLEDGEMENTS	281
SUMMARY	281
REFERENCES	282
APPENDIX: REVIEW OF THE BRITISH RECORDS	
Introduction	283
Accepted records	284
Insufficiently substantiated records	290
Rejected records (wrongly identified)	292
List of observers	293
References	293

INTRODUCTION

Since 1829, nearly 40 individuals of the White-billed Diver *Gavia adamsii* have been recorded in Britain. As 30 of these have occurred within the last 25 years, the species is not necessarily the extreme rarity that its total numerical standing tends to indicate. Furthermore it is sufficiently similar to the Great Northern Diver *G. immer* in winter, juvenile or immature plumage that many birds must pass unrecognised, or at least unclaimed. This paper presents the findings of the work we have conducted over several years on the elucidation of the problems of identification, together with a synthesis of some of those known aspects of the bird's natural history which we feel are of value and interest to the field ornithologist. We hope that it will encourage and enable readers to examine critically all large divers so that the true status of this species off our coasts can be more clearly defined than the present records allow.

G. adamsii was first described by George Robert Gray in 1859 from an adult in breeding plumage collected in Alaska. Its distinction from *immer*, however, was appreciated by Captain James Clark Ross some 30 years previously when he collected three specimens

Table 1. The popularly accepted differences between the Great Northern Diver *Gavia immer* and the White-billed Diver *G. adamsii*

Characters marked with an asterisk apply to breeding plumage only

Character	<i>G. immer</i>	<i>G. adamsii</i>	Original authority
* head and neck iridescence	mainly green	mainly purple	} Gray 1859
* white spots on scapulars	smaller	larger	
* white spots on sides of rump	larger	smaller	
bill size	smaller	larger	
gonys angle	poorly developed	strongly developed	
* bill colour	black	yellowish-white	} Seebohm 1885
* white throat streaks	about 12	about 6	
* white neck streaks	about 18 on each side	about 10 on each side	
culmen	curved	straight	} Collett 1894
commissure of upper mandible ('cutting edge' or maxillary tomium)	concave	straight to convex	
primary shaft colour	dark brown	whitish	} Witherby 1922
cross-section of bill	more rounded	flatter	

from an area north of Hudson Bay. Against his better judgement, he was dissuaded from claiming them as a distinct species by Edward Sabine, who believed them to be merely old males of *immer* (Seebohm 1885). Gray's description was based on the first six characters listed in table 1. Subsequently, a further six characters of greater or lesser importance were described. Many of these characters are shown well in Sage (1971). Although some twelve ostensibly diagnostic characters have been recognised, the separation of the two species in breeding plumage can be based on bill colour alone.

BREEDING DISTRIBUTION AND RANGE

The breeding ranges of the two species have been described by several authors (Bailey 1948, Dementiev 1951, Snyder 1957, Irving 1960, Palmer 1962, Godfrey 1966), but perhaps the most comprehensive assembly of the known information is that given by Bannerman (1959). However, since his treatment is so detailed and lacks some additional data which have subsequently come to light, the following summary (and speculation) may be useful.

The two divers together have a basically circumpolar Holarctic breeding distribution, but the ring is broken between Iceland at the one end and western Russia at the other. *G. adamsii* breeds within a relatively narrow band about 1,000 km wide, lying mainly north of the Arctic Circle (fig. 1). This band extends from the region of the Varanger Fjord, on the borders of northern Norway and western Russia, and extends eastwards to the Siberian tundra, Alaska and north-west Canada. *G. immer* breeds mainly south of the Arctic Circle in Alaska, Canada (where it extends as far south as the Great Lakes), coastal Greenland and Iceland. The small area of overlap at the edges of the ranges of the two species in Alaska and north-west Canada has led some workers—notably Dementiev (1951)—to consider them as conspecific, and this has given rise to speculation regarding possible hybridisation and/or continuous variation of characters. While this may be biologically possible, the lack of any direct evidence for hybridisation and a suggestion of a species-isolating mechanism resulting from a difference in choice of habitat (Sage 1971) indicate the unlikelihood of this conspecificity theory.

POST-BREEDING DISPERSAL

At the end of the breeding season, late in September, the advancing ice forces *adamsii* away from its breeding grounds to the coastal wintering areas further south. The statement by Voous (1960) that 'even during the winter the species rarely leaves the ice-covered coastal seas' is difficult to understand, for there are several references to assemblages of birds in seas well south of the ice for both New and

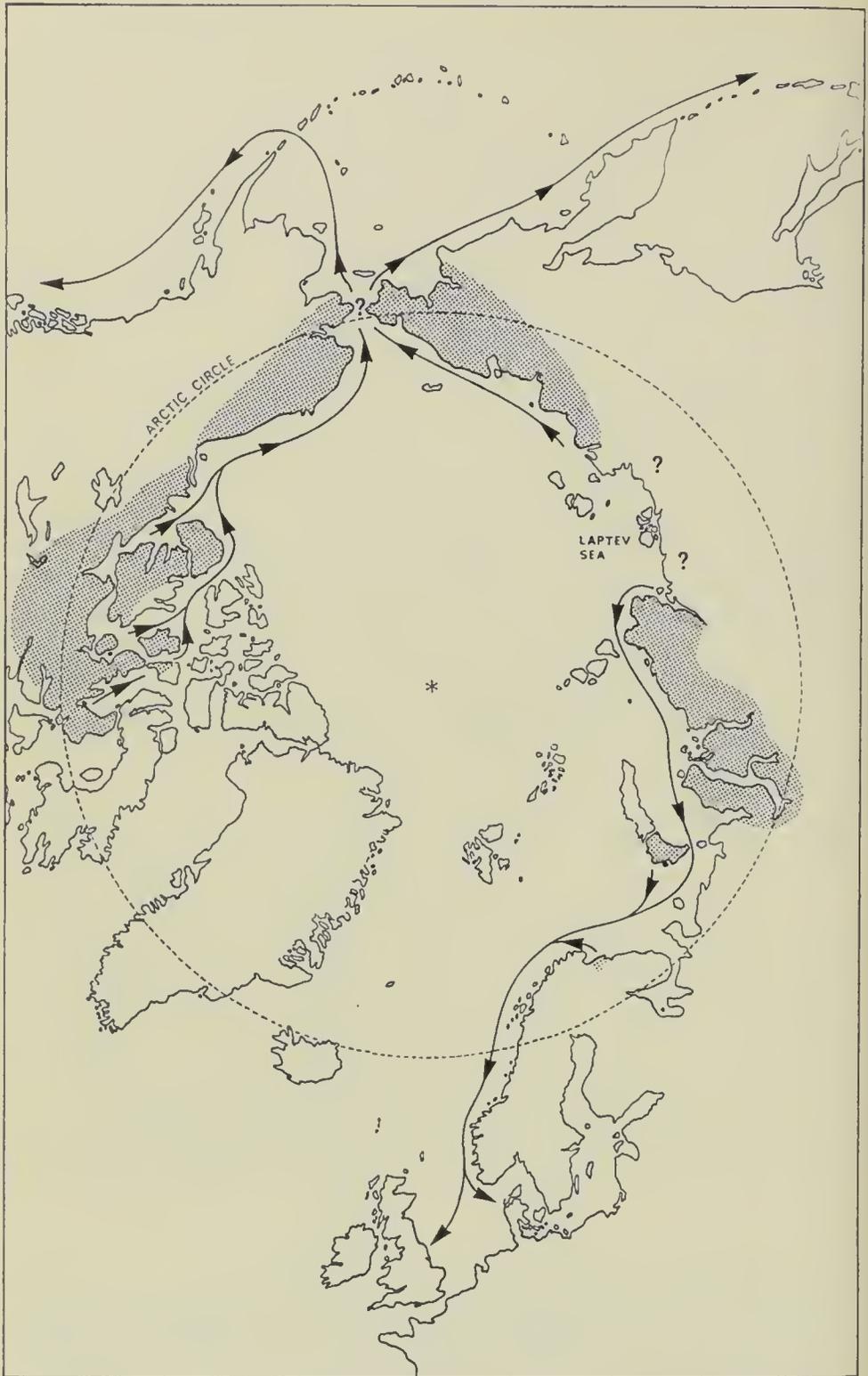


Fig. 1. Breeding areas and probable autumn dispersal routes of the White-billed Diver *Gavia adamsii*

Old World populations (Collett 1894, Palmer 1962, Godfrey 1966).

Evidence for the routes followed is rather sparse and difficult to obtain, but the general picture seems to be as follows (see fig. 1). The New World breeding population returns to the coast and is seen to migrate westwards, then south through the Bering Straits. The eastern Russian population, extending perhaps as far west as the Laptev Sea where Dementiev (1951) recorded an apparent break in the otherwise continuous, if sporadic, distribution across the Russian tundra (and see also Vaurie 1965), may turn eastwards, thence through the Bering Straits. Once through the Straits, the migration routes of these two populations are not known. Wintering birds have been recorded as far south as Japan in the western Pacific and off the coast of British Columbia in the east. Although these two populations would seem to come into contact at times of migration in the Bering Straits, it may be that they remain discrete, the Russian birds following the Asian seaboard and the Alaskan birds following the American coast.

It would seem likely that the population breeding west of the Laptev Sea migrates westwards to make up the assemblages known to winter off the Norwegian coast (Collett 1894). Almost certainly, the British records originate *only* from these Norwegian gatherings. Therefore any problems of identification which may be thought to stem from the theory of conspecificity (or from hybridisation) can be discounted so far as this population is concerned, as it is drawn from the 'purest' end of the postulated cline.

MOULT AND WINTER PLUMAGE

After leaving the breeding grounds in late September, adult *adamsii* undergo a moult into winter plumage. Witherby *et al.* (1938-41) stated that in *immer* the autumn moult of adults is complete and that, although little information is available, it would seem that this moult is also complete in adult *adamsii*. Dementiev (1951) agreed with this view, but Palmer (1962) stated that only first-summer birds moult their remiges in autumn. We can cast no light on this dichotomy of opinion but, because this moult into winter plumage is completed soon after the birds leave their breeding quarters, and certainly before the earliest date that a specimen has been recorded in this country (November), it is not relevant to a discussion on winter diver identification in Britain. The spring moult out of winter plumage, however, is highly relevant, because it is during this period that the adults acquire the black and white breeding plumage by a complete moult, including remiges and rectrices. However, only birds in their second spring or older assume such a plumage; those in their first spring at this time do not moult their remiges and moult only some of their body feathers, the new

feathers being similar to those in winter-plumage adults. They remain in this 'winter appearance' plumage for the next twelve months before assuming their first black and white adult plumage in the second spring. Only Dementiev's account is at variance with this. He stated that in birds in their second spring or older the prenuptial moult is only partial, involving the body feathers and not the remiges or rectrices. From the evidence of the British records this is clearly not the case, as several specimens have been recorded (all later than December) showing new breeding-plumage feathers but yet flightless due to the simultaneous shedding of the remiges.

The winter plumage assumed between these two moults is superficially similar in both *immer* and *adamsii*. The underparts from chin to vent are pure white, and the upperparts from forehead to tail and including the wings are more or less uniformly dark brown. The feathers of the upperparts (excluding the head and neck) of juveniles of both species are broadly tipped with greyish-white, giving the birds a distinctly scalloped appearance. Thus, five of the twelve characters which have been considered diagnostic in breeding plumage are lost, leaving only the colour of the primary shafts and bill criteria on which to base an identification. Two of the remaining characters, the shape of the cross-section and the commissural line of the upper mandible (the cutting edge or maxillary tomium), are impossible to apply in the field; and, unfortunately, the most reliable character in breeding plumage, the colour of the bill, also undergoes a seasonal change in both species. In *adamsii* it darkens slightly at the base, though remaining basically 'white'. In *immer* the black bill of summer becomes much paler and can assume a superficially 'whitish' appearance. In juvenile to second-winter *immer* the bill is usually very pale (juveniles always so).

THE IDENTIFICATION PROBLEM

The problem of identification has centred around a reluctance to identify as *adamsii* any 'white-billed' diver not showing a bill with the ostensibly classic straight culmen, markedly angled gonys and large size. Not unnaturally, there has also been the reverse tendency to identify *immer* as *adamsii* mainly on the basis of the pale bill colour, but especially if this was associated with merely one (sometimes more) of the other bill characters which might have approached classic proportions. Both these approaches have led to erroneous pronouncements in the past and, to a lesser extent, the practice continues to this day.

Even in the year *adamsii* was described, the authorities of the time suggested that the tendency towards paleness of the bill in *immer* was an ageing phenomenon and that this character could not be used reliably to separate the two species (Sclater 1859). In

Norway, *adamsii* killed in the 1860's continued to be referred to the better-known *immer* 20 years after the former species was described (Bannerman 1959). In the British literature there are many well-documented examples of wrong identification, the initial pronouncements being made with such confidence as to give no hint that the species could present any difficulty at all. Thus Griffith (1896) wrote of the bird from Hickling Broad in 1872* as follows: 'the specimen has been carefully compared with others in the British Museum, and there is no doubt as to its identification'; it was this same bird that Witherby (1922) dismissed, almost with scorn, as 'an ordinary Great Northern Diver'. Although Ogilvie-Grant (1908) considered adults 'fairly easy to distinguish from [*G. immer*], even in winter-plumage', he made that statement in an article on a supposed adult *adamsii* shot at Holy Island in January 1879 and this too was subsequently and correctly rejected by Witherby (1922) as *immer*.

Much later, after the shape of the bill had been pronounced 'the safest character' (Bannerman 1959), we find an entry in the *Annual Report* of the Cornwall Bird-Watching and Preservation Society for 1965 (35: 70) quoting expert opinion as saying 'it is difficult, almost impossible to be certain of a White-billed Diver in the field. Even the shape and size of the bill and its colour are not considered decisive factors'. Some observers, however, had certainly considered shape to be absolutely diagnostic, even to the extent of overriding all other warning signs. An almost black-billed diver found dead at Chichester Harbour in the 1950's was declared *adamsii*, with support from the British Museum (Shackleton 1962 and see pages 292-293). That there remains an *immer/adamsii* problem is nowhere better illustrated than in the pages of one of our contemporary journals (Parrack 1972) where readers were invited to identify a very clear colour photograph of a large diver seen in the outer harbour at Torquay in 1970. In a subsequent issue the editors published the replies which, as well as hovering around *immer* or *adamsii*, naturally included the inevitable suggestion that it could have been a hybrid; the final editorial verdict was: 'Our own view is that it is a White-billed which should be submitted to the *British Birds Rarities Committee*' (see page 293).

Clearly, confusion has reigned around White-billed Divers, particularly birds in winter plumage, for over 100 years. It would seem that a vindication of the reputedly diagnostic characters depends on demonstrating (a) the invariability in *adamsii* of straightness of culmen and sharpness of gonys angle (which together are

*Details of all British records mentioned in the main text are given in the appendix (pages 283-296).

supposed to confer on the bill its much-quoted upturned or 'retroussé' appearance), (b) the converse in *immer*, and (c) the similarity in the winter bill colour of the two species. Our examination of many specimens of both species shows that none of these tenets can be regarded as wholly valid.

EXAMINATION OF PRESERVED SPECIMENS

Birds in breeding plumage

The examination of specimens of undoubted identity in breeding plumage (17 *immer* and eleven *adamsii*) has confirmed the overlap of bill-measurement parameters which has been cursorily recorded in the literature. This is shown in fig. 2a in which the length of the culmen is plotted against depth at gonys (as a means of representing the overall 'size') as a single point for each individual. On average, the bills of *immer* were indeed smaller than those of *adamsii*, but the overlap is such that separation on the grounds of size alone is clearly not possible except in the cases of the largest or smallest birds. A more complete presentation of the biometric data is given on pages 272-276.

The majority of the *adamsii* specimens had perfectly straight culmens except for a slight downward curvature beginning 5-15

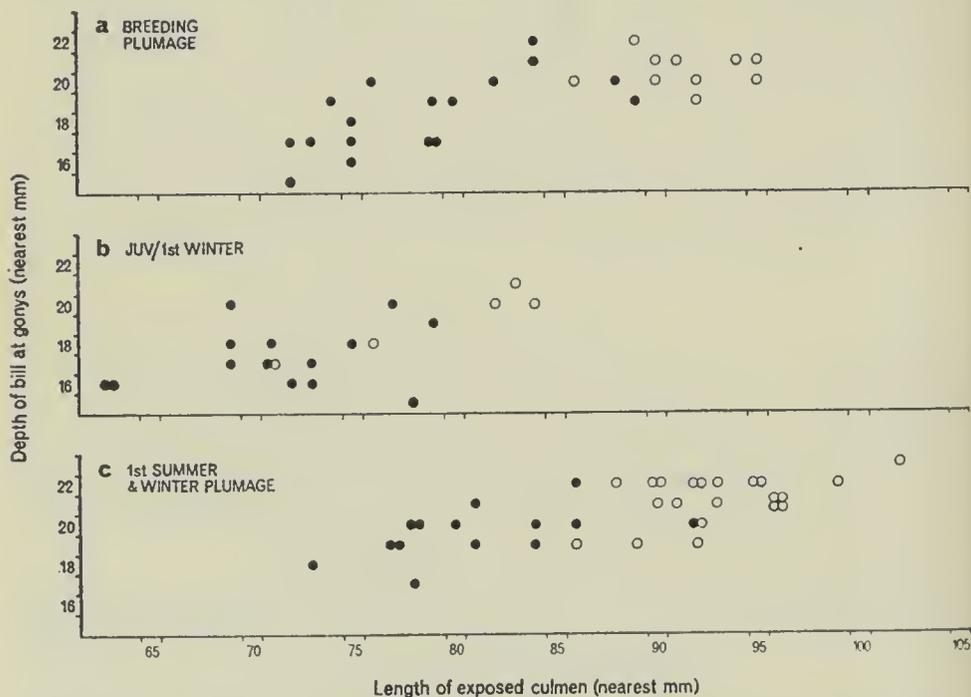


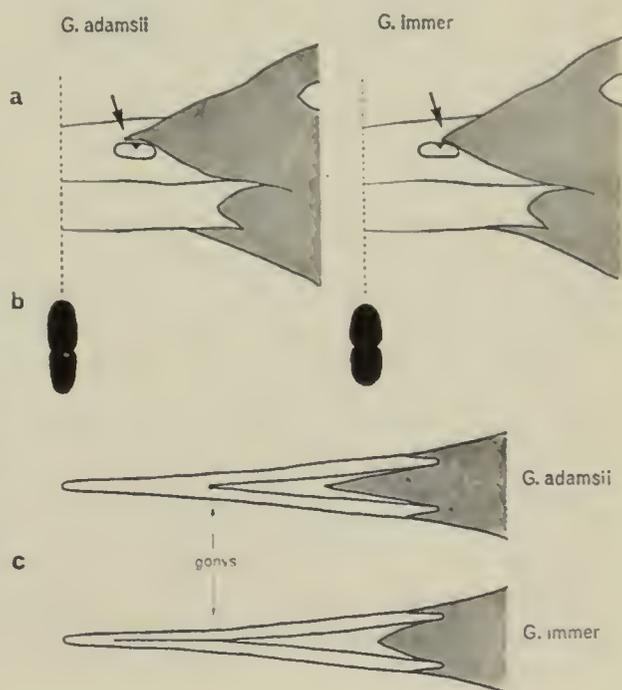
Fig. 2. Scatter diagram depicting overall bill size in the Great Northern Diver *Gavia immer* (solid circles) and the White-billed Diver *G. adamsii* (open circles): (a) birds in breeding plumage (27 measured); (b) juvenile and first-winter birds (19 measured); (c) first-summer birds and those in winter plumage, second winter or older (35 measured)

mm before the tip. Two specimens had slightly convex culmens but not so markedly convex as the majority of the *immer*, three of which, however, did exhibit culmens equally as straight as those of *adamsii*. Only five of the *adamsii* carried any data on sex: all were male except one and this was one of the two with a curved culmen, the other having been sexed as a male. Eight of the *immer* were unsexed, including two of the three with straight culmens, the third having been sexed as a male.

Only two *immer* showed a marked gonys angle (one of these also had a straight culmen), whereas the majority of *adamsii* had this feature more or less well developed. In two unsexed specimens, however, the angle was only just perceptible, and one bird (a male) exhibited a perfectly smooth curve from chin to tip, making it indistinguishable from the majority of *immer* in this respect. In only one case (unsexed) did the gonys angle approach the degree of sharpness that is usually depicted in drawn illustrations of *adamsii*.

The shape of the cross-section of the bill was essentially different in the two species. In *immer* the sides of both upper and lower mandibles were convex and the bill in section showed a more or less distinct figure-of-eight shape. In *adamsii* the bill was flattened laterally and in section was more the shape of a round-ended narrow rectangle, indented only slightly at the junction of the two mandibles (fig. 3b). This character was found to be somewhat variable, particularly in *immer*, some examples of which showed a tendency to flattening at the sides. While there was no mistaking the narrow flat bill of a

Fig. 3. Diagram of (a) maxillary feathering, (b) cross-section of bill, and (c) chin feathering and gonys fusion, characteristic of the White-billed Diver *Gavia adamsii* and the Great Northern Diver *G. immer*. Difference in maxillary feathering is diagnostic, but for value of cross-section, chin feathering and gonys fusion see discussion on pages 265-267



classic *adamsii*, it was difficult to distinguish between a slightly rounded one and a somewhat flattened *immer*.

As a separating character, therefore, bill size is sufficiently variable to cause problems; straightness of culmen, shape of cross-section, and gonys angle, though apparently less variable than size, nonetheless do show exceptions from the general rule which would make a firm identification in winter plumage difficult, especially if the various exceptions occurred in combination.

The paleness of the primary shafts of *adamsii* compared with the dark brown shafts of *immer* was found to be a consistent and invariable difference between the two species. The winter-plumage specimen of *adamsii* said to show brown primary shafts (Witherby 1922) is discussed on page 267. Primary-shaft colour, though common to both winter and breeding plumages, is of little value in the field unless seen while the bird is stretching on the sea (rather than flying) at very close range (plate 41).

The material was therefore examined for further consistently different characters common to both plumages which could be applied, along with primary-shaft colour, to specimens in non-breeding plumage. Only if such characters existed did we think that it would be possible to effect a separation which would not rely on the variable bill criteria, nor on subjective impressions.

The extent of the feathering on the maxilla (upper mandible) over the nostril was found to be one such character. In the *adamsii* it always extended well beyond the nasal tubercle, a small projection positioned mid-way along the dorsal periphery of the nostril. In an extreme case, this feathering almost reached the anterior margin of the nasal aperture. In the *immer* specimens the maxillary feathering *never* extended beyond the tubercle; it sometimes reached the forward edge but more frequently stopped level with the centre (fig. 3a and plate 43).

Further examination of the bills of the two species revealed two other structural differences: the chin feathering between the two halves of the lower mandible in *adamsii* almost invariably extended further and more acutely towards the gonys than in *immer*; and the fusion of the two rami of the lower mandible at the gonys was always complete in *adamsii*. This fusion was accentuated by the greater or lesser development of a bulge at this point, anterior to which the sheath of the lower mandible (gnathotheca) was fused and continued smoothly to the tip. In *immer* there was no developed bulge and, though fused, the separate origins of the two rami of the gnathotheca could be seen continuing towards the tip, a more or less developed groove separating them. In very few specimens was this groove too indistinct to be recognised in the absence of comparative material (fig. 3c).

These last two characters were not considered diagnostic in so far as, like the bill shape and size characters discussed earlier, they slightly overlapped. Nonetheless it was felt that they may be useful, the mandibular fusion in particular, in corroborating the identity of a specimen.

Birds in non-breeding plumage

Applying the apparently diagnostic characters of primary-shaft colour and extent of maxillary feathering to juvenile and winter-plumage specimens of *immer/adamsii* (53 individuals examined) divided the series into two groups, between which a further consistent difference could be seen. The group conforming with *immer* (28 specimens) without exception showed a brown to dark brown coloration along the culmen ridge, regardless of the overall paleness of the bill. Even in juvenile birds, which had the palest bills, this dark culmen ridge was always present and clearly delineated from the rest of the bill. No bird from the group conforming with *adamsii* (25 specimens) showed any trace of this feature. Less clear cut but nonetheless apparent were the paler sides to the head in the *adamsii*. This feature had been described before (Palmer 1962), but the degree of difference was insufficiently explained to be able to apply it readily as a field character.

With one exception, all the birds identified in this way as *adamsii* had been originally identified as such. The exception was a British specimen from Tunstall in Yorkshire which had been submitted for consideration by the Rarities Committee but was withdrawn by the observer before a decision had been given because independent assessment had pronounced the bird *immer* (Pashby 1963). This specimen has now been resubmitted and, in the light of the new evidence, has been accepted by the Rarities Committee as *adamsii*.

One bird in the *immer* group had been labelled *adamsii*. This was an adult specimen in the British Museum and is the bird credited with having brown primary shafts by Witherby (1922). It is not a typical *adamsii* aberrant only in having dark primary shafts, however; in addition, it has short maxillary feathering, a culmen length of 84 mm (which fails to reach the bottom end of the adult *adamsii* range), a groove extending some way beyond the fusion at the gonys, and a darkening of the otherwise pale bill along the culmen. The origin of the specimen is also suspect, as it bears two labels, one giving the locality as Japan and the other as North America! It is therefore not even possible to consider the bird meaningfully as a possible hybrid. While not a classic example of *immer*, it does show more affinity with that species than with *adamsii*, and most certainly its existence cannot be used to cast doubt on the validity of primary shaft colour as a diagnostic character.

The addition of these non-breeding plumage specimens to the total sample examined (36 *adamsii* and 45 *immer*) shows the characters of bill size, straightness of culmen, angle of gonys and shape of cross-section to be even more variable than was suggested by the breeding-plumage specimens alone. This may possibly be a result of the greater proportion of known females and certainly of younger birds in the non-breeding sample. The range of overlap of bill length between the two species was extended by several millimetres in both directions (see figs. 2b and 2c). As well as further examples of *immer* with quite straight culmens, there were a number of juvenile and adult winter *adamsii* with curved culmens, some markedly so, the curvature being not merely restricted to the distal region of the bill but extending over the entire length (see plates 42 and 44). Several more specimens of *adamsii* showed that the attenuation of the lower mandible to form a point with the upper at the tip can begin at the base of the rami and is by no means restricted to originating at the gonys. On the other hand, some specimens of *immer* exhibited a well-pronounced angle at the gonys, often in combination with a more or less straight culmen. This forcibly demonstrated the danger of reliance on shape which is so much stressed in the literature.

The immature and winter-plumage birds also showed greater variability than those in breeding plumage with regard to the mandibular fusion at the gonys and the length of the chin feathering. Juvenile and first-winter *immer*, in particular, appeared to show a greater tendency towards complete fusion of the gnathothecal rami at the gonys than did breeding-plumage birds (see page 266). Complete fusion in *adamsii*, however, was invariable, regardless of age.

The apparent length of the chin feathering was seen to depend on the angle at which the rami of the lower mandible attenuated towards each other. In some specimens of *immer* this occurred sharply, some distance posterior to the gonys, thus bringing the rami close together to run parallel for a variable length before fusing. In such specimens the chin feathering, though still relatively short, appeared to be 'long' and more or less filled the area between the rami in a manner more characteristic of *adamsii*. Only in specimens of *immer* whose mandibular rami became confluent gradually and evenly from the base to the gonys was the chin feathering recognisably short.

With so many alternative characters to consider, we eventually concluded that the shape of the cutting edge of the upper mandible was unnecessarily esoteric. There were differences between the two species in this respect, but in some cases the distinction was either extremely fine or absent and, in any event, it was difficult to assess.

We have deliberately excluded this character in the following discussion.

SUMMARY OF IDENTIFICATION CHARACTERS

Relating the evidence discussed above to published field descriptions, which have the advantage of including behavioural characteristics, it is possible now to assert with some confidence that the separation of *adamsii* from *immer* in winter plumage is not so difficult as was previously supposed.

In *immer*, regardless of whether the culmen is straight or the gonys angled, the bill is normally held horizontally and, although in some adults and in all juveniles it is very pale and can look quite white in good light, the culmen ridge is always dark (plate 41). In precise terms, the whiteness can be described as a very pale cream invested with an overall cast of bluish-grey. The minimum development of the dark brown culmen ridge runs from the base to the tip and extends laterally down the sides of the upper mandible, often reaching the dorsal margin of the nostril; elsewhere, the bill of the juvenile, including the entire exposed lower mandible, is the bluish-cream colour described above. In older birds, the development of the winter bill can lead to a patchy distribution of the dark and pale areas and in most cases never reaches the extensively pale condition of the juvenile.

In *adamsii* the generally larger white bill *never* has a dark culmen ridge and is habitually held pointing upwards at an angle of about 20 degrees from the horizontal, as in the Red-throated Diver *G. stellata* (see plates in Sage 1971). The angle of the gonys and the straightness of the culmen, the importance of which has tended to be exaggerated by several authors, are not always pronounced, even in post-juvenile birds (plate 44), and it is not so much these as the upward carriage of the head that gives the bill its characteristically upturned or 'retroussé' appearance. The bill colour of *adamsii* has been variously described as 'pale horn', 'sun-bleached bone' and 'ivory white'. We would prefer to describe it simply as pale yellowish-cream which in bright sunlight can appear strikingly white. The base of the upper mandible, both dorsally and laterally down to the nostril, and sometimes the extreme base of the lower mandible shade to a dark horn colour. On the upper mandible this darkening extends only as far as the region around the anterior margin of the nostril and never along the length of the ridge as it does in *immer*. The obviousness of the distinction between the yellowish cast in *adamsii* and the bluish cast in *immer* depends on the lighting conditions but, in any event, this character is not as important as the colouring of the culmen in distinguishing the two species.

Adults of both species in winter plumage also show a difference

in the scapular pattern which can be seen at reasonable range in the field. This blocking effect is a counterpart of the breeding plumage white spotting and it shows on each scapular feather as two pale areas, one on each side of the shaft, towards the tip. In *adamsii* these are large and prominent but in *immer* they are much less so, soon becoming obscure by fading and wear and conferring on the back a much more uniform appearance (plates 41 and 42). In evaluating birds in the field, care should be taken to discriminate between this winter scapular *blocking* and any summer scapular *spotting*, as many birds, even in the early months of the year, are in active moult to breeding plumage (plates 41 and 43).

Compared with the majority of *immer*, the sides of the face and upper neck in *adamsii* are much paler and in good light can look very white. Characteristically, though not invariably, the pale sides of the face extend on to the lower lores (but not as extensively as in the Red-throated Diver), over the eye and on to the ear-coverts. The line of demarcation between the dark upperparts and the pale underparts on the head and neck seems to be much more clearly defined in *immer* (see plates 41 and 42 for extremes of these features). At the base of the neck in adult *adamsii*, the brown of the upperparts can extend forwards on the tips of the lower neck feathers to form a more or less distinct collar (a counterpart of the lower edge of the breeding-plumage black neck). This seems not to be developed to the same degree in *immer* and rarely forms a complete collar, though some extension round the sides is evident.

Only two specimens of juvenile/first-winter *adamsii* have so far been recorded unequivocally in British waters. From the examination of these and from non-British specimens, it is clear that the size and shape of the bill fall far short of classic proportions (plates 42 and 43) and it is very probable that past examples have been assigned to *immer*. It seems likely that the classic shape of the bill is not fully developed until after the first spring moult has taken place (when the birds are about eight months old) and it may also be that its maximum development is characteristic only of adult males. Certainly until the first summer, and perhaps even beyond it, there can be some variation in bill size, straightness of culmen and angle of gonys, but *never* in the colour or general upward carriage, both of which should be adequate to separate juveniles in the field. Although the back patterning of juvenile *adamsii* and *immer* is similar, the pale edges to the rounded feathers, which give the back its characteristically scalloped appearance (plates 41 and 42), are much paler and broader in *adamsii*. This character, however, would be of doubtful value in the field unless the two species were together for direct comparison.

White-billed Divers are sometimes recorded as a result of being

found dead or dying, mainly from oiling, on beaches. The identification of such specimens is relatively easy using the field characters detailed above and can be further confirmed by examination of the maxillary feathering above the nostril. This character (described in detail on page 266) appears to be quite diagnostic and is not so cryptic as it may seem, the differences being at once recognisable (plate 43). The colour of the primary shafts is another important and diagnostic character (plate 43). In *adamsii* these are white or very pale yellowish-brown, the tip darkening distally for the last

Table 2. The separating characters of the Great Northern Diver *Gavia immer* and the White-billed Diver *G. adamsii* in non-breeding plumages

Character	<i>G. immer</i>	<i>G. adamsii</i>
ALL AGES		
culmen colour	brown to dark brown ridge, regardless of paleness (variable) of rest of bill	not differentiated from rest of bill colour (uniformly pale)
head carriage	horizontal, never tilted upwards	habitually held upwards
visible primary shaft colour	dark brown	white to cream or yellow-brown (except tip)
colour of cheek feathers	darker	paler, extending further up to and around eye
maxilla feathering	never extends beyond nasal tubercle	always extends beyond nasal tubercle
cross-section of bill	usually convex-sided	usually flat-sided
JUVENILES		
overall colour of upperparts	darker brown	paler greyish-brown
pale tips to upperpart feathers	narrower and darker	wider and paler
culmen length	61-82 mm	71-84 mm
FIRST—SUMMER AND OLDER		
culmen shape	not invariably convex	not invariably straight
shape at gonyes	not invariably smoothly convex	not invariably angled
gonyes fusion	not invariably incomplete	invariably complete
chin feathering	not invariably short	invariably long
general body size	usually smaller	usually larger
exposed culmen length	69-90 mm	85-100 mm
SECOND—WINTER AND OLDER		
scapular blocking	smaller and less distinct	larger and more distinct

10-75 mm, depending on the age of the individual; the extreme lateral margins of the shaft may be brown for a greater distance than this. In *immer* the shaft is mid- to dark brown, paling to creamy-white only on the calamus (not visible in the open wing). As specimens may be flightless due to the simultaneous loss of the remiges (plate 43), it is not always possible to apply this examination. Almost invariably, the flat-sided bill, complete gonys fusion and usually long and acutely pointed chin feathering will serve as confirmatory characters for *adamsii*. All the separating characters are summarised in table 2.

It is important when examining dead specimens, whether cabinet skins or corpses, to consider the effects of drying after skinning and/or exposure between death and collection on the bill-colour criteria discussed above. The bases of both upper and lower mandibles in cabinet skins start to darken almost immediately after preparation; this process is substantially complete after two to three weeks. In *adamsii* the lower mandible darkens to brown or even black ventral to a line drawn between the gape and the gonys in the region where the sub-theal tissue overlying the bone is at its thickest. This darkening also occurs immediately above and below the nasal aperture, but not along the commissure and only slightly along the culmen ridge, extending 5-25 mm from the feathers. Just as drying does not obscure the diagnostically pale culmen of *adamsii*, neither does exposure bleach out the dark culmen ridge of *immer*. Several long-dead specimens taken from exposed beach situations still showed the dark ridge, despite the apparent scaling off of the outer layer of the sheath; in cross-section, the pigment was seen to extend throughout the entire thickness of the rhinotheca (sheath of the upper mandible). Very old museum specimens which have been subjected to prolonged exposure to direct sunlight can, however, show signs of fading, and in extreme cases the culmen ridge may be barely perceptible.

MEASUREMENTS

It is possible to take a large number of measurements from any one specimen. Body weight, wing span, lengths of tail, tarsus and wing, as well as various parameters of the bill, have all appeared in the literature. The measurements discussed here are all confined to the bill, as these are of more value than the others for identification purposes and can more readily be taken from long-preserved material.

R. Wagstaffe (*Brit. Birds*, 45: 424) listed no fewer than twelve different measurements of the bill taken between a multiplicity of more or less identifiable points. *The Handbook* confined itself to giving one, the distance between the tip of the upper mandible and

the nostril, though in practice this is a relatively inaccurate measurement as the anterior margin of the nostril is difficult to define, especially in dried material. For the purposes of comparison with the ranges given in that work, however, the tip-to-nostril measurement is included here.

The object of the measurements analysis was to try to detect specific differences of bill size between *immer* and *adamsii*. It was found that to achieve this it was necessary to evaluate only two measurements—the length of the culmen and the depth of the bill at the gonys. Together, these two parameters serve to give an overall expression of size. The length of exposed culmen was taken with dividers from the tip of the upper mandible to the junction of the bill with the forehead feathering, measured to the nearest whole millimetre. The depth of the bill at the gonys was taken with sliding or bow calipers and measured to the nearest 0.5 mm. Although the tip of the upper mandible was broken in a few specimens (seven of the 82 measured), such individuals were not discarded from the analysis. The average overlap of upper and lower mandibles, calculated from measurements of intact individuals of the appropriate age group, was added to the observed length taken to a point level with the tip of the lower mandible. These corrections were:

<i>G. immer</i>	juvenile/first-winter	3 mm (mean 2.9, 9 measured)
	first-summer and older	4 mm (mean 3.6, 22 measured)
<i>G. adamsii</i>	juvenile/first-winter	4 mm (mean 3.9, 5 measured)
	first-summer and older	6 mm (mean 5.7, 23 measured)

In a further three cases, the break was obviously so close to the original tip that it was apparent that only about 2 mm had been lost and this amount was simply added to the observed measurement.

Table 3. Observed ranges of culmen length, and of bill tip to nostril length, in post-juvenile male and female Great Northern Divers *Gavia immer* and White-billed Divers *G. adamsii*

The numbers in brackets after each range show the mean value and number of individuals measured

	<i>G. immer</i>	<i>G. adamsii</i>
Culmen length		
Males	72-92 mm (81.3; 10)	90-95 mm (92.0; 4)
Females	73-80 mm (76.4; 7)	86-95 mm (92.2; 9)
Tip to nostril		
Males	54-68 mm (61.0; 7)	71-76 mm (73.7; 3)
Females	55-60 mm (58.6; 5)	71-78 mm (74.4; 8)

As might be expected from the larger sample size, our observed ranges of tip-to-nostril measurements extended those given in *The Handbook* as follows:

	<i>G. immer</i>	<i>G. adamsii</i>
Present study	47-69 mm	51-81 mm
<i>The Handbook</i>	53-70 mm	60-80 mm

The Handbook divided its ranges into male and female components and implied that females are slightly smaller than males. It did not, however, take age into consideration. The analysis of our measurements showed that there was no significant difference in bill length between males and females in any one age category (table 3), though in *immer* the means for females were slightly less than those for males. Differences between age groups were, however,

Table 4. Bill measurements of the Great Northern Diver *Gavia immer* (millimetres)

The calculated ranges are statistically representative of 95% of the total population.
*But for the one bird measuring 92 mm, the range here would extend only to 89 mm

	Mean and standard error	Calculated range ($P = 0.05$)	Observed range	Number measured
Juvenile/1st winter				
Culmen length	71.57 \pm 1.30	61-82	63-79	14
Tip to nostril	54.30 \pm 1.49	44-65	47-61	10
Depth at gonys	17.36 \pm 0.42	13.5-21.5	15-20	14
1st summer and older				
Culmen length	79.71 \pm 0.94	69-90	72-92*	31
Tip to nostril	60.65 \pm 0.97	51-70	52-69	23
Depth at gonys	18.89 \pm 0.30	15.5-22.5	15-22	31

Table 5. Bill measurements of the White-billed Diver *Gavia adamsii* (millimetres)

The calculated ranges are statistically representative of 95% of the total population.
*Sample size too small and variance too great for calculated range to have any value here

	Mean and standard error	Calculated range ($P = 0.05$)	Observed range	Number measured
Juvenile/1st winter				
Culmen length	79.20 \pm 2.35	*	71-84	5
Tip to nostril	60.20 \pm 2.66	*	51-66	5
Depth at gonys	19.20 \pm 0.74	*	17-21	5
1st summer and older				
Culmen length	92.45 \pm 0.65	85-100	85-102	31
Tip to nostril	74.07 \pm 0.66	67-81	70-81	27
Depth at gonys	20.91 \pm 0.19	18.5-23	19-23	32

significant and indicated that it is apparently during the first spring moult that the bill increases in size to reach adult proportions. For this reason, the results are grouped into two age categories—juvenile/first-winter, and first-summer and older. No significant difference in bill size was found between winter-plumage and breeding-plumage birds in the latter category.

The results are shown graphically in fig. 2 and given in statistical form in tables 4 and 5. Our extension of the range beyond that given in *The Handbook* well illustrates the limitations of sample size on the presentation of biometric data merely in terms of observed values. The tables, therefore, contain a theoretically derived range. This is calculated by applying the *t* statistic and standard deviation to the observed mean at a probability level of $P = 0.05$ in order to show the range within which 95% of the total population may be expected to fall. This holds good even though the actual number of specimens examined forms a very much smaller percentage of the population. We feel that it is more useful to give a range of measurements which may be transgressed by only one out of every 20 birds than merely to give the values for a small sample whose limits do not necessarily relate in any wider context.

The results confirm that, on average, *immer* has a shorter and shallower bill than *adamsii* (table 6). This is most pronounced in the bill length of those birds that have passed through their first spring moult. The difference between juvenile and first-winter birds of the two species is not so marked. All bill-measurement parameters between the two species show a degree of overlap, particularly in

Table 6. Comparative summary of bill measurements of the Great Northern Diver *Gavia immer* and the White-billed Diver *G. adamsii* (millimetres)

The ranges are statistically calculated to be representative of 95% of the total population; the figure in brackets after each range is the mean of the sample measured, to the nearest 0.5 mm (the figures marked with an asterisk are the observed and not the calculated ranges, since the sample sizes here were too small for meaningful statistical manipulation). The sample sizes are given in tables 4 and 5

	<i>G. immer</i>	<i>G. adamsii</i>
Culmen length		
Juvenile/1st winter	61-82 (71.5)	*71-84 (79)
1st summer and older	69-90 (79.5)	85-100 (92.5)
Tip to nostril length		
Juvenile/1st winter	44-65 (54.5)	*51-66 (60)
1st summer and older	51-70 (60.5)	67-81 (74)
Depth at gonys		
Juvenile/1st winter	13.5-21.5 (17.5)	*17-21 (19)
1st summer and older	15.5-22.5 (19)	18.5-23 (21)

juveniles, and therefore specific identification on the grounds of bill measurements alone is clearly not possible. However, the ranges of the culmen lengths of post-juvenile birds overlap by merely 5 mm (7 mm observed), and only about one in five falls within this overlap range. In the majority of cases, therefore, bill measurements will be of value in confirming the identity of a specimen, provided that it conforms in the qualitative respects discussed earlier.

SUMMARY OF BRITISH OCCURRENCES

Numbers, distribution and status

From the first record, identified retrospectively, in 1829, we find that there have been 39 acceptable records of individual White-billed Divers up to and including that in December 1973. Sixteen of these were sight records (not subsequently recorded dead), three were shot by 19th-century collectors, 16 were found dead and four found dying. We have been able to trace the present location of 20 out of the 23 birds shot, found dead or dying. The other three (Holy Island, between 1830 and 1832; Whiteness Voe, Shetland, 1946; and Sandsend, Yorkshire, 1952) were preserved but the specimens are now lost, though fortunately the 1946 and 1952 birds were adequately documented. Only eight of the 23 specimens were sexed and all were female.

Fig. 4 shows the distribution of the records around the British coasts. There are no records for Ireland. With three notable exceptions, the distribution is restricted to the east coast and Shetland and, except for one record over a century ago, these are all north of the Humber. This distribution is wholly in accord with the theory that all the British birds are drawn from the population wintering off the Norwegian coast.

Fig. 5 depicts the temporal distribution of the 37 records for which the month of first sighting is known. It is clear that the peak periods for the mainland coast are the months of January and February. Although there is no significant difference in this respect between the different regions along this stretch, there have been fewer birds recorded north of the Firth of Forth, but this may simply be a reflection of observer activity. The records from north of the Moray Firth show a striking difference in distribution, the peak period being much later in May and June. Only one isolated record from this region, of a bird found at Whiteness Voe in Shetland, occurred outside this period. The overall picture strongly suggests that, for whatever reason and by whatever route, birds reach this country normally between December and February over a range which does not include the Northern Isles and which stretches only as far south as the Humber. Shetland seems to get its records by virtue of being the last landfall for birds moving northwards, making their way

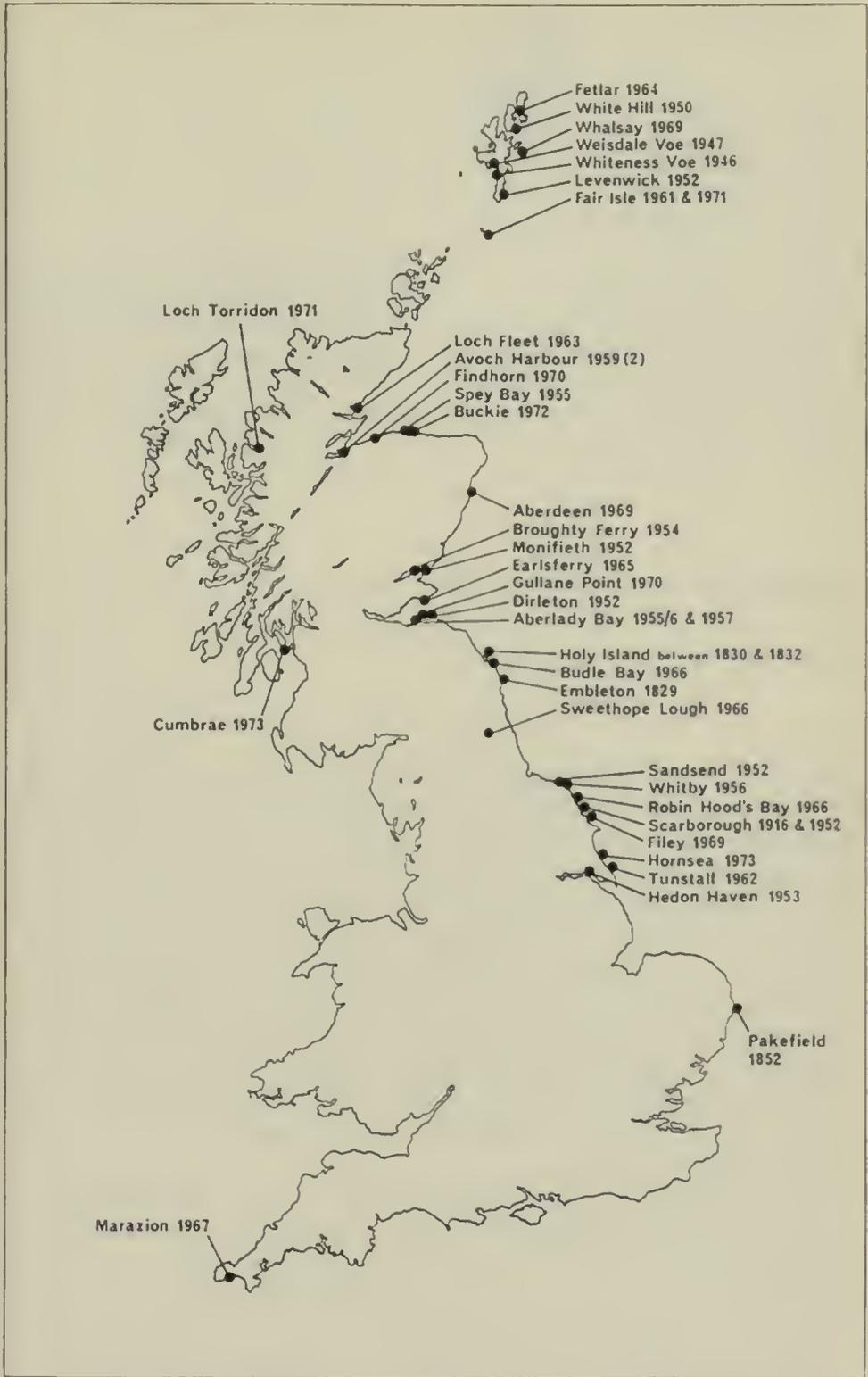


Fig. 4. Geographical distribution of British records of the White-billed Diver *Gavia adamsii* (1829 to 1973)

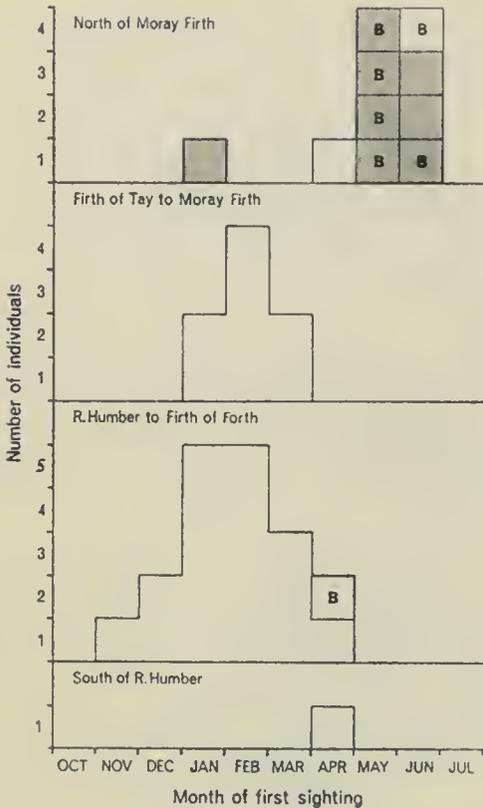


Fig. 5. Distribution of British records of the White-billed Diver *Gavia adamsii* (1829 to 1973) with respect to month of first sighting (unknown for two of the 39 records). Shaded bars denote Shetland records; B indicates breeding plumage

back to the breeding grounds (or summering areas, in the case of non-breeders), having completed their moult further south. Given this explanation, it is not surprising, as Bannerman (1959) suggested it was, that there are no records from the Faeroes. Although the lack of winter records in Shetland could be attributed to reduced observer activity in those months, it is significant that intense watching on the east coasts of mainland Scotland and northern England during April, May and June has yet to produce a record of *adamsii* in May or June and has turned up only one breeding-plumage bird in April (Sweethope Lough, Northumberland, 1966). In these same areas, less intense watching in the earlier months (December to March) has accounted for 50% of the British records, and so the absence in spring seems to be real.

Because all but six of the records have occurred within the last 25 years, the status of *adamsii* in Britain may now be more accurately described as that of a rare winter visitor and not a vagrant, as it has been labelled in the past. The pattern of the records now suggests that there is a regular movement across the North Sea, but apparently not involving large numbers of birds. As divers are not oceanic but generally winter within, say, 10 km of the coast, and as there are no significant currents across the North Sea which would drift birds in the direction of Britain, this crossing seems to be an

active passage. We know that there is a small regular passage round south-west Norway into the Skagerrak (Swales 1954), and it could be that a small proportion of the birds migrating in this area continue in a south-westerly direction. Reputedly, the females in some species are the stronger migrants (Dorst 1962), and it is a surprising fact that all the British records to have been sexed were females. That this could be coincidence is statistically highly improbable ($P < 0.01$), assuming that no abortive attempt was made to sex any of the other specimens. It is interesting to speculate that this may help to explain the seemingly unnecessary North Sea crossing. According to Dementiev (1951), White-billed Divers form a permanent pair bond; but this is not necessarily maintained during the winter (Sage 1971) and it may be that the different sexes have more or less separate wintering areas, the females probably travelling further south than the males.

Spring moult in Britain

1. Sequence. From the examination of specimens and detailed field notes covering several months from November to April, it is possible to describe the sequence of the spring moult into breeding plumage as follows.

Moult begins with the lesser and greater wing-coverts (starting with the former), and birds can be seen in complete winter plumage apart from heavy spotting in these regions only. After the onset of this covert moult, traces of breeding plumage also appear, especially on the rump but also on the mid- and upper back, beginning always on the sides near the shoulders. Progress of the moult in these latter areas is slow until the covert moult is almost complete. By that time the main region of the scapulars may have started (plate 43). In one specimen (Cumbrae, 1973) the two central tail-feathers were being renewed at this stage, but no other tail-moult information is available. Although there is no change in appearance, the feathers in the breast and belly regions begin to be replaced some time after the onset of the covert moult but before its completion (evident from the state of the skin seen while skinning several specimens).

Before the birds lose their predominantly winter appearance, the primaries, together with their coverts, and the secondaries are shed more or less simultaneously over a period of perhaps only a few days (plate 43), apparently starting from the outside of the wing (Scarborough, 1952—10th and 9th primaries missing in each wing; Hedon Haven, 1953—10th to 7th missing in each wing). Then begins a period of flightlessness during which the moult of the contour feathers begins to accelerate. Moulting on the head and neck begins at this time, but unfortunately the sequence represented by the British specimens (at least those which seem to be moulting

normally) is broken here and the next examples are of birds in complete, or almost complete, breeding plumage. Only one bird (Whalsay, 1969) is described as being in full breeding dress except for the neck which remained white below. It therefore seems that the development of the neck collar and bands is the last phase of the moult though, exceptionally, a specimen found at Aberlady Bay in 1957 was showing fairly heavy lower neck moult while still carrying a complete set of old primaries.

In the bird found at Cumbrae in January 1973, the wing-covert moult was in a fairly advanced stage, but mixed with the remaining winter-plumage greater coverts were a few abraded summer-plumage feathers from the previous year, a feature also observed in one of the *immer* we examined (Islay, February 1964). Some breeding-plumage feathers may therefore be retained after the autumn moult, and birds sighted early in the year which show signs of white spotting should not be assumed to be embarking on their spring moult. These retained feathers, however, are very much abraded, especially the white spots which appear as though they have been eaten away, leaving holes in the ends of the feathers. The description of the sighting at Aberlady Bay in November 1955 (Hamilton and Hogarth 1956) records a bird which was, in all probability, in this condition. Incidentally, the moult stage of a sighting later in the season at the same locality (Hamilton and Hogarth 1957) gives no cause to doubt that it was the same bird.

2. Duration and timing. The timing of the moult is variable between individuals. Apparently normal birds can be found in early stages of wing-covert moult from mid-December to late February. Birds which are losing, lacking or starting to renew their remiges have been recorded from the end of January to the end of March. The acquisition of new remiges, at least in normal individuals, seems to be complete by early April. Birds in full breeding plumage have been recorded from late April, and no 'normal' bird after the middle of May has shown any signs of winter plumage.

It is pertinent to point out here that from March onwards post-juvenile birds showing no signs of breeding plumage will, in all probability, be in their first summer, and it is to this group only that the term 'immature' should be applied. There are several instances in the literature and in unpublished field notes where indiscriminate use of the term has made the assessment of the record extremely difficult. While it is probable that second-summer birds, though in breeding plumage, do not breed, we feel that for the purpose of field observation the age definitions should be: (a) *juvenile* (showing 'scalloped' backs) up to the spring in the year following hatching; (b) *immature* from spring to late summer in the

year following hatching; and (c) *adult* from the second winter onwards.

Because the moult seems not to be synchronised throughout the population, combining the individual records does not enable the duration of any of the stages to be assessed. Some moulting individuals have been observed over long periods, but in nearly all cases the observers considered that the birds were behaving in a way which suggested that they were sick (in most cases probably from oiling). This would almost certainly have affected the normal progress of the moult. Such a bird seen at Buckie in 1972 was watched for over two months and, although the primaries were said to have started regrowing at the onset of this period (mid-March), they were still not fully grown at the end (plate 41).

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SUMMARY

The problems of separating both live and dead examples of the Great Northern Diver *Gavia immer* and the White-billed Diver *G. adamsii*, and the difficulties attributed to such separation in the past, are discussed and identification criteria listed. Present knowledge of the breeding distribution and range is summarised and the post-breeding dispersal of *adamsii* postulated. Spring moult is discussed in some detail and the winter plumages described. *G. adamsii* undergoes a post-breeding moult which is complete before any individual reaches British waters, usually in December. The characters of bill shape and size, the most favoured criteria for identification purposes up to the present time, are shown to be much less useful than was supposed, and several new and more reliable characters are given.

Over 80 examples of the two species were examined firstly to establish valid structural differences in summer-plumage birds which could then be related to the

winter-plumage and sub-adult specimens. The main part of the paper deals with these characters and their relative importance, both in the field and in the hand. Measurements are given for both species and these confirm that *adamsii* has the larger bill, but there is a measure of overlap.

The occurrence of *adamsii* in British waters is discussed in detail. The evidence indicates that winter records are most likely to occur in north-east England and south-east Scotland by virtue of the continuation of a south-westerly migration along the Norwegian coast, thence across the North Sea to Yorkshire northwards. Records in northern Scotland and Shetland occur chiefly in May and June when the return to the summer quarters is under way. The present status of 'vagrant' seems now to be invalid and it is suggested that 'rare winter visitor' is more correct.

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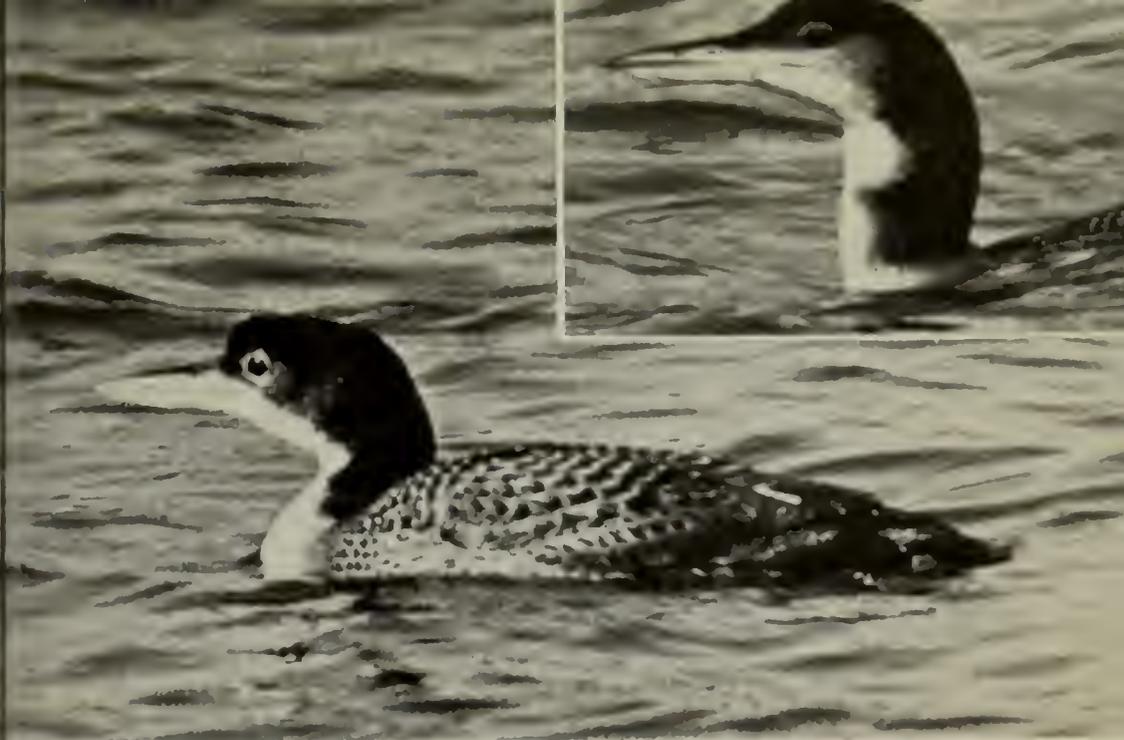


PLATE 41. Above, juvenile first-winter Great Northern Divers *Gavia immer*: the dark culmen ridge on the otherwise pale bill shows up clearly on both; note the sharp demarcation between the dark upperparts and pale underparts on the head and neck; the scalloped appearance of the back and wing-coverts shows clearly but is not so pronounced as in White-billed Divers *G. adamsii* of the same age (*J. B. and S. Bottomley*; inset: *G. V. Adkin*). Below, White-billed Diver, Buckie, Banffshire, 14th March to 20th May 1972 (photographed about 25th April: note the absence of a dark culmen, the pale sides to the head, and the white primary shafts; the winter-plumage blocking on the scapulars shows particularly well; the spring moult is almost complete on the wing-coverts and the new primaries are growing, otherwise the bird is in winter plumage (*D. B. McGinn*) (pages 257-296)



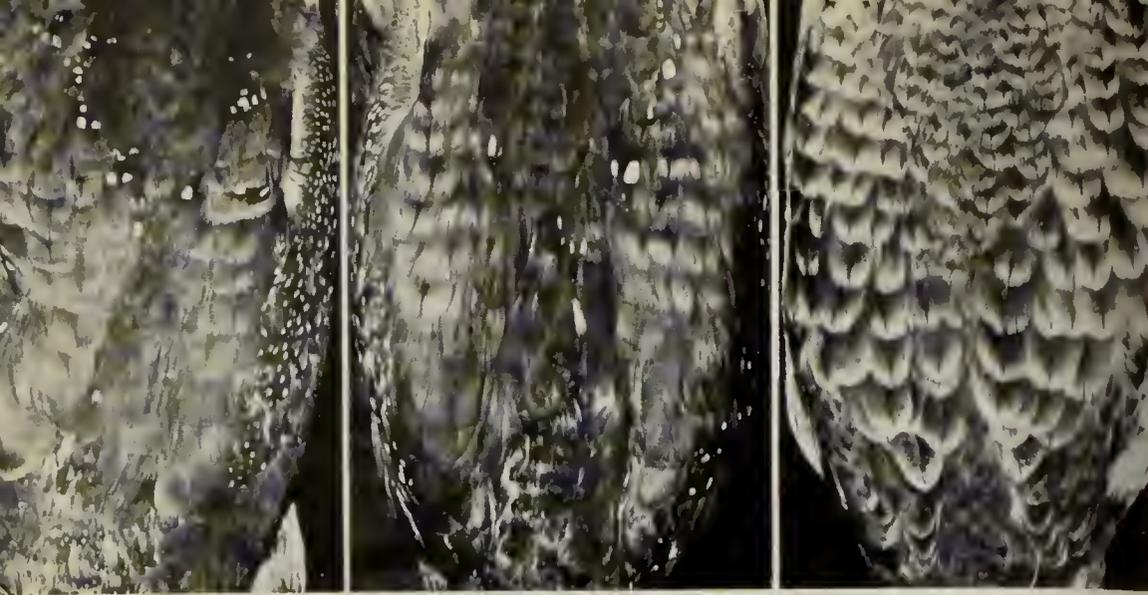


PLATE 42. Above, back feathering of adult Great Northern Diver *Gavia immer*, Islay, Argyll, 13th February 1964 (left), of adult White-billed Diver *G. adamsii*, Hedon Haven, Yorkshire, 18th February 1953 (centre), and of juvenile/first-winter White-billed Diver, Hornsea, Yorkshire, 8th December 1973 (right): the moult to breeding plumage in the two adult birds is almost complete on the wing-coverts, and new feathers are appearing on the mantle and upper scapulars. Note the relative prominence of the winter-plumage scapular blocking in the centre photograph; the scalloped juvenile plumage of *adamsii* is seen to be more pronounced than in *immer* (*G. V. Adkin*). Below, juvenile/first-winter White-billed, St Paul Island, Alaska, 17th December 1960: the length (76 mm) and marked curvature of the culmen and the absence of gonys angle are all typical of *immer*, but the lack of a dark culmen ridge and the extensively pale cheeks (at the extreme of development here) are diagnostic of *adamsii* (*City of Liverpool Museums*)

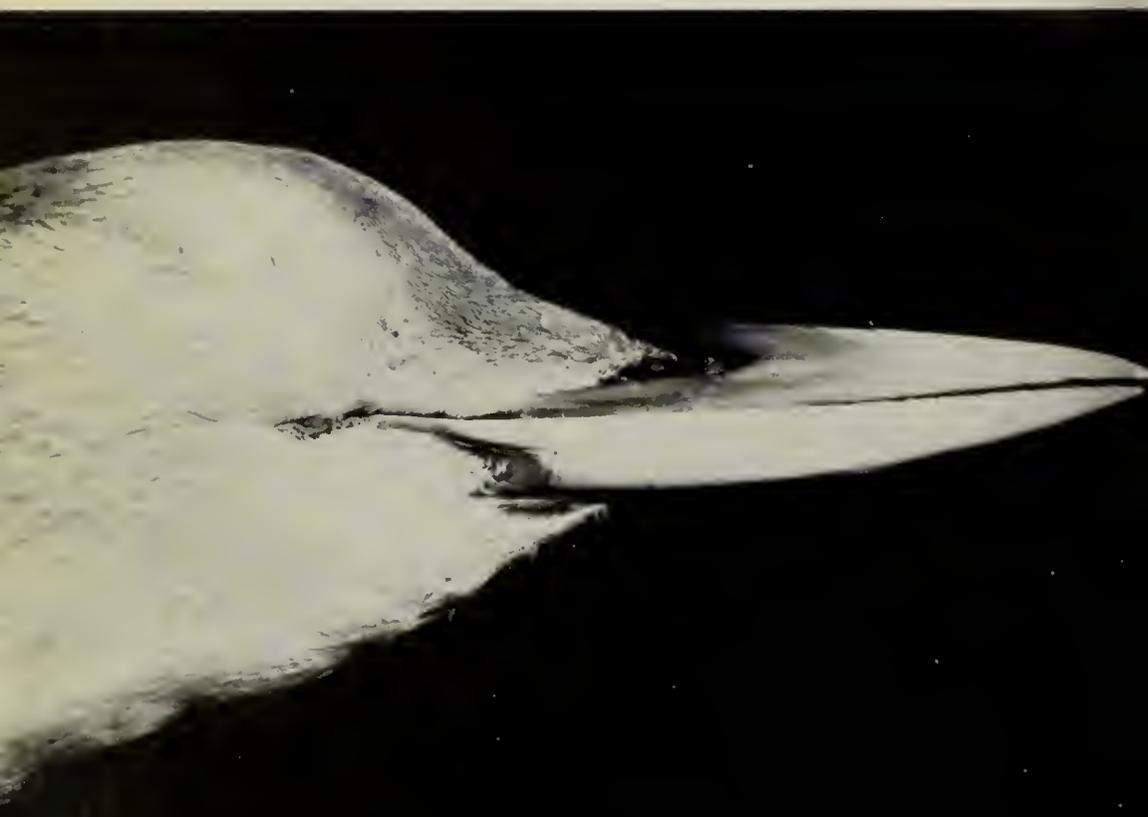




PLATE 43. Above left, 7th primary from an adult White-billed Diver *Gavia adansii* (left), showing the white shaft, compared with a dark-shafted primary from an adult Great Northern *G. immer*. Above right, *immer* maxillary feathering (above) extending only as far as the front edge of the nasal tubercle, compared with the much longer maxillary feathering of *adansii* (*D. M. Burn*). Below left, juvenile first-winter White-billed, Gullane Point, East Lothian, 16th January 1970; note the small bill, resembling *immer* in shape but lacking the dark culmen ridge, and the prominent white primary shafts (*G. F. Adkin*). Below right, adult White-billed in active spring moult, Filey, Yorkshire, 1st March 1969; the remiges are completely missing, breeding-plumage feathers are appearing on the scapulars, back and rump, and the winter wing-coverts are almost entirely replaced (*D. M. Burn*).



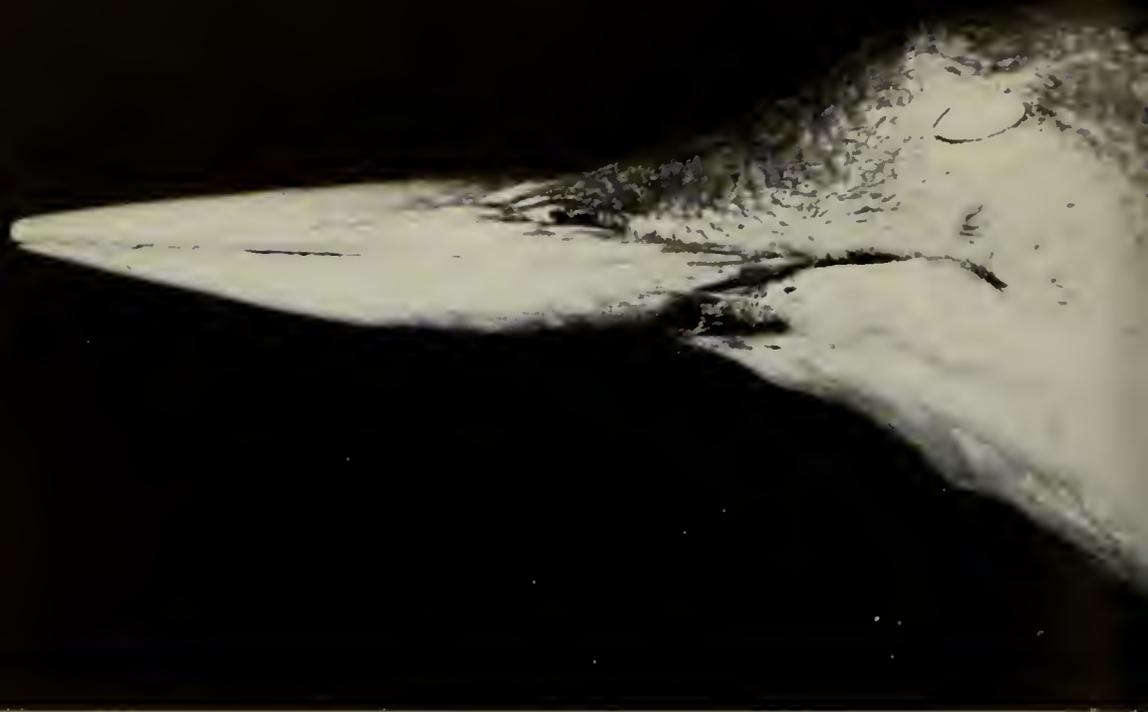


PLATE 44. Two adult White-billed Divers *Gavia adamsii*. Above, Scarborough, Yorkshire, 30th January 1952, showing a near-classic bill shape—deep and flat-sided, the culmen straight and the gonys angle fairly well pronounced. Below, Hedon Haven, Yorkshire, 18th February 1953: while the gonys angle is as pronounced as in the bird above, the culmen is as curved as in most *immar* (*D. M. Burn*)



Appendix. Review of the British records

INTRODUCTION

The first critical review of the records of the White-billed Diver was published by Witherby in 1922. He used as his basis the second edition of Saunders (1899), most of the errors in which had been repeated in the *Hand-list* (Hartert *et al.* 1912). The corrected list of accepted records, as well as those rejected and regarded as uncertain, was published by Witherby in the *Practical Handbook* (1924) and appeared again, unchanged, in *The Handbook* (1940). W. E. Clarke gave the same information in his revision of Saunders' *Manual* (1927). No further review appeared until Bannerman (1959), by which time the records had risen from two to almost 20. Since then the list has nearly doubled in length but no revision of the record book has been published.

We have evaluated critically every published and unpublished record claimed at any time as *adamsii* that we have been able to locate, up to the end of 1973. We have also personally examined 21 out of the 25 traceable specimens and have received details (taken under our direction) of a further three. All those records that we find adequately substantiated (39 individuals) are listed on pages 285-289. These are followed on pages 290-293 by those records which we do not feel should be included in the definitive British list. In some cases we have rejected records because we maintain that the birds were Great Northern Divers wrongly identified as White-billed either by the original observers or subsequently by others; all such records are supported by specimens or adequate photographs. In other cases we can say only that the record is insufficiently substantiated: this does not imply that the observers necessarily made a wrong identification but that, in view of the confusion which has clouded objective identification in the past, the details which are available are inadequate to distinguish between the two species.

The *British Birds* Rarities Committee exercises jurisdiction only over records from 1958 onwards. Records previously published as accepted in its annual reports are marked in the list below with a dagger (†). Post-1958 accepted records not marked in this way are included here with the full approval of the Rarities Committee and will be listed as accepted in its next 'Report on rare birds'. The committee is also in agreement with our decisions on all the post-1958 records which appear in the 'insufficiently substantiated' and 'wrongly identified' lists on pages 290-293.

The references in the literature in which the various records have been published are listed separately at the end of this appendix.

Newspaper reports are not included. Each reference is numbered and the details of each record include a list of the appropriate reference numbers. The number of the main reference for any record—the one giving the most descriptive detail—is printed in **bold type**. Not all the records have received detailed treatment and in such cases no bold number is given. For completeness we have included every reference we have been able to find in which a record is mentioned, however cursorily. This is for three main reasons. Firstly, some entries in the literature cannot readily be ascribed to specific records: in three cases, for example, only photographs were published, with no details of date or locality. We feel it important to indicate that the review is complete to the extent of including such records. Secondly, several records have been described as, for example, the 'twelfth' or the 'nineteenth' for Britain, or an approximation to the number has been given. In most cases the count is inaccurate, and for the benefit of future workers we seek to clarify the confusion by demonstrating the equivalence in our own list. Finally, a record may appear as *adamsii* in one reference and as *immer* in another; equating these is often difficult unless all are viewed together, but a more serious drawback is the risk of arriving at the wrong conclusion if any one reference of such a record is consulted in isolation.

The format of each entry in the lists is given below. In some cases, individual details may be either unknown or inappropriate to the record and may therefore be omitted.

Date Locality, county; age, sex, *predominant* plumage (juvenile/immature/winter/breeding); exposed culmen length; sight record/found dead or dying/shot (observers'/finders'/collectors' initials); preserved form—location and reference number of specimen (cross-reference to plate).

Notes.

List of numbers of references on pages 293-296.

Culmen lengths given in parentheses are from birds whose upper mandible is broken at the tip. The measurement given is from the edge of the forehead feathers to a point level with the tip of the lower mandible. The addition of the mean overlap (see page 273) to this figure will give a near approximation to the original length of the culmen, before the break occurred.

ACCEPTED RECORDS (39 individuals)

An asterisk (*) against the date indicates that we have personally examined the specimen, a dagger (†) that the record has been published by the Rarities Committee among the lists of accepted records in its annual reports (see references 41, 58, 71, 72, 73, 75).

- December 1829 Embleton, Northumberland; adult, winter plumage; 102 mm; shot; mount—Hancock Museum, Newcastle upon Tyne, no number.
refs: 4, 8, 13, 14, 29, 35, 42, 43, 63, 64, 68, 74, 80, 82, 83, **85**, 86, 87
- During 1830-32 Holy Island, Northumberland; adult, breeding plumage; shot (B, JS); presumably a mount but specimen now untraceable.
This record was overlooked by all previous reviewers. It appears only once in the literature (Bolam 1912). It was shot by Bolam's grandfather who described it as having an ivory white bill. This was spontaneously confirmed to Bolam 70 years later by the boatman who ferried the grandfather on the day the bird was shot. The combination of breeding plumage and the white bill is sufficient to validate the record.
ref: **8**
- Spring 1852 Pakefield, Suffolk; adult, winter plumage; shot (*per* AS); mount—Castle Museum, Norwich, no. 15.935(58).
The plate in Babington (1886) is *not* of this bird, as Harting (1901) claimed, but depicts the pre-1886 Suffolk specimen rejected as *immer* (see page 292).
refs: 3, 4, 36, 42, 43, 55, 63, 64, **65**, 68, 74, **77**, 80, 82, 83, **85**, 86, 87, 89
- 29th February to 2nd March 1916 Scarborough, Yorkshire; adult, winter plumage; sight record (WJC).
refs: 4, 13, **16**, 81, **82**
- 21st January 1946 Whiteness Voe, Shetland; adult, winter plumage; 96 mm; found dead (LSVV, UMV, BWT); skull and rhamphotheca specimen now lost.
refs: 4, 18, 66, 78, 79, **80**, 82, 83
- 8th June 1947 Weisdale Voe, Shetland; adult, breeding plumage; sight record (LSVV, UMV).
refs: 4, 18, 66, **78**, 79, 82, 83
- Early May 1950 White Hill, Yell, Shetland; adult, breeding plumage; sight record (WS *per* LSVV).
Though listed merely as an adult, this bird is known to have been in full breeding plumage. WS, first officer of the *Earl of Zetland*, saw the bird from the boat. Subsequently, his report to LSVV was something like: 'I've just seen a most unusual immer-geese—it had a massive white bill stuck up into the air' (LSVV verbally).
refs: 4, 79
- *30th January 1952 Scarborough, Yorkshire; adult, winter plumage; (93 mm); found dead (ES, AJW); skinned head—John R. Mather Collection, no. XU 4 (plate 44).
refs: 4, 13, 18, 81, **82**
- 10th February 1952 Sandsend, Yorkshire; adult ♀, winter plumage; 92 mm; found dying (AH, ABW, RMG); study skin—at one time in Whitby Museum but now lost (see over).

A short report in the *Whitby Gazette*, 14th March 1952, indicates that the skin of this record was confirmed by the British Museum as *adamsii*. Although the report goes on to say that the specimen would be housed in Whitby Museum, it cannot now be found in the collection and is presumed lost (*ABW in litt.*). See also the discussion of the Whitby 1956 accepted record (page 287). In the circumstances, it is extremely fortunate that full details of this bird were published at the time.

refs: 4, 13, 14, 18, 76, **82**

*24th February 1952 Monifieth, Angus; adult, winter plumage; 96 mm; found dead (GBC); skull and rhamphotheca, both wings and one foot—Dundee Museum, no. 1971-284.

refs: 4, **18**, 21, 66, **82**

24th February 1952 Dirleton, East Lothian; adult, winter plumage; sight record (RGT).

refs: 4, **18**, 66, 82

8th June 1952 Levenwick, Shetland; 'adult'; sight record (TH *et al.* per LSVV). No details beyond those given here have ever been published but it would have been impossible to have claimed this record as an *adult* White-billed Diver in June unless it had been showing an all-white bill. By that date an 'adult' Great Northern Diver (we take it that the observer is implying that the bird was in breeding plumage) would have assumed fully its black bill and we feel that no informed observer would then entertain thoughts of *adamsii*. Given that this argument is valid, the record is acceptable.

refs: 4, 18, 79, 82

*18th February 1953 Hedon Haven, Paull, Yorkshire; adult, winter plumage; 93 mm; found dying (KF *et al.*, GHA); study skin—John R. Mather Collection, no. XU 3 (plates 42 and 44).

refs: 4, **30**

21st January, 4th and 28th February 1954 Broughty Ferry Castle, Angus; presumably adult, winter plumage; sight record (ACr, GBC, LF, HGW, JG).

refs: 4, **21**, 34, 37

*2nd January 1955 Spey Bay, Morayshire; 'probably not first winter' ♀, winter plumage; 86 mm; found dead (AMR, AA, AW, IG); skull and rhamphotheca—Aberdeen University Zoology Department Collection, no. 1955.4.1.

This record was overlooked by Bannerman (1959). No details of its plumage are given in the published description (only that the primaries had 'whitish' shafts). Although the culmen length is probably within both the juvenile and the adult ranges, the bill has a worn and chipped look characteristic of older birds. The tentative age description that was published should therefore be taken to mean 'second winter or older'.

refs: 5, 57, **66**

- 12th to 17th November 1955, and 19th February to 29th April 1956
Aberlady Bay and Gosford Bay, East Lothian; adult, winter plumage; sight record (FDH, KCH *et al.*).
Whether the two phases of sightings were of different birds will always be a matter for conjecture, but there is nothing in the difference in descriptions which is inconsistent with their referring to the same bird at two moult stages and we recommend that they be officially regarded as such.
refs: 4. **37, 38**, 39
- *17th March 1956
Whitby, Yorkshire; adult, winter plumage; 90 mm: found dying (*per* ABW); mount—Whitby Museum, no number.
The Whitby Museum houses one mounted specimen of a White-billed Diver. This is known to be one of the two examples found locally (ABW *in litt.*), though it bears no data and is not catalogued. The appearance and measurements of its bill do not correspond with the details published in ref. 82 of the Sandsend 1952 bird (pages 285-286) which, in any case, was said to have been preserved as a skin, not a mount. Bryan Fewster (verbally) recalls that the mount was returned to Whitby Museum in about 1960, having been sent for preservation to the Hancock Museum. The evidence seems clear enough to justify relating this mounted specimen to the 1956 record and we must conclude that the Sandsend 1952 bird has been lost. The extreme tip of the upper mandible of this specimen was broken in life and the break is worn smooth. Nonetheless, it projects 5.5 mm beyond the lower. Because of this, and because of the rate at which it is approaching a point, probably only 2 mm are missing. This amount has been added to the measured length to give the 90 mm listed above.
ref: 90
- *13th January 1957
Aberlady Bay, East Lothian; adult $\frac{3}{4}$, winter plumage; 95 mm: found dead (FDH, KSM); study skin—Royal Scottish Museum, Edinburgh, no. 1957/27.
Published only in the *Edinburgh Bird Bulletin*, where it is mentioned only casually, this record was not included in the Bannerman review.
ref: 40
- †4th to 8th February 1959
Avoch Harbour, Ross-shire; adult, winter plumage: sight record (JL).
refs: 4. 11. **45**, 57, 58, 62
- †4th to 11th February 1959
Avoch Harbour, Ross-shire; presumably adult, winter plumage: sight record (JL, JM, MR, AA).
This bird was first seen on the same occasion as the one listed immediately above but apparently was not in company with it. The description says merely that the brown back showed 'some irregularity of tint'. We feel that the scalloped back of a juvenile/first-winter bird would have struck the observer more forcibly and therefore we conclude that he was describing the appearance of the scapular blocking of a bird in at least its second winter. This and the

previous bird are the last records to be included in Bannerman's review.

refs: 4, 11, **45**, 57, 58, 62

†14th May 1961 Fair Isle, Shetland; adult, breeding plumage; sight record (GJB, PD *et al.*).

refs: 12, **22**, 23, 24, 25, 75

*18th March 1962 Tunstall, Yorkshire; adult ♀, winter plumage; 92 mm; found dead (BSP, AHR); study skin—Hull Museum, no. 16/63/3 (see page 267).

refs: **54**, 91

*†7th April 1963 Loch Fleet, Golspie, Sutherland; adult, winter plumage; 96 mm; found dead (IDP); dried head—temporarily in John R. Mather Collection.

refs: 2, 41, **57**

6th June 1964 Fetlar, Shetland; first summer, immature plumage; sight record (LR).

Rejected by the Rarities Committee when first submitted, this record has been re-appraised in the light of the latest evidence and is now considered acceptable.

(no published references)

*1st January 1965 Earlsferry, Fife; adult, winter plumage; 96 mm; found dead (RSW, GW *et al.*); skinned head—Royal Scottish Museum, Edinburgh, no. 1969/10.

(no published references)

*15th February 1966 Robin Hood's Bay, Yorkshire; adult ♀, winter plumage; 93 mm; found dying (CJF *per* JRM); study skin—John R. Mather Collection, no. XU 1.

ref: 92

*24th April 1966 Budle Bay, Northumberland; adult, winter plumage; 92 mm; found dead (CED); skull and rhamphotheca—C. E. Douglas, 25 Brierdene Road, Whitley Bay, Northumberland.

ref: 6

†26th April 1966 Sweethope Lough, Northumberland; adult ♀, breeding plumage; 95 mm; found dead (FMW *per* AMTy); study skin—Hancock Museum, Newcastle upon Tyne, no. 67/1966.

refs: 6, 10, 71

†10th to 26th April 1967 Marazion, Cornwall; adult, winter plumage; sight record (RF, JEB, PMK *et al.*).

This is the most geographically anomalous of all the British records. It was considered to be a sick bird (JEB *in litt.*), which doubtless explains its apparent disorientation. It is significant that it was recorded very late in the season, yet its progression into breeding plumage was very slight.

refs: 10, 56, 72

- *1st March 1969 Filey, Yorkshire; adult ♂, winter plumage; (84 mm); found dead (RHA *per* JRM); study skin—John R. Mather Collection, no. XU 2; part skeleton—British Museum (Nat. Hist.), Tring, no. S/1969.1.1 (plate 43).
(no published references)
- *24th March 1969 Aberdeen; adult, winter plumage; 90 mm; found dead (BBR, JJDC *per* DMB); deep-frozen corpse—British Museum (Nat. Hist.), Tring, no number.
refs: 26, 47, 60
- 4th to 7th May 1969 Whalsay, Shetland; adult, breeding plumage; sight record (WA, JHS).
refs: 26, 47
- *16th January 1970 Gullane Point, East Lothian; first winter, juvenile plumage; 71 mm; found dead (RKM); skull, rhamphotheca and left wing—R. K. Macgregor, 47 Morningside Drive, Edinburgh, no number (plate 43).
The first British record of a bird in juvenile plumage. In both size and shape the bill is almost indistinguishable from that of a typical juvenile *immer* but the diagnostic characters clearly point to *adamsii*.
(no published references)
- *1st February 1970 Findhorn, Morayshire; adult, winter plumage; 91 mm; found dead (BE); skinned head (skull complete) and right wing—temporarily in Liverpool Museum.
ref: 26
- 29th May 1971 Fair Isle, Shetland; adult, breeding plumage; sight record (JHS).
ref: 27
- 6th to 22nd June 1971 Upper Loch Torridon, Ross-shire; adult, breeding plumage; sight record (JAW, PJT, RHD *et al.*).
This is the latest of the June records, none of the other three birds having been recorded after 8th June.
refs: 27, 48
- 14th March to 20th May 1972 Buckie, Banffshire; adult, winter plumage; sight record (DBM, RHD, RLe *et al.*) (plate 41).
ref: 28
- *27th January 1973 Great Cumbrac, Buteshire; adult ♀, winter plumage; 96 mm; found dead (shot) (SJG *per* CJB); study skin—temporarily in John R. Mather Collection.
ref: 7
- *8th December 1973 Hornsea, Yorkshire; first winter, juvenile plumage; 83 mm; found dead (RRL, DTI *per* AMTa); study skin—John R. Mather Collection, no. XU5 (plate 42).
The second British record of a bird in juvenile plumage.
ref: 15

INSUFFICIENTLY SUBSTANTIATED RECORDS (24 individuals)

(R) beneath certain dates denotes that the record was submitted to, but rejected by, the Rarities Committee up to the date of publication of its last annual report.

- December 1883 River Orwell, Suffolk; age and plumage unknown; shot; presumably a mount—at one time in the Babington Collection but now lost.
refs: 3, 55, 77, 85
- Winter 1895/96 Emsworth Harbour, Hampshire; age and plumage unknown; shot; presumably a mount—at one time in the possession of the Rev. Canon S. G. Scott, Havant, but now lost.
refs: 17, 42, 44, 63, 64, 85, 86, 87
- January 1897 Filey Brigg, Yorkshire; age unknown, winter plumage; shot (seen by JC); specimen untraceable.
Regarded by Witherby as 'uncertain', this record was defended by Chislett (1952) on the grounds that 'John Cordeaux was an excellent naturalist and a careful recorder'. Bannerman (1959) accepted this defence. There have been many 'excellent naturalists', both in Cordeaux' time and since, who have made mistaken identifications; and, in the total absence of supporting evidence, we do not see how this record can possibly be regarded as anything but uncertain.
refs: 4, 13, 19, 42, 49, 64, 85, 86, 87
- 31st December 1901 Caister, Norfolk; age and plumage unknown; found dead (seen by ECS); specimen untraceable.
refs: 36, 88
- 14th January 1925 Harlech, Merioneth; adult, winter plumage; sight record (GMF *per* HEF).
ref: 32
- April 1925 Toll's Island, Scilly; age and plumage unknown; sight record.
The manuscript mentioned in the published reference is a collection of Clark and Rodd papers from *The Zoologist*, annotated by C. J. King; it is now in the library of the Edward Grey Institute.
ref: 56
- 21st May 1950 Spiggie Voe, Shetland; 'immature': sight record (LSVV).
refs: 4, 18, 79, 82
- 24th April 1951 Bay of Scousborough, Shetland; 'immature', sight record (LSVV).
It is with some reluctance that we include this and the last bird in this category. They were accepted by Bannerman and have been listed in the pages of *British Birds* as *adamsii* (ref. 82). However, no details beyond those given here have been published nor are any now available (LSVV *in litt.*). We do feel that some objective standards must be applied to any record of a species so prone to mis-identification and, in the absence of any appraisable evidence, we are logically obliged to regard these records as uncertain.
refs: 4, 18, 79, 82

- 9th October 1953 Salthouse, Norfolk; age and plumage uncertain; sight record (DRW).
refs: 50, 67
- 20th March 1960 (R) Seaton Sluice, Northumberland; adult, winter plumage; sight record (CB).
ref: 20
- 13th January 1962 (R) Needs Oar, Beaulieu River, Hampshire; adult, winter plumage; sight record (EM, HAB, DG *et al.*).
ref: 17
- 17th February 1963 (R) Llanddwyn Island, Anglesey; age and plumage uncertain; sight record (GMI, MJW).
(no published references)
- 12th March 1963 (R) Foulney Island, Barrow, Lancashire; apparently adult, winter plumage; sight record (JSh).
(no published references)
- 26th December 1963 (R) North Coates Point, Lincolnshire; adult, apparently most of mantle, back and scapulars showing breeding plumage, otherwise winter plumage; sight record (GKB, RLo).
(no published references)
- 11th to 21st February 1965 (R) St Agnes, Scilly; two individuals; age and plumage not published; sight record (HMQ, FHDH).
One bird was seen on 11th February and the other on 19th; both were together on 21st.
refs: 56, 59
- 8th and 9th July 1967 (R) Haroldswick, Unst, Shetland; apparently first summer, immature plumage; sight record (FJW, MS, EAM *et al.*).
ref: 72
- 9th or 10th March 1968 Tay estuary (probably Tayport), Fife; apparently adult, winter plumage; died in care (seen by JJDG, SRP); specimen not preserved.
This bird was oiled and was seen by the observers in the Dundee SPCA kennels. It was transferred to Aberdeen Zoo where it died and the body was burnt before a full description had been taken.
refs: 26, 33, 46, 47
- 2nd June 1968 Stornoway, Outer Hebrides; two individuals; age and plumage uncertain but probably first summer; sight record (BRS, JSa).
(no published references)
- 3rd October 1968 North Ronaldsay, Orkney; age and plumage uncertain; sight record (DBW).
(no published references)

- 25th January 1969 (R) Creetown, Kirkcudbrightshire: apparently adult, winter plumage; sight record (RHM).
ref: 73
- 2nd March 1969 Dunnet Bay, Caithness; no age or plumage details available; sight record (DMS).
(no published references)
- 30th August 1969 (R) Helli Ness, Lerwick, Shetland; apparently juvenile; sight record (GPT, SDH).
ref: 73

REJECTED RECORDS (WRONGLY IDENTIFIED) (8 individuals)

The correct identity in each case is *G. immer*. An asterisk (*) against the date indicates that we have personally examined the specimen.

- 14th December 1872 Hickling Broad, Norfolk; 'immature'; shot (ETB); mount—Dyke Road Bird Museum, Brighton, case no. 332.
refs: 9, 31, **35**, 42, 43, 61, 63, **85**, 86, 87
- * January 1879 Holy Island, Northumberland; adult ♂, winter plumage; 84 mm; shot (ACh); study skin—British Museum (Nat. Hist.), Tring, no. 07.12.5.2.
refs: 8, 29, 42, 51, **52**, 84, **85**, 86, 87
- Before 1886 Possibly mouth of R. Stour or R. Orwell, Suffolk; 'immature'; presumably shot; mount—at one time in the Babington Collection but now lost.
This is the bird figured in Babington (1886). This figured specimen is *not* the Pakefield record (page 285) as stated in Harting (1901).
refs: **3**, 35, 36, 42, 43, 55, 63, 74, 77, **85**, 86, 87, 88
- Late autumn 1893 Loch Fyne, Argyll; said to be immature; shot (EB, seen by BA, BS); mount—in Manchester Grammar School in 1922 but this location not checked.
refs: **1**, 42, 63, 64, 70, 85, 86, 87
- * About 1953 Chichester Harbour, Hampshire; adult, plumage unknown; found dead (KS *per* GM); skull and rhamphotheca—British Museum (Nat. Hist.), Tring, no. S/1958.4.1.
This specimen was initially identified as *immer*, but after five years or so the finder re-appraised it and on the basis of the bill *shape* considered it then to be *adamsii*. As such it was transferred to the British Museum where we examined it eleven years later. The gonys angle is fairly well developed, but the bill is almost totally black and the gonys fusion is incomplete, the groove running well forwards towards the tip.
There is some evidence to suggest that the corpse was found during autumn and, if so, it was probably losing its breeding plumage.

Unknowns aside, what is perfectly clear is that it is an example of *immer*, as the finder had first suspected.

refs: 17, 69

* 13th February 1964 Islay, Argyll; adult, winter plumage; 86 mm; found dead (GAR); study skin—Glasgow Museum, no. Z64-16 (plate 42).

This bird has a slight asymmetrical deformity of the lower mandible which gives it the appearance (from one side) of having a strongly developed gony angle. In all other respects it is a typical *immer*.

(no published references)

* About 30th April 1967 North Ronaldsay, Orkney; first winter, no data on plumage; 69 mm; found dead (RHD, KGW); skull and rhamphotheca—temporarily in John R. Mather Collection.

(no published references)

14th February 1970 Torquay, Devon; adult, winter plumage; sight record (DWG).

The published photograph of this record clearly shows a dark culmen ridge. The bird was therefore *immer* as the observer had maintained when he submitted the photograph, though the editors of the journal concluded otherwise (see page 263).

ref: 53

LIST OF OBSERVERS, COLLECTORS, ETC.

G. H. Ainsworth, B. Allen, A. Anderson, R. H. Appleby, W. Arthur, G. J. Barnes, Rev J. E. Beckerlegge, C. J. Bibby, Miss H. A. Bidmead, Bolam (grandfather of G. Bolam), E. T. Booth, C. Bower, G. K. Brown, E. Burgess, D. M. Burn, A. Chapman (ACh), W. J. Clarke, G. B. Corbet, J. Cordeaux, A. Cross (ACr), P. Davis, R. H. Dennis, C. E. Douglas, B. Etheridge, Dr C. J. Feare, K. Fenton, H. E. Forrest, R. Fry, L. Fullerton, G. M. Furley, R. M. Garnett, D. Gluc, Dr I. Goodbody, S. J. Gorzula, D. W. Greenslade, Dr J. J. D. Greenwood, J. Grierson, F. D. Hamilton, Mrs A. Healam, T. Henderson, F. H. D. Hicks, Miss K. D. Hogarth, S. D. Housden, D. T. Ireland, G. M. Ireson, P. M. Kent, R. Leavett (RLe), Rev J. Lees, R. Lorand (RLo), R. R. Lowe, K. S. Macgregor, R. K. Macgregor, E. A. Machell, J. Macintosh, J. R. Mather, D. B. McGinn, Mrs E. Miller, Mr and Mrs R. H. Miller, G. Mountfort, R. M. Nedderman, B. S. Pashby, Dr I. D. Pennic, S. R. Pepper, Miss H. M. Quick, Dr B. B. Rae, A. M. Raffan, G. A. Richards, A. H. Rider, Mr and Mrs L. Roberts, Dr M. Rusk, E. C. Saunders, B. R. Sawford, Mrs J. Sawford (JSa), A. Scales, K. Shackleton, B. Sharpe, J. Sheldon (JSh), J. Shell (JS), E. Sigston, J. H. Simpson, M. Sinclair, W. Sinclair, D. M. Stark, A. M. Taylor (AMTa), R. G. Thin, G. P. Threlfall, P. J. Tizzard, B. W. Tucker, A. M. Tynan (AMTy), L. S. V. VENABLES, Mrs U. M. VENABLES, A. B. Walker, F. J. Walker, K. G. Walker, A. J. Wallis, M. J. Warren, G. Waterston, A. Watson, H. G. Watson, Dr R. S. Weir, Mrs J. A. Whyte, D. R. Wilson, Col F. M. Wood, D. B. Wooldridge.

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Contamination of birds with Fulmar oil

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Fisher (1952) summarised the known records of Fulmars *Fulmarus glacialis* using their stomach oil in defence against intruders at their nest sites. In this work he wrote: 'On the cliffs of the Fair Isle the fulmars (as would be expected) resent strange intruders, and threaten such migrant birds as visit their cliffs, including great spotted woodpeckers [*Dendrocopos major*]!' More recently Dennis (1970b) reported the oiling of a White-tailed Eagle* and a Honey Buzzard at Fair Isle and mentioned several other possible victims. The aim of this paper is to summarise recent reports of Fulmar oiling from Fair Isle and elsewhere and to discuss its consequences. It is hoped that this will stimulate other observers to look for similar cases of what must be a more widespread phenomenon than was previously realised.

THE NATURE OF THE CONTAMINATION

Fulmar oil is generally thought to be a secretion of the stomach (Mathews 1949) and can be produced by the chick even as it emerges from its shell. The oil is usually yellow in colour (although it may be tinted by ingested foods) and has a characteristic foul, musky odour. When threatened by an intruder, the Fulmar forcibly ejects oil in a series of hiccoughs via the open gape in the direction of the threat. This emission may be repeated several times in succession. A bird contaminated with this oil is unable to preen it from the feathers, to which it clings with tenacity. When fresh, this contamination may be recognised as such on a bird in the hand by the characteristic smell and by being sticky to the touch. Areas of contamination may often be located by the presence of small particles of peat, soil or grass adhering to the oil. With age it loses much of its stickiness and darkens in colour, but it may retain its smell for a considerable time. G. J. Barnes (verbally) has informed me that a contaminated wing in his possession still retains its smell after 13 years!

RECENT OBSERVATIONS

Table 1 lists recent cases of birds contaminated with Fulmar oil on Fair Isle and elsewhere. It also includes sight records of six birds of five species with contaminated plumage possibly resulting from such oiling. The records listed by Dennis (1970b) are included, except where possible Fulmar contamination of a particular species has since been proved. Represented in table 1 are 17 species de-

*Scientific names of birds affected by Fulmar oil are given in table 1

Table 1. Recent records of birds contaminated with oil ejected by Fulmars *Fulmarus glacialis*, and (in square brackets) sight records of birds reported with soiled plumage possibly from Fulmar oil

All localities are in Shetland, except Copinsay (Orkney) and Co. Durham. Data from Dennis (1970a, b), Macmillan (1970), Coulson and Horobin (1972), Tulloch (1973), G. J. Barnes (unpublished records), D. Coultis (verbally) and personal observations

Species	Place	Date	Extent of oiling	Remarks
Grey Heron <i>Ardea cinerea</i>	Fair Isle	{ 29.5.63 1.6.63	Light Saturated	Trapped Found dead
[Sparrowhawk <i>Accipiter nisus</i>	Fair Isle	Spring 73	Moderate	Sight record: flight impeded]
Goshawk <i>Accipiter gentilis</i>	Fair Isle	3.12.71	Light	Trapped
White-tailed Eagle <i>Haliaeetus albicilla</i>	Fair Isle	19.8.69	Saturated	Caught by hand, flight much impeded
Honey Buzzard <i>Pernis apivorus</i>	Copinsay	8.6.69	'Spattered'	Found dead, spattered with fishy oil
	Fair Isle	29.6.70	Heavy	Seen on 24.6 when spat at by Fulmars, later found dead
	Fair Isle	5.7.71	Moderate	Seen alive from 30.6; caught by hand, emaciated, died later
[Osprey <i>Pandion haliaetus</i>	[Fair Isle	15.6.73	Heavy	Sight record: flight impeded]
Peregrine <i>Falco peregrinus</i>	Fair Isle	Unknown	Unknown	Sight record: soiled plumage]
	[Fair Isle	Spring 71	Moderate	Sight record: flight impeded]
	Mainland	July 73	Moderate	Caught by hand, flight impeded
Kestrel <i>Falco tinnunculus</i>	Foula	May 72	'Contaminated'	Found dead
Coot <i>Fulica atra</i>	Fair Isle	Spring 71	Light	Caught by hand
Great Black-backed Gull <i>Larus marinus</i>	Fair Isle	July 71	Light	Chicks ^c spattered when they passed Fulmar
Herring Gull <i>Larus argentatus</i> (2)	Fair Isle	Winter 71	Moderate	Caught by hand, flight impeded
[Kittiwake <i>Rissa tridactyla</i> (2)	Co. Durham	Spring 66	'Covered'	Sight record: covered in oily substance]
Razorbill <i>Alca torda</i>	Fair Isle	Winter 70	Moderate	Found dead
Guillemot <i>Uria aalge</i>	Fair Isle	Winter 69	Saturated	Found dead
Long-eared Owl <i>Asio otus</i>	Fair Isle	13.6.71	Saturated	Caught by hand; flight impossible, emaciated, died later
	Fair Isle	24.11.71	Light	Trapped
	Fair Isle	25.6.72	Light	Trapped
	Fetlar	June 72	'Contaminated'	Found alive, died later
Short-eared Owl <i>Asio flammeus</i>	Fair Isle	Winter 71	Saturated	Found dead
Raven <i>Corvus corax</i>	Yell	18.4.70	Light	Raven on ground spattered by flying Fulmar
Hooded Crow <i>Corvus corone cornix</i>	Fair Isle	23.5.73	Moderate	Three recently fledged chicks caught by hand, flight impeded
Grasshopper Warbler <i>Locustella naevia</i>	Fair Isle	27.10.73	Moderate	Caught by hand
Reed Bunting <i>Emberiza schoeniclus</i>	Fair Isle	May 71	Saturated	Caught by hand, flight impossible
	Fair Isle	Spring 72	Light	Trapped

finitely contaminated by this oil, of which four may be classified as 'residents' at the time of the oiling (Great Black-backed Gull, Raven, Hooded Crow and the introduced White-tailed Eagle); the Peregrine might also belong to this category. Although it is difficult to assign some species to a particular category, for example the winter records of Herring Gull, Razorbill and Guillemot, the remainder were mainly migrants. Only two species of small passerines (Grasshopper Warbler and Reed Bunting) are included in the table, and it is evident that the majority of the birds found Fulmar-oiled are of larger species. The definite, dated records come from eight months of the year between April and December, with three-quarters of these between May and September.

Where known, the extent of the contamination has been given; birds examined at Fair Isle have been found with contamination varying from light spattering to almost total saturation. A Long-eared Owl in the latter extreme state had the flight-feathers stuck together and the body-feathers matted, exposing the bare skin in many areas. A Grasshopper Warbler in a similar state was almost unable to move its wings which were virtually stuck to its flanks. Thus the effects are twofold; firstly, when the flight-feathers are contaminated there is impairment of flight; secondly, when the body-feathers are contaminated, disarrangement of the insulating feathers may well result in serious heat loss through the exposed skin.

DISCUSSION

Fulmars first bred at Fair Isle in 1903; they have since increased rapidly and at the last complete count in 1969 there were estimated to be 17,000 pairs. Initially the birds deserted the cliffs between September and December but now, although numbers are lower at the end of the breeding season, they may be seen ashore at any time of the year and vacation of the cliffs occurs only in severe weather. The incidence of Fulmar oil contamination may be viewed against this background of increasing numbers and increasing attendance throughout the year. There is a correlation between the Fulmar breeding season (May to September) and the concentration of reports of contaminated birds, three-quarters occurring in these months. This might be expected, as the Fulmar breeding season spans the main migration months at Fair Isle. The records falling outside this period (dated records in April, October, November and December and undated winter records) indicate that interaction between Fulmars and other species on the cliffs can occur at any time of the year, not only during the breeding season in defence of eggs and chicks.

The cliffs at Fair Isle provide shelter and food for many small migrants but, considering the large numbers of small passerines

sometimes present on the sea cliffs, the percentage recorded contaminated with Fulmar oil is negligible. Nevertheless, it is difficult to imagine the circumstances which would culminate in a Fulmar oiling a Grasshopper Warbler or a Reed Bunting unless the victim was unintentionally caught in some other conflict.

Birds of prey (including owls) figure prominently in the table. Since only small numbers pass through Fair Isle, Fulmar oiling must be a real problem for these migrants. Of the birds of prey affected, only the White-tailed Eagle has represented a direct threat to the Fulmar; this species was recorded by Fisher (1952) as one of only a very few avian predators of adult Fulmars. On Fair Isle the four young birds introduced in 1968 taught themselves to capture adults on the wing and one took chicks on the cliffs. It was probably this last bird that was oiled (Dennis 1970a). The other birds of prey, posing no direct threat to the Fulmars, were probably contaminated while seeking refuge on the cliffs, being unable to find any other place safe from the attentions of the skuas *Stercorarius spp* and gulls *Larus spp* and away from the populated part of the island.

Although both gulls and Ravens take unattended Fulmars' eggs, the contaminated young of these species were not opportunist feeders but were still dependent on their parents for food. The Great Black-backed Gull chicks were seen to be sprayed when they wandered too close to nesting Fulmars, and it is likely that the young Ravens similarly ran the gauntlet of the Fulmars on the cliffs before they were fully fledged.

To produce the state of saturation seen in some of the birds, it would be necessary for several conflicts to have taken place. Evidence for successive oilings comes from the Grey Heron trapped with light oiling and then subsequently found dead with its plumage saturated. This also emphasises the plight of some of the tired migrants arriving at Fair Isle where suitable food may not be readily available. Conflict with the Fulmars and the resulting incapacitating burden of oil might quickly lead to their death.

Actual observations of these conflicts are few but presumably they must usually happen on land. Dennis (1970b) reported a case of a Honey Buzzard sprayed by Fulmars when it landed too near them, and the contamination of the wandering, unfledged gull chicks was similar. This last observation is paralleled by a case mentioned by Fisher (1952). However, Tulloch (1971) recorded an incident in which a Fulmar displaced from a ledge by a Raven returned and sprayed the intruder as it flew by. Similarly, again in Fisher (1952) there are two records of Fulmars ejecting oil in flight, once at a man who had dislodged a sitting bird from its egg. At sea, where Fulmars follow fishing boats for the offal thrown overboard, their supremacy is respected even by the larger gulls and Great Skuas *S. skua*. Here

adoption of an aggressive posture, without the emission of oil, is apparently sufficient in itself.

ACKNOWLEDGEMENTS

I am indebted to G. J. Barnes for access to his records and for allowing me to incorporate his observations in this text.

SUMMARY

Recent occurrences of birds contaminated with oil ejected by Fulmars *Fulmarus glacialis* at Fair Isle and elsewhere are summarised and the circumstances of the contamination discussed. Seventeen species were definitely contaminated, the majority being large birds, particularly raptors and owls. Three other species were possibly affected. Only two small passerines were reported. Three-quarters of the reports were during the Fulmar breeding season (May to September), but interaction is not confined to this period. The winter records are a result of increased Fulmar attendance on the cliffs at this season. Of the birds affected only the White-tailed Eagles *Haliaeetus albicilla* introduced on Fair Isle posed a direct threat to the Fulmars, taking adults and young for food; a minority were fledging young wandering too close to Fulmars, and the majority of the remainder were tired migrants, contaminated while seeking refuge on the cliffs.

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Notes

Grebes eating bread The note and comment on Little Grebes *Tachybaptus ruficollis* eating bread (*Brit. Birds*, 66: 227) prompts me to record that in April 1967, when attempting to photograph its Australian counterpart, the Black-throated Little Grebe *T. novaehollandiae*, on a lake in the Botanic Gardens, Melbourne, I saw a bird of this species taking pieces of bread which were being thrown to ducks. Its method was to approach underwater and appear on the surface for long enough only to snatch the food, apparently because of its nervousness of the people rather than of the ducks.

I was not especially impressed by this behaviour at the time because I was familiar with the fact that on the Norfolk Broads it is by no means unknown for Great Crested Grebes *Podiceps cristatus* to take bread thrown for other species. Although not usually so nervous as the Australian bird cited above, they usually wait (on the surface) on the outskirts of the party being fed until a piece of food (usually bread) lands near to them, when they grasp and dive with it. However, in August 1959 and for several subsequent seasons, one particular bird which frequented Salhouse Broad, on the River Bure, would come close to a boat among the waiting throng of Mallards *Anas platyrhynchos*, feral geese *Anser sp.*, Moorhens *Gallinula chloropus* and Coots *Fulica atra*, and successfully compete with them for scraps of bread.

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Head plumage of female Scaup R. A. Frost (*Brit. Birds*, 64: 288) described four female Scaup *Aythya marila* which had a whitish patch in the auricular region in November, December and January, and suggested that this feature may be retained at least until the early winter. It appeared that previously this mark had been known only in summer plumage, and it seems worth recording an additional November observation. At Surrey Docks, London, on 17th November 1973, I saw five female Scaup (aged as first-winter by their brown-washed face patches), all of which showed this mark clearly at ranges up to 100 metres. At close range, say 20 metres, it appeared as a crescentic mark, but at greater distances it often appeared as a more rounded spot, varying in obviousness according to the viewing angle and light. Clearly this mark may be quite normal in winter female Scaup, at least early in the season. Further, I wonder whether its presence may provide an additional distinction between pure female Scaup and some of the similar *Aythya* hybrids (see, for example, *Lond. Bird Rep.*, 36: 86-91, plate 1). Notes on the presence or absence of this head pattern in female Scaup-like

hybrids, and on its incidence later in the winter in female Scaup, would be useful.

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Bar-tailed Godwit feeding on open heath For 40 minutes on 3rd October 1973, I observed a Bar-tailed Godwit *Limosa lapponica* feeding continuously on Wingletang Down, St Agnes, Isles of Scilly. The vegetation here consists of heather and gorse between large areas of very short grass, moss and sea thrift. Although occasionally probing to a depth of 2-3 cm, the bird was feeding (presumably on small insects) mainly by picking from the surface with the tip of its bill. Several other godwits were foraging on the shore in the normal manner.

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Nocturnal feeding by Pied Wagtails in winter At dusk on 29th January 1972, at North Road railway station, Plymouth, Devon, we observed about 20 Pied Wagtails *Motacilla alba* feeding on flies (Diptera) which had apparently been attracted by the bright overhead platform lights. It was thought that these wagtails formed part of a flock roosting on the upper side of a glass roof nearby. The small insects flying near the lights were picked off by quick bill movements of the birds in sustained hovering flight, and also sought on the surface of mail bags which had been stowed in trollies on the platform. Other unidentified material was obtained from the ground. This feeding behaviour was still going on when darkness had truly fallen.

Among passerines, nocturnal feeding in artificial light by Swallows *Hirundo rustica*, Blue Tits *Parus caeruleus*, Robins *Erithacus rubecula*, Spotted Flycatchers *Muscicapa striata* and House Sparrows *Passer domesticus* has been reported (*Brit. Birds*, 59: 501; 60: 255-256; 62: 80; 63: 136-137), but we can find no reference to such behaviour in Pied Wagtails.

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Pied Wagtails roosting at floodlit sewage farms sometimes still feed after dark on the open sludge beds, but we have not come across any previous records of nocturnal feeding in or around buildings, where roosting wagtails are usually very lethargic. Eds

We regret that, owing to shortage of space, it is not possible to include our usual complement of short items. We trust, however, that readers will appreciate the importance of the major contribution on the White-billed Diver to which this issue is largely devoted. The next number will include the 'Report on rare birds in Great Britain in 1973' and so the same is expected also to apply in that instance. From the September issue onwards, the normal pattern of contents will be resumed.

Eds

News and comment *Robert Hudson*

Discouraging colonialism? The Wood Sandpiper is a surprisingly successful species. Not only is it one of the more numerous waders halting to moult in the shot-torn Mediterranean area, on migration to Africa, it has recently been reported nesting in new areas at both extremities of its breeding range. Most well-informed birdwatchers will now be aware that it has been nesting in the Scottish Highlands since 1959, but the localities are kept secret and the birds left undisturbed. It is interesting to compare this with the situation in North America, as recorded in the January 1974 issue of *Auk*. Apparently the species breeds commonly in the Commander Islands and appears frequently in the Pribilofs, where it was seen displaying in 1954, while a male in breeding condition and later a young bird were collected in 1961. Another male in breeding condition and later a downy chick were collected on Amchitka Island in the Aleutians in 1969, but only one bird reappeared there the following year. There appears to have been quite an influx in 1971, when it recolonised Amchitka, and a male in breeding condition was collected on Adak Island. Chicks were also found at Massacre Bay on Attu Island in 1973, but this time they were only photographed. It is concluded that the species is not really expanding its range into Alaska, but has a long history of temporary breeding after influxes of migrants in spring. As in a previous case concerning Little Gulls found breeding in Ontario, an adult and eggs being promptly collected (1963, *Auk*, 80: 548-549), some people might think that these birds deserve medals, or dunce's caps, or something, for trying to nest in North America at all.

Birthday honours The names of two well-known naturalists appeared in this year's Birthday Honours List, published on 15th June, and we congratulate both. David Attenborough was awarded the CBE for services to nature conservation; he is perhaps best known to the general public for his 'Zoo Quest' television films, and for his books on his expeditions to out-of-the-way islands and countries. Secondly, the MBE was awarded to Mrs Grace Hickling, Secretary of the Northumberland, Durham and Newcastle upon Tyne Natural History Society; with particular interests in seabirds and seals, Mrs Hickling is especially concerned in watching over the famous Farne Islands reserve, about which she wrote a good account (under her maiden name, Grace Watt) in 1951, entitled simply *The Farne Islands: their history and wild life* (Country Life, London).

Birding by the disabled Nearly three years ago David Glue, on the staff of the British Trust for Ornithology, had the misfortune to be involved in a car accident which left him permanently disabled. Undaunted, he has continued his wheelchair ornithology; and from his experiences he has decided to write a book on birdwatching for the disabled. In particular, he is keen to compile a list of significant ornithological sites which can be visited by those confined to a wheelchair. Some RSPB reserves have hides which are modified to take wheelchairs; and David asks to be sent (c/o BTO, Beech Grove, Tring, Hertfordshire) information on other easily accessible reserves and good birdwatching sites.

Egg on their faces Hard on the heels of the news that Richard Porter has been promoted within the Royal Society for the Protection of Birds, from Investigations Officer to Regional Officer for South-east England, comes public revelation of his last investigation and its international ramifications. The story was unfolded at considerable length in *The Sunday Times* for 16th June, and only a brief digest can be given here. In the summer of 1973, one David Neville of Coventry was convicted for taking Raven eggs in Wales. Richard Porter had come across the name before, and, with the assistance of the Coventry police, Neville's

house was searched; an egg collection with related data files was seized. Neville was again prosecuted and fined heavily; but the most important result of the Coventry raid was the discovery that the data files included correspondence which revealed international collaboration between egg-collectors, involving Professor Charles Sibley of the Peabody Museum, Yale University. Professor Sibley is not an oologist, but his research into avian systematics includes sophisticated analyses of the proteins in egg albumen; this is fundamental work of great importance, and Professor Sibley is undoubtedly one of America's most distinguished ornithologists. However, to maintain an adequate inflow of research material, it is now known that he encouraged a wide circle of egg-collectors to supply him with albumen; and in the case of Britain he received more specimens than the Home Office had granted licences for. Following consultations between Richard Porter and the United States Department of the Interior, special agents of the Fish and Wildlife Service raided Yale University, seizing correspondence files; and investigations are still continuing into the activities of 260 egg-collectors in 64 countries. Professor Sibley was charged with offences under the Lacey Act (which prohibits imports concerning species protected in their countries of origin), and on 20th May he was fined \$3,000.

Human nature being what it is, it is all too easy to express the wrong sentiments at a VIP's discomfiture. Professor Sibley has been quoted as saying that he feels that bird conservationists are governed by their emotions and have little knowledge of bird population dynamics; and there is no doubt that this view has many adherents in North America. In a previous paragraph I have commented on certain cases where rare breeding birds were deliberately collected in Alaska and Ontario; while in a recent issue of *Bird Banding* (1974, 45: 24-28) A. R. Phillips used the title 'The need for education and collecting' for a polemic in defence of collecting extralimitals and vagrants, the desirability of having subspecific determinations being one of his major themes. Only gradually are American birders breaking away from the tradition that first national and state records should be specimens; and too many American museum workers, typified by A. R. Phillips, still distrust sight records. It is only six years ago, too, that the International Council for Bird Preservation felt moved to protest publicly at certain experiments in the USA on water-deprivation until the point of death (see *Ibis*, 110: 207, 579-580). The sad fact is that, despite sterling work by the various Audubon Societies (which perhaps concentrate too much on habitats rather than inhabitants), some aspects of American attitudes to wildlife lag sadly behind those in most west European countries.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

April reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

April was a month dominated by anticyclonic weather over the whole of Britain and Ireland. It was generally cold and dry (in Derbyshire the driest month since February 1957). Winds persisted between north and south-east, resulting in a number of interesting influxes from the south-eastern parts of Europe. The arrival of certain migrants and summer visitors will be treated in a later summary,

as will spring movements of some of the commoner species (and of others which occurred in greater than average numbers).

An unusual spring passage of **Black-necked Grebes** *Podiceps nigricollis* was noted in Bedfordshire, where eight at Blunham gravel pits from 18th to 20th had reduced to three by 28th. An **albatross** off Portland Bill (Dorset) on 27th was probably a **Black-browed** *Diomedea melanophris* (in May one was reported in Chichester Harbour in Sussex where it was seen perching on boats), and a **Little Shearwater** *Puffinus assimilis* was identified off St Agnes (Scilly) on 30th.

A few southern herons were reported during the month, the first **Purple Heron** *Ardea purpurea* being at Porthgwarra (Cornwall) on 19th, followed by one at Dungeness (Kent) on 21st and one coming in off the sea at St Catherine's Point (Isle of Wight) late in the month. A **Little Egret** *Egretta garzetta* arrived at Warton Marsh, Ribble (Lancashire), on 10th and stayed into May, and one was at Slapton Ley (Devon) on 20th. A **Night Heron** *Nycticorax nycticorax* at Maraitaine Quarry (Guernsey) from early April until 13th May was probably a genuine vagrant, and the same may well apply to another at Cleator, near Egremont (Cumberland) from 12th to 18th April. An unusual sight was that of a **Bittern** *Botaurus stellaris* flying high over Chobham Common (Surrey) NNE towards Windsor Great Park (Berkshire) on 15th.

Spoonbills *Platalea leucorodia* were reported from eight places. The adult on the Exe marshes (Devon) on 31st March (*Brit. Birds*, 67: 250) stayed until 7th May and was joined by an immature on 24th April, which remained to 10th May; in Kent an adult at Cliffe on 3rd was later joined by an immature, and both were still present on 5th May, while one was in the Stodmarsh/Westbere area on 14th; at Minsmere (Suffolk) an adult was seen on 22nd and 29th and an immature on 24th; elsewhere Spoonbills were seen at Frisby gravel pits (Leicestershire) on 7th, at Holkham (Norfolk) on 13th and 14th, and at Wisbech sewage farm (Lincolnshire/Norfolk) and on the Ouse Washes near Purls Bridge (Cambridgeshire) on 20th. Perhaps the 'bird of the month' was a **Glossy Ibis** *Plegadis falcinellus* which arrived at Swanscombe (Kent) on 11th and stayed for over four weeks to 12th May; of particular interest is the fact that a small party of this species arrived in the Camargue in southern France at about the same time.

A drake **Green-winged Teal** *Anas crecca carolinensis* was at Walberswick (Suffolk) from 20th to 5th May, an immature male **American Wigeon** *A. americana* at Eye Brook Reservoir (Leicestershire) for a month from 17th, and a male of the latter species on the Ouse Washes between Welney and Welmore (Norfolk) on 19th. A drake **Ring-necked Duck** *Aythya collaris* at Broxbourne (Hertfordshire) from 28th to 30th is the first record for the London area. (Unfortunately, the possibility of escape cannot be ruled out for any of these Nearctic wildfowl.) A party of five **Scaup** *A. marila* at Chew Valley Lake (Somerset) from 6th is worthy of note. Predictably there were few reports of **Long-tailed Ducks** *Clangula hyemalis*, and only one from inland: the only English counts above single figures were of up to 28 at Formby Point between 13th and 23rd, an all-time record for Lancashire, and of 35 off Bridlington (Yorkshire) on 13th, though in northern Scotland a huge gathering of 3,000 or more was present at Loch Fleet (Sutherland) in the middle of the month, where there had been only 200 on 24th March. Forty-six **Velvet Scoters** *Melanitta fusca* flew east at Beachy Head (Sussex) on 12th and ten east on 29th, while 28 on 28th was the maximum counted off Dungeness and there was a most unusual record of a drake inland at Upton Warren (Worcestershire) on 21st. (Passage of **Common Scoters** *M. nigra* will be treated in a later summary.) Two **King Eiders** *Somateria spectabilis* were at Loch Fleet, one staying until 28th, this species apparently having become almost resident in parts of northern Scotland in recent years. Late **Smew** *Mergus albellus* were reported from Somerset, Essex, Norfolk, Nottinghamshire and Aberdeenshire, all singles or pairs. A **Greylag Goose** *Anser anser* of the race *rubrirostris* was reported at Bempton

cliffs (Yorkshire) on 13th; this race usually winters east from the Black Sea region. A **Brent Goose** *Branta bernicla* was seen well inland at Girling Reservoir (Essex) on 21st, while a flock of 33 **Barnacle Geese** *B. leucopsis* at Spurn (Yorkshire) on 20th was most unusual.

Apart from records from possible breeding sites, there was a female **Goshawk** *Accipiter gentilis* at Minsmere from 12th to 14th and on 26th. **Honey Buzzards** *Pernis apivorus* were already back in their breeding quarters in Hampshire by 26th, an early date, but we have no information from other known breeding areas. Leaving aside individuals which had overwintered, there were a number of records of returning **Marsh Harriers** *Circus aeruginosus*, including an adult male at Leighton Moss (Lancashire) on 7th, the earliest ever recorded there; and singles of the rarer **Montagu's Harrier** *C. pygargus* were recorded at Sandwich Bay (Kent) on 11th, Westbury-on-Trym (Bristol) on 14th, Corhampton (Hampshire) on 16th and Arne (Dorset) on 26th, while a male and a female were at Minsmere on 28th. **Ospreys** *Pandion haliaetus* were reported from ten places after the two March records (*Brit. Birds*, 67: 250), in Co. Wexford, Dorset, Sussex, Kent, Hertfordshire, Staffordshire, Lancashire, Yorkshire, Co. Durham and Northumberland, though unfortunately we have no information from Scotland. **Hobbies** *Falco subbuteo*, reported from four places in April, will be dealt with in a later summary covering arrival dates of certain summer visitors. A **Quail** *Coturnix coturnix* was at Nettleshall (Suffolk) on 13th, and **Spotted Crakes** *Porzana porzana* were at Dungeness on 16th and at Bough Beech Reservoir (also Kent) about the same time, while at Dinnet (Aberdeenshire) at least two were calling on 29th; **Corncrakes** *Crex crex* were reported only from Skokholm (Pembrokeshire) on 22nd and from the Calf of Man two days later, when one was trapped.

A female **Kentish Plover** *Charadrius alexandrinus* stayed at Cley (Norfolk) from 8th to at least 21st and a male was seen on 28th, one was at Pennington marshes (Hampshire) on 21st and 29th, and two pairs were reported on the west coast of Guernsey on 25th. An early **Dotterel** *Eudromias morinellus* appeared on Holy Island (Northumberland) on 28th. There were three April records of **Wood Sandpipers** *Tringa glareola*—two birds near Purls Bridge on 19th and singles at Steart (Somerset) and Ecton sewage farm (Northamptonshire) on 27th. **Little Stints** *Calidris minuta* were reported from Minsmere, Cliffe, Langton Herring (Dorset) and Marshside, Ribble (three); and **Temminck's Stints** *C. temminckii* from Cley on 18th and from Sandwich Bay on 7th and at the end of the month, when the two birds present both exhibited quite definite black leg colouring, contrary to all we have been taught to believe (see, for example, *Brit. Birds*, 67: 10). **Avocets** *Recurvirostra avosetta* were particularly plentiful during March-May and will consequently be treated in a later summary of the spring season.

A **Great Skua** *Stercorarius skua* was at Spurn on 6th, one flew north at Seaton Sluice (Northumberland) on 12th and two north and one south there on 28th; and three went east at Beachy Head on 28th, while there was an unusual sighting of one inland at Ogston Reservoir (Derbyshire) on 12th. **Arctic Skuas** *S. parasiticus* were reported from nine places in south and west England and Yorkshire, and at Fair Isle (Shetland), where passage occurred from 17th with a maximum of 50 on 30th. The adult **Ring-billed Gull** *Larus delawarensis* which had been at Blackpill (Glamorgan) since 5th December 1973 (*Brit. Birds*, 67: 130) left on 2nd April, being replaced the next day by a second-year which stayed for five days; while these two individuals were probably the same as those recorded in the first half of 1973 (*Brit. Birds*, 66: 509-517), a sub-adult which arrived on 27th and stayed into May was a different bird. It is still a very odd situation that all the confirmed reports of this Nearctic species have been from one locality. Two other Nearctic gulls were reported during the month, an adult **Laughing Gull** *L. atricilla* at Loch Skerrols, Islay (Argyll), on 21st and a **Sabine's** *L. sabini* in Scilly on 26th. Up to three **Mediterranean Gulls** *L. melanocephalus* were at Dungeness during

the second half of the month. **Little Gulls** *L. minutus* were reported from nine localities, including 34 at Blackpool (Lancashire) on 21st and over 50 all month at Eglwys Nunydd Reservoir (Glamorgan), with as many as 73 there at times. The unprecedented spring passage on the south coast will be treated later.

Three early **Nightjars** *Caprimulgus europaeus* were logged, at Maulden Wood (Bedfordshire) on 25th, at St Catherine's Point on 26th and in the South Dukeries (Nottinghamshire) on 30th. A **Golden Oriole** *Oriolus oriolus* was at Kempton Park (Middlesex) on 28th and least 17 **Hoopoes** *Upupa epops* were found from 3rd in Alderney, Scilly, Cornwall, Devon, Pembrokeshire, Somerset, Hampshire, Sussex, Kent, Suffolk, Northamptonshire and Warwickshire. A **Woodlark** *Lullula arborea* at Holkham on 7th was presumably a migrant, and another at Kibworth golf course (Leicestershire) on 20th was the first record for that county for many years. A migrant **Treecreeper** *Certhia familiaris* was at Spurn on 15th and a bird trapped at Sandwich Bay on 4th was thought to be a **Short-toed** *C. brachydactyla*.

Shore Larks *Eremophila alpestris* were still at Minsmere until 5th (twelve), at Lade (Kent) until 12th (two), and all month at Bempton cliffs where the maximum was 27 on 20th. **Fieldfares** *Turdus pilaris*, which were reported in some large flocks and movements, will be dealt with in a later summary.

Savi's Warblers *Locustella luscinioides* were singing at Stodmarsh from 16th and the first was recorded at Minsmere on 17th, four singing there by 30th; one at Portland on 29th was the second Dorset record and the first for the observatory. Other rarities included a **Subalpine Warbler** *Sylvia cantillans* at Lower Bodham, Holt (Norfolk), on 10th; an **Icterine Warbler** *Hippolais icterina* on Gugh (Isles of Scilly) on 29th; single **Tawny Pipits** *Anthus campestris* in Scilly, on St Agnes on 23rd and on St Mary's from 23rd to 28th; and a male **Black-headed Wagtail** *Motacilla flava feldegg* in Nottinghamshire at Holme Pierrepont on 30th (one was also present on Fair Isle from 3rd to 8th May).

A **Waxwing** *Bombycilla garrulus* was at Tynemouth from 22nd to 24th. Migrant **Great Grey Shrikes** *Lanius excubitor* appeared on the Calf of Man on 8th, near Scarborough (Yorkshire) on 16th, at Bempton cliffs on 20th and 21st, on Fair Isle from 28th to 30th, and at Teesmouth where three different individuals were recorded on 4th, 13th and 29th. **Twites** *Acanthis flavirostris* were still present in four places outside their breeding areas, including near Langleeford, well inland in Northumberland, where a flock of about 20 was seen on 11th. A few flocks, mainly rather small, of **Bramblings** *Fringilla montifringilla* were reported, the largest consisting of 300-400 at Astley (Lancashire), and an influx of 90 was noted on Fair Isle on 30th, where there were up to 16 **Snow Buntings** *Plectrophenax nivalis* all month. A **Lapland Bunting** *Calcaeus lapponicus* was at Bempton cliffs on 24th and two were on Fair Isle on 30th. Finally, a **Mealy Redpoll** *A. f. flammea* was identified in Scilly on 29th and a pair of **Serins** *Serinus serinus* were present on Alderney from 13th to at least 24th.

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Volume 67 Number 7 July 1974

257 The White-billed Diver in Britain
David M. Burn and John R. Mather Plates 41-44

297 Contamination of birds with Fulmar oil
Roger A. Broad

Notes

302 Grebes eating bread *M. D. England*

302 Head plumage of female Scaup *P. J. Grant*

303 Bar-tailed Godwit feeding on open heath *G. Summers*

303 Nocturnal feeding by Pied Wagtails in winter
Mr and Mrs Bernard King

304 News and comment *Robert Hudson*

305 April reports *D. A. Christie*

James Williamson-Bell drew the Fulmar (page 301)

Volume 67 Number 8 August 1974



BRITISH BIRDS

EDITORIAL

RARE BIRDS IN GREAT BRITAIN 1973

REASONS FOR RECORD REJECTION

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BRITISH BIRDS

Editorial

Advances in field identification

Ever since B. W. Tucker wrote the field characters sections of *The Handbook* 35 years and more ago, Britain has led the ornithological world in developing both the criteria and the disciplines of field identification. We have not by any means held a complete monopoly: for example, America through Roger Tory Peterson taught us a considerable lesson in visual presentation in the 1950's, and recently Sweden through Lars Svensson, writing primarily for ringers, has stolen a bit of a march in the concise presentation of essential characters. It seems, however, that in terms of sheer effort we in Britain still try the hardest to break the barriers surrounding difficult species or groups. In this respect, the work of several contributors to this journal has been outstanding. Furthermore, the increasing experience and, thus, skill of observers are more and more evident throughout Britain, and nowhere more so than in the files of the Rarities Committee. It therefore seems strange that there are signs of a backlash in observers' opinions on the practicability of further refinements in diagnosis, and of doubt that some of the ground already gained will be held. It is also worrying that the number of observers publishing identification studies has noticeably contracted, while controversies in the field over both bird and bird guide have multiplied. In our view, this is not a healthy situation and a lot of energy is being wasted. Why should this be?

As we have recently pointed out (*Brit. Birds*, 65: 409-410), a large element of potential disservice to observers exists in modern identification guides. We therefore repeat our conviction that, where specific identification is difficult, the last word has yet to

be, indeed may never be, written on many species. The apparent simplification of diagnosis, occasioned so often by the mere physical dimensions of the guides and not by their authors' intents, is a constant danger to the many observers who lack the older, *slower* gospels of identification. This danger exists whenever a guide is opened, but it is at its greatest when attitudes are conditioned by either the hectic race for another 'tick' or by the instant impatience with other observers' opinions that so frequently erupts these days. Improvements in real knowledge have been accompanied by less sharing of it, and the stigmata inflicted upon observers when they make mistakes (and who does not?) can nowadays be severe.

The fine fabric of British identification science is in danger of being carelessly torn instead of constantly, carefully altered. The procession of experts (a title still merited) who have worked on field characters for so many years have commonly exhibited insight, industry and, perhaps most important, openness of mind. Hardly one has not seen some of his studies criticised, even made invalid, by later knowledge, but we should not be blinded by hindsight to the essential value of the attempts, nor downcast that they occasionally fail. The challenge in field identification remains for each individual observer, whatever his generation, and we see no new answer to it. The specious quicksilver of field guides and the random alchemy of observers are poor substitutes for the immutable and hard-won gold of *The Handbook*, and of the papers that have tried to keep the unique promise that it gave to the world.

Report on rare birds in Great Britain in 1973 (with additions for ten previous years)

F. R. Smith and the Rarities Committee

Plates 45-50

This is the sixteenth annual report of the Rarities Committee. The composition of the committee is still D. I. M. Wallace (chairman), F. R. Smith (honorary secretary), D. G. Bell, A. R. M. Blake, P. E. Davis, R. H. Dennis, P. J. Grant, R. J. Johns, R. A. Richardson and Dr J. T. R. Sharrock but, with several retirements pending, consultations are now taking place with other review bodies in order to fill the vacancies that will be created.

The number of records submitted for 1973 was very high, owing mainly to a heavy autumn passage movement, supplemented from Nearctic sources in particular, which followed a spring influx swollen by a record number of about 40 Red-footed Falcons *Falco vespertinus*. The total of over 550 records probably exceeded that in the peak year of 1970, and the difference would have been considerably greater if the large numbers of Richard's Pipits *Anthus novaeseelandiae* then dealt with were taken into account in the comparison. The number of species involved was also a record, reaching a total of 121, compared with 108 in 1972 and 114 in 1971. The acceptance rate continues to be steady and within the range 80-85% that has become regular in this decade.

The main systematic list of accepted records is given on pages 313-340, followed by supplementary accepted records for 1962 (one), 1964 (one), 1965 (two), 1966 (two), 1967 (one), 1969 (three), 1970 (three), 1971 (six) and 1972 (20). Appendix 1 on pages 344-346 lists the 92 rejected records for 1973, while appendices 2 to 8 list a further rejection for 1965, one for 1967, three for 1968, one for 1969, two for 1970, one for 1971 and 12 for 1972. It will be noted from these supplements and appendices that all the outstanding records of White-billed Divers *Gavia adamsii* have now been dealt with (see the paper on this species' status in Britain and its identification in the July 1974 issue). Appendix 9 gives the single accepted record for 1973 of a species in 'category D' of the British and Irish list (see *Brit. Birds*, 66: 332).

The comments on individual species have been prepared by D. I. M. Wallace, with assistance from P. J. Grant and also from Davis W. Finch, a regional editor of *American Birds*, who has provided much useful information on wader passage in north-east America. The accepted Irish records have again been included, but it should be made clear that they have been adjudicated by the Irish Records Panel. All Irish records are published annually in the *Irish Bird Report* (obtainable from S. Cromien, 13 Fingal Place, Prussia Street, Dublin 7), and we express our gratitude to K. Preston, honorary secretary of the Irish Records Panel, for agreeing to our repeating them and for providing advance information. They are given at the beginning of each species comment as before, after the summary (in brackets) of the world breeding range.

Photographs of some of the rarities of 1973 are reproduced on plates 45-50. Observers are again urged to submit any black-and-white prints of rarities for possible publication.

An up-to-date list of the species considered by the committee is given in appendix 10. Copies of the revised 'Unusual Record' form are obtainable free of charge from the address on page 348; observers are encouraged to use this form wherever possible.

The principles and procedure followed in considering records were explained in the 1958 report (*Brit. Birds*, 53: 155-158), and the systematic list is set out in the same way as in the 1972 report (*Brit. Birds*, 66: 331-360). The following points, some of which were outlined more fully in the 1958 report, should be borne in mind, as they show the basis on which this information has been put together:

(i) The details included for each record are (1) county; (2) locality; (3) number of birds if more than one, and age and sex if known (in the case of spring and summer records, however, the age is normally given only where the bird concerned was not in adult summer plumage); (4) if trapped or found dead; (5) date(s); and (6) observer or observers up to three in number, in alphabetical order.

(ii) No record which would constitute the first for Britain and Ireland is published by us, even if we consider it acceptable, until it has been passed by the Records Committee of the British Ornithologists' Union.

(iii) In general, the report is confined to records which are regarded as certain, and 'probables' are not included. In the case of the very similar Long-billed and Short-billed Dowitchers *Limnodromus scolopaceus* and *L. griseus*, however, we are continuing to publish indeterminable records and this also applies to observations of the two pratincoles *Glareola spp* and of such 'difficult' groups as albatrosses *Diomedea spp* and frigatebirds *Fregata spp*.

(iv) The sequence of species, vernacular names and scientific nomenclature follow the British Trust for Ornithology's guide *A Species List of British and Irish Birds* (1971). Any sight records of subspecies (including those of birds trapped and released) are normally referred to as 'showing the characters' of the race concerned.

Duplicated draft lists of the records in this report have again been sent to all the county recorders concerned in England and to the regional recorders in Scotland, Wales and the Isle of Man; proofs have also been approved by the appropriate authorities in Scotland, Wales and Ireland and individually by the members of the committee. This double-checking of the details and improvements in the exchange of information have reduced the likelihood of discrepancies between reports of this committee and regional publications. Observers can help by supplying the last dates on which birds are seen.

Problems concerning escapes and introductions have again been dealt with by M. D. England, author of a recent review of this subject (*Brit. Birds*, 67: 177-197); these become more difficult and important each year. The Wildfowl Trust has continued to help with advice on wildfowl escape and identification problems, while Derek Goodwin has advised on a number of problems that have involved museum research, under the arrangement made with the British Museum (Natural History).

The committee is most grateful to the many individuals and organisations whose co-operation has made the publication of this report possible. All records should continue to be addressed to F. R. Smith, 117 Hill Barton Road, Exeter, Devon EX1 3PP.

Systematic list of records accepted

White-billed Diver *Gavia adamsii*

Wyrshire: Cumbrac, adult ♀, found shot, 27th January (S. J. Gorzula *per* C. J. Libby); specimen temporarily in collection of J. R. Mather.

Corkshire: Hornsea, first-winter, found dead, 8th December (D. T. Ireland, *per* R. Lowe, *per* A. M. Taylor); specimen in collection of J. R. Mather.

(Arctic Russia, Siberia and Alaska) These are the first of 15 accepted records published in this report (see also pages 340-342). The committee is indebted to David M. Burn and John R. Mather for their thorough review of these and all other past records (see *Brit. Birds*, 67: 257-296, plates 41-44). Reference to this paper is essential if the identification of large divers is to be safely achieved.

Albatross *Diomedea sp*

(Southern oceans) None off Britain, but one off Cape Clear Island, Co. Cork, on 17th May was about the 32nd ever.

Cory's Shearwater *Calonectris diomedea*

Argyll: Islay, 19th August (K. Verrall).

Devon: Sidmouth, 3rd May (P. Clement).

Hampshire: St Catherine's Point, Isle of Wight, 3rd May (D. B. Wooldridge).

Sicily: 6½ km off St Mary's, three, 8th September (M. A. Brazil, T. A. Walsh).
St Mary's, 12th October (B. Bland, P. J. Milford).

Southerland: about 35 km north-west of Point of Stoer, 4th October (A. C. Macleod).

Worshshire: Spurn, 25th August (F. J. Walker).

(East Atlantic and Mediterranean) Also eleven off Cape Clear Island, Co. Cork, on 5th August, and singles there on 6th, 9th and 21st August; and five off Cork Harbour on 9th August. This was the ninth consecutive year yielding spring records.

Little Shearwater *Puffinus assimilis*

(Atlantic south from Madeira and Caribbean, and southern Pacific and Indian Oceans) Singles off Cape Clear Island, Co. Cork, on 6th June and 21st August, and two there on 10th August. These are the first since 1968 and bring the all-time total to about 40. The three autumn birds were almost simultaneous with Cory's Shearwaters at Cape Clear Island and Cork Harbour.

Frigatebird *Fregata sp*

(Tropical and sub-tropical seas) None around Britain, but one off Cape Clear Island, Co. Cork, on 24th August. Birds of this genus have been acceptably recorded twice off Britain (in July 1953 and August 1960), but this is the first for Ireland. The only specific identification has been of the Magnificent Frigatebird *F. magnificentis*.

Purple Heron *Ardea purpurea*

Bedfordshire: Caddington, adult, found shot, August (*per* C. Banks, P. F. Bonham).

Dumfriesshire: Hightae Loch, 27th May (A. Goodwin, R. T. Smith).

Essex: Orsett, immature, 26th May (S. G. F. and Mrs C. Y. Davies).

Hampshire: Sandown, Isle of Wight, adult, 17th June (S. Downes, D. C. Lang).

Kent: Stodmarsh, adult, 29th April (J. D. Fearnside, J. N. Hollyer, M. G. Wells *et al.*). Murston, adult, 20th May (R. Smith). Dungeness, 29th July (J. R. H. Clements).

Suffolk: Minsmere, adult, 27th April to 9th May and 19th May to 18th June; immature, 11th to 24th June; five immatures in morning of 24th July and two in evening (H. E. Axell, G. Cornford, A. Diebel *et al.*).

Sussex: Glynde Reach, adult, 28th May (D. C. Lang, P. J. Wilson *et al.*).

(South-central Eurasia, north to Netherlands, and Africa) The spring and early summer records are unexceptional, but the events of 24th July were almost without precedent for a single locality (even Minsmere, which has long attracted this species). Since 1958 at least 150 individuals have been recorded in Britain, but only two in Ireland.

Little Egret *Egretta garzetta*

Caernarvonshire: Pwllheli, 21st May (P. R. Barnett).

Carmarthenshire: Ferryside, 21st May (T. A. W. Davis).

Devon: River Taw, the one recorded from 18th November 1972 (*Brit. Birds*, 66: 334) was last seen on 21st February (D. Price).

Kent: Cliffe Pool and Marshes, 23rd June (T. E. Bowley, R. F. Hutchings, L. F. Woollard *et al.*). Medway estuary, 26th to 30th August (J. F. Holloway *et al.*).

Lincolnshire: Holbeach Marsh, 3rd June and 29th July (D. Buck, W. Walker, P. N. Watts). North Killingholme, 6th to 17th June (K. Atkin, P. Haywood, G. M. Roberts *et al.*).

Orkney: Sandwick, 18th to 27th May (E. Balfour, C. J. Booth, G. Wylie *et al.*).

Pembrokeshire: Martin's Haven, the one first recorded on 20th November 1972 (*Brit. Birds*, 66: 335) stayed until at least 14th January (J. W. Donovan, B. L. Sagg *et al.*).

Yorkshire: Seamer, Scarborough, 27th May (R. H. Appleby, W. Clark, B. Cockerill *et al.*). Hornsea Mere, 30th May (C. J. Bibby, J. Day, D. T. Ireland *et al.*).

(South Eurasia, Africa and Australia) The small spring influx produced an exceptionally wide geographical scatter, the first bird being surprisingly the farthest north. There is also the hint of one remaining to wander the east coast of England throughout the summer. Since 1958 about 130 have been recorded in Britain and 30 in Ireland. The high incidence of Irish records shows clearly how the approach of this species differs from that of the Purple Heron—this from the south, the other from the east.

Squacco Heron *Ardeola ralloides*

Somerset: Chew Valley Lake, adult, 26th May (A. Ashman, A. Bundy, D. Ladhams *et al.*).

(South Europe, south-west Asia, and Africa) Until 1919, it was this species of southern heron that most frequently reached Britain and Ireland and it was the Purple Heron and Little Egret that were the great rarities. Since 1958, however, no more than nine are known to have appeared.

Night Heron *Nycticorax nycticorax*

Kent: Cottington Court, 27th June (A. J. Greenland).

Leicestershire/Rutland: Eye Brook Reservoir, immature, 17th to 26th November (K. Allsopp, R. E. Cox, C. Towe *et al.*).

Lincolnshire: Boston, immature, 13th to 19th November (B. Kettle, P. Pearson *et al.*) (plate 45a).

(South Eurasia, Africa and the Americas) Surprisingly, only three records of a species that averaged seven individuals annually during 1968-72. The grand total for Britain and Ireland is now over 30.

Little Bittern *Ixobrychus minutus*

Wyrshire: Culzean, ♂, 22nd to 24th May (G. Riddle, M. Wilson).

Devon: Exminster Marshes, ♂, 6th May (R. A. Harding).

Durham: Hurworth Burn Reservoir, ♂, 1st June (A. Wilson, C. Wray).

Inverness-shire: Boat of Garten, ♀, 28th May (Miss H. Dow).

Kent: Westbere, two ♂♂, 6th May (J. N. Hollyer).

Suffolk: Weybourne, ♂, 6th to 10th May (A. J. L. Smith *et al.*).

Northamptonshire: Hollowell Reservoir, ♂, 8th June (C. J. Coe *et al.*).

(West Eurasia, Africa and Australia) After only four records in both 1971 and 1972, the fortunes of this species are restored by a widespread spring influx, with three occurrences reflecting the unusual penetration by Little Egrets of northern England and Scotland. As for the last species, the grand total is now over 230.

White Stork *Ciconia ciconia*

Somerset: Paulton, 10th August (A. G. and Mrs A. A. Snelling).

Suffolk: Havergate, 16th and 17th May (R. J. Partridge, P. J. Roberts *et al.*).

(Central and south Europe, south-west Asia and north-west Africa) Although exceptionally numerous in 1967, 1971 and 1972, in the other 13 of the last 16 years the annual average has been only one. The grand total must now be about 140 (nearly one-third in the last three years), but none has reached Ireland since 1909.

Glossy Ibis *Plegadis falcinellus*

Yorkshire: Spurn, 13th August (B. Banson, A. Butler, B. R. Spence *et al.*); Vath Ings, 22nd August (C. Needham).

(Cosmopolitan but very local, nearest breeding colonies in Balkans) Although the two localities are some 135 km apart, it is reasonable to suppose that these records refer to the same individual. It has become

unusual for this declining species to occur in consecutive years and, as in 1972, the date is exceptionally early in autumn (most have been during September-December). These are only the twelfth and thirteenth records (involving probably nine individuals) since 1958.

Green-winged Teal *Anas crecca carolinensis*

Drakes showing the characters of this North American race of the Teal were recorded as follows:

Durham: Hurworth Burn Reservoir, 23rd December to 28th January 1974 (M. A. Blick, P. T. Salmon *et al.*).

Inverness-shire: Struy, 7th June (M. I. Harvey). Longman Bay, 12th December (R. H. Dennis).

Orkney: Eynhallow, 2nd November (M. A. Macdonald).

Ross-shire: Dalmore, Alness, 10th February to 3rd March (A. R. Mainwood).

Yorkshire: Gouthwaite Reservoir, 10th February to 4th March (F. A. Wardman *et al.*); this is the fifth successive year that presumably the same drake has been seen here.

(North America) Also single birds on the North Bull, Co. Dublin, on 18th October and at Kilcolman Wildfowl Refuge, Co. Cork, on 28th December.

Blue-winged Teal *Anas discors*

Orkney: Stronsay, two ♂♂, both shot, 5th September (*per* A. Allison, R. Zawadzki *et al.*).

American Wigeon *Anas americana*

Durham: Seal Sands, Teesmouth, ♂, 4th December (R. Wakely).

Kinross-shire: Loch Leven, ♂, 8th June to 6th August (A. Allison).

London: Surrey Docks, ♂, 29th August (R. Alderton).

Outer Hebrides: North Uist, ♂, 23rd April to 1st June (P. Coxon *et al.*).

Perthshire: Carsebreck, ♂, 24th March (Dr D. M. Bryant).

Shetland: Haroldswick, Unst, ♂, 16th to 24th May (G. Bundy, M. Sinclair).

(North America) Also a pair at Akeragh Lough, Co. Kerry, on 25th February which were the first to reach Ireland since 1969. The April-June birds were only the sixth, seventh and eighth in those months since 1958. The total number recorded in Britain and Ireland is now about 71, over two-thirds since 1958.

Ring-necked Duck *Aythya collaris*

Buckinghamshire: Marlow gravel pits, the ♂ recorded from 17th December 1972 (*Brit. Birds*, 66: 337) stayed until 15th July and was seen again from 16th December until 17th April 1974 (R. E. Youngman *et al.*).

Devon: Beesands Ley and Slapton Ley, ♂, presumed to be the bird recorded each year since 1970 (*Brit. Birds*, 66: 338), from 20th December 1972 until 18th March, from 7th to 22nd April, on 2nd June and from 25th October to the end of the year (M. R. Edmonds, D. G. Warman *et al.*).

Somerset: ♂, presumed to be the bird recorded in 1971 and 1972 (*Brit. Birds*, 66: 338), at Blagdon Reservoir, Cheddar Reservoir and Chew Valley Lake from 16th March to 4th June and from 28th August to 4th October (A. H. Davis, B. Rabbits, K. E. Vinicombe *et al.*).

(North America) The astonishing loyalty to past localities continues, and still not a female in sight!

Surf Scoter *Melanitta perspicillata*

Northumberland: Bamburgh, ♂, 25th October to at least 10th February 1974 (A. J. P. Gloth, M. Henry *et al.*).

(North America) Long stays are not unusual in this Nearctic sea-duck, but this is the first on the east coast of England since 1961.

Steller's Eider *Polysticta stelleri*

Outer Hebrides: South Uist, the ♂ recorded in 1972 (*Brit. Birds*, 66: 338) stayed throughout 1973 and until at least June 1974 (R. Jones, Mrs M. E. Lacey, J. O'Sullivan *et al.*) (plate 48).

King Eider *Somateria spectabilis*

Ayrshire: ♂, presumed to be the bird recorded in 1971 and 1972 (*Brit. Birds*, 66: 338), at Barassie on 10th March (W. R. Brackenridge, I. H. Leach), Skelmorlie from 15th April into May (W. W. Wardrop) and Ballantrae from 8th to 14 July (W. R. Brackenridge, M. E. Castle, R. H. Hogg *et al.*).

Buteshire: Great Cumbrae, ♂, 29th May (D. M. Bryant), presumed to be the Ayrshire bird.

Caithness: Holborn Head, two ♂♂, 18th October, one to 31st December (L. P. Alder, Mrs P. M. Collett *et al.*).

Shetland: Walls, ♀, 25th February (D. Coutts, I. Sandison). Cliff Sound/Trondra, ♂, 11th March to 6th May, 13th November to 31st December (D. Coutts, P. K. Kinnear *et al.*). Gulberwick, ♀, 1st to 3rd April (D. Coutts, Dr B. Marshall, J. Spriggs). Ulsta, Yell, immature ♂, 8th to 17th May (D. Coutts, R. J. Tulloch). Mangaster Voe and Muckle Roe, ♂, 1st to 7th June (P. H. Rathbone). Fair Isle, ♂, 15th and 16th September (R. A. Broad, D. J. Holman, N. Riddiford *et al.*). Cunningsburgh, ♂, 10th November (W. Johnson, P. K. Kinnear).

Sutherland: Loch Fleet, ♂, 17th November to at least May 1974 (J. and G. Bell, D. Macdonald).

(Circumpolar Arctic) The trends to greater numbers and more southerly occurrences continue. Just how many birds are involved it is difficult to judge, but 14 records make an impressive showing. That two should feature females is noteworthy, too; since 1958 only two others have been recorded. The grand total of individuals now stands at 95 or thereabouts.

Lesser White-fronted Goose *Anser erythropus*

Gloucestershire: Slimbridge, adult, 2nd December to at least 23rd February 1974 (L. P. Alder, M. A. Ogilvie, Sir P. Scott *et al.*). A small goose seen flying over Chalford, Gloucestershire, in company with 15 White-fronted Geese *A. albifrons* on 28th November, and heading for Slimbridge, was very probably the same bird.

(North-east Europe and Siberia) It is sad that changes in the winter status of the European White-front *A. a. albifrons* and the Bean Goose *A. fabalis* seem to have influenced the appearances of this beautiful bird. From 1954 to 1960 it came regularly to south-west Scotland, and from 1949 to 1967 to Norfolk, but since 1968 there have been only three away from Slimbridge, and one of those (in Carmarthenshire in 1971) was thought to have come from there. This bird brings the total of British identifications to about 90 individuals. There is one Irish record, in Co. Wexford in 1969.

White-tailed Eagle *Haliaeetus albicilla*

Cornwall: Nare Head and Fal River area, last two weeks of December (P. A. Maker, B. Mallow, P. R. G. Marriott *et al.*).

(South Greenland and Iceland, then east from Norway and eastern Europe to Pacific) Also one shot at Garrison, Co. Fermanagh on 11th January. The first to reach Britain and Ireland since 1962. This increasingly rare eagle was once resident, last breeding in Scotland in 1916.

Gyrfalcon *Falco rusticolus*

Aberdeenshire: Glen Tanar, found dead, 18th April (N. Picozzi).

Argyll: Tiree, 27th to 31st December (Dr J. M. and I. L. Boyd).

Caithness: Berriedale Water, 2nd April (M. R. M. Leslie, R. Low, C. McKenzie).

Off Outer Hebrides: immature ♂ landed on trawler about 65 km west of Outer Hebrides about 16th February, brought into Aberdeen on 21st; released in Shetland 2nd March, seen 11th and 18th March by D. Coutts and R. J. Tulloch (R. H. Dennis, N. Picozzi *et al.*).

Shetland: Fair Isle, 22nd April (R. A. Broad).

(Circumpolar Arctic) As in 1972, an above-average showing of this impressive raptor. At least 40 have been seen since 1958; from that year to 1965 November-January records made up eleven out of a total of 18, but over the last 16 years as a whole those from March to May have grown to nearly half of the total.

Red-footed Falcon *Falco vespertinus*

Ayrshire: Colmonell, ♀, 16th and 17th July (I. H. Leach).

Berkshire: Earley, Reading, ♀, 6th June (T. A. Guyatt).

Derbyshire: Chelmorton, ♀, 28th May (Mr and Mrs Dean).

Devon: Hartland Forest, ♀, 28th May (D. G. Gilbert).

Essex: East Tilbury, ♀, 29th July (D. Martin).

Fife: Isle of May, ♀, 19th May (J. H. B. Munro).

Glamorgan: Kenfig Pool, ♀, 20th to 31st May (P. G. Lansdown, J. R. Smith, C. Stockton *et al.*).

Gloucestershire: Frampton-on-Severn, ♂, 25th May (J. R. Hunter). South Cerney, ♀, 30th May (D. V. Mardle).

- Hampshire:** New Forest, ♂, 25th May to at least 23rd June, ♀, 7th to 16th June (D. F. Billett, P. J. Curry, J. H. Taverner *et al.*). Farlington, ♀, 5th and 6th June (D. F. Billett, A. N. Williamson *et al.*).
- Kent:** Sandwich Bay, ♀, 26th May (J. N. Hollyer). Dungeness, ♀, 26th to 28th May (J. Dixon, K. Redshaw *et al.*). Harty, Isle of Sheppey, immature, 18th and 19th August (T. E. Bowley, J. Francis, C. E. Wheeler *et al.*).
- Lancashire:** Ainsdale, ♂, 20th May (W. J. and W. D. Clift, L. McCoskery *et al.*).
- Lincolnshire:** Keelby, ♀, 26th May (D. C. Hodgson).
- Norfolk:** Burnham Overy, ♀, 20th May (J. A. W. Moyes); Holme, ♀, 21st May; ♀, 12th July (P. R. Clarke). Salthouse, ♀, 26th May (M. A. Blick, W. E. Fletcher, P. T. Salmon).
- Northumberland:** Lynemouth area, immature ♂, 14th June to 21st September (D. T. Metcalfe *et al.*).
- Nottinghamshire:** Colwick, ♂, 31st May to 6th June (M. C. Powell, N. R. Stocks, K. Thornton *et al.*).
- Outer Hebrides:** Benbecula, ♂, 16th to 21st June (Dr I. T. and Mrs M. M. Draper).
- Shetland:** Whalsay, ♀, 17th June (J. H. Simpson). Tresta, ♂, 26th June to at least 4th July (D. Coutts, Dr B. Marshall, I. Sandison).
- Somerset:** Barrow Gurney Reservoir, ♂, 4th October (D. Buffery).
- Staffordshire:** Cannock Chase Reservoir, ♂, 28th May to 6th June (A. R. M. Blake, R. A. Hume *et al.*).
- Suffolk:** Walberswick, ♀, 30th May (F. K. and Mrs A. E. Cobb, Miss A. J. Towns). Minsmere, ♂, 31st May to 8th June, immature ♂, 9th to 16th June, ♂, 1st to 13th July, ♂, 1st to 5th September (H. E. Axell, S. C. Joyner, P. J. Makepeace *et al.*).
- Sussex:** Beachy Head, ♂, 10th May (J. F. Cooper); ♂, 1st June (P. Brown). Rye, 13th June (D. L. Brown).
- Sutherland:** Meikle Ferry, Dornoch, ♂, 1st May (F. E. Provc).
- Wiltshire:** Tilshead, ♀, 1st and 2nd June (F. Mavrogordato, G. L. Webber *et al.*).
- Yorkshire:** Spuru, ♀, 23rd to 26th May (S. Lister, B. R. Spence, S. J. Weston *et al.*); ♂, 2nd June (J. Cudworth, J. C. Lidgate, D. Smith *et al.*); ♂, 9th June (J. Cudworth, P. Delaloye, C. Massingham *et al.*). Hornsca Mere, ♂, 14th June (D. T. Ireland). Knaresborough, immature, 27th August (J. R. Mather, P. T. Treloar).

(East Europe and south from Siberia) Although this insectivorous falcon has been an expected spring and early summer vagrant for many years, this influx was on an entirely new scale (both numerically and geographically). About 40 birds in 24 counties completely eclipses the previous record numbers of 1959, 1961, 1967 and 1969. The spring arrivals were also remarkable in that most females came earlier than males and outnumbered them. Both sexes went farther north than usual, with twelve records from north of the Humber.

Lesser Kestrel *Falco naumanni*

Glamorgan: Vale of Neath, 7th November (P. G. Lansdown).

Staffordshire: Cannock Chase Reservoir, 4th November (A. R. M. Blake).

Sussex: Stcyning, 4th November (C. E. Messer).

(South Europe, west-central and east Asia and north-west Africa) This astonishing trio confirms the trend over the last five years for this small falcon to appear in late autumn. This is not new, however, since four of the 13 before 1969 were also in October or November. The Staffordshire record is particularly noteworthy in being the only one in an inland county in a total of 17 records, all in Britain except one in Ireland.

Crane *Grus grus*

Middlesex: Greenford, 3rd June (A. J. L. Smith).

Shetland: Foula, 2nd and 3rd June (R. Furness, J. Vernal).

(North and central Eurasia, locally south to Turkey) Not since 1964 have there been no more than two records in a year.

Sora Rail *Porzana carolina*

Scilly: St Agnes, immature, 26th September to 9th October (A. R. and B. R. Dean, D. Smallshire *et al.*).

(North America) This is the first since 1920 and only the sixth ever. Full details, plus a short review of immature crake identification, will be published shortly.

Little Crake *Porzana parva*

Scilly: St Agnes, adult ♂, 9th October (D. I. M. Wallace).

Suffolk: Minsmere, 27th September (E. Hosking).

(Central and east Europe and west Asia) The first since 1970. The 19 records since 1958 fall into the historical pattern of spring and autumn vagrancy and rare winter discoveries. The grand total for Britain and Ireland is now about 86.

Sociable Plover *Vanellus gregarius*

Hampshire: Brighstone/Atherfield, Isle of Wight, 6th October (J. Pain *et al.*).

(South-east Russia and west-central Asia) Only the 13th record of this rare plover, all August-December apart from one in January, one in April and one in July.

Lesser Golden Plover *Pluvialis dominica*

Scilly: St Mary's, 20th to 25th September (R. P. Bowman, D. B. Hunt *et al.*); St Mary's and St Agnes, two, 28th September to 15th October, one staying to 20th October (P. D. Hyde, E. G. Phillips *et al.*).

Somerset: Steart, 23rd and 24th September (A. H. Davis, R. H. Ryall, K. E. Vinicombe).

(Arctic North America and north-east Asia) These records constitute the first 'group arrival' of this species to Britain and Ireland. The long, presumably recuperative stay of the later birds in Scilly (both undoubtedly of the nominate American race) echoed those of the 1962 individual there and of the first 1971 Cornish bird. Singly or together, they roosted on St Mary's and commuted daily to and from St Agnes.

Long-billed Dowitcher *Limnodromus scolopaceus*

Cornwall: Marazion Marsh, 25th September to 6th October (J. B. and Mrs S. Bottomley *et al.*) (plate 46).

Somerset: Porlock Marsh, 29th September to 26th October (E. S. Clare, J. D. Sanders, B. W. Thomas *et al.*) (plate 47).

Dowitcher *Limnodromus scolopaceus* or *L. griseus*

Argyll: Loch Riddon, 5th April (E. Hutchison).

Hampshire: Stanpit Marsh, Christehurch, 2nd and 3rd December (M. J. Arnold, C. I. Husband).

Kent: Sandwich Bay, 22nd September to 11th October (D. M. Batchelor, G. Halliwell *et al.*).

Shetland: Fair Isle, 20th and 21st September (G. J. Barnes, A. Parker, P. Sellar *et al.*).

Yorkshire: Bolton-on-Swale, 31st January (G. D. Moore).

(North America) The September arrival of the two Long-billed and two of the unidentified dowitchers within the same twelve-day period as the four Lesser Golden Plovers above and eight of the Buff-breasted Sandpipers *Tryngites subruficollis* on page 324 is striking, as is the high total for 1973 of seven dowitchers. There was none in Britain in 1972 (and none in Ireland in the year under review).

Stilt Sandpiper *Micropalama himantopus*

Essex: Walton-on-the-Naze, 2nd September (M. Hutchings, J. K. Weston).

(North America) The eleventh record for Britain and Ireland, for once associated with the simultaneous arrival of other American waders.

Great Snipe *Gallinago media*

Nottinghamshire: Hoveringham, 30th and 31st March (K. Corbett, D. H. and Mrs Y. M. Tyldesley *et al.*).

Scilly: St Martin's, 21st October (R. V. A. Marshall).

Shetland: Out Skerries, 20th to 27th September (I. S. and Mrs S. Robertson).

(North-east Europe and north-west Asia) These three bring the total since 1958 to 30 (the figure in the last report should have been 27), but the grand total for Britain and Ireland is over 200. No change in the pattern of occurrence or in the difficulty of identification is apparent.

Upland Sandpiper *Bartramia longicauda*

Yorkshire: Bolton-on-Swale, 6th August (G. D. Moore).

(North America) An exceptionally early record of a species normally to be looked for *after* the arrival of Buff-breasted Sandpipers; with a growing number of other American wader records 'out of season', it again prompts the thought of vagrant unmated adults an ocean away from home. The twelfth in Britain and Ireland since 1960, it brings the all-time total to 27.

Spotted Sandpiper *Tringa macularia*

Glamorgan: Oxwich, 27th August to 4th September (M. Davies, P. G. and Mrs C. M. Lansdown *et al.*).

(North America) This species missed a year in 1972. This is the 21st to reach Britain; only one has been identified in Ireland.

Lesser Yellowlegs *Tringa flavipes*

Hampshire: Pennington Marshes, 18th September (R. Dunn, E. J. Wiseman).

Lincolnshire/Norfolk: Wisbech sewage farm, 11th October (B. W. Jarvis).

Northamptonshire: Ditchford gravel pits, 9th and 10th May (R. W. Bullock *et al.*).

Silly: Tresco, 2nd to 17th September (D. B. Hunt, I. J. and M. G. Ibbotson *et al.*).

Yorkshire: Seamer sand and gravel pits, 27th May and 5th June (R. H. and Mrs A. M. Appleby, B. Cockerill *et al.*).

(North America) Also four at Akeragh Lough, Co. Kerry, on 6th August, declining to three from 7th to 11th and to two from 12th to 15th. With several records of wintering in Europe and Africa, March-May occurrences are less surprising than formerly and now total nine since 1958. This species has occurred over 100 times in Britain and Ireland.

Terek Sandpiper *Xenus cinereus*

Devon: Plym estuary, 17th November to 5th May 1974 (P. F. Goodfellow, R. Smaldon *et al.*).

Kent: Sandwich Bay, 20th May (D. M. Batchelor, C. K. Dunkley, T. Fox *et al.*).

(North-east Europe and Siberia) With only eight previous records, two in one year is exceptional. Even more remarkable is the wintering of the Devon bird (on which a note will be published shortly). The spring migrant occurred during the 16-day period spanned by the 1963, 1969 and 1972 individuals. We are tempted to assume that some of the small Fenno-scandian population has begun to migrate through western Europe and it will be fascinating to see if more recur.

Baird's Sandpiper *Calidris bairdii*

Kent: Bough Beech Reservoir, 22nd and 23rd September (B. Bland, C. Slade).

Somerset: Porlock Marsh, 15th September (J. Cantelo).

Sussex: Arlington Reservoir, 11th to 18th September (P. J. Wilson *et al.*).

(Extreme north-east Siberia and North America) Also one at Swords, Co. Dublin, from 4th to 6th October. Four in a year is about the average for the past decade and the dates are typical. At least 47 are known to have reached Britain and Ireland.

White-rumped Sandpiper *Calidris fuscicollis*

Cheshire: Weaver estuary, two, 9th to 11th August (Dr R. J. Raines), one staying to 19th, perhaps 27th (Dr J. N. Yates *et al.*).

Durham: Dorman's Pool, Teesmouth, 4th to 14th August (T. J. Francis, G. D. Moore, A. J. Wheeldon *et al.*).

Lincolnshire/Norfolk: Wisbech sewage farm, 28th July to 10th August (K. Atkin, J. A. W. Moyes *et al.*).

Norfolk: Cley, 11th August (S. C. Joyner *et al.*). Thornham Harbour, 24th October (B. L. Sage).

Orkney: Cleat, Sanday, 23rd July (D. Lea). Dcerness, 28th October (C. J. and C. M. Booth).

Shetland: Grutness, 7th to 11th November (D. Coutts, L. Dalziel *et al.*).

Suffolk: Walberswick, 25th July to 1st August (C. R. Naunton, J. Shackles *et al.*) (plate 49b). Minsmere, 30th and 31st August (H. E. Axell, M. Tasker, R. Tooth *et al.*).

(North America) Also one at Akeragh Lough, Co. Kerry, from 17th to 22nd October, and one in the Bann estuary, Co. Londonderry, from 27th to 30th October. An interestingly varied set of records of a species that has become the third commonest American wader in Britain and Ireland, having overtaken the Lesser Yellowlegs in the last three years. Although a wide temporal scatter has been noted in several years, the seven between 23rd July and 11th August set a new puzzle to which vagrant unmated adults again give the readiest answer.

Sharp-tailed Sandpiper *Calidris acuminata*

Flintshire: Shotton, 14th to 24th October (C. D. N. Johnson, J. D. Venables, G. A. Williams *et al.*) (plate 50 and see pages 351-352).

Merioneth: Morfa Harlech, 14th and 15th October (P. Hope Jones).

(North-east Siberia) Also one at Ballycotton, Co. Cork, on 30th August, the first for Ireland. Three in one year break all previous conceptions of the status of this species. The earlier records number only eight, and even the mass rarity-searching of recent years has produced only three since 1961. The Welsh birds came later than any others. Before it is assumed that these vagrants came westwards from Siberia by way of Europe, it should be noted that several reached the Atlantic coast of North America during the autumn.

Western Sandpiper *Calidris mauri*

Devon: Axmouth, 9th to 12th September (B. J. Mathews, D. E. Paull *et al.*).

Essex: Rainham, 21st to 23rd July (K. Noble *et al.*).

(North-east Siberia and Alaska) These two records, only the second and third for Britain (the first since 1956), bring the total for Britain and Ireland to five. The Rainham bird showed partial breeding plumage and its arrival was clearly associated with the early White-rumped Sandpipers above. It is likely that this species crossed the Atlantic on other occasions in 1973, since it was also reported from Brittany and Portugal. Significantly, Western Sandpipers were unusually common in north-east America during the autumn; concentrations of up to 100 were noted in September in Massachusetts, where the passage was the largest for many years.

Buff-breasted Sandpiper *Tryngites subruficollis*

Cornwall: Stithians Reservoir, four, 8th to 16th September (Reverend J. E. Beckerlegge, H. P. K. Robinson, L. P. Williams *et al.*).

Devon: Lundy, two, 2nd September (J. N. Dymond, Miss D. B. Ogden); one, 7th (M. Rogers); two, 19th September (C. J. Cornell, Miss G. Crouch).

East Lothian: Aberlady Bay, 7th to 9th September (H. Galbraith, W. Wyper, B. Zonfrillo *et al.*).

Fife: Tentsmuir, 30th September (Dr D. M. Bryant).

Flintshire: Shotton, trapped, 18th to 28th October (M. Jones, Dr R. J. Raines, Dr J. N. Yates *et al.*) (plate 49c).

Lancashire: Cockerham, 31st August and 1st September (K. E. Hague).

Man: Calf of Man, 17th September (R. J. Haycock, M. Wright).

Norfolk: Cley, 1st to 19th September (M. R. Alibone, P. Campbell, R. A. Richardson *et al.*).

Scilly: St Agnes, 19th September (Miss E. Culwick, N. J. Phillips). St Mary's, two, 23rd September (A. R. Dean, P. D. Hyde *et al.*).

Shetland: Fair Isle, 21st September (R. A. Broad, D. J. Holman, N. Riddiford *et al.*).

Somerset: Blagdon Reservoir, 15th to 21st September (A. H. Davis, K. E. Vinicombe *et al.*). Steart, 25th September to 4th October (G. P. Threlfall, M. G. Wilson *et al.*). Chew Valley Lake, 3rd October (D. Buffery).

Sussex: Camber, 6th September (Dr J. and Mrs M. J. Comyn).

(North America) Also one at Akeragh Lough, Co. Kerry, on 7th September. Once again a remarkable influx, these 18 records involving about 23 birds being on a par with the totals for 1970 and 1971. The first arrivals were most striking, the ten days from 31st August producing birds in seven counties east to Sussex and Norfolk and north to East Lothian. As in 1972 there was a late October record, exceptional in recent years. About 150 individuals have now been recorded in Britain and Ireland, and this has become the second commonest Nearctic wader in western Europe (the Pectoral Sandpiper *C. melanotos* being the most frequent). Once again the backcloth of passage in North America in autumn 1973 is of significance: at least 45 reached Atlantic Canada from 20th August, and a similar number in the north-eastern United States in September included one group of 18.

Broad-billed Sandpiper *Limicola falcinellus*

Dorset/Somerset: Sutton Bingham Reservoir, 5th and 6th September (A. Bundy, B. J. Mathews, D. E. Paull).

Durham: Washington, 25th May (B. Clasper, J. Percfitt, B. Unwin).

Norfolk: Cley, 28th to 31st May (W. E. Fletcher, D. Smallshire, M. Turton *et al.*).

Suffolk: Minsmere, 16th to 19th May, another 22nd May (H. E. Axell, P. J. Makepeace, R. Pratt *et al.*).

(North Eurasia) Once, like the Great Snipe, dogged by confusion with a common species and considered rare, the clouds over

this wader seem to be dispersing. Five is the most ever in one year. The May dates closely match those of 1972 (and those of Terek Sandpipers in recent years). There have now been 22 since 1958 and about 46 altogether.

Black-winged Stilt *Himantopus himantopus*

Surrey: Englefield Green, 10th October (S. G. Wilson).

(Southern Eurasia, Africa, Australasia and the Americas) This highly specialised wader remains an erratic vagrant, not overshooting in the now regular manner of many Mediterranean species. This is the 33rd record since 1958.

Wilson's Phalarope *Phalaropus tricolor*

Lancashire: Freckleton, 4th to 9th October (M. Jones, H. Shorrocks, P. H. Smith *et al.*).

Norfolk: Cley, 21st October (A. G. Duff *et al.*).

Shetland: Lerwick, 14th to 21st September (D. Coutts, M. R. Lawn, G. Robertson *et al.*).

Yorkshire: Spurn, 27th September (A. O. Aitken, B. R. Spence, R. A. Williams *et al.*).

(North America) Four is now about the average. As in 1972, the association of latitude and date suggests one or two birds moving south through Britain; when the other American wader records are considered however, all four could have been direct arrivals. Once again the number reaching Atlantic North America was high. (It may be noted here that Shetland was reached by four species of Nearctic waders in 1973, a very unusual circumstance.)

Collared Pratincole *Glareola pratincola*

Caithness: Loch of Mey, 4th August (S. Laybourne).

Cornwall: Hayle Kimbro, Lizard, 29th and 30th May (B. Cave).

Durham: Washington, 17th June (J. Perfitt *et al.*).

Glamorgan: Penclawdd, 27th May (R. J. and Mrs M. J. Howells).

Lincolnshire: Gibraltar Point, 21st May (K. Payne, R. B. Wilkinson).

Northamptonshire: Hollowell Reservoir, 14th May (C. J. Coe *et al.*).

Pratincole *Glareola pratincola* or *G. nordmanni*

Lancashire: Chapel Island, Ulverston, 19th August (C. Clapham, J. Sheldon).

(Collared in south Europe, south-west Asia and Africa; Black-winged in south Russia and west Asia) After a year with no pratincoles at all, the Collared made a spirited return, with five overshooting in spring and one or two vagrants in August. The six certain identifications of this species take the total since 1958 to 13 and the all-time total to not more than 44. Black-winged have numbered at least twelve (seven since 1958).

Ivory Gull *Pagophila eburnea*

Caithness: Dunnet Bay, 18th to 23rd December (G. G. Bates, Mrs P. M. Collett, S. Laybourne).

(Circumpolar Arctic) Although still irregular, this gull has appeared in five out of the last seven years. There have now been about 87 records for Britain and Ireland.

Ring-billed Gull *Larus delawarensis*

Glamorgan: Blackpill, adult, 14th to 31st March (M. Davies, R. A. Hume, P. G. Lansdown *et al.*); immature, 3rd to 14th June (D. W. Evans, P. G. Lansdown, K. E. Vinicombe *et al.*); adult, perhaps the March bird, 5th December to 2nd April 1974 (R. A. Hume, D. K. Thomas, K. E. Vinicombe *et al.*).

(North America) The first records of this close relative of the Common Gull *L. canus*. Its occurrence had long been suspected, but it took a small group of very painstaking observers to prove it. Papers examining the problems of identification and detailing the first two records have been published by P. J. Grant, R. A. Hume and K. E. Vinicombe (*Brit. Birds*, 66: 115-118, 509-517).

Bonaparte's Gull *Larus philadelphia*

Sutherland: Scourie, immature, 7th June (R. W. Byrne, C. J. Mackenzie-Grieve).

Yorkshire: Flamborough Head, immature, 13th September (D. I. M. Wallace).

(North America) The Scourie bird takes the total of Scottish records to four. The Yorkshire one, the second for that county, appeared during a widespread influx of American waders. This delightful small gull, in many ways the ecological sibling of the Black-headed Gull *L. ridibundus* in North America, continues its recent series of occurrences; since 1967 these have been annual and have totalled 14 out of 28 in all.

White-winged Black Tern *Chlidonias leucopterus*

Aberdeenshire: Ythan estuary, 26th September (M. J. Grigson, A. Parker).

Anglesey: Llyn Maelog, 1st to 3rd July (D. M. F. Cooper).

Devon: Slapton Ley, immature, 25th to 30th September (T. F. Edwards *et al.*).

Essex: Walthamstow Reservoirs, immature, 27th August (J. Fitzpatrick).

Hampshire: Pennington Marshes, immature, 12th and 13th August (R. Dunn, E. J. Wiseman *et al.*).

Kent: Stodmarsh, 31st May (J. N. Hollyer, P. and Mrs M. Larner). Harty, Isle of Sheppey, immature, 18th and 25th to 30th August (C. E. Wheeler, R. V. White, L. F. Woollard *et al.*). Dungeness, immature, 29th and 30th September (S. D. Housden, K. Redshaw).

Lancashire: near Lancaster, 21st to 29th June (K. E. Hague, B. Townson).

Lincolnshire: Gibraltar Point, two 24th May (K. and Mrs D. E. Payne); 1st September (T. Gill, K. and Mrs D. E. Payne *et al.*).

Norfolk: Cley, immature, 1st to 10th October (R. A. Richardson *et al.*).

Pembrokeshire: Gann estuary, immature, 31st August (K. J. S. Devonald).

Shetland: Fair Isle, 10th June (R. A. Broad, J. W. F. Davis, N. Riddiford).

Somerset: Durlcigh Reservoir, 19th September (R. H. Ryall).

Staffordshire: Blithfield Reservoir, 20th and 21st September (P. B. Taylor).

Sussex: Chichester gravel pits, 26th May and 1st June (E. T. W. Kemp, M. Shrubbs, Miss J. V. Stacey). Thorney Island, 11th August (B. A. E. Marr, I. R. Willis).

(South-east Europe, west and east Asia) (Omitted from the report for 1971 was one at Castletownberehaven, Co. Cork, in May.) Noticeably more than in 1972, and once again noticeably widespread. These 19 birds bring the grand total for Britain and Ireland to about 268. In the last two years, spring records have become prominent.

Whiskered Tern *Chlidonias hybrida*

Devon: Slapton Ley, 15th May (N. A. G. Bowden, M. R. Edmonds *et al.*).

Kent: Bough Beech Reservoir, 17th June (G. J. Harris, Mrs E. D. Parrinder).

Somerset: Chilton Trinity clay pit and Durleigh Reservoir, 12th to 14th May (C. F. S. Avent, C. C. Davis, Miss E. M. Palmer *et al.*).

(South Eurasia, north-west, east and south Africa, and Australia) Apart from an exceptional nine in 1970, this species has produced one to three records in twelve of the 16 years from 1958 to 1973. These three birds take the grand total to 52.

Gull-billed Tern *Gelochelidon nilotica*

Devon: Slapton Ley, 9th August (M. R. Edmonds).

Durham: Greatham Creek, Teesmouth, 21st June (G. D. Moore).

Kent: Sandwich and Pegwell Bays, 16th August (P. W. J. Findley, N. J. Langley).

Norfolk: Weybourne, 18th August (C. Johnson, L. Mulford, A. J. L. Smith *et al.*).

Northumberland: Beadnell, 30th June (J. Bacon).

(Denmark, south Europe, south Asia, north-west Africa, Australia and the Americas) Five is above the recent average, and the grand total moves to about 160. The incidence of both spring and autumn records north of the East Anglian coast is increasing.

Caspian Tern *Hydroprogne caspia*

Glamorgan: Blackpill, 19th to 21st August (M. J. Charles, M. Davies, A. Parker *et al.*).

Lancashire: Leighton Moss, 2nd to 10th August (P. Marsh, A. Pickup, J. Wilson *et al.*).

Norfolk: Hickling, 31st July, two from 3rd to 8th August, one to 12th (Dr R. Hornby, M. J. Seago).

Staffordshire: Cannock Chase Reservoir, 14th October (A. R. M. Blake).

Yorkshire: Bolton-on-Swale, 24th and 25th April (W. and Mrs E. Hallett, G. D. Moore *et al.*). Bempton, 18th July (S. C. Madge).

(Baltic, south-east Europe, south-west and south-east Asia, Africa, Australia and North America) Another average showing of this huge tern. The grand total now exceeds 100, 69 since 1958.

Rufous Turtle Dove *Streptopelia orientalis*

Cornwall: Lands End, 5th October (D. I. M. Wallace).

(Most of Asia, except far north) This is only the fourth ever. A note on the occurrence is published on pages 352-354; it includes comment on the possibility of confusion with the Turtle Dove *S. turtur*.

Great Spotted Cuckoo *Clamator glandarius*

Cornwall: Gwithian, 27th May to 1st June (G. D. Dixon *et al.*) (plate 45b).

(South Europe, south-west Asia and Africa) The sixteenth record for Britain and the latest of the nine in spring.

Yellow-billed Cuckoo *Coccyzus americanus*

Hampshire: Chewton Glen, Highcliffe, 20th October, found dead on 22nd (M. Banks, R. Jones, M. J. Stewart *et al.*).

(North America) After two in 1971 and none in 1972 this record, typically from the south coast and in late autumn, brings the grand total to about 32.

Scops Owl *Otus scops*

Nottinghamshire: Bestwood, Nottingham, found 28th June, died later on same day (Y. Collington, A. Dobbs, Mrs D. Forshaw *et al.*).

(South Europe, Russia, west Asia and north-west Africa) Only the seventh since 1958, six of these since 1968, and about the 71st in all.

Snowy Owl *Nyctea scandiaca*

Northumberland: North Tyne valley, 18th February to 16th March (W. M. Barr, Dr and Mrs D. Johnson).

Outer Hebrides: a pair remaining from 1972 (*Brit. Birds*, 66: 344) stayed throughout the year (locality withheld) (W. A. J. Cunningham *et al.*). Balranald, North Uist, immature ♂, 17th May to 1st September (P. Coxon *et al.*).

Shetland: Fetlar, two pairs in January and February; two ♂♂ and four ♀♀ in March and April; three or four in May; ♂ mated to two ♀♀: old ♀ laid five eggs and hatched five young, two young were reared but one died in September; young ♀ laid three eggs but deserted 12th to 14th June; two more ♀♀ arrived 6th June; up to five in September, some to December (R. J. Tulloch *et al.*). Fair Isle, immature ♂, 26th March, adult ♂, 9th May (R. A. Broad *et al.*). Unst, 23rd April, immature ♀ in May, two on 1st June, singles 2nd and 14th June (*per* R. J. Tulloch). Noss, ♂, 22nd June (P. K. Kinnear). North Roe, 12th September (*per* R. J. Tulloch).

(Circumpolar Arctic) This was the first year that two females nested on Fetlar, but again breeding success was low. Elsewhere the situation in the Outer Hebrides holds out the promise of further breeding attempts.

Little Swift *Apus affinis*

Denbighshire: Llanrwst, picked up 6th November, kept overnight and released 7th (E. Griffiths).

(Africa, Middle East and south Asia) This is the first of these small swifts to reach Britain, though one was seen in Ireland at Cape Clear Island, Co. Cork, in June 1967. Italy and Malta are the only other European countries north of the African continent to which this species is known to have strayed.

Alpine Swift *Apus melba*

Devon: Lundy, 22nd May to 1st June (J. N. Dymond, M. Rogers, A. M. Taylor *et al.*) (plate 49a). Berry Head, 9th October (Dr L. A. and Mrs M. H. Collins).

Dorset: Portland Bill, 7th October (F. R. Clifton, W. E. Oddie, G. Walbridge *et al.*).

Glamorgan: Lisvane Reservoir, 5th May (P. G. and Mrs C. M. Lansdown, G. L. Roberts *et al.*).

Norfolk: Cley, 30th May (N. V. Allen, A. G. Duff, G. A. Miller).

Pembrokeshire: Ramsey Island, 14th to 25th May (I. J. Ferguson-Lees, J. M. Harrop, P. Hope Jones *et al.*).

Worcestershire: Upton Warren, 6th May (P. K. Dediccoat *et al.*).

Yorkshire: Knaresborough, 27th May (J. L. C. Gandy, J. R. Mather, P. T. Treloar *et al.*).

(South Eurasia, north-west and east Africa) Also one at Great Blasket Island, Co. Kerry, on 4th July. Nine is above the average for this magnificent bird, and for six to occur in one spring month is distinctly unusual; normally its dates show a remarkably random scatter. It is possible that the October birds were one and the same. There have now been 95 since 1958.

Bee-eater *Merops apiaster*

Cornwall: Releath, Crowan, seven, 25th June (Reverend J. E. Beckerlegge); Gwincar, four, 28th June (R. G. Gendall).

Devon: Stoke Gabriel, four, 28th May (J. D. Wallis).

Dorset: Lodmoor, 25th June (P. Toynton).

Glamorgan: Mumbles, seven, 21st June (M. Davies, D. R. Waugh, D. Willis).

Hertfordshire: Stevenage, one, perhaps two, 29th June (P. J. Curry).

Lincolnshire: Gibraltar Point, two, 10th June (K. Payne, R. B. Wilkinson).

Norfolk: Winterton, two, 8th August (I. Loades).

Suffolk: Walberswick, found dead, 15th July (G. J. Jobson); 23rd August (C. Kightley). Havergate, 8th August (T. Gravett).

(South Europe, south-west Asia and north-west Africa) These eleven records of at least 20 birds (depending on the degree of duplication between the Cornish and Welsh parties) in eight counties constitute the most striking influx ever of this beautiful insectivore. Four records per year has been the recent average and in 1972 there were only two (involving three individuals). The eleven or more birds in June arrived significantly later than other southern species, suggesting that they came not as overshooting migrants but as displaced breeders. The three August records (of

four birds) may likewise indicate continuing displacement in northern latitudes. Altogether about 240 Bee-eaters are known to have reached Britain and Ireland (over one in three since 1958).

Roller *Coracias garrulus*

Argyll: Loch Eck, immature, 15th October (T. W. Haynes).

Caithness: Reay, immature, 26th to 30th September (A. F. C. M. and Mrs P. M. Collett, Mr Rowntree).

Norfolk: East Wretham Heath, 27th May (R. A. Hoblyn); Weeting, 28th May (R. P. Bosanquet, P. Naylor, N. J. Redman *et al.*). Wells, 8th to 14th August (P. R. Banham).

(South and east Europe, west Asia and north-west Africa) After only one in the previous two years, these four constitute a welcome return to form. The spring bird appeared during the marked influx of Red-footed Falcons (pages 318-319). The total is now about 176.

Short-toed Lark *Calandrella cinerea*

Midlothian: Musselburgh Lagoons, 16th September (Dr L. L. J. Vick).

Shetland: Fair Isle, 6th to 8th May (R. A. Broad, J. W. F. Davis, N. Riddiford *et al.*); trapped, 27th September to 5th October, two on 6th, three on 7th, two on 8th, one staying to 13th October (G. J. Barnes, R. A. Broad, N. Riddiford *et al.*). Out Skerries, 4th to 10th October (I. S. Robertson *et al.*).

Somerset: Brean Down, 16th June (R. Angles).

Yorkshire: Spurn, 21st September (A. O. Aitken, J. Colmans, R. A. Williams *et al.*).

(South Eurasia, north and east Africa) This small, rather finch-like lark has been appearing in larger numbers since 1967. In the last seven years at least 72 individuals have been recorded and there have been more than twice as many in autumn as in spring. The absence from Scilly is surprising, since it occurred there annually from 1967 to 1972.

Red-rumped Swallow *Hirundo daurica*

Dorset: Portland Bill, 29th July (J. A. Lucas, G. Walbridge).

Glamorgan: Eglwys Nunydd Reservoir, 15th August (P. G. Lansdown).

Hampshire: Hengistbury Head, 12th September (C. I. Husband).

Kent: Stodmarsh, 5th May (D. A. Newson, J. W. T. Reaney, F. A. Sutton *et al.*).

(South and east Eurasia, and Africa) For autumn records to outnumber spring ones is unusual. Significantly, there has been no break in consecutive annual occurrences since 1963, whereas prior to that year there had been only nine records ever. The grand total is now 36.

Short-toed Treecreeper *Certhia brachydactyla*

(Continental Europe south of Baltic, also Asia Minor and north-west Africa) We are still without entirely trustworthy criteria

for the separation of this species from the Treecreeper *C. familiaris*, despite much recent research by workers both in Britain and on the Continent (see, e.g., *J. Orn.*, 113: 287-295; *Vogelwelt*, 93: 201-215). The apparent overlaps in plumage, voice and measurements of the two are truly daunting. Again we ask observers and ringers to take the greatest care with their descriptions of odd treecreepers and must stress in particular the importance of comparative study.

White's Thrush *Zoothera dauma*

Shetland: Fair Isle, immature, trapped, 24th and 25th September (R. A. Broad, R. Dewey, T. Loseby *et al.*).

(Central, east and south-east Asia and Australasia) Although the sixth on Fair Isle, this is no more than the 35th recorded in Britain and Ireland (and only the sixth since 1958). It is another species whose occurrence pattern has not changed in spite of the greatly increased coverage and mass rarity-searching of recent years.

Black-eared Wheatear *Oenanthe hispanica*

(South Europe, south-west Asia and north-west Africa) None in Britain, but one at Great Blasket Island, Co. Kerry, on 14th August is the second Irish record. The grand total now stands at 25.

Thrush Nightingale *Luscinia luscinia*

Shetland: Fair Isle, trapped, 21st May (P. Agland, R. A. Broad, N. Riddiford *et al.*); trapped, 25th to 27th May (D. Bell, R. A. Broad, N. Riddiford *et al.*); trapped, 1st to 3rd June (R. A. Broad, R. A. Richardson, N. Riddiford *et al.*).

(Scandinavia, east Europe and west Asia) Three more displaced members of the southern Scandinavian population bring the all-time total to 22. In spite of the fact that its occurrences are mounting—there had been only one before 1957—this close relative of the Nightingale *L. megarhynchos* is still irregular, having appeared in consecutive years only twice. Yet all 18 spring records are contained within 28 days, the mean date being 19th May.

Cetti's Warbler *Cettia cetti*

Caernarvonshire: Bardsey, 26th to 30th October (D. Henshilwood, H. Miles).

Cornwall: Par, 28th March to 12th April (P. R. Marriott, C. J. Stevens *et al.*).

Kent: many records, including proved breeding at one locality, to be summarised at a later date.

Suffolk: Minsmere, 22nd February to 24th April, 4th and 7th October (H. E. Axell); two, 30th October to at least 18th February 1974 (A. Parker).

English south coast: singles seen from May to end of year and singles trapped on 30th June, 27th July and 4th October (locality and names of observers withheld).

(South and west Europe, south-west Asia and north-west Africa) The colonisation of this robust species which began in earnest in autumn 1971 continues, and a paper on this subject is in prepara-

tion. The far-flung records from Cornwall and north Wales compare with those from Co. Cork in 1968 and from Yorkshire in 1972.

Lanceolated Warbler *Locustella lanceolata*

Shetland: Fair Isle, immature, trapped, 22nd September (N. V. Allen, R. A. Broad, I. Burrows *et al.*). Out Skerries, 22nd September (I. S. Robertson).

(East Eurasia from central Russia to north Japan) These two records closely match the one on Fair Isle in September 1972. Three in two years is quite exceptional for this species which is an erratic vagrant at best, with 15 records all told. Its congener Pallas's Grasshopper Warbler *L. certhiola* has now been unreported for 13 years, and unaccepted for 17.

Savi's Warbler *Locustella luscinioides*

Devon: Braunton, 27th May to 24th June (I. Taylor, A. J. Viekey *et al.*).

Dorset: Radipole Lake, trapped, 20th August (L. Kearsley, G. Pepler *et al.*).

Kent: Stodmarsh, 20th April, up to three singing subsequently but no evidence of breeding success (P. J. Mountford *et al.*). Seasalter, 29th April (B. Bundock).

Norfolk: Yare valley, singing ♂, 11th to 15th May (Dr M. George, M. J. Seago).

Suffolk: Minsmere, first on 27th April, last on 5th August, six pairs probably bred (H. E. Axell *et al.*). Walberswick, at least three singing from 28th April to 22nd July (G. J. Jobson, C. S. Waller).

Yorkshire: Hornsea Mere, 16th and 17th August (D. T. Ireland, S. C. Madge).

Great Reed Warbler *Acrocephalus arundinaceus*

Kent: Sandwich Bay, trapped, 5th May (D. M. Batchelor).

Yorkshire: Wilton, Redear, trapped, 19th May (H. G. Burrows, G. W. Follows, S. C. Norman *et al.*).

(Europe and west-central Asia) Another poor showing by a species which only a few years ago many thought of as a potential breeding bird. Two is the fewest in any year since 1967. Notes on the identification of this species and the similar Clamorous Reed Warbler *A. stentoreus*, and comments on the possibility of confusion of vagrants, were published in *Brit. Birds*, 66: 382-385.

Aquatic Warbler *Acrocephalus paludicola*

Cornwall: Marazion Marsh, adult, 17th August (R. Higson, N. J. Phillips *et al.*); immature, trapped, 18th (I. Macmillan, B. Pattenden); two immatures 26th and 27th, adult and two immatures 5th September (R. Higson, N. J. Phillips *et al.*); 7th September (B. S. Cave, C. D. Ingram).

Devon: Lundy, 10th and 11th August (J. N. Dymond, M. Rogers). Exe reedbeds, immature, trapped, 16th August (F. R. Smith). South Milton Ley, single immatures trapped, 27th August, 10th to 20th September, and 16th and 17th September; four seen together on 19th September including at least one of the ringed birds (R. Burridge *et al.*).

Dorset: Radipole Lake, 16 immatures trapped—singles on 13th, 14th, 15th, 16th, 17th, 20th, 24th, 25th, 26th, 27th and 31st August, three on 5th September, singles on 11th and 18th September (J. Oakshott, G. Pepler *et al.*).

Essex: Two-tree Island, Leigh-on-Sea, 23rd September (A. R. M. Blake).

Glamorgan: Kenfig Pool, 8th and 9th September (M. Davies, P. G. Lansdown, D. K. Thomas *et al.*).

Hampshire: Farlington Marshes, adult and two immatures trapped, perhaps another seen, 11th August (J. D. and N. J. Lindsay, J. H. Marchant *et al.*); three immatures trapped 12th, single immatures trapped 19th, 9th and 10th September (A. N. Williamson *et al.*). Pennington Marshes, 30th August (R. Dunn, E. J. Wiseman).

Somerset: Berrow Marsh, two, 26th August (B. E. Slade). Steart, two immatures trapped 26th August, one immature trapped 27th August (A. W. Evans).

Sussex: Pagham Harbour, 30th August (P. Hawes, I. B. Roy).

Yorkshire: Spurn, immature, trapped, 12th August (J. Cudworth, B. R. Spence *et al.*).

(East Europe and west Asia) Also one on Cape Clear Island, Co. Cork, on 14th and 15th October, the first recorded in Ireland since 1961. At least 48, all but three of those aged being immatures, followed in the flight path of the record 56 in 1972. Clearly a real change in occurrence frequency is being maintained, but, unlike previous years, in 1973 all the British records were contained between 10th August and 23rd September and there was only the Irish straggler in October. Altogether over 300 have been recorded (half since 1968 when the change was first apparent).

Sardinian Warbler *Sylvia melanocephala*

Kent: Dungeness, ♀, trapped, 17th April (K. Redshaw, R. E. Scott *et al.*).

Norfolk: Waxham, ♂, trapped, 28th and 29th April (Dr E. L. Williams).

(South Europe, Middle East and North Africa) Two surprising and isolated occurrences, only the fourth and fifth for Britain, including the first female. There were no records of sympatric species (such as the Subalpine Warbler *S. cantillans*, which appeared every year from 1966 to 1972).

Greenish Warbler *Phylloscopus trochiloides*

Devon: Lundy, trapped, 22nd June (J. N. Dymond, M. Rogers).

Shetland: Fair Isle, trapped, 24th June (G. J. Barnes, R. A. Broad, N. Riddiford *et al.*); trapped, 4th to 8th July (G. J. Barnes, R. A. Broad, J. W. F. Davies *et al.*).

Yorkshire: Redcar, 23rd and 24th August (A. J. Wheeldon *et al.*).

(Eurasia from south Finland and north Germany to Kamchatka) The June and July occurrences are indicative of birds that had well overshoot their normal range and no doubt relate to the recent spread of this species in northern Europe. The grand total moves on to 89. Since 1958 seven (out of 77) have been in spring or early summer.

Bonelli's Warbler *Phylloscopus bonelli*

Scilly: St Agnes, 12th to 15th September (M. A. Brazil, D. B. Hunt, T. A. Walsh *et al.*).

Sussex: Alfriston, 7th August (P. J. and Mrs V. A. Wilson).

(Central and south Europe, Levant and north-west Africa)
Another two typical autumn records take the grand total to 37.

Arctic Warbler *Phylloscopus borealis*

Northumberland: Brownsman, Farne Islands, 16th to 18th September (G. Clarke, R. Gomes, C. Slater *et al.*).

Shetland: Fair Isle, immature, trapped, 4th September (R. A. Broad, N. Riddiford *et al.*); immature, trapped, 10th September (G. J. Armstrong, R. A. Broad, P. F. Fawkes *et al.*). Lunna, near Vidlin, 17th September (Dr B. Marshall).

(North-east Europe, north Asia and Alaska) The divergence in the occurrence patterns of this species and its close relative the Greenish Warbler becomes clearer as the years pass. It has yet to appear in spring or early summer, but young birds reach Shetland in early or mid-autumn every year and occur rarely but widely on the east, south and west coasts of Britain up to late October. The grand total for Britain and Ireland is now about 77. Only three have reached Ireland, whereas that country's catch of Greenish Warblers is 21.

Radde's Warbler *Phylloscopus schwarzi*

Silly: St Agnes, 13th October (A. J. Greenland, R. E. Turley, D. I. M. Wallace *et al.*); 22nd to 26th October (R. H. Charlwood, A. Quinn *et al.*).

(Central and east Asia) Appearing on the same isle as the last British bird in 1971, these two led their observers a most frustrating dance. It has been suggested that there was only one extremely skulking individual, but it seems certain that different birds were involved, the first being seen on only one day and the second being much browner with cleaner head marks. They are the twelfth and thirteenth for Britain; none has yet reached Ireland.

Tawny Pipit *Anthus campestris*

Cornwall: Porthgwarra, 15th September (H. P. K. Robinson *et al.*).

Devon: Slapton Ley, 7th September (D. Elphick, A. K. Searle, E. C. Still).

Dorset: Portland Bill, 23rd August (D. Brotheridge, G. L. and M. G. Webber); trapped, 9th September (F. R. Clifton, G. Walbridge *et al.*).

Hampshire: St Catherine's Point, Isle of Wight, 23rd April (J. K. Bowers).

Kent: Stodmarsh, 6th and 7th May (P. J. and M. Mountford).

Norfolk: Cley, 2nd July (S. D. Housden).

Silly: St Mary's, 7th September (I. J. and M. G. Ibbotson); total of four, 10th to 15th October (B. Bland, B. D. Harding, P. J. Milford *et al.*); one, 16th October (R. E. Emmett, G. J. Jobson, D. I. M. Wallace *et al.*). St Agnes, 19th September (Miss E. Culwick, N. J. Phillips). Treco, 17th October (R. J. B. Jackson).

Shetland: Out Skerries, 22nd September (I. S. and Mrs S. Robertson).

Somerset: Steart, 4th October (B. Rabbits).

Sussex: Arlington Reservoir, 6th August (P. J. Wilson). Beachy Head, 30th August, four (three trapped) 7th to 10th October, one 11th and 12th, one 15th to



PLATE 45. Above, immature Night Heron *Nycticorax nycticorax*, Lincolnshire, November 1973, one of two found in the eastern half of England in the middle of that month (page 315) (photo: Keith Atkin). Below, Great Spotted Cuckoo *Clamator glandarius*, Cornwall, May 1973 (page 328) (photo: J. B. and S. Bottomley).





PLATE 46. Long-billed Dowitcher *Limnodromus scolopaceus*, Cornwall, October 1973 (page 321); very long bill (twice as long as head) and much greater width of dark bars than of intervening pale ones on uppertail help to distinguish this species from the very similar Short-billed Dowitcher *L. griseus* (photos: J. B. and S. Bottomley); compare with plate opposite and those cited in the caption





PLATE 47. Another Long-billed Dowitcher, Somerset, also October 1973; here the dark tail bars appear narrower, though still wider than the white ones, and the dark arrowheads on the undertail show well (*photos: B. W. Thomas*). Dowitcher identification was discussed in detail in this journal by Dr I. C. F. Nisbet (54: 343-357, plates 55-58) and D. I. M. Wallace (61: 366-372, plates 43-47).









PLATES 48 (centre pages) and 49. More rare birds photographed in Britain in 1973. Previous pages, drake Steller's Eider *Polysticta stelleri* in eclipse, facing away from group of two adult and four young Eiders *Somateria mollissima*, Outer Hebrides, August (page 317); this bird was found in May 1972 and was still present at the same place in June 1974 (photo: Pamela Harrison). Above left, Alpine Swift *Apus melba*, Lundy, Devon, May (page 329) (photo: M. Rogers); right, White-rumped Sandpiper *Calidris fuscicollis*, Suffolk, July (page 323) (photo: C. R. Naunton). Below, Buff-breasted Sandpiper *Tryngites subruficollis*, Flintshire, October (page 324), photographed in the same field and on the same day as the Sharptailed Sandpiper *C. acuminata* shown in plate 50 opposite (photo: Dennis Green)





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e 50. Sharp-tailed Sandpiper *Calidris acu-*
, Flintshire, October 1973 (pages 323.
, 32): note sharp contrast between dark
crown (lightly streaked rufous) and
supercilium, with dark patch behind eye,
pale collar of fine striations on ochre-
breast (compare with Pectoral Sandpipers
lanotos overleaf) (photos: Dennis Green)

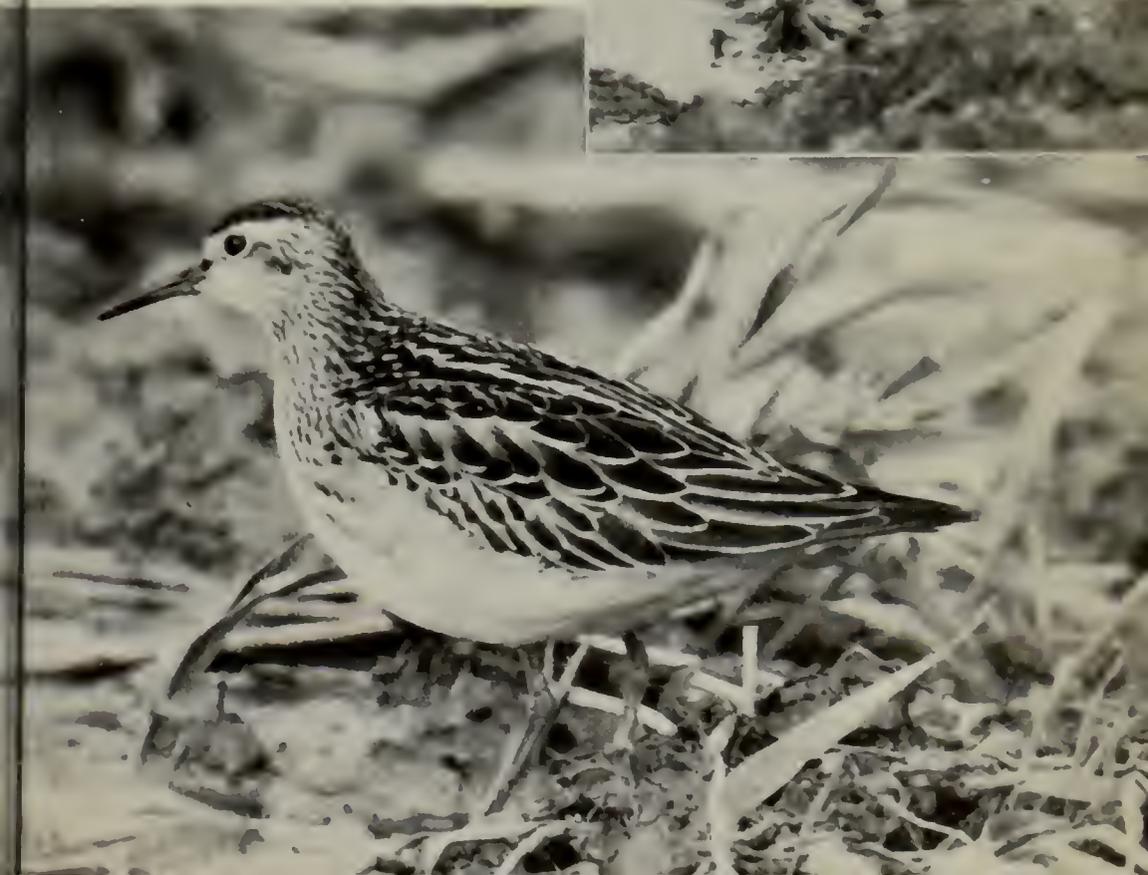




PLATE 51. Pectoral Sandpipers *Calidris melanotos*, Cornwall, September 1967 (above) and October 1968 (below). Records of this American wader are no longer considered by the Rarities Committee, but these photographs provide a useful comparison with the Sharp-tailed on plate 50 (photos: J. B. and S. Bottomley)



17th (R. H. Charlwood, J. F. Cooper, A. Quinn *et al.*); 22nd September (J. A. Lucas); 28th October (R. F. Porter, I. R. Willis).

(Europe, south Asia and north-west Africa) Also one on Great Saltee, Co. Wexford, on 20th May. Another 26 or so birds in an influx similar in scale to that of 1972. Records were more markedly concentrated in Scilly and Sussex than in most recent years, some ten appearing during 7th-17th October. Another midsummer record is noteworthy. With about 275 since 1958, this is currently the commonest 'rarity' that we monitor.

Olive-backed Pipit *Anthus hodgsoni*

Shetland: Fair Isle, 24th September (G. J. Jobson).

(North-east Russia, central and east Asia) The third record for Fair Isle and the fourth for Britain. The centre of the breeding range is a good 7,000 km from Britain. Like the largely sympatric Pechora Pipit *A. gustavi*, it appears generally earlier than its most frequent Asiatic congener, Richard's Pipit *A. novaeseelandiae*.

Red-throated Pipit *Anthus cervinus*

Devon: Lundy, 31st October to 2nd November (J. N. Dymond).

Norfolk: Kelling Quags, 19th and 20th May (A. J. L. Smith *et al.*).

Scilly: St Mary's, 11th October (D. S. Flumm, B. Mellor, M. J. Rogers). St Agnes, 14th October (A. J. Greenland, R. E. Turley, D. I. M. Wallace *et al.*).

Shetland: Fair Isle, 28th May to 2nd June, another 30th May to 2nd June (P. Agland, G. J. Barnes, R. A. Broad *et al.*); 16th to 18th September (G. J. Barnes, T. Lawrence, D. Willis).

Somerset: Blagdon Reservoir, 24th September (R. M. Curber, M. G. Wilson).

Sussex: Beachy Head, 6th October (J. F. Cooper).

(Arctic Eurasia) The best ever showing of this species. The grand total for Britain and Ireland is now 87.

Citrine Wagtail *Motacilla citreola*

Shetland: Out Skerries, immature, 20th to 23rd September (I. S. and Mrs S. Robertson, R. J. Tulloch *et al.*).

(East Russia and west-central Asia) The eleventh in Shetland, and the eighteenth in all. The September date is typical, the occurrence pattern of this fine wagtail generally resembling those of the two rarest Asiatic pipits, the Olive-backed and Pechora (see above).

Lesser Grey Shrike *Lanius minor*

Angus: Montrose Basin, 3rd to 19th July (Mrs V. A. Black, G. M. Crighton *et al.*).

Hampshire: Portsdown Hill, Portsmouth, adult, 15th July (N. B. Ansell).

Norfolk: Holme, 27th May (P. R. Clarke, H. Ramsay).

Suffolk: Blythburgh, 10th June (C. L. Clarke, J. D. Shackles, C. S. Waller *et al.*).

Surrey: Haslemere, immature ♀, found dying, 18th November (D. Parr).

Sussex: Sidlesham, immature, 6th September (M. and Mrs V. Shrubbs).

(South and east Europe and south-west Asia) This is the most southern and rarest of British shrikes; six were also recorded in 1961 and 1970 but have never been exceeded. The wide scatter of places and dates is characteristic, though the Surrey bird was exceptionally late. The grand total moves on to about 86.

Woodchat Shrike *Lanius senator*

Cornwall: Porthgarra, immature, 25th to 28th August (H. P. K. Robinson, L. P. Williams *et al.*); immature, 7th and 8th September (C. D. Ingram, H. P. K. Robinson *et al.*).

Devon: Lundy, ♀, trapped, 18th May (J. N. Dymond, Mr and Mrs J. M. Dymond *et al.*); ♀, 26th June (J. N. Dymond, M. Rogers, A. M. Taylor); immature, 23rd August (J. N. Dymond, Miss D. B. Ogden, M. Rogers).

Dorset: Portland Bill, immature, trapped, 21st August (G. Gregory, G. Walbridge, G. L. Webber); immature, 6th to 12th October (F. R. Clifton, W. E. Oddie *et al.*).

Pembrokeshire: Skomer Island, ♀, 26th May (J. E. Davis *et al.*).

Shetland: Virkie, 20th May (D. Coutts, Sir R. Erskine-Hill, F. Hunter).

Suffolk: Halesworth, 26th May (R. W. H. Garner).

Surrey: East Ewell, found dead, 11th May (Mr and Mrs Panting *et al.*).

Yorkshire: Easington, 29th and 30th August (B. Banson, J. Fitzharris, J. Lidgate *et al.*).

(West and central Europe, south-west Asia and north-west Africa) A near-average showing, though the incidence of autumn immatures is unusually high. The grand total is now about 305.

Rose-coloured Starling *Sturnus roseus*

Caernarvonshire: Aberdaron, 28th June (R. S. and Mrs M. E. Thomas).

Durham: Billingham, 27th to 30th June (Mr and Mrs J. W. Blick, S. P. Moses).

Lincolnshire: Wainfleet, immature ♀, trapped, 18th October (W. M. Peet, R. B. Wilkinson).

Midlothian: Penicuik, 29th June (N. A. Ruckley).

Shetland: Bigton, about 20th to 24th May (D. Coutts, L. Dalziel, Sir R. Erskine-Hill *et al.*).

(South-east Europe and south-west Asia) Five is above the average. For comments on the escape likelihood in this and other rarities, readers are referred to the recent paper by M. D. England (*Brit. Birds*, 67: 177-197).

Myrtle Warbler *Dendroica coronata*

Scilly: Tresco, 16th to 23rd October (D. B. Hunt, D. I. M. Wallace *et al.*).

(North America) The fourth in all and the first since 1968, the last year in which American passerines were obvious. Many observers have felt that the decline in direct transatlantic liner traffic would extinguish the series of British and Irish records of wood warblers (Parulidae). There was none in 1969, only two in 1970 and again none in 1971 and 1972; thus the appearance of this beautiful

flycatching sprite and of the first live Ovenbird *Seiurus aurocapillus* in Europe (see below) was very much against the trend.

Ovenbird *Seiurus aurocapillus*

Shetland: Out Skerries, trapped, 7th and 8th October (I. S. and Mrs S. Robertson, R. J. Tulloch *et al.*).

(North America) A wing of this species was found on the Lancashire coast in January 1969 (*Brit. Birds*, 63: 289), but the above is the first acceptable record of a live bird for Britain and Europe. This American warbler is a partly sympatric congener of the Northern Waterthrush *S. noveboracensis* which has been recorded twice in Britain and once in France.

Serín *Serinus serinus*

Dorset: Bincleaves, Weymouth, 10th May (R. A. Ford). Portland Bill, ♂, 24th July (J. A. Lucas, G. Walbridge); 29th October (P. Brown, M. C. Cooper, D. M. Hawker).

Hertfordshire: Hilfield, Bushey, 21st March (R. Curtis, M. G. Wells).

Kent: Dungeness, 18th June, 10th July (K. Redshaw).

Lancashire: Chorlton-cum-Hardy, immature ♂, trapped, 9th March (G. McPherson, J. Shakeshaft, I. D. Walker *et al.*).

Lincolnshire: Donna Nook, 5th September (S. Lorand).

Pembrokeshire: Strumble Head, ♂, 10th April (J. W. Donovan).

Suffolk: Blythburgh, ♂, 12th May (A. J. L. Smith).

Sussex: Beachy Head, ♀, 20th and 24th April (R. H. and Mrs M. E. Charlwood); two, 5th May (J. F. Cooper).

(Continental Europe, Mediterranean, Asia Minor and north-west Africa) The records up to 1970 were discussed in *Brit. Birds*, 64: 213-223. Unless, as we suspect, a proportion of reports are not submitted to us, it may be that this lively little finch is becoming less frequent. Regular breeding has not been proved, and in the year under review there were no long stays anywhere. Spring males appear to have predominated for the past three years.

Scarlet Rosefinch *Carpodacus erythrínus*

Devon: Lundy, one, perhaps two, 27th September (J. N. Dymond, D. E. Reid, M. Rogers *et al.*).

Dorset: Portland Bill, 15th September (L. Mulford, A. J. L. Smith, G. Walbridge *et al.*).

Norfolk: Blakeney Point, 19th and 20th August (J. C. Eaton, D. J. Holman, N. Williams *et al.*).

Northumberland: Brownsman, Farne Islands, 14th September (R. Gomes, C. Slater). Bamburgh, trapped, 6th October (M. Bell, M. S. Hodgson).

Shetland: Sumburgh, 19th May (Dr B. Marshall). Tolob, ♂, 20th May (D. Coutts); 27th August (Dr B. Marshall). Virkie, ♂, 20th and 21st May (D. Coutts).

F. Hunter, Dr B. Marshall *et al.*); another ♂, 22nd May (D. Coutts); one 12th September, three 14th September (D. Coutts). Fair Isle, 22nd May to 1st June; trapped, 22nd to 25th June; 23rd to 26th August, two 27th, three 28th, two 29th to 31st, three 1st to 5th September, one to 9th, five 10th, six 11th to 15th, two 16th and 17th, three 18th to 22nd, one 23rd September—at least eleven individuals in autumn, all immature or ♀ and four ringed (R. A. Broad, N. Riddiford *et al.*). Durigarth, ♂, 23rd May (L. Brown, D. Coutts, Sir R. Erskine-Hill). Scalloway, ♂, 23rd and 24th May (A. D. J. Cook, C. D. Ingram). Out Skerries, ♀, 18th June (Mrs S. Robertson); three 25th August, one 28th, two 1st to 5th September, one 9th and 10th September (I. S. Robertson). Whalsay, 26th August, 12th September (J. H. Simpson). Foula, 30th and 31st August (R. Furness).

Yorkshire: Spurn, trapped, 11th September (B. R. Spence *et al.*); 14th and 15th (A. O. Aitken, S. L. James, R. A. Williams *et al.*); trapped, 23rd September and 12th October (B. R. Spence *et al.*); 21st October (J. Cudworth).

(East Europe and across Asia, and east Turkey to Himalayas) Another 40 or more to add to the recent flood. Almost one in four appeared in Shetland in spring, and occurrences at that season are now growing fast: since 1963 there have been 35 spring records and this species must now be regarded as a double passage migrant in Shetland. The change in the status of this once 'Fair Isle only' finch is so interesting that we tabulate below the occurrences since 1958. Spring arrivals have been dated from 30th April to 22nd June, autumn ones from 27th July to 25th October.

Table 1. Number of Scarlet Rosefinches *Carpodacus erythrinus* recorded during 1958-73, showing increasing frequency and widening periods of occurrence

Month	1958-62	1963-67	1968-72	1973	1958-73
January	—	—	—	—	—
February	—	—	1	—	1
March	—	—	—	—	—
April	—	—	1	—	1
May	—	3	11	7	21
June	—	4	7	2	13
July	—	—	1	—	1
August	8	6	19	10	43
September	20	38	59	18	135
October	4	8	14	3	29
November	—	—	—	—	—
December	—	—	—	—	—
TOTALS	32	59	113	40	244
Annual means	6	12	23	40	15

Two-barred Crossbill *Loxia leucoptera*

Inverness-shire: Dores, 4th April (Miss A. M. Paterson).

Shropshire: Blakeridge, Colebatch, ♂, 30th January to 3rd February (L. Durntall); probably the Walcot bird of November 1972 (see page 343).

(North-east Europe, north-central Asia, northern North America

and West Indies) At least one more to add to the 15 from 1966 to 1972, bringing the grand total to 60 or more.

Black-headed Bunting *Emberiza melanocephala*

Kent: Reculver, ♂, 19th August (J. and M. J. Palmer, J. G. Walmsley).

Scilly: St Agnes and Gugh, ♂, 16th to 19th May (O. B. and Mrs K. Parker, Miss J. Spenlove-Spenlove).

Shetland: Fair Isle, immature or ♀, 21st to 26th August (R. A. Broad, N. Riddiford, D. Woodward *et al.*). Fetlar, ♂, 21st to 30th September (R. H. F. Thorne).

(South-east Europe and south-west Asia) Four in one year is the most ever and for three of the records to be in autumn is also unusual. The grand total is now about 35.

Yellow-breasted Bunting *Emberiza aureola*

Caernarvonshire: Bardsey Island, ♀, trapped, 4th and 5th September (D. Henshilwood, C. Prescott, T. Squire *et al.*).

Shetland: Out Skerries, 9th to 11th September (Dr B. Marshall, I. S. Robertson, J. H. Simpson *et al.*). Fair Isle, 13th and 14th September (R. A. Broad, R. Filby, M. Lawley *et al.*); 17th to 22nd September (R. A. Broad, D. J. Holman, N. Riddiford *et al.*). All immature or ♀.

(North-east Europe and north Asia) Once again a strong showing of a bunting which normally migrates south-east from its breeding grounds. These four bring the total during 1966-73 to 24 and the grand total to 44; thus over half have come in the last eight years, a trend closely comparable to that of the Scarlet Rosefinch which is sympatric in Europe.

Rustic Bunting *Emberiza rustica*

Shetland: Fair Isle, immature or ♀, 19th to 29th September (N. Allen, R. A. Broad, I. Burrows *et al.*).

(North-east Europe and north Asia) After the seven records from five counties from Scilly to Shetland in 1972, this single record is more typical in locality (and number). This remains one of the rarest buntings on the British and Irish list.

Little Bunting *Emberiza pusilla*

Scilly: St Mary's, 7th October (T. Francis *et al.*). St Agnes, 27th October (P. Clement, A. Quinn).

Shetland: Out Skerries, 8th May (D. Coutts, I. S. Robertson, R. J. Tulloch *et al.*); 22nd September (I. S. Robertson). Upper Kergord, 13th and 14th May (Dr B. Marshall *et al.*). Fair Isle, 24th September, two 25th and 26th, one staying to 30th September (G. J. Barnes, R. A. Broad, N. Riddiford *et al.*); 15th October (G. J. Barnes).

(North-east Europe and north Asia) Also one on Cape Clear Island, Co. Cork, from 11th to 17th October. Like the Rustic, this bunting retreated to island archipelagos in 1973 following a wider occurrence pattern the previous year. The two May birds were the first in spring since 1962. The grand total moves on to about 175.

White-throated Sparrow *Zonotrichia albicollis*

Shetland: Out Skerries, 5th to 15th May (D. Coutts, I. S. Robertson, R. J. Tulloch *et al.*).

(North America) This is the third North American passerine of 1973 and the least surprising. It is a robust species that has reached Britain and Ireland ten times before.

Amendment to the 1967 report

White-billed Diver *Gavia adamsii*

Cornwall: Marazion, the last date should read 26th April.

Amendment to the 1972 report

Aquatic Warbler *Acrocephalus paludicola*

Dorset: Radipole Lake, 26th September (P. J. Curry, J. Williamson) (*Brit. Birds*, 66: 348) was *not* trapped.

Supplementary 1962 record accepted

White-billed Diver *Gavia adamsii*

Yorkshire: Tunstall, adult ♀, found dead, 18th March (B. S. Pashby, A. H. Rider); specimen at Hull Museum.

Supplementary 1964 record accepted

White-billed Diver *Gavia adamsii*

Shetland: Fetlar, first-summer, 6th June (Mr and Mrs L. Roberts). This record, previously rejected, has been accepted after reconsideration.

Supplementary 1965 records accepted

White-billed Diver *Gavia adamsii*

Fife: Earlsferry, adult, found dead, 1st January (G. Waterston, Dr R. S. Weir *et al.*); head in Royal Scottish Museum, Edinburgh.

Baird's Sandpiper *Calidris bairdii*

Cornwall: Marazion Marsh, 20th and 21st October (P. J. Dare, R. G. Haddon). This record, previously rejected (*Brit. Birds*, 59: 302), has been accepted after reconsideration.

Supplementary 1966 records accepted

White-billed Diver *Gavia adamsii*

Northumberland: Budle Bay, adult, found dead, 24th April (C. E. Douglas); skull held by observer.

Yorkshire: Robin Hood's Bay, adult ♀, found dying 15th February, died 16th (C. J. Feare *per* J. R. Mather); specimen in collection of J. R. Mather.

Supplementary 1967 record accepted

Red-footed Falcon *Falco vespertinus*

Warwickshire: Middleton, ♂, 14th and 21st May (G. A. Arnold, D. Smallshire *et al.*).

Supplementary 1969 records accepted

White-billed Diver *Gavia adamsii*

Aberdeenshire: Aberdeen, adult, found dead, 24th March (Dr J. J. D. Greenwood, Dr B. B. Rae, *per* D. M. Burn); specimen at British Museum, Tring.

Shetland: Whalsay, adult in breeding plumage, 4th to 7th May (W. Arthur, J. H. Simpson).

Yorkshire: Filey, adult ♀, found dead, 1st March (R. H. Appleby *per* J. R. Mather); specimen in collection of J. R. Mather.

Supplementary 1970 records accepted

White-billed Diver *Gavia adamsii*

East Lothian: Gullane Point, first-winter, found dead, 16th January (R. K. MacGregor); skull and wing held by observer.

Morayshire: Findhorn, adult, found dead, 1st February (B. Etheridge); head and wing temporarily at Liverpool Museums.

Semipalmated Sandpiper *Calidris pusilla*

Scilly: Treseo, 27th September (L. P. Mulford, T. Sibley, A. J. L. Smith *et al.*).

(North America) This is the first record of this difficult species to be accepted in the light of the new criteria established by D. I. M. Wallace (*Brit. Birds*, 67: 1-16, plates 2-3).

Supplementary 1971 records accepted

White-billed Diver *Gavia adamsii*

Ross-shire: Upper Loch Torridon, adult in breeding plumage, 6th to 22nd June (R. H. Dennis, P. J. Tizzard, Mrs J. A. Whyte *et al.*).

Shetland: Fair Isle, adult in breeding plumage, 29th May (J. H. Simpson).

Cetti's Warbler *Cettia cetti*

Suffolk: Minsmere, singing ♂, 29th March to 18th June (H. E. Axell).

Tawny Pipit *Anthus campestris*

Kent: Sandwich Bay, 9th May (J. N. Hollyer).

(Europe, south Asia and north-west Africa) This takes the total of 1971 records to at least 33—an all-time peak.

Trumpeter Finch *Rhodopechys githaginea*

Suffolk: Minsmere, 30th May to 15th June (F. K. Cobb, D. J. Holman *et al.*).

Sutherland: Handa Island, 8th and 9th June (C. R. and Mrs J. M. Tubbs).

(South-east Spain, Canary Islands, northern Africa and south-west Asia) The first accepted records for Britain and Ireland. Full details will be published in due course.

Supplementary 1972 records accepted

White-billed Diver *Gavia adamsii*

Banffshire: Buckie, adult, 14th March to 20th May (R. H. Dennis, R. Leavett, D. B. McGinn *et al.*).

Black-browed Albatross *Diomedea melanophris*

Shetland: Hermaness, Unst, 21st July to 4th August (M. Anderson, L. R. Cole).

(Southern oceans) A second record for the year, though this may well have been the same bird as that seen off Fife on 8th August (*Brit. Birds*, 66: 333).

Purple Heron *Ardea purpurea*

Hertfordshire: Rye Meads, 2nd September to 3rd October (P. Martin *et al.*).

(South-central Eurasia, north to Netherlands, and Africa) Another autumn occurrence to add to the five already noted for 1972.

Little Egret *Egretta garzetta*

Norfolk: Breydon Water, 4th to 8th May (P. R. Allard *et al.*). Holme, 28th May to 5th June (P. R. Clarke *et al.*).

(South Eurasia, Africa and Australia) Two to add to the 13 already published for 1972; both are clearly linked to the remarkable series at Cley where at least four arrived between 30th April and 2nd June (*Brit. Birds*, 66: 335).

Little Bittern *Ixobrychus minutus*

Berkshire: Padworth, ♀, 18th and 19th April (D. Ellis, K. Pritchard).

Dorset: Radipole Lake, ♂, 23rd to 25th April (D. N. Arnold *et al.*).

White Stork *Ciconia ciconia*

Somerset: Rode, 14th July (C. Cook), additional to the Danish White Stork taken into captivity in autumn 1971 and released about 18th August 1972 (see *Brit. Birds*, 65: 4-5, 303-305, 327; 66: 336).

Gyrfalcon *Falco rusticolus*

Shetland: Scousburgh, 14th to 19th December (A. Anderson). Dale, Walls, 15th December (*per* D. Coutts). Ulsta, Yell, 22nd December (R. J. Tulloch).

(Circumpolar Arctic) These three winter records are quite separate from the spring influx in 1972 which mainly affected southern counties of England.

Broad-billed Sandpiper *Limicola falcinellus*

Norfolk: Salthouse, 25th August (M. Woodcock).

Cetti's Warbler *Cettia cetti*

Dorset: Radipole Lake, 21st October (C. Bignal, M. R. Shepherd).

Suffolk: Minsmere, 14th to 23rd March (H. E. Axell, P. J. Makepeace).

(South and west Europe, south-west Asia and north-west Africa) The seventh and eighth localities (fifth and sixth counties) with a record of this species in 1972.

Aquatic Warbler *Acrocephalus paludicola*

Somerset: Chew Valley Lake, trapped, 20th August (R. J. Prytherch, F. R. Smith, K. Standing).

Arctic Warbler *Phylloscopus borealis*

Shetland: Grutness, 27th September; Loch Spiggie, 29th September; Spiggie. Bigton, 29th September (Sir R. Erskine-Hill *et al.*).

(North-east Europe, north Asia and Alaska) These additional records mean that at least five of this robust *Phylloscopus* reached Shetland in the nine days from 24th September—a concentration paralleling the influx of five Greenish Warblers to Norfolk a month earlier (*Brit. Birds*, 66: 349).

Pallas's Warbler *Phylloscopus proregulus*

Norfolk: Holme, trapped, 17th to 19th October (P. R. Clarke).

(Central, east and south-east Asia) This brings the grand total in Britain to 47. After three consecutive annual appearances this smallest *Phylloscopus* on the British and Irish list failed to appear in 1973.

Two-barred Crossbill *Loxia leucoptera*

Shropshire: Walcot Forest, ♂, 8th and 14th November (R. Harrison, D. Hope).

(North-east Europe, north-central Asia, northern North America and West Indies) A seventh record to add to the already high total for the year (see also page 338).

Appendix 1. List of 1973 records not accepted

This list contains all the 1973 records not accepted after circulation to the committee. It does not include (a) records withdrawn by the observer(s), without circulation, after discussion with the honorary secretary; (b) records which, even if circulated, were not attributed by the observer(s) to any definite species; or (c) records mentioned in 'Recent reports' of which full details were unobtainable. Birds considered to be escapes are also omitted.

In the vast majority of cases the record was not accepted because we were not convinced, on the evidence before us, that the identification was fully established; in only a very few cases were we satisfied that a mistake had been made.

Black-browed Albatross	Seaton Sluice, Northumberland, 13th November
Cory's Shearwater	Between Lundy and Hartland Point, Devon, 19th August
	Fair Isle, Shetland, 7th September
Little Shearwater	Peel, Isle of Man, 29th September
Purple Heron	Hornsea Mere, Yorkshire, three, 8th August
Great White Egret	Holbeach Marsh, Lincolnshire, 24th June, 31st July
Night Heron	Loch Spelve, Argyll, 16th August
American Bittern	Cley, Norfolk, 3rd November
Gyr Falcon	Fraserburgh, Aberdeenshire, 11th September
Red-footed Falcon	Frampton-on-Severn, Gloucestershire, 24th April
	Durlcigh Reservoir, Somerset, 17th May
	Wells, Norfolk, 1st June
Little Crake	Leigh-on-Sea, Essex, one or two, 28th to 31st March
	Wisbech sewage farm, Lincolnshire/Norfolk, 5th August
Killdeer	Blithfield Reservoir, Staffordshire, 22nd September
Dowitcher	Snape, Suffolk, 28th July
	Walland Marsh, Kent, 17th September
	Arlington Reservoir, Sussex, 25th September
Stilt Sandpiper	Pagham Harbour, Sussex, 24th August
	West Fleet, Dorset, 25th September
Great Snipe	Brough Haven, Yorkshire, 21st September
	Sheringham, Norfolk, 6th November
	Sandwich Bay, Kent, 11th November
Slender-billed Curlew	Harty, Kent, 24th December
Solitary Sandpiper	Loughborough, Leicestershire, 8th September
Spotted Sandpiper	St Mary's, Scilly, 9th September
Lesser Yellowlegs	Pagham Harbour, Sussex, 29th August
	Salthouse, Norfolk, 4th and 5th October
Least Sandpiper	Sandwich Bay, Kent, 22nd October
Baird's Sandpiper	Silverdale, Lancashire, 30th August
	Skokholm Island, Pembrokeshire, 5th and 6th October
White-rumped Sandpiper	Chew Valley Lake, Somerset, 14th October
Semipalmated Sandpiper	Conder Green, Lancashire, 22nd July, 10th August
	Durlcigh Reservoir, Somerset, 22nd and 23rd October

Western Sandpiper	Warsash, Hampshire, 27th October
Buff-breasted Sandpiper	Nottingham, 16th September
Pratincole	Mellon Udrigle, Ross-shire, four, 9th or 10th September
Ivory Gull	Clodgy Point, St Ives, Cornwall, 13th November
Bonaparte's Gull	Newhaven, Sussex, 21st October
White-winged Black Tern	Rye Harbour, Sussex, 23rd June Barn Elms Reservoir, Surrey, 1st September
Whiskered Tern	Dungeness, Kent, 26th August
Gull-billed Tern	Minsmere Haven, Suffolk, 18th November
Caspian Tern	Bardney, Lincolnshire, 22nd September
Sooty Tern	Lymington, Hampshire, 21st August
Lesser Crested or Swift Tern	Flotta, Orkney, 29th July
Sandgrouse	Keyhaven, Hampshire, 17th November
Snowy Owl	Loch Doon, Ayrshire, 3rd to 21st June
Hawk Owl	Duncansby Head, Caithness, 26th September
Nighthawk	Pitts Deep, West Solent, Hampshire, 17th September
White-rumped Swift	Scarborough, Yorkshire, 24th May
Alpine Swift	Seaford Head, Sussex, 5th and 6th June
White-winged Lark	Fair Isle, Shetland, 23rd February
Red-rumped Swallow	Hamford Water, Essex, 1st September
Nutcracker	Aberlady Bay, East Lothian, three, 15th August Lavenham, Suffolk, mid-October Minsmere, Suffolk, 4th November
Siberian Thrush	Minsmere, Suffolk, 12th June
Dusky Thrush	Stranraer, Wigtownshire, 18th May
Olive-backed Thrush	St Govan's Head, Pembrokeshire, 24th September
Rock Thrush	Fair Isle, Shetland, 7th June
Black-eared Wheatear	Bempton, Yorkshire, 23rd August
Pied Wheatear	Holm, Orkney, 22nd May
Black Wheatear	Cuckmere Haven, Sussex, 18th August
Red-flanked Bluetail	Thurso, Caithness, 18th June
Cetti's Warbler	Slapton Ley, Devon, 7th September
Great Reed Warbler	Old Felixstowe, Suffolk, 20th June
Aquatic Warbler	Cley, Norfolk, 6th August
Greenish Warbler	Lundy, Devon, 12th August North Ronaldsay, Orkney, 16th October
Bonelli's Warbler	Llangorse Lake, Breconshire, 18th August
Pallas's Warbler	Plymouth, Devon, 31st October
Collared Flycatcher	Fakenham, Norfolk, 12th May
Tawny Pipit	Cley, Norfolk, 29th October Winterton, Norfolk, 3rd November
Olive-backed Pipit	Staines Reservoir, Middlesex, 7th November
Red-throated Pipit	Hornsea Mere, Yorkshire, 29th May
Lesser Grey Shrike	Fairlie Moor, Ayrshire, 11th November Sutton Coldfield, Warwickshire, 1st December
Serin	Long Ashton, Somerset, 3rd and 4th September
Trumpeter Finch	Beachy Head, Sussex, 23rd September
Pine Grosbeak	Menai Bridge, Anglesey, five, 20th May Eccleshall, Staffordshire, 25th to 27th November
Two-barred Crossbill	Caterham Valley, Surrey, two, 29th August to 2nd September
Rock Bunting	Gatchouse of Fleet, Kirkcudbrightshire, 9th June
Rustic Bunting	Twiland Wood, Worcestershire, 8th August

Little Bunting	Noss, Shetland, 19th May
	Theddlethorpe, Lincolnshire, 26th August
	Sewardstone, Essex, 10th September
	St Agnes, Scilly, 12th October
	Porthgwarra, Cornwall, 21st October
Savannah Sparrow	Hengistbury Head, Hampshire, 14th April

Appendix 2. Supplementary 1965 record not accepted

White-billed Diver	St Agnes, Scilly, two, 11th-21st and 19th-21st February respectively
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Appendix 3. Supplementary 1967 record not accepted

White-billed Diver	North Ronaldsay, Orkney, about 30th April
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Appendix 4. Supplementary 1968 records not accepted

White-billed Diver	Tay estuary, Fife, 9th or 10th March
	Stornoway, Outer Hebrides, two, 2nd June
	North Ronaldsay, Orkney, 3rd October

Appendix 5. Supplementary 1969 record not accepted

White-billed Diver	Dunnet Bay, Caithness, 2nd March
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Appendix 6. Supplementary 1970 records not accepted

Sharp-tailed Sandpiper	Frodsham, Cheshire, 12th September
Western Sandpiper	East Aberthaw, Glamorgan, 25th August

Appendix 7. Supplementary 1971 record not accepted

Western Sandpiper	Sandbach, Cheshire, 17th October
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Appendix 8. Supplementary 1972 records not accepted

Cory's Shearwater	Weybourne, Norfolk, 28th August
	Rhos Point, Denbighshire, 8th December
Crane	Fingringhoc Wick, Essex, three, 27th June
White-rumped Sandpiper	Wisbech sewage farm, Lincolnshire/Norfolk, 29th September
Western Sandpiper	Fairburn Ings, Yorkshire, 6th to 10th November
Calandra Lark	Fair Isle, Shetland, 6th June
Dusky Thrush	Fair Isle, Shetland, 15th January
Aquatic Warbler	Rainham, Essex, 20th August
Arctic Warbler	Holkham, Norfolk, 3rd September
Pallas's Warbler	Hornsea Mere, Yorkshire, 27th September
Red-throated Pipit	Fair Isle, Shetland, 20th September, 11th October
Serin	Blickling, Norfolk, 13th January

Appendix 9. Species currently placed in category D

One such record for 1973 has been accepted (see *Brit. Birds*, 66: 332):

Indigo Bunting *Passerina cyanea*

Essex: Walton-on-the-Naze, 8th September (R. D. Moore, D. R. Waugh).

Appendix 10. Species considered by the Rarities Committee

The list which follows is based upon the British and Irish list, but the committee is also interested in records of species which have not yet qualified for this. It is likewise concerned with a number of well-marked races, e.g. Green-winged Teal, Black-headed Wagtail. But sight records of these (including ones examined in the hand) are accepted only as 'showing the characters' of the race in question. Category D species (see *Brit. Birds*, 64: 429-430; 66: 332) that at present concern the committee are listed separately.

White-billed Diver	Gyr Falcon	Ivory Gull
Pied-billed Grebe	Red-footed Falcon	Ring-billed Gull
Black-browed Albatross	Lesser Kestrel	Slender-billed Gull
Capped Petrel	Crane	Great Black-headed Gull
Bulwer's Petrel	Sandhill Crane	Laughing Gull
Cory's Shearwater	Sora Rail	Franklin's Gull
Little Shearwater	Baillon's Crake	Bonaparte's Gull
Wilson's Petrel	Little Crake	Ross's Gull
Frigate Petrel	Allcn's Gallinule	White-winged Black Tern
Madeiran Petrel	American Purple	Whiskered Tern
Magnificent Frigatebird	Gallinule	Gull-billed Tern
Purple Heron	Great Bustard	Caspian Tern
Green Heron	Little Bustard	Sooty Tern
Little Egret	Houbara Bustard	Bridled Tern
Great White Egret	Sociable Plover	Royal Tern
Squacco Heron	Killdeer	Brünnich's Guillemot
Cattle Egret	Caspian Plover	Pallas's Sandgrouse
Night Heron	Lesser Golden Plover	Rufous Turtle Dove
Little Bittern	Short-billed Dowitcher	Great Spotted Cuckoo
American Bittern	Long-billed Dowitcher	Yellow-billed Cuckoo
White Stork	Stilt Sandpiper	Black-billed Cuckoo
Black Stork	Great Snipe	Scops Owl
Glossy Ibis	Upland Sandpiper	Eagle Owl
Black Duck	Eskimo Curlew	Snowy Owl
Blue-winged Teal	Solitary Sandpiper	Hawk Owl
American Wigeon	Spotted Sandpiper	Tengmalm's Owl
Ring-necked Duck	Greater Yellowlegs	Nighthawk
Bufflehead	Lesser Yellowlegs	Red-necked Nightjar
Surf Scoter	Marsh Sandpiper	Egyptian Nightjar
Harlequin Duck	Terek Sandpiper	Little Swift
Steller's Eider	Least Sandpiper	Alpine Swift
King Eider	Baird's Sandpiper	Needle-tailed Swift
Hooded Merganser	White-rumped Sandpiper	Bee-eater
Ruddy Shelduck	Sharp-tailed Sandpiper	Blue-cheeked Bee-eater
Lesser White-fronted	Semipalmated Sandpiper	Roller
Goose	Western Sandpiper	Calandra Lark
Red-breasted Goose	Buff-breasted Sandpiper	Bimaculated Lark
Egyptian Vulture	Broad-billed Sandpiper	White-winged Lark
Griffon Vulture	Black-winged Stilt	Short-toed Lark
Spotted Eagle	Wilson's Phalarope	Lesser Short-toed Lark
Black Kite	Collared Pratincole	Crested Lark
White-tailed Eagle	Black-winged Pratincole	Red-rumped Swallow
Pallid Harrier	Cream-coloured Courser	Nutcracker

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|-----------------------|------------------------|--------------------------|
| Penduline Tit | Orphean Warbler | Baltimore Oriole |
| Wallcreeper | Sardinian Warbler | Evening Grosbeak |
| Brown Thrasher | Subalpine Warbler | Arctic Redpoll (in hand) |
| Siberian Thrush | Spectacled Warbler | Citril Finch |
| Eye-browed Thrush | Desert Warbler | Serin |
| Dusky Thrush | Fan-tailed Warbler | Trumpeter Finch |
| Black-throated Thrush | Greenish Warbler | Scarlet Rosefinch |
| American Robin | Bonelli's Warbler | Pine Grosbeak |
| White's Thrush | Arctic Warbler | Two-barred Crossbill |
| Olive-backed Thrush | Pallas's Warbler | Scarlet Tanager |
| Grey-cheeked Thrush | Dusky Warbler | Summer Tanager |
| Veery | Radde's Warbler | Pine Bunting |
| Rock Thrush | Collared Flycatcher | Black-headed Bunting |
| Desert Wheatear | Alpine Accentor | Yellow-breasted Bunting |
| Black-eared Wheatear | Tawny Pipit | Cretzschmar's Bunting |
| Pied Wheatear | Olive-backed Pipit | Rock Bunting |
| Isabelline Wheatear | Pechora Pipit | Rustic Bunting |
| Black Wheatear | Red-throated Pipit | Little Bunting |
| Red-flanked Bluetail | Citrine Wagtail | Song Sparrow |
| Thrush Nightingale | Lesser Grey Shrike | Fox Sparrow |
| Rufous Bush Robin | Woodchat Shrike | White-throated Sparrow |
| Cetti's Warbler | Rose-coloured Starling | Slate-coloured Junco |
| Lanceolated Warbler | Red-eyed Vireo | Rufous-sided Towhee |
| River Warbler | Black-and-White | Rose-breasted Grosbeak |
| Savi's Warbler | Warbler | Spanish Sparrow |
| Pallas's Grasshopper | Parula Warbler | |
| Warbler | Yellow Warbler | CATEGORY D |
| Moustached Warbler | Myrtle Warbler | White Pelican |
| Thick-billed Warbler | Blackpoll Warbler | Greater Flamingo (race |
| Great Reed Warbler | Ovenbird | <i>roseus</i> only) |
| Blyth's Reed Warbler | Northern Waterthrush | Baikal Teal |
| Paddyfield Warbler | Yellowthroat | Yellow-shafted Flicker |
| Aquatic Warbler | Hooded Warbler | Blue Rock Thrush |
| Olivaceous Warbler | American Redstart | Blue Grosbeak |
| Booted Warbler | Bobolink | Indigo Bunting |

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The reasons for record rejection

As indicated in the statement preceding its report for 1972 (*Brit. Birds*, 66: 329-330), the Rarities Committee still has difficulty in getting observers to appreciate how critical decisions on rarity records can be. This is particularly true of certain species subject to confusion with others which are closely similar and often much commoner. Their definite identity may therefore be masked by adverse circumstances or by lack of precise detail. Such problematic records often attract verdicts such as 'too marginal', 'probable only', or 'cannot accept as 100%'; a condensed, fictitious example follows:

SPECIES CLAIMED **Great Snipe** *Gallinago media*

DIGEST OF NOTES 'A solitary snipe flushed from dry edge of sewage bed, flew away fast but without twisting; looked bulky and dark, showed white tail corners; silent; no other snipe nearby, size seemed close to Redshank *Tringa totanus*; observer familiar with Snipe *G. gallinago* and Jack Snipe *Lymnocyptes minimus*, but this bird looked very different and identified as Great on silence, white in tail, and size.'

DIGEST OF COMMITTEE COMMENTS 'Details insufficient for certain identification; could have been a roosting, possibly injured, large Snipe which did not call; observer clearly unaware of mainly white tips to outer tail-feathers in young Snipe; safer to reject.'

Judgement is also made difficult when the details submitted are incomplete or too brief for a total picture of the bird observed to be ascertained. Often further investigation of such claims indicates that a mistake has been made, as follows:

SPECIES CLAIMED **Aquatic Warbler** *Acrocephalus paludicola*

DIGEST OF NOTES 'Small, streaked *Acrocephalus* in reeds by path; four brief views showed bird to be yellower than Sedge Warblers *A. schoenobaenus* nearby; streaked rump not seen, but head pattern of creamy supercilia and thin but marked pale stripe on mid-crown looked different; not associating with Sedge.'

DIGEST OF INITIAL COMMITTEE COMMENTS 'Observer clearly aware of difference between two species but his notes do not certainly exclude immature Sedge; probable only; other observers reported this bird, therefore obtain further descriptions and then recirculate.'

DIGEST OF ADDITIONAL NOTES 'Crown stripe yellowish, thickly mottled dark; supercilia whitish, not reaching far behind eye; underparts yellowest along flanks; legs not seen.'

DIGEST OF FINAL COMMITTEE COMMENTS 'Record not helped by additional notes which indicate bird was immature Sedge (supercilia of Aquatic long and buffy, reaching nape); now reject.'

The vast majority of records found unacceptable by the Rarities Committee resemble the two examples above, especially the first. Both contain what might be termed 'good starts' but fail in the end. There was no certain negative mark against the Great Snipe claim but equally there was no clinching positive one; the com-

mittee therefore played it safe. Rejection of the Aquatic Warbler claim occurred because finally a mistake in diagnosis was evident.

There are other factors which attract particularly careful attention. The most frequent is the continuing danger of escape by captive birds, now numbering at least 1,500 species in Britain alone and the subject of a recent paper in this journal (*Brit. Birds*, 67: 177-197). The consequences are twofold. First, there are records of species whose identity is not in doubt but whose origin is. Secondly, there are many exotic species in captivity which closely resemble known or potential migrants and vagrants. The committee tries hard to keep abreast of importations into Britain and continental Europe. In the case of any new or significant record, the advice of M. D. England is always sought before any final decision is taken, and the species comments in the annual report have attempted to give a balanced view of the escape situation for those species most hedged by it.

Perhaps more serious is the concern that arises when the date or locality of a vagrant departs radically from its established pattern, for example a Pallas's Warbler *Phylloscopus proregulus* before any Yellow-browed Warblers *P. inornatus*. In such cases the committee expects or must ask for exceptional attention to detail and, in its absence, often feels compelled to play safe. There is also the problem of disagreements among observers over identifications, whether concurrent with the actual record or subsequent to it, and of the sometimes angry controversies that result. The committee may or may not choose to referee such situations; but certainly serious *bona fide* requests for reconsideration in the light of new evidence directly affecting a record or altering the criteria used in its original judgement have never been refused. It must be repeated, however, that the committee has no sixth sense, and there are occasions when observer disputes damage a record beyond repair or leave it hopelessly suspended. Once again rejection is the only safe course.

Finally, it may be noted that records found unacceptable on grounds of incredible or clearly exaggerated evidence are happily very few and far between. The committee feels obliged to point out some errors of this kind, but only in the hope that early correction will assist the errant observers concerned to accept the common disciplines of the vast majority and thereby to overcome their very human desire for a new 'tick'. Proof of the repeated unreliability of a particular observer remains very rare, and determined dishonesty such as evidently afflicted many of the Hastings Rarities (see *Brit. Birds*, 55: 281-384; 62: 364-381; 64: 61-68) has never, to our knowledge, reappeared in the national record of sight or in-the-hand identifications.

D. I. M. WALLACE
Chairman, Rarities Committee

Notes

Field notes on the Sharp-tailed Sandpiper On 14th October 1973 we found a Sharp-tailed Sandpiper *Calidris acuminata* in a flooded field at Sealand (near Shotton Pools) on the Welsh side of the boundary between Flintshire and Cheshire (see page 323). When first seen, it was asleep on the edge of some pools formed by the dumping of slurry from a nearby Pig farm. At this stage the feature which particularly attracted our attention was its yellowish breast. Put to flight by a passing tractor, it soon returned and started feeding in the mud surrounding the pools; it was very tame then and throughout its eleven-day stay, during which it was watched by several hundred observers and photographed (see plate 50).

Feeding with a Little Stint *C. minuta* and a Reeve *Philomachus lugnax*, it was intermediate in size, if anything slightly closer to the Reeve, thereby being about 19 cm in length. After the yellowish breast, which appeared to be between ochre and buff at very close range, the most notable feature of this small wader was the combination of a dark chocolate-brown crown (with several fine pale rufous streaks) with a prominent white supercilium and a dark patch behind the eye (plate 50a, b). It had a white chin and a faint collar of brown striations extending from the neck above the ochre breast (plate 50a). The ochre of the breast was suffused into the white of the belly and the brown striations on the side of the neck. The wings, back and mantle appeared scaly, dark brown and black with pale edges (light rufous to buffish-white). Two pale lines on each side of the upperparts are well shown in plate 50c: the upper one was white, but the lower consisted of a line of white edgings above a broken band of bright rufous feather bases. The bill was black and the legs a faded yellow. The bird was probably in its first autumn, since it conformed fairly closely to the illustration of a juvenile on plate III in *The Handbook*.

In flight the feet were level with the tip of the tail, the leading edge of the underwing was black, and there was a white patch on each side of the tail base and a pale, poorly defined wing-bar. On the ground a subdued, monosyllabic but musical 'whit, whit' note was heard (also described as a soft 'weep, weep, weep'), but a different chattering call was noted when the bird was flying.

Separation from the only species with which this is likely to be confused, the Pectoral Sandpiper *C. melanotos* (illustrated on plate 51), was not difficult. The following points should be noted:

(i) There was little streaking on the breast other than a narrow collar round the lower throat; Pectoral Sandpipers have very much more extensive streaking here, sharply marked off from a pure white abdomen.

(ii) The buffish to ochreish breast was quite distinct from the breast coloration of the Pectoral Sandpiper in any plumage.

(iii) The dark crown, white supercilium and dark eyestripe were all more prominently defined than in the Pectoral Sandpipers we have seen (compare plates 50 and 51).

(iv) While there were no Pectoral Sandpipers present for direct comparison, there was a strong impression that the Sharp-tailed was much less upright in posture and stockier in appearance, with shorter neck and legs (this is also suggested by comparing the plates).

(v) The calls were much more metallic and less reedy and harsh than notes we have heard from Pectoral Sandpipers.

In *Birds of the Soviet Union* (translated edition, 1966-68) the authors, G. P. Dementiev and N. A. Gladkov, gloomily and unnecessarily concluded (vol. 3, p. 174) that 'any report on observing this bird must be considered unreliable unless substantiated by specimens obtained'. In the hand there is a further distinction: the tail of the Sharp-tailed is fan-shaped and the feathers are regularly graduated to the long central pair; while in the Pectoral the terminal outline has a bi-concave appearance due to the relatively great length of the central pair compared with the three outermost which are equal.

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and G. A. WILLIAMS

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Grey Phalarope feeding on earthworms From 15th to 17th January 1974, a Grey Phalarope *Phalaropus fulicarius* spent periods of several hours daily on a patch of shallow floodwater on the village green at Poulshot, Devizes, Wiltshire. The bird swam and waded, feeding in the normal manner, but it also spent a considerable part of its feeding time lifting earthworms (Lumbricidae) out of the water, many of which it ate; others, however, were so large that it simply held them in its bill as though uncertain of what to do next, then dropped them into the water before retrieving them and again letting them fall. On occasions a worm was shaken vigorously or beaten on the surface of the water before finally being dropped as before. Presumably all the worms were drowned, as at no time was any voluntary movement of the prey detected.

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Rufous Turtle Dove in Cornwall At about 17.30 hours on 5th October 1973, I spotted what I took to be a Turtle Dove *Streptopelia turtur* sitting on a telegraph wire by a small clump of trees near a house just inland from Land's End, Cornwall. I like Turtle Doves and, because other migrants were few and far between, I drove my car as close as possible. From 20 metres I put my 10 × 40

glasses on the bird and was immediately struck by its 'darkness' (in weak sunlight) and 'heaviness'. I was conscious of a quite wide variation in Turtle Dove plumage, but this individual looked very abnormal. I picked up the Heinzel, Fitter and Parslow guide (1972, *The Birds of Britain and Europe with North Africa and the Middle East*) and compared the bird with the dove plate: it matched neither the Turtle nor the Rufous Turtle Dove *S. orientalis*. Somewhat confused, I put the book away and concentrated on the bird. After four minutes or so, it became anxious and flew down in to stubble, showing a tail that lacked a white rim. Leaving my car, I circled the bird, finally flushing it at 15 metres, obtaining good flight views at up to 200 metres and then watching it flight out of sight towards Sennen.

There seemed to be no hope of re-finding the bird, so I returned to Penzance where, before further reference, I made finished drawings and full notes from my scribbled field sketches and comments. Unfortunately the former have since been lost in the post during circulation round the Rarities Committee, but the latter read virtually as follows:

'An obvious *Streptopelia* but distinctly darker, duller and heavier than *turtur*; adult, with red "eye" and neck "brooch"; sitting hunched or flying off with tail and wing pattern/action recalling Stock Dove *Columba oenas* or Woodpigeon *C. palumbus*. Size as Collared Dove *S. decaocto* but a little less tail and more wing. Bill dark, in scale, "eye" red, forehead and face pale buff. Crown grey, nape greyish-buff, chest and flanks dirty buff, vent dirty white, greyish neck patch with at least five black lines, two showing whitish edges (whole area indistinct). Centre mantle dark brown, scapulars and inner wing-coverts scalloped with dull warm brown and ochre edges around blackish centres, outer wing-coverts grey (no blue tone), primaries blackish, tail blackish (no tail rim visible above), feet reddish. Undertail black with quite broad greyish rim, undertail-coverts dull greyish merging with buff, underwings dark. In flight whole plumage rather drab, less clearly patterned than *turtur*, upper back showing greyish-buff tone; wing pattern less striking and no tail rim visible on take-off or in flight.'

Further reference to Heinzel *et al.* got me no closer to an identification; all I could do was to look for Turtle Doves with which to compare the bird. On the following day I crossed to the Isles of Scilly, and by 14th October I had spent much time watching up to 25 *turtur* on St Agnes at similar ranges and in like light. As these were immatures, a plumage comparison was not possible, but they all looked very different in character from the Land's End bird and I finally judged them to be 'definitely smaller, slighter, more flick-winged in flight, with tail rims always visible even on two "scruffs".' I also felt that, compared with Collared Doves in Penzance on 6th October and on St Agnes later, the Land's End bird had shown little, if any, difference in size and less in character.

I began to sense that to identify it as an odd *turtur* was really not satisfactory, but when I showed my drawings to S. C. Madge, who has seen the Himalayan form of *orientalis*, he was not very impressed, commenting that to his eyes this species was very reminiscent of the Stock Dove in character and size. My morale sagged further when I found that the description of *orientalis* in *The Handbook* partly contradicted the plate.

In late October I was able to research the matter more fully and once more I felt that I might have seen *orientalis*. Some are no bigger than Collared Doves and, in fact, none is as large as a Stock Dove; one on St Agnes in May 1960 (*Brit. Birds*, 53: 445-446) showed a light greyish tail rim only at close range. Yet there remained discrepancies, such as the buffy forecrown (featured in two plates but not in any description), the neck patch (not blue enough, according to descriptions) and the rather dull brown of the wing-coverts (lacking the rufousness implied both by published descriptions and by the bird's name). I still found myself unable to come to a decision on this very intriguing dove, and accordingly Derek Goodwin, author of *Pigeons and Doves of the World* (1967), was asked for his views. He replied as follows:

'I have no doubt at all that the bird was, as the observer thinks, an Eastern Turtle Dove *Streptopelia orientalis*, most probably *S. o. orientalis* (or the barely separable island forms *S. o. simpsoni* or *S. o. ori*), but possibly a dull individual of *S. o. agricola*. His description, in my opinion, is excellent and could fit no other species.

'He seems worried about the whitish edges to the black strips on the neck: perhaps I erred by omission here as I described them as "light bluish grey" but they can fade to whitish in worn plumages (and do) and in any case are often so pale, especially in females, that they would almost certainly look whitish in the field. As to its being duller on the wing-coverts, another point that seems to worry him, this in fact is characteristic of *orientalis*; the name "Rufous Turtle Dove" is descriptive only of the race from peninsular India, *S. o. erythrocephala*. This name is a standing temptation to imaginative bird-watchers to misidentify richly coloured males of *S. turtur*. He certainly need not worry that it did not fit "precisely" the pictures in the field guide he mentioned. Its dove pictures are not its strongest point, to put it mildly.

'I've not heard of any *S. orientalis* being imported but it seems a long way west.'

On the basis of Mr Goodwin's comments, the identification as *S. orientalis* has been accepted by the Rarities Committee (see page 328), eight of whose members saw the original coloured drawings before their loss. This bird was the fourth to have been seen free in Britain and the second in October. Sadly, and despite Mr Goodwin's closing remarks, this species is occasionally imported (see *Brit. Birds*, 67: 191), and thus the possibility exists that it was an escape.

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Swallow persistently mobbing Tawny Pipit I was interested in the note by Julian C. Rolls on the mobbing of a Common Tern *Sterna hirundo* by a group of Swallows *Hirundo rustica* (*Brit. Birds*, 66: 169). On 6th October 1972, on St Mary's, Isles of Scilly, I witnessed similar behaviour by a Swallow towards a Tawny Pipit *Anthus campestris*. It persistently chased the pipit in the air, following every twist and turn, and the only way that the latter could obtain relief from its pursuer was to settle on the ground. Immediately on taking flight, however, it was again harassed by the Swallow until it once more sought refuge on the ground. This happened on four or five occasions over a period of some 15 minutes, each flight lasting for a minute or so at heights ranging from just above the hedgerows to about ten metres.

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This type of pursuit behaviour by various passerines, chiefly in autumn, was discussed by Dr K. E. L. Simmons (*Brit. Birds*, 44: 369-372). Apart from intraspecific reactions, he recorded Swallows chasing Sand Martins *Riparia riparia* several times, Kingfishers *Alcedo atthis* twice, and Coot *Fulica atra*, Common Sandpiper *Tringa hypoleucos* and Black Tern *Chlidonias niger* once each. Such behaviour is probably not uncommon, despite the paucity of published records, and may be a type of exaggerated social response. EDS

Carrion Crows eating oily fish paper The note by Bernard King describing the eating of oily fish paper by Jackdaws *Corvus monedula* (*Brit. Birds*, 66: 496) prompts me to record the following similar incident. During the afternoon of 24th December 1973, on open grassland at Durdham Down, Bristol, I saw two Carrion Crows *C. corone* eating oily fish and chip paper. Each bird was standing on a piece of saturated paper and tugging at and swallowing portions of varying size. This behaviour continued for several minutes.

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Large flock of Hooded Crows in Suffolk At 16.30 hours on 22nd February 1974, at Reydon Marshes, near Southwold, Suffolk, I watched a flock of 62 Hooded Crows *Corvus corone cornix* flying overhead slightly west of north. This record is of interest in view of the decrease in the numbers seen in Suffolk in winter and on migration in the last 30 years. W. H. Payn (1962, *The Birds of Suffolk*) reported that, apparently, up to 50 were seen at West Stow in the 1950's, but otherwise the maximum numbers recorded in the county in recent years have been 17 at Sudbourne in January 1969, and 15

in the Dunwich-Westleton area in December 1972 (*Suffolk Bird Reports*).

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Bearded Tit with abnormal leg coloration on 24th January 1973, while ringing at Ely, Cambridgeshire, I caught a male Bearded Tit *Panurus biarmicus* with bright golden-yellow legs and feet and light brown claws, the usual colour of these parts being blackish. In all other respects the bird appeared normal. I can recall no previous mention of such variation, and H. E. Axell, who has handled 3,500 Bearded Tits at Minsmere, Suffolk, informs me that he has never seen or heard of one with this abnormal leg colour.

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House Sparrows acquiring a feeding technique When I first hung out plastic nets filled with shelled peanuts in my garden at Brickhill, Bedford, in the winter of 1964/65, the usual tits *Parus spp* and Greenfinches *Carduelis chloris* flew to and clung on them to feed. House Sparrows *Passer domesticus* attempted to do this, but fluttered awkwardly and never succeeded in staying on the net long enough to feed on the nuts. It was normal to see them on the ground below the net, looking upwards and waiting for the other species to dislodge fragments of nut, upon which they then fed (Dunnocks *Prunella modularis* behaved similarly).

During the following eight winters I did not hang out these nets, but baited a large funnel trap which I occasionally closed for ringing purposes. Last winter (1973/74) I reverted to the plastic nets and, to my surprise, found that House Sparrows instantly started feeding expertly on them, seeming now to be even more adept than the Greenfinches, fluttering less when alighting.

It seems likely that the House Sparrows had acquired this habit elsewhere and that it is now commonplace and taken for granted by observers. It should, therefore, be placed on record that this was not always the case.

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J. Jack also reports that in 1973 a pair of House Sparrows perfected the technique of grasping the mesh of a white wire nut-basket in his garden at Cuffley, Hertfordshire. A series of notes that we published four years ago (*Brit. Birds*, 63: 345) show that by the late 1960's House Sparrows were already clinging to various types of mesh feeders and taking the contents. This is but one example of a recent adaptation to an essentially artificial environment by an opportunistic species (see also *Brit. Birds*, 66: 91-99). Eds

May reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

May was generally an unsettled month, with high pressure north-east of Britain producing easterly winds in the first week. The middle third of the month was characterised by winds from a southerly quarter followed by a short spell of westerly weather and a day of north-easterly winds on 25th, and the last week was dominated by depressions in the north Atlantic.

DIVERS TO CRAKES

After the bird at Loch Fleet (Sutherland) in March and April (*Brit. Birds*, 67: 250) another **White-billed Diver** *Gavia adamsii* was reported during May from Fetlar (Shetland), and in Chichester Harbour (Hampshire/Sussex) a **Black-browed Albatross** *Diomedea melanophris* was seen at Sandy Point on 10th.

Purple Herons *Ardea purpurea* were reported only from East Anglia, Kent and Lancashire: in Norfolk one was at Cley and another at Strumpshaw, near Norwich, on 19th; at Minsmere (Suffolk) there was one on 13th and 18th-19th, when two were reported from nearby Walberswick, and another was at the latter locality on 25th; at Stodmarsh (Kent) two were recorded also on 19th; while in Lancashire there was one at Warton Marsh, Ribblesdale, on 7th and one at Leighton Moss on 15th. A **Little Egret** *Egretta garzetta* was at Lady's Island Lake (Co. Wexford) from 5th to 12th, one stayed at Loch of Strathbeg (Aberdeenshire) from 22nd to 29th, and further singles were seen at Belvide Reservoir (Staffordshire) on 30th and at Salcombe (Devon) on the last day of the month. One of the more exciting events of May and June was what appeared to be an unprecedented arrival of **Great White Egrets** *E. alba* (though investigations into the escape possibility are being made): the first indication occurred when a large egret flying over Sutton-in-Ashfield (Nottinghamshire) on 16th May was identified as this species, and three days later what was thought to be the same individual was watched at Newton Solney and Clay Mills (Derbyshire); on 28th one arrived at Sealing Dam Reservoir (Yorkshire), staying until 6th June, while on 1st June another came in off the sea from the north-east at Spurn (Yorkshire); and then, on 11th June, a Great White Egret appeared at Lodmoor (Dorset). A **White Stork** *Ciconia ciconia* was at Lough Beg (Co. Antrim/Co. Londonderry) on 9th, and one at Ballykelly (Co. Londonderry) from about 20th was still present in July. A total of about 13 **Spoonbills** *Platalea leucorodia* was recorded in nine counties north to Aberdeenshire and west to Co. Dublin, where a single bird at Rogerstown had been in the area since November 1972.

A drake **Green-winged Teal** *Anas crecca carolinensis* was at Minsmere from 11th to 20th, and a pair of **American Wigeon** *A. americana* from 21st until 17th June, the male staying until the end of that month. At Rattray (Aberdeenshire) 415 **Long-tailed Ducks** *Clangula hyemalis* flew north and 35 south in two hours on 4th. Three **Velvet Scoters** *Melanitta fusca* were off Howick (Northumberland) on 4th, when a monthly maximum of 13 flew east at Beachy Head (Sussex); at Dungeness (Kent) easterly movement comprised one on 4th, four on 10th and an exceptional 165 on 12th. From Shetland there was an unconfirmed report of no fewer than four **King Eiders** *Somateria mollissima* during May. **Brent Geese** *Branta bernicla* were reported from nine places, with a flock of 59 flying north-west at the Bann estuary (Co. Londonderry) on 30th.

Single **Rough-legged Buzzards** *Buteo lagopus*, no doubt stragglers from the autumn/winter influx, were seen in Norfolk at Blakeney Point on 1st and 4th and at Cley on 2nd, at Fair Isle on 6th and at Strathbeg on 7th. A **Red Kite** *Milvus milvus* appeared at Titchfield Haven (Hampshire) on 5th, a **Black Kite**

M. migrans on Ringstead Downs (Norfolk) on 10th, and a **Honey Buzzard** *Pernis apivorus* at Spurn on 19th, while **Marsh Harriers** *Circus aeruginosus* were reported from 20 widely scattered localities. Outside breeding areas, **Montagu's Harriers** *C. pygargus* were noted only at Minsmere on 6th, Arne (Dorset) on 7th and Dungeness on 30th. Only about eleven **Ospreys** *Pandion haliaetus* were seen at 13 localities in England, in Lancashire, Nottinghamshire, and the east and south-east. The expected overshooting of **Red-footed Falcons** *Falco vespertinus* produced single birds at Minsmere on 2nd and 19th, near Fordingbridge (Hampshire) on 5th, at Holme (Norfolk) on 17th, at Leighton Moss on 17th and 18th and at Craven Arms (Shropshire) on 24th and 29th. **Quails** *Coturnix coturnix* were heard near Eye Brook Reservoir (Leicestershire) on 22nd and at Wittersham (Kent) on 26th, and **Spotted Crakes** *Porzana porzana* seen at Chew Valley Lake (Somerset) on 4th and found to be still present in the Dinnet area of Aberdeenshire in the second week (see *Brit. Birds*, 67: 307). **Corncrakes** *Crex crex* were seen or heard near Gunnerton (Northumberland) on 7th, on Fair Isle from 8th to 12th, in the Rattray/Strathbeg area on 11th, at Slimbridge (Gloucestershire) on 19th, at Hempstead woods (Norfolk) on 24th, and at Salthouse heath (also Norfolk) on 29th (two). A **Crane** *Grus grus* was reported in the Horsey area of Norfolk for several days towards the end of the month.

CHARADRIIFORMES

A **Little Ringed Plover** *Charadrius dubius* on the Calf of Man on 5th was rather surprisingly only the second Manx record. **Kentish Plovers** *C. alexandrinus* were recorded in Kent (seven), Sussex (one), Suffolk (one), Norfolk (four) and Guernsey (two). The usual spring passage of **Dotterel** *Eudromias morinellus* was noted from the traditional localities with some records from 'new' sites: in the latter category was a trip at Cliffe (Kent) from 13th to 17th which numbered 22 on the first date, the largest flock reported to us; the next largest gathering was of twelve, at Fulbourn (Cambridgeshire) also on 13th, which had dispersed by 26th; a total of about 60 was reported from elsewhere, in Tyneside, Norfolk, Suffolk, Hertfordshire, Kent, Somerset, Lancashire and the Isle of Man. The last **Jack Snipe** *Lymnocyptes minimus* were two at Teesmouth (Co. Durham) until the middle of the month. About 18 **Wood Sandpipers** *Tringa glareola* were found at 14 places, and there was a maximum of 43 **Spotted Redshanks** *T. erythropus* at Arne on 6th. **Little Stints** *Calidris minuta* were noted at 17 places, nowhere more than five together, and **Temminck's** *C. temminckii* at 17, a total of about 32 birds including up to four at Minsmere and Teesmouth. This is about the same as the number of **Curlew Sandpipers** *C. ferruginea* reported, apart from an unprecedented spring flock of 34 at Crossens Marsh (Lancashire) on 23rd.

American waders were well represented during May—a **Pectoral Sandpiper** *C. melanotos* at Porlock marsh (Somerset) on 5th and one at Cley on 10th, a **Lesser Yellowlegs** *T. flavipes* on St Mary's (Scilly) from 11th to 13th, a **Buff-breasted Sandpiper** *Tryngites subruficollis* in Aberlady Bay (East Lothian) from 11th to 15th, another **Pectoral** on Tresco (Scilly) on 19th, and a **White-rumped Sandpiper** *C. fuscicollis* in the Bann estuary on 25th. Palearctic waders included a **Broad-billed Sandpiper** *Limicola falcinellus* at Dawlish Warren (Devon) on 27th, and from southern Europe a **Black-winged Stilt** *Himantopus himantopus* arrived at Attenborough (Nottinghamshire) on 18th; in Lancashire **Collared Pratincoles** *Glareola pratincola* were at Scotsman's Flash, Wigan, from 22nd to 28th and at Freekleton sewage farm from 24th to 27th, when one was reported at Fleet Pond (Hampshire). A **Grey Phalarope** *Phalaropus fulicarius* in summer plumage was at Hornsea Mere (Yorkshire) on 27th, and single **Red-necked Phalaropes** *P. lobatus* were seen near Wimborne (Dorset) about 20th and swimming among a flock of Coots *Fulica atra* at Chasewater (Staffordshire) on 27th. A **Stone Curlew** *Burhinus oediconemus* on Fair Isle on 23rd was unusual. It is worth mentioning here

that the first **Terek Sandpiper** *Xenus cinereus* to winter in Britain (see page 322) was last seen on the Plym estuary (Devon) on 5th, and presumably the same individual stayed at Radipole Lake (Dorset) on 6th and 7th and was seen 40 kilometres further east at Brownsea Island about five days later.

A good passage of **Arctic Skuas** *Stercorarius parasiticus* will be summarised later. **Pomarine Skuas** *S. pomarinus* were noted at four places: two singles at Portstewart (Co. Antrim) and another two at Gilkieker/Hill Head (Hampshire); a total of 45 at Beachy Head, with maxima of 20 on 10th and 14 on 12th; and an even larger passage at Dungeness which totalled 73, all adults, between 8th and 13th, maxima being 23 on 10th and 45 on 12th. At the same place an adult **Long-tailed Skua** *S. longicaudus*, the first ever spring record for Dungeness, was seen on 13th. A **Laughing Gull** *Larus atricilla* was identified at Burnham-on-Croueh (Essex) on 5th. Of the rarer terns a **White-winged Black Tern** *Chidonias leucopterus* was identified at Dungeness on 28th, two **Whiskered Terns** *C. hybrida* were reported at Blackpill (Glamorgan) on 13th, and a **Caspian Tern** *Hydroprogne caspia* remained at Ynys-hir and Ynys-las (Cardiganshire) from 8th to 28th: **Gull-billed Terns** *Gelochelidon nilotica* were seen at Sizewell Beach (Suffolk) on 10th and at Langley Point (Sussex) on 14th (two) and 16th, and one was at Portland Bill (Dorset) on 16th. **Roseate Terns** *Sterna dougallii* were seen well inland at Eye Brook Reservoir and at Pitsford Reservoir, both on 18th and the latter the second Northamptonshire record.

NEAR-PASSERINES AND PASSERINES

A first-year female **Snowy Owl** *Nyctea scandiaca* was on Fair Isle from 17th to 20th and another female there on 28th. From southern Europe there were few instances of overshooting involving near-passerines. Single **Alpine Swifts** *Apus melba* appeared at Hunmanby Gap (Yorkshire) on 13th and at Cley on 17th. A **Bee-eater** *Merops apiaster* flew north at Bempton cliffs (Yorkshire) on 17th and one was at Dungeness on 19th. A **Roller** *Coracias garrulus* was at Aston Upton Down (Oxfordshire) from 23rd to 27th and one remained at Grange (Banffshire) from 29th to 3rd June. **Hoopoes** *Upupa epops* were reported from only twelve places north to Northumberland and west to Dublin.

A **Woodlark** *Lullula arborea* flew east at Sand Bay (Somerset) on 5th, when one also appeared at Spurn, and a **Raven** *Corvus corax* was at Wells (Norfolk) on 11th. Up to seven **Shore Larks** *Eremophila alpestris* were at Bempton cliffs until 9th, and singles were on Fair Isle on 23rd and 29th and at Spurn on 26th and 27th. Late **Fieldfares** *Turdus pilaris* were reported from 17 places, mostly in small flocks or singles, though there were flocks of up to 500 between West Boldon and Holy Island (Northumberland) until 8th and over 100 near Cheddar (Somerset) as late as 17th. In England at least, there were far fewer **Redwings** *T. iliacus*, the last being five on Holy Island on 20th and one at Minsmere from 18th to 25th. A **Nightingale** *Luscinia megarhynchos* was found dead at Spurn on 8th (this species is a rarity north of the Humber). A **Marsh Warbler** *Acrocephalus palustris* trapped on Sark on 16th was the first Channel Islands record; additionally, singles were at Sandwich Bay on 18th, at Spurn on 25th (trapped), at Sevenoaks (Kent) on 27th, and at Dungeness on 31st (trapped, the first for the observatory). Migrant **Wood Warblers** *Phylloscopus sibilatrix* were seen on Fair Isle on 13th and on the Calf of Man on 17th and 24th.

There were late records of three **Waxwings** *Bombycilla garrulus* at Tynemouth on 8th and of a **Great Grey Shrike** *Lanius excubitor* on Bardsey (Caernarvonshire) on 2nd. The last **Bramblings** *Fringilla montifringilla* were five at Leybourne (Kent) on 16th and the last **Snow Bunting** *Plectrophenax nivalis* a female on Fair Isle on 25th.

Golden Orioles *Oriolus oriolus* were widely reported—three in west Cornwall between 11th and 18th, at least three in Dorset in the second half of the month.

two in Leicestershire on 26th, a young male trapped on the Calf of Man on the same date (a first for the observatory), one at Minsmere on 26th and 27th, one on Fair Isle on 29th and up to two at Wheatfen Broad (Norfolk) from 30th to 1st June. Many other scarce migrants were few in number and these included **Bluethroats** *Luscinia svecica*, with only singles at Rattray on 18th, Teesmouth on 25th and Tynemouth on 25th and 26th, though on Fair Isle they were recorded on most days from 11th with a maximum of ten on 17th. The only *Hippolais* warbler was at Sandwich Bay on 11th, and the only **Red-breasted Flycatcher** *Ficedula parva* a male at Wells on 5th.

A number of interesting rarities rounded off an eventful month. A **Short-toed Lark** *Calandrella cinerea* was trapped at Spurn on 9th and another was on Fair Isle from 11th to 15th. A male **Rock Thrush** *Monticola saxatilis* at Clogher Head (Co. Louth) on 20th and 21st will be the first Irish record of this species, if accepted. Two male **Black-eared Wheatears** *Oenanthe hispanica* of the black-throated form arrived at Dungeness on 21st, one of them staying until 29th. A **Thrush Nightingale** *L. luscinia* was on the Out Skerries (Shetland) on 17th and another on Fair Isle on 21st and 22nd (*cf. Brit. Birds*, 66: 372). A **Savi's Warbler** *Locustella luscinoides* was trapped in the Bridgwater area of Somerset on 14th, one stayed at Farlington marshes (Hampshire) from 26th until 1st June and another remained on the River Taw (Devon) from 27th well into July; while a **Great Reed Warbler** *A. arundinaceus* was heard (though apparently not seen) at Stodmarsh on 26th. Two more **Subalpine Warblers** *Sylvia cantillans* followed the one in April (*Brit. Birds*, 67: 308), a female trapped on Fair Isle on 16th and a male at Langness (Man) on 17th. A **Richard's Pipit** *Anthus novaeseelandiae*, very rare in spring, remained at Teesmouth from 2nd to 4th and a **Red-throated Pipit** *A. cervinus* was on Fair Isle on 13th and 14th, while from southern or eastern Europe **Tawny Pipits** *A. campestris* appeared on Skomer Island (Pembrokeshire) on 13th, on the Out Skerries from 14th to 17th and on 26th and at Bempton cliffs on 18th and 19th. Single **Woodchat Shrikes** *Lanius senator* were present at Porthgwarra (Cornwall) on 17th and 18th, on Samson (Seilly) on 19th, on Fair Isle from 19th to 21st (trapped), and at Creech St Michael, near Taunton (Somerset), from 21st until 24th, while another was reported on Fetlar during the month; and **Serins** *Serinus serinus* were found at Salthouse on 4th, at Beachy Head on 15th and at Clogher Head on 19th. An immature male **Scarlet Rosefinch** *Carpodacus erythrinus* was singing at Salthouse on 27th and another immature male or female was trapped on Bardsey on 31st. On 16th a male **Rustic Bunting** *Emberiza rustica* appeared on the Out Skerries, while on Fair Isle there was a female from 10th to 14th, a male on 15th and 16th and a different male from 17th to 22nd. **Ortolan Buntings** *E. hortulana* have become rare in Britain in recent years: in May they were recorded at Dungeness, where two on 10th constituted the first spring record there, and on Fair Isle with one or two daily from 9th to 15th.

STOP PRESS From a flood of recent reports, space permits only the following: Cattle Egret near Rolvenden (Sussex), mid-July to 16th August; Solitary Sandpiper, Rainham (Essex), 1st to 5th September; Spotted Sandpipers, Weir Wood Reservoir (Sussex), 11th to 17th August, and Aberthaw (Glamorgan), 25th; Lesser Yellowlegs, Sandbach (Cheshire), 26th August to at least 5th September; Terek Sandpiper, Sutton Bingham Reservoir, 18th August, and Western at the same place 20th to 22nd; White-rumped Sandpiper, Ferrybridge (Dorset), 4th September; Wilson's Phalarope, Dibden Bay, 14th to 18th August; pratineole, Cley, 27th and 28th; Whiskered Tern, Southampton Water, 17th August; Ross's Gull, Redcar, 22nd August; Greenish Warblers, Spurn, 31st to 3rd September, Teesmouth about same time and Wells 3rd September; and Bonelli's Warbler, Great Yarmouth (Norfolk), 30th August to 1st September.

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Volume 67 Number 8 August 1974

- 309 Editorial: Advances in field identification
- 310 Report on rare birds in Great Britain in 1973 (with additions for ten previous years) *F. R. Smith and the Rarities Committee*
Plates 45-50
- 349 The reasons for record rejection

Notes

- 351 Field notes on the Sharp-tailed Sandpiper *C. D. N. Johnson, J. D. Venables and G. A. Williams* Plates 50-51
- 352 Grey Phalarope feeding on earthworms *Geoffrey L. Boyle*
- 352 Rufous Turtle Dove in Cornwall *D. I. M. Wallace*
- 355 Swallow persistently mobbing Tawny Pipit *G. Summers*
- 355 Carrion Crows eating oily fish paper *Dr A. P. Radford*
- 355 Large flock of Hooded Crows in Suffolk *Bryan L. Sage*
- 356 Bearded Tit with abnormal leg coloration *C. A. E. Kirtland*
- 356 House Sparrows acquiring a feeding technique *Dr J. T. R. Sharrock*
- 357 May reports *D. A. Christie*

D. I. M. Wallace drew the Little Swift (page 348)

Volume 67 Number 9 September 1974



BRITISH BIRDS

FOOD OF LONG-EARED OWLS

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BRITISH BIRDS

Feeding ecology of the Long-eared Owl in Britain and Ireland

David E. Glue and Geoffrey J. Hammond

Among the five widely distributed species of owls in Britain and Ireland, the breeding and feeding biology of the Long-eared Owl *Asio otus* is the least understood. The diets of some Long-eared Owls in England were studied in detail by Ticehurst (1939), who examined pellet samples from seven localities, and more recently a number of local analyses have added to our knowledge, notably in Lancashire (South 1966), Ulster (Fairley 1967), Inverness-shire (Wooller and Triggs 1968), Yorkshire (Armitage 1968) and Kent (Flegg and Cox 1968). With the help of 22 ornithologists during 1964-73, we have examined the spectrum of prey taken by Long-eared Owls at a further 51 localities, totalling 7,761 vertebrate prey items. The studies have brought to light a number of interesting facts about the feeding ecology of this owl at British and Irish breeding sites and winter quarters, and form the basis of this paper.

DISTRIBUTION, HABITAT, NEST AND ROOST SITES

The Long-eared Owl is not scarce as a breeding bird in some parts of Britain, being widely distributed over much of eastern and lowland Scotland and northern England, and in the Isle of Man. In western Scotland, Wales and the rest of England it is generally local, and even entirely absent from several regions. It is more widespread in Ireland. Its numbers are augmented substantially in the winter by immigrants from the Continent. The status of the Long-eared Owl in many areas is obscure, owing to the difficulty of

locating scattered pairs; but the birds can often be found by carefully listening for the characteristic calls of the adults and young, or by looking for roosts in suitable places.

This is typically the conifer owl in Britain and Ireland, being found in plantations, small shelter belts and clumps of spruce, pine and larch on farmland and moorland. To a lesser extent it frequents deciduous woodland, especially with ivied trees and occasional conifers, and also low bushes on marshes, dune-slacks and moorland. Winter congregations of half-a-dozen and even as many as 20 owls have been located.

The birds are often faithful to one locality, returning annually to breed or winter in the same wood or clump of trees. The presence of a roosting owl is often betrayed by groups of pellets and excrement at the foot of the regular roost tree. The ground beneath the nest can be a useful source of pellets and prey remains, as can the site of the roosting mate, which is frequently within 50 metres of the nest. These facts make it possible, through diligent searching, to collect and analyse sizeable samples of Long-eared Owl pellets and so to assess the diets of both breeding and wintering birds.

The 51 sites from which the data used in this paper are derived comprise 25 in northern England, twelve in Scotland, ten in southern England, two in Ireland and two in Wales. Space does not allow us to discuss the 51 diets individually, but full details of each have been deposited in the British Trust for Ornithology's Reference Library. The varied nature of the sites is illustrated by the ten brief habitat descriptions which follow.

Examples of breeding sites

INVERNESS-SHIRE: Mature Douglas firs among unevenly aged fir, spruce and larch stands showing widespread wind damage.

NOTTINGHAMSHIRE: Tall hawthorns in the centre of deciduous scrub surrounded by arable farmland.

LINCOLNSHIRE: Scots pines in the centre section of an extensive area of Forestry Commission plantations.

KENT: Dense willow scrub with extensive areas of rough grassland on a vast coastal shingle expanse.

CO. LONDONDERRY: Tall Scots pines in mature oak woodland close to a suburban housing area.

Examples of winter roost sites

ORKNEY: Firs in a small mixed wood near farm buildings, surrounded by agricultural land and moorland.

STAFFORDSHIRE: A narrow strip of mainly coniferous woodland situated on heather grass-moor with hill pasture nearby.

CAMBRIDGESHIRE: Apple trees in a large mature Blenheim orange orchard, under-sown with grass and flanked by ploughed arable land.

KENT: A dense thicket of hawthorns forming part of a much larger area of deciduous woodland, surrounded by mixed farmland and marsh.

WILTSHIRE: Scattered clumps of semi-mature Norway spruce among young beeches on a steep chalk downland slope.

PELLET ANALYSIS

It is often not easy to ascertain whether pellets were regurgitated by Long-eared Owls without a confirmatory sighting of the predator, because they vary considerably in size, colour and composition, and can be confused with those ejected by other species, particularly the Tawny Owl *Strix aluco*. The latter often frequents conifer stands and sometimes utilises old nests of other birds, as does the Long-eared Owl. Consequently, only material from sites where a Long-eared Owl has been observed and identified has been used in this summary.

Most commonly, fresh Long-eared Owl pellets are elongated dark grey-black masses of clumped fur and feathers, enveloping a core of mammal and bird bones with the occasional hard parts of invertebrates. The average size of 2,484 pellets from 20 scattered sites was 3.3 cm in length by 1.9 cm in breadth. These measurements compare closely with those from other studies (South 1966, Armitage 1968, D. W. Scott, verbally). Occasionally included among the smallest pellets are virtually round castings which often do not contain hard materials. These are probably composed of residues regurgitated after a fully formed pellet has already been ejected.

Several analysts of Long-eared Owl pellets have urged the need for care when identifying and quantifying bird and mammal prey (South 1966, Flegg and Cox 1968). Decapitation and partial consumption of birds and larger mammal prey occurs during both the breeding and non-breeding seasons. Consequently, checks on the numbers of mammal pelves and bird sterna and sacra have been made regularly, to ensure that the pellet analysis represents an accurate record of the diet.

HUNTING METHODS

The Long-eared Owl appears to be a particularly versatile hunter. From the combined contents of the 51 diets examined (table 1), it is clear that this owl feeds on a large spectrum of small and medium-sized mammals, fewer birds, and the occasional amphibian and invertebrate. Consideration of the variety of hunting techniques employed goes a long way towards explaining the relative frequency with which the different preys are eaten.

The hunting method most commonly observed involves quartering over open ground, flying forwards and back again over the regular territory at a height of usually 0.5-1.5 metres. The wing-beats are quite fast and are not normally raised above the line of the body, and there are short (but occasionally lengthy) intervals of gliding

Table 1. Vertebrate diet of Long-eared Owls *Asio otus* at 51 localities in Britain and Ireland, from pellet analyses and from prey identified at nest sites

A conversion factor in 'prey units' has been applied to each food item (see Southern 1954), based on the estimated weight of the species; the total prey weight thus calculated is expressed as a percentage of the combined weight of all prey. One prey unit is equal to approximately 20 gm of matter

	Number of individuals	Percent numerical	Conversion factor	Percent prey weight
Short-tailed Vole <i>Microtus agrestis</i>	3,679	47.4	1.0	40.7
Wood Mouse <i>Apodemus sylvaticus</i>	1,397	18.0	1.0	15.4
Birds (see pages 366-368)	1,161	15.0	1.0	12.8
Bank Vole <i>Clethrionomys glareolus</i>	854	11.0	1.0	9.4
Brown Rat <i>Rattus norvegicus</i>	233	3.0	5.0	12.9
Common Shrew <i>Sorex araneus</i>	201	2.6	0.5	1.1
Pygmy Shrew <i>Sorex minutus</i>	99	1.3	0.2	0.2
Orkney Vole <i>Microtus arvalis orcadensis</i>	48	0.6	2.0	1.1
Water Vole <i>Arvicola amphibius</i>	27	0.3	5.0	1.5
Rabbit <i>Oryctolagus cuniculus</i>	15	0.2	20.0	3.3
House Mouse <i>Mus musculus</i>	12	0.2	1.0	0.1
Mole <i>Talpa europaea</i>	10	0.1	5.0	0.6
Water Shrew <i>Neomys fodiens</i>	6	0.1	0.75	<0.05
Pipistrelle Bat <i>Pipistrellus pipistrellus</i>	5	0.1	0.25	<0.05
Common Frog <i>Rana temporaria</i>	5	0.1	1.0	0.1
Weasel <i>Mustela nivalis</i>	4	0.1	4.0	0.2
Grey Squirrel <i>Sciurus carolinensis</i>	2	<0.05	20.0	0.4
Harvest Mouse <i>Micromys minutus</i>	1	<0.05	0.3	<0.05
Stoat <i>Mustela erminea</i>	1	<0.05	10.0	0.1
Edible Dormouse <i>Glis glis</i>	1	<0.05	8.0	0.1
TOTAL	7,761	100.0		100.0

during the hunting flight. It is in this manner and over such habitats as rough grassland, hill pasture, marsh, grass-moor, woodland rides and glades that the bulk of the Long-eared Owl's primary prey on the British mainland, the Short-tailed Vole*, must be taken. Prey is captured while quartering by a deliberate stall during flight, which brings the owl to the ground feet-first, talons at maximum spread, hopefully pinning the small mammal and absorbing the impact of landing. Occasionally, Long-eared Owls hover effectively over low herbage and bushes before plunging to kill small mammals or disturb roosting birds. Although probably the most nocturnal of the British owls, this species occasionally hunts in daylight (J. Young, D. W. Scott, verbally).

Limited observations suggest that Long-eared Owls are well suited to hunting in woodland, and the regularity with which cover-dwelling rodents, such as the Wood Mouse and Bank Vole, are taken (table 1) confirms this view. The birds frequently hunt by

*Scientific names of mammalian prey species are listed in table 1

quartering plantations, keeping below the canopy, and sometimes rest on low vantage points in cover to watch for prey below. Thus, although there is still considerable scope for studies of their hunting techniques, particularly in view of the recent availability of image intensifiers for nocturnal use, a variety of methods in both open and closed habitats are already well known.

SPECTRUM OF MAMMAL PREY

As stressed earlier, the Long-eared Owl feeds on a wide variety of small and medium-sized mammals. The 18 species listed in table 1 formed 85% of the vertebrate prey total. The Short-tailed Vole was numerically the commonest prey item, accounting for 47% of the total prey. This is the most abundant small rodent of open habitats, being distributed throughout the British mainland but absent from certain of the Scottish islands and from Ireland (Southern 1964). Of the other small mammals eaten in any quantity, the Wood Mouse, Bank Vole, Brown Rat, Common and Pygmy Shrews are all widely distributed on the British mainland and in Ireland, with the notable exceptions of the Common Shrew which is absent from Ireland and the Bank Vole which in Ireland is restricted to the south-west (Southern 1964).

The 51 diets examined included four from localities where the Short-tailed Vole is absent—two in Orkney and two in Ireland. In Orkney there is an ecologically and anatomically very similar cricetid rodent, the Orkney Vole, and this was the staple food item at each site there (both small woodland roosts surrounded by agricultural land and moorland). Orkney Voles formed 57% and 52% of the combined prey weight at the two localities, with Wood Mice, Brown Rats, House Mice and Pygmy Shrews killed in smaller numbers (prey unit total = 89.2; see table 1). At both Irish breeding sites—oak woodland in Co. Londonderry and pastoral farmland in Co. Cork—Wood Mice were the primary prey, forming 72% and 61% of the diets respectively, with Brown Rats of secondary importance (15% and 23%) and fewer small birds, House Mice and Pygmy Shrews (prey unit total = 282). These findings agree closely with those of earlier analyses of Long-eared Owl pellets in Ireland. At one site in Co. Antrim, pellet material collected by Standen (1897) contained 70% Wood Mice, 22% Brown Rats, 6% birds and 1% bats and shrews (prey unit total = about 508). In a more comprehensive study by Fairley (1967), the combined content of pellets from 16 localities in Cos. Antrim, Down and Londonderry comprised 70% Wood Mice, 20% Brown Rats, 6% House Mice, 4% birds and 1% Pygmy Shrews (prey unit total = 1,373).

In the 47 diets examined on the British mainland in the current study, Short-tailed Voles occurred in every pellet sample and this small rodent was the main food item by prey weight in 40 diets. The Wood Mouse was consistently of secondary importance, though in two localities—deciduous scrub on farmland in Nottinghamshire and deciduous woodland on chalk downland in Berkshire—it was the primary food by prey weight. At another roost on Nottinghamshire farmland, Brown Rats were the major food item by prey weight, but rats occurred in only ten (21%) of the mainland diets and were largely immature animals. From the occasional presence of the remains of Brown Rats, Water Voles, Rabbits, Moles, Grey Squirrels, Weasels and Stoats, it is clear that the Long-eared Owl is capable of taking both sizeable and aggressive mammalian prey (table 1). In the remaining four diets in which the Short-tailed Vole was not of primary importance, birds were predominant (see below).

Apart from mammalian and avian prey, the occasional amphibian and invertebrate is eaten. Beetle remains were present in eight diets and counts of elytra, thoraces and headparts suggested 28 individuals, largely dor beetles (Geotrupidae) and ground beetles (Carabidae), taken mainly during the breeding season. Chaetae of earthworms (Lumbricidae) were identified in pellets from two localities. Hence, as with the Barn Owl *Tyto alba* (Glue 1967, 1971), invertebrates only occasionally form an important constituent of the diet, in contrast to the food requirements of the Little Owl *Athene noctua* (Hibbert-Ware 1936, 1937-38) and Tawny Owl (Southern 1954, 1969) in Britain.

SPECTRUM OF BIRD PREY

Bird prey constitutes a greater proportion of the diets of Long-eared and Tawny Owls than of those of the other three widespread British and Irish owls (Glue 1972). Bird remains were present in 46 (90%) of the pellet samples analysed, forming 15% of the total prey consumed in all 51 diets, and were the main food by prey weight in four diets. The four localities concerned were mixed conifer plantations in Hertfordshire, conifer belts on moorland in Staffordshire, and coastal scrub in Kent and Yorkshire.

Because of the problems posed by the decapitation and partial consumption of bird prey, it was not possible to identify all the fragmentary remains. With the aid of an extensive reference collection, however, 955 of the 1,161 birds were named. In view of the proportion unidentified (18%), the probable bias against small passerines and in favour of some larger birds among those identified, the uncertain age and hence weight of some species, and the preponderance of House Sparrows *Passer domesticus*, it was considered impracticable to attempt to break down the spectrum of bird food

by prey weight for each species. In table 1 a conservative conversion factor of 1.0 (about 20 gm) has been applied to birds in general, to provide a comparison with the relative weights of other vertebrate prey.

It is clear that Long-eared Owls often raid communal roosts of thrushes, finches and sparrows, and also kill a wide variety of largely woodland and woodland fringe birds. The House Sparrow was by far the commonest victim, comprising 57% of the individual birds identified. The next commonest were the Starling *Sturnus vulgaris* (9%), Blackbird *Turdus merula* (5%), Greenfinch *Carduelis chloris* (4%), Skylark *Alauda arvensis*, Song Thrush *T. philomelos* and Linnet *Acanthis cannabina* (each 3%), Jay *Garrulus glandarius* (2%), warblers *Phylloscopus* and *Sylvia spp* (2%) and Great Tit *Parus major*

Table 2. Vertebrate diets of Long-eared Owls *Asio otus* at 20 sites during breeding and non-breeding seasons

Scientific names are listed in table 1

	BREEDING: March-July (1,475 pellets)		NON-BREEDING: Aug-Feb (1,009 pellets)	
	Number	Percent	Number	Percent
Short-tailed Vole	1,789	50	1,146	45
Wood Mouse	738	21	408	16
Bank Vole	515	14	228	9
Brown Rat	93	3	84	3
Common Shrew	100	3	61	2
Other (except birds)	52	1	54	2
Birds (see table 3)	291	8	596	23
TOTALS	3,578	100	2,577	100

Table 3. Bird prey diets of Long-eared Owls *Asio otus* at 20 sites during breeding and non-breeding seasons

Scientific names are given on pages 366-367

	BREEDING: March-July (1,475 pellets)			NON-BREEDING: Aug-Feb (1,009 pellets)		
	Number	% bird total	% grand total	Number	% bird total	% grand total
House Sparrow	132	45	3.7	353	59	13.7
Finches	28	10	0.8	58	10	2.3
Starling	22	8	0.6	58	10	2.3
Blackbird	18	6	0.5	32	5	1.2
Song Thrush	16	5	0.4	17	3	0.7
Others identified	48	16	1.3	21	4	0.8
Unidentified	27	9	0.8	57	10	2.2
TOTALS	291	100	8.1	596	100	23.1

(1%). Bird prey ranged in size from Goldcrest *Regulus regulus* up to Moorhen *Gallinula chloropus* and Little Owl. Included among the 1,161 birds eaten were just single young Partridge *Perdix perdix* and Pheasant *Phasianus colchicus*, indicating that this owl only rarely kills gamebirds. All species comprising numerically less than 1% of the identified avian prey are listed in the appendix on page 369.

At 20 sites, pellets were collected methodically over the year and it was possible to compare the spectrum of vertebrate prey taken during the breeding season (March to July) with that taken during the non-breeding season (August to February) (table 2). The most striking change in the non-breeding season was the threefold increase, from 8% to 23%, in the numerical proportion of birds in the diet. This was due to a greater dependence on communally roosting House Sparrows in the autumn and winter months, when they comprised, numerically, 14% of the whole diet, compared with the much smaller number (though wider variety) of young woodland birds killed in the summer (table 3).

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SUMMARY

The spectrum of prey taken by the Long-eared Owl *Asio otus* at 51 widespread localities in Britain and Ireland during 1964-73 is assessed by the analysis of pellets and prey traces. Guidance is given on the location of roosts and on the collection and analysis of pellets. Habitats and hunting methods are described.

Small and medium-sized mammals are shown to be the main prey, the 18 species found forming numerically 85% of the 7,761 vertebrate food items identified. The Short-tailed Vole was the staple food (47% of prey), with the Wood Mouse (18%), birds (15%) and the Bank Vole (11%) most regularly of secondary importance. (For scientific names see table 1, page 366 and the appendix.) In Ireland and Orkney, where the Short-tailed Vole is absent, the Wood Mouse and Orkney Vole were respectively the main foods, with Brown Rats, House Mice and Pygmy Shrews eaten in smaller numbers.

Despite the predominance of small mammals in the Long-eared Owl's diet, larger species were occasionally taken, for example adult Water Voles, Grey Squirrels and a Stoat. Larger bird prey included Moorhen, Little Owl and Nightjar. House Sparrows were by far the commonest bird prey, particularly in the autumn and winter months when there was a threefold increase in the numerical proportion of birds in the diet.

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Appendix. Species comprising numerically less than 1% of the identified Long-eared Owl bird prey

Partridge <i>Perdix perdix</i> (young)	Wheatear <i>Oenanthe oenanthe</i>
Pheasant <i>Gallinago colchicus</i> (young)	Goldcrest <i>Regulus regulus</i>
Moorhen <i>Gallinula chloropus</i>	Pied Flycatcher <i>Ficedula hypoleuca</i>
Lapwing <i>Vanellus vanellus</i>	Duncock <i>Prunella modularis</i>
Woodpigeon <i>Columba palumbus</i>	Pied Wagtail <i>Motacilla alba</i>
Little Owl <i>Athene noctua</i>	Hawfinch <i>Coccothraustes coccothraustes</i>
Nightjar <i>Caprimulgus europaeus</i>	Goldfinch <i>Carduelis carduelis</i>
Swallow <i>Hirundo rustica</i>	Redpoll <i>Acanthis flammea</i>
Jackdaw <i>Corvus monedula</i>	Bullfinch <i>Pyrrhula pyrrhula</i>
Blue Tit <i>Parus caeruleus</i>	Brambling <i>Fringilla montifringilla</i>
Coal Tit <i>Parus ater</i>	Yellowhammer <i>Emberiza citrinella</i>
Willow Tit <i>Parus montanus</i>	Reed Bunting <i>Emberiza schoeniclus</i>
Treecreeper <i>Certhia familiaris</i>	

Studies of less familiar birds

173 Icterine Warbler

Geoffrey Beven

Photographs by Ib Trap-Lind

Plates 52-54

The Icterine Warbler *Hippolais icterina*, so characteristic of the cultivated parklands and town parks of central and eastern Europe, is named by virtue of its general coloration from the Greek *ikteros*, meaning 'jaundice' or 'a greenish-yellow bird'. The loud song is striking and contains both fine musical and harshly discordant sounds. This species has already featured in a previous photographic series (Ferguson-Lees 1954), but we can now include some magnificent photographs taken in Denmark by Ib Trap-Lind in 1966-67 (plates 52-54).

The Icterine Warbler is 13.5 cm long and resembles a large, stocky leaf-warbler *Phylloscopus* sp with brownish-olive upperparts and bright lemon-yellow underparts, the sides of breast and flanks tinged brownish. On young birds there is less yellow, and in some adults the greens and yellows are suppressed, leaving a greyish colour (Smout 1960). The short supercilium and eye-ring are also yellow. The olive-brown wing when folded shows the longest primary reaching to or beyond the tips of the uppertail-coverts, and the slim point of the bunched primaries forms about a third of the total wing-length. These wing characters are perhaps the most valuable field distinction from the very similar Melodious Warbler *H. polyglotta*, in which the longest primary does not reach the end of the uppertail-coverts and the slim point of the bunched primaries forms about a quarter of the total wing-length (see especially plates 3-4 in Ferguson-Lees 1965). The inner secondaries and tertials are edged yellow or whitish and often form a distinct pale patch in the closed wing (Williamson 1956), but this feature should never be used as the single or best factor in distinguishing between these two species in spring, as the Melodious Warbler occasionally shows a similar panel at that time. For a detailed discussion of these points, see Wallace (1964). The tail is olive-brown and almost square at the tip. In the autumn Icterine Warblers tend to be much duller, with very pale yellowish underparts, and there is a possibility of confusion with, for example, Garden Warblers *Sylvia borin* (Williamson 1956, 1963).

The crown has a peaked appearance, the peak being usually just behind the eye (Wallace 1964). The bill is rather flat and broad,

the upper mandible being brown and the lower pinkish, both yellow along the cutting edges; the bright orange mouth is often visible when the bird sings. The irides are dark or olive-brown, and the legs blue in front and purplish at the sides. Several races have been described but are not generally accepted (Vaurie 1954, Williamson 1963).

There are six closely related species of *Hippolais* which breed in Europe and western Asia. They largely replace each other geographically, with comparatively little overlap (Ferguson-Lees 1954). Of the five which breed in Europe, the Icterine Warbler is the most widespread, ranging from 67° in Norway, 61° in Sweden, 63° in Finland and 64° in Russia southward to the Alps, northern Yugoslavia, Bulgaria and the northern Caucasus. In Asia the range extends to western Siberia, reaching the Altai mountains, and also into extreme western Anatolia (where rare); and there is a separate population in northern Iran. Nesting in North Africa is not regarded as proved (Etchécopar and Hüe 1967), in spite of a report that Icterine Warblers nested commonly round Tunis (Payn 1948).

The range overlaps that of the Melodious Warbler in the northernmost part of Italy and in north-east France (Voous 1960). According to Erard (1961), in the French department of Marne the Icterine appears to occupy the northern districts and the Melodious the southern, the River Marne forming a natural boundary between them. A study in the 20 km wide French zone of overlap in Burgundy showed that each male kept other males of both species out of its territory, reacting to the song of the other species in the same way as to that of its own but rather less intensely (Ferry and Deschaintre 1966).

In Britain a nest with three eggs is said to have been found in 1907 near Marlborough, Wiltshire (British Ornithologists' Union 1971). Previously regarded as a rare vagrant to Britain (Witherby *et al.* 1938-41), in recent years this species has been recorded more commonly. It is now considered an irregular passage visitor in May and June, mostly at Fair Isle, and regular in very small numbers from late August to mid-October on the east and south coasts of Britain and in south-west Ireland (Co. Cork), less often elsewhere. According to Sharrock (1969), the peak autumn migration in Britain and Ireland as a whole occurs between 27th August and 9th September. The region of peak passage on the British east coast becomes progressively more southerly through the autumn, perhaps because the vagrancy pattern merely mirrors the latitude of the bulk of the population at any particular time.

On the Continent, passage through Provence occurs from late August (Lévêque 1957) and many pass by night along the north German coast in the first week of September (Nisbet 1957).

At about this time, passage is also occurring through Greece, Turkey, Jordan, Iraq and Iran (Bannerman 1954, Lambert 1957, Vaughan 1960). It is, therefore, perhaps surprising that in autumn these warblers appear to be uncommon in North Africa, though small numbers do move through the Sudan and Eritrea then (Moreau 1972).

Most Icterine Warblers seem to winter in western Arabia and eastern tropical and southern Africa, from Kenya south to the Transvaal, Botswana and South-west Africa, sometimes reaching the Orange Free State (Bannerman 1954, Moreau 1961, 1972, Mackworth-Praed and Grant 1963), but there is uncertainty about the exact range. Lack (1971) considered that they winter mainly south of Zambia and that records from Cameroun and Kenya are probably of birds in transit. There are, however, records from Uganda between October and March, and a bird sang throughout three successive winters in a Kampala garden (Pearson 1972). Pitman (1934) considered the species fairly common in Zambia, but there are apparently only two authentic records (involving four birds) from the Kaonde-Lunda province in the north-west (Britton 1970). Farther south, Traylor (1965) found it common in Ngamiland (north-west Botswana). In South Africa it is said to be uncommon (Mackworth-Praed and Grant 1963).

Bannerman (1953) described the Icterine Warbler as extremely rare in West Africa. More recently, however, birds have been reported returning northwards through Nigeria in April and May (Elgood *et al.* 1966). Early in spring many arrive at Lake Chad, having already laid down fat for the journey north (Dowsett and Fry 1971). On spring migration they mainly cross the central Sahara, and by the end of March some have reached the Kufra oasis in the centre of the great Libyan Desert (Cramp and Conder 1970), though others are still passing through northern Libya in early May (Stanford 1954). Although they are common spring migrants in Tunisia and Tripolitania, they are rather scarce then in Cyrenaica and Egypt (Moreau 1961, Bundy and Morgan 1969). They arrive in their European breeding-grounds mainly in mid-April and May (Scott 1970), but small numbers continue to pass through southern France until the end of May (Lévêque 1957). Moreau (1961, 1972) concluded that probably a large proportion make very long flights on migration, especially over West Africa in autumn. Alternatively, perhaps, they move through East Africa in autumn, returning northwards via West Africa.

In spring the Icterine Warbler frequents canopy in open woodland, especially oaks, often with few or no bushes. It is also found in forest edges and orchards, and in much of Europe it is the common warbler of town parks and gardens. It is fond of isolated trees or

bushes among cultivated plots, often near houses or water, and occasionally drier scrubby areas. In western Siberia it originally inhabited bushes on wooded slopes and greatly extended its range eastwards as more land became cultivated (Voous 1960). In Sweden, though preferring maritime deciduous woods, it is also found in pure conifers in Scania and on the island of Fårö (Durango 1948). On migration through Greece it visits olive groves, vineyards and scrub, and in North Africa palm groves, oleanders, eucalyptus, arid bush and grass in open desert, ascending in Eritrea to *Combretum* woodland and plateau scrub at up to 1,300 metres; and in winter it frequents the acacia savannahs of tropical Africa (Bannerman 1954, Stanford 1954, Lambert 1957, Smith 1957, Voous 1960).

The food consists mainly of insects and their larvae, including beetles, flies, small moths, earwigs, locust-hoppers and aphids. Spiders and small snails, and even earthworms, are also eaten, and in summer cherries, currants and elderberries.

Although active and lively, the Icterine moves more slowly than the leaf-warblers. Much time is spent among leaves high in the canopy, jumping restlessly from branch to branch in search of insects. Nevertheless, this species often skulks in bushes, especially on migration when it may be extremely shy and easily overlooked. It has a more upright perching stance than the leaf-warblers and is seldom seen on the ground. When excited it seems to sing even more vigorously than usual, often erecting its crown feathers to produce a characteristic big-headed appearance. Perched on a twig, its typical stance at such times is with legs wide apart and rather short tail squared. E. M. Nicholson has described a display-flight in which the bird sings while parachuting down from a tree like a pipit *Anthus sp.*, and other observers have noted a fluttering display-flight with occasional short glides, much like that of a Wood Warbler *P. sibilatrix* (Witherby *et al.* 1938-41, Bannerman 1954).

At its best, the song is similar to that of the Marsh Warbler *Acrocephalus palustris* but more rapid and powerful, with frequent imitations. Loud and vehement, sometimes almost explosive, it is long sustained with rich musical notes and much harsh chattering, shrieking and churring. Its mimicry has given rise to the German name *Gelbspötter* (Yellow Mocker). As it sings it often jumps about the twigs, and it may sometimes be heard singing at night. The song is delivered either from dense cover or from an exposed perch, perhaps the top of a tree or bush, or even a telegraph wire or tall flagpole in a village square. On occasion it may be uttered in flight or while hovering in front of another bird. Song may stop when breeding begins but may be resumed immediately if the eggs disappear (Van Dobben 1949). Moults occur late in the year in winter quarters, and many birds start to sing before moving northwards; song continues

until July (Witherby *et al.* 1938-41, Ferguson-Lees 1954). The female contributes a quiet subsong. There are various calls: a low and churring alarm, a plaintive 'hooeet', a musical liquid 'deederoid', a harsh 'tek-tek' and a quiet chattering.

The nest is placed in a fork in a tree or bush, often syringa, lilac, elder, osier, pear or other fruit tree, usually one to three metres up but occasionally five. The very neat, deep and solid structure is normally built by both sexes and often securely attached by fine grass loops to the fork. Moss and vegetable down, fine grasses, roots and perhaps bark fibre are used, and the lining is of hair, grasses and roots, with a few feathers (plate 54).

Van Dobben (1949), who closely studied the nest-building technique, found that the bird stuck sheep's wool and empty egg pockets of spiders to twigs with web, forming a little platform. By sitting and turning on this and adding further material, it formed a shallow cup, wiping cobwebs on to the outside and pulling them over the rim. Then the bird lay flat down, supported on the rim by throat, wings and tail, while it made rapid alternate scrabbling movements of its feet. Material was slowly pushed from the bottom of the cup into the surrounding wall which rose steadily higher. This process of adding material to the bottom and pushing it outwards to build up the rim was repeated, the original elastic cobwebs, binding twigs to rim, stretching as the wall grew.

The outside of the nest may be beautifully decorated with pale birch bark, and vegetable fibres are sometimes bound round the nest like barrel-hoops. Decorations have also included wool, paper, lichens and cocoons, and even rags up to 46 cm long. Some nests are much tidier than others (see plates here and in Ferguson-Lees 1954).

There are usually four or five eggs, more rarely six, laid at daily intervals. Their size is variable; they are oval and slightly glossy, dull rose or very pale pinkish-violet in colour, sparingly spotted or streaked black or with very fine lines. In Estonia some were deep pink with darker spots. Incubation, lasting 13 to 14 days, is shared by both birds; the female sits very close and scolds loudly if disturbed. The young are fed in the nest for 13 to 14 days, food being brought in the bill. The species is single-brooded, full clutches being found at the end of May in Germany, though farther north in Estonia laying does not begin until the first week of June. (Data from Witherby *et al.* 1938-41, Bannerman 1954.)

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The Crag Martin in winter quarters at Gibraltar

N. Elkins and B. Etheridge

Plate 55

The Crag Martin *Hirundo rupestris* is a southern Palearctic species which is generally sedentary, occasionally wandering a little in winter; it is more migratory in the northern parts of its range (Cramp 1970). In Europe it breeds from Iberia through southern France, Switzerland, Bavaria, Austria and Italy to the Balkans. It also breeds in North Africa from Morocco to Tunisia and Cyrenaica. Voous (1960) quoted instances of wintering in the southern Alps. In Spain, Bernis (1966) stated that the species winters in the lowlands and is migratory to some extent, but gave little detail. Some migrants pass through north-west Africa, and recently one was taken in Senegal in mid-November (Moreau 1972). However, there is little information on the whereabouts of the winter quarters of the more migratory European populations, mainly owing to the difficulty in trapping and ringing breeding birds. Few Crag Martins have been ringed in western Europe (G. Hemery, Professor L. Leporati, Dr A. Schifferli, and Dr G. Zink, *in litt.*).

In Gibraltar the species is mainly a winter visitor, roosting in large numbers. The origin of these birds is unknown at present, but it is hoped that this question may be resolved by the ringing programme which began in November 1973. A few pairs occasionally breed (E. F. J. Garcia *in litt.*), and small passages occur in late summer and autumn, and in spring.

This paper is concerned with the behaviour of Crag Martins wintering in Gibraltar, ringing data being used to amplify the observations. Our study covered the three winters from 1971/72 to 1973/74.

MOVEMENT AND NUMBERS

Crag Martins begin to appear in Gibraltar in increasing numbers from the first week of October. By late October considerable flocks are present, with 300 to 400 feeding over the western slopes of the Rock of Gibraltar in suitable weather. At this time there is also much movement north and south between the Rock and Spain, but the majority remain to roost. By mid-November numbers rise to 700-800, but, apart from feeding flocks in the most favourable weather, an increasing proportion of these birds leave the Rock in the morning, returning in the evening. Large feeding flocks virtually cease to exist by late November, and only a few birds occasionally remain to feed during the day. By the end of November the roosting population numbers over 1,000, and from early December to early March between 1,500 and 2,000 birds arrive nightly to roost. There is evidence that the wintering population increased during the study period, from an estimated 1,300-1,500 in winter 1972/73 to over 2,000 in the following winter. This increase was also noticed by the local ornithologists who know the species well (E. F. J. Garcia *in litt.*).

The above figures are based on direct counts of birds arriving to roost at dusk. In addition, in winter 1973/74 the size of the population was calculated from retrap data during the ringing programme. The calculation was based on the method used by Boreham (1964) at a breeding colony of Sand Martins *Riparia riparia*. Owing to factors operating against random sampling, only a tentative figure could be deduced. This was $2,100 \pm 200$, which agrees closely with data obtained by direct counting. Random sampling when trapping was not possible, owing to several factors. The whole roost was not accessible; and the extent of movement of birds between various parts of the roost, thought to be considerable at times, was unknown. Data were also probably biased by disturbance and, infrequently, by reduced trapping efficiency due to gusty winds. A lower ratio of retrapped to new birds in late February and early March, when there was no sign of the population diminishing, suggested that wintering birds were leaving and passage migrants were taking their place. From late February other migrant hirundines were in the area and could be seen at dusk among arriving Crag Martins. Migrant Swallows *H. rustica* and Red-rumped Swallows *H. daurica* were also trapped in the roost itself.

During March the Crag Martin population decreases until all have left by the end of the month, though Lathbury (1970) recorded that some were present until mid-April.

HABITAT

Voous (1960) described the breeding habitats as warm, sunny and

dry rocky slopes, deep rock clefts, narrow river valleys and steep rocky sea coasts. In general the Crag Martin is a sedentary bird which at most seeks favourable micro-climates in which to winter.

The Rock of Gibraltar has a steep western slope covered with dense olive maquis, broken only by discontinuous cliff and rock faces and small man-made fire-breaks and water catchments. The eastern side of the Rock (plate 55) is mainly bare, with precipitous cliffs and large water catchments. The smaller catchments on the western side are steep rocky slopes with concrete surfaces. These catchments and the natural rock faces, surrounded as they are by dense bushes, afford warm slopes over which insect life abounds.

The Crag Martins roost mainly in a small number of limestone sea caves on the east side of the Rock. Minor roosts exist in clefts and man-made tunnel entrances in the cliffs above. The major roost occupies several large caves (see plate 55), the largest accessible one being 40 metres across and 25 metres high at the mouth. Cave depths vary, the deepest measuring some 50 metres. One or two have steep sandy slopes inside, which are due to past exploration and excavation. There is also a good deal of boulder fall at the mouths. The caves all face eastwards, most on to a shingle beach with outcrops of limestone. (This beach is artificial, being spoil from rock tunnelling, and all the caves opened on to the sea until 20 to 30 years ago.) Those further north, also used for roosting, open directly on to the sea and are therefore inaccessible. The beach itself is accessible from land only by a steep flight of steps through an area prohibited to the general public. Thus the roost is almost undisturbed by man, the only predators being the resident Peregrines *Falco peregrinus* and at least two feral cats. These cats feed extensively on Crag Martins which are probably caught while roosting on the lowest ledges.

The airflow round the Rock is such that the caves are unaffected by most wind directions. They are sheltered from westerlies and south-westerlies except in certain conditions which cause gustiness locally. In easterlies a relatively calm area exists at sea level along this part of the coast, owing to the deflection of the airflow upwards over the Rock. Other wind directions are very infrequent. The cliffs above the caves rise in a series of terraces to the top of a ridge at about 250-300 metres above sea level.

BEHAVIOUR

In autumn, feeding flocks of Crag Martins patrol the whole of the western slopes but are more concentrated at the southern end, where the bare warm surfaces are frequently used for perching. Here the birds rest and preen in sunny weather. Aerial chasing frequently occurs, and perched flocks also show behaviour similar to that of

terns *Sterna spp* during 'dreads': a whole party suddenly leaves its perch and wheels away in complete silence, later returning to rest again. Once, in midwinter, a flock of 500 birds, flying at 300 metres, showed panic at the appearance of an unidentified raptor. They dived quickly to lower levels, hugging the slopes very closely. This behaviour was also noted twice involving a Peregrine, but a wintering Osprey *Pandion haliaetus* provoked no such reaction. Migrating raptors, such as Honey Buzzards *Pernis apivorus* and Griffon Vultures *Gyps fulvus*, are actually mobbed by flocks of Crag Martins in late autumn, and it may be that the birds recognise potential predators and take avoiding action from these only.

Nearby buildings with rooftop rainwater pools are occasionally used for drinking and bathing. On one occasion, two birds repeatedly perched on a church tower in the centre of the town of Gibraltar, though this is perhaps not unusual in view of the records of nesting on man-made structures (Cramp 1970, Niederfriniger 1973).

Flocks normally consist solely of Crag Martins, but other hirundines, such as Swallows, Red-rumped Swallows, Sand and House Martins *Delichon urbica*, are occasionally seen among them during spring and autumn passage. A House Martin arrived with roosting Crag Martins on 22nd December 1973, but disappeared after feeding above the cliffs for a few minutes. In March a few Swifts *Apus apus* can also be seen arriving with the Crag Martins, some to roost under the eaves of town buildings and others using the caves. Both Swifts and other hirundines doubtless feed in the same area as the Crag Martins.

It was found that feeding birds are present in large numbers in light winds and when temperatures are above 18°C. Clearly these conditions lead to a large flying insect population, concentrated enough to support several hundred Crag Martins. In mid-October mean temperatures are greater than 18°C from 1½ hours after sunrise until past sunset. This allows 9½ hours for feeding over the Rock. By early November mean temperatures have dropped sufficiently to reduce this feeding time to 6½ hours. After mid-November, with cooler and more inclement weather, almost the entire population visits the Rock only to roost. Mean temperatures remain below 18°C after this time and for the remainder of the wintering period of the species, and, except on individual days of high temperature, Crag Martins must seek food elsewhere. In the more inland areas of southern Spain, the diurnal range of temperature is greater and the days are warmer. Feeding probably occurs over a wide area of the Spanish hinterland, as the winter climate precludes any concentrated abundance of food. P. G. C. Brudenell-Bruce (*in litt.*), at Zahara de los Atunes (Cádiz), southern Spain, has recorded a party of about 100 regularly flocking at sunset between October and

March. J. Pineau (*in litt.*) has trapped Crag Martins going to roost in December in the hills of northern Morocco around Jebel Musa, some 30 km SSW of Gibraltar.

In Gibraltar the birds arrive at dusk and leave during the morning. Incoming birds arrive from the north, flying to the west of the Rock. The route taken, and the altitude, are largely dependent on wind force and direction. In light winds the Crag Martins fly at heights of up to 300 metres above sea level. In strong westerlies they come considerably lower, often at rooftop height over the town. In strong easterlies they fly further west, at heights of up to 150 metres. In westerlies flight is direct, but in a turbulent easterly flow much circling in eddies downwind of the Rock can be observed as the birds move south. On reaching the southern half of the Rock they move across the lower slopes and quickly drop over the edge of the eastern cliffs. Their arrival at the cliffs is spectacular, the birds pouring silently over the cliff edge, the only sound being the rush of air through the wings. This behaviour is similar to that exhibited by other social species which regularly roost in sea caves, such as the Starling *Sturnus vulgaris*. Unlike that of some other hirundines, for example Swallows, their flight into the roost is normally direct, with no swarming.

On arrival at the cave mouth, the birds appear under the edge of the roof, having dropped down the face of the cliff above. There is little activity, and most go to roost in a short time, but on warm evenings some feeding takes place prior to roosting. In all the caves, the Crag Martins roost on innumerable ledges. The roofs are covered in stalactites, many of which have formed 'chimneys': these offer further roosting sites which the birds utilise. Many use the deepest recesses of the caves.

The timing of the roosting flight is dependent upon weather conditions in the feeding area. In fine or fair weather with light or moderate winds, it begins 30 to 60 minutes before local sunset: movements starting later than this occur mainly in December when daylight is shortest. On average, all birds are at the roost by 15 to 20 minutes after sunset, occasionally arriving in semi-darkness. In dull, cloudy conditions, when light available for feeding is substantially reduced, the birds come to roost much earlier, appearing up to two or three hours before sunset, and then the roosting flight may be prolonged and broken. Heavy rain and very strong winds result in even earlier arrivals. For example, on 28th November 1972, with an easterly wind of 40 to 50 knots, large numbers were present low over the town in the lee of the Rock from midday onwards. On two days in December 1973, with strong south-westerly winds and heavy rain, roosting flights began just after midday; on one of these days, the 19th, most of the incoming birds appeared ahead of a

marked cold front which was moving from the west, accompanied by heavy rain. This early return due to a front approaching from the west has been noted on several occasions, and suggests that most of the birds were feeding in an area to the west of Gibraltar (see below). This is borne out by observations of birds leaving in this direction in the morning.

The departure in the morning is much less conspicuous. The birds do not leave the roost early, usually not stirring until at least 30 to 60 minutes after local sunrise, though on occasions they have been observed moving within 15 to 20 minutes of sunrise. Large numbers can be seen on the ledges of the roost up to 1-1½ hours after sunrise, and are occasionally still in the caves as late as 3-3½ hours after sunrise. Both in the caves and on the cliffs, they sunbathe and preen in suitable sheltered spots, including the sandy-bottomed cave mouths. In cold weather they appear very loth to leave their relatively warm environment. The departure doubtless depends upon the availability of food, and this in turn is dependent upon the daytime rise of temperature in the feeding area. Although some of the morning movement is in a northerly or north-westerly direction (no birds have ever been recorded either arriving or departing along the east side of the Rock), substantial numbers, possibly the majority, fly due west across the bay of Algeciras. These birds head towards the hills of the Tarifa peninsula in southern Spain, which have a general elevation of 300 metres, rising to 600 metres in places. Some of the slopes are bushy and craggy, and catch the early morning sun, probably providing good feeding conditions early in the day. Also, on warm sunny mornings, even in midwinter, there appears to be sufficient food in the vicinity of the roost to delay the departure of at least some of the birds. A few even remain in the general area all day, mainly when temperatures rise in the early spring. No birds have been recorded arriving from the west in the evening: they prefer to follow the coast round the head of the bay.

In normal weather conditions, and allowing for the journey to and from the nearest feeding area (about 10-15 km distant), the time available for feeding is estimated to be in the region of 6-8½ hours in December and January, increasing to 8-10½ hours by March. In bad weather, when the return flight sometimes begins four to five hours before sunset, the feeding time in midwinter must be reduced to 1½-4 hours. Even then, food is unlikely to be available in any quantity. The early roosting flights are doubtless due to a combination of lack of food, reduced efficiency of food gathering, the necessity to conserve energy by going to roost early, and the urge to shelter from rain. Kennedy (1970) mentioned a wide variety of species seeking such shelter, but quoted several records of hirundines flying and presumably feeding in rain.

VOICE

Contrary to statements in the literature, it was found that the Crag Martin is surprisingly vocal and has a wide range of calls. A continuous hubbub of sound emanates from feeding flocks in autumn. Calls are hirundine in character, and a subdued Swallow-like song is heard at times. They are mainly variations on 'prrrit', variously noted as 'trrrip', 'tyiup' and 'chirrp'. Others have been recorded, including one recalling a House Martin, single notes 'pitcha' and 'tsooep', and a low churr. In excitement, for example during aerial chasing, a rapid 'chu-chu-chu-chu-chu' has been heard, similar to the flight note of a Redpoll *Acanthis flammea*. Perched birds sometimes give a loud, whistling 'teeoo' or 'tsiu' when disturbed; this is occasionally repeated quickly, two or three times. A quiet, plaintive 'wheeee' has been heard from perched birds at the appearance of a predator. The last two calls both appear to be alarm notes. In winter the Crag Martins at the roost are often quite vocal for a short while, both on arrival and on departure.

VARIATION IN WEIGHT

All birds trapped and re-trapped in the course of the ringing programme during 1973/74 were weighed with a spring balance, interpolating to the nearest 0.1 gm. Those trapped before 28th January were mist-netted on the western and southern slopes of the Rock, while subsequent captures were made in mist-nets in the roosting caves, except for a few caught on the slopes. Weight data for all samples of five or more birds are shown in fig. 1. Most of the martins trapped were caught in the evening on arrival, but later in the winter some morning catches were made. All birds were weighed immediately when trapped, except those in large catches in the evening, when the majority were removed from the site and weighed between one and three hours later. These latter were then roosted overnight in ventilated cardboard boxes and released the following morning near the trapping site. This delay in weighing may have resulted in a slight unnatural weight loss due to the activity of the birds in the boxes. Samples of birds roosted overnight were re-weighed the following morning and found to have lost 3% to 4% of their weight overnight. This was similar to the 2%-5% loss in the sheltered cave roost estimated by comparing the weights of samples trapped in the evening and in the following morning. Small passerines are known to lose up to 10% or more of their weight overnight (Perrins 1964).

The highest weights occurred after mild days of sunny, dry weather with light winds, when food was most abundant. Evidence showed that the weight decrease in bad weather was more rapid than the corresponding increase in good weather. Gladwin and Nau

PLATE 52. Icterine Warbler *Hippolais icterina* feeding brood. Denmark, July 1967 (photo: Ib Trap-Lind). Like most *Hippolais*, this species is rather large and heavily built for a warbler, with a prominent head and strong, flattened bill; the wing-structure (the primaries extending well down the tail) is the most reliable distinction from the Melodious Warbler *H. polyglotta* (pages 370-376)



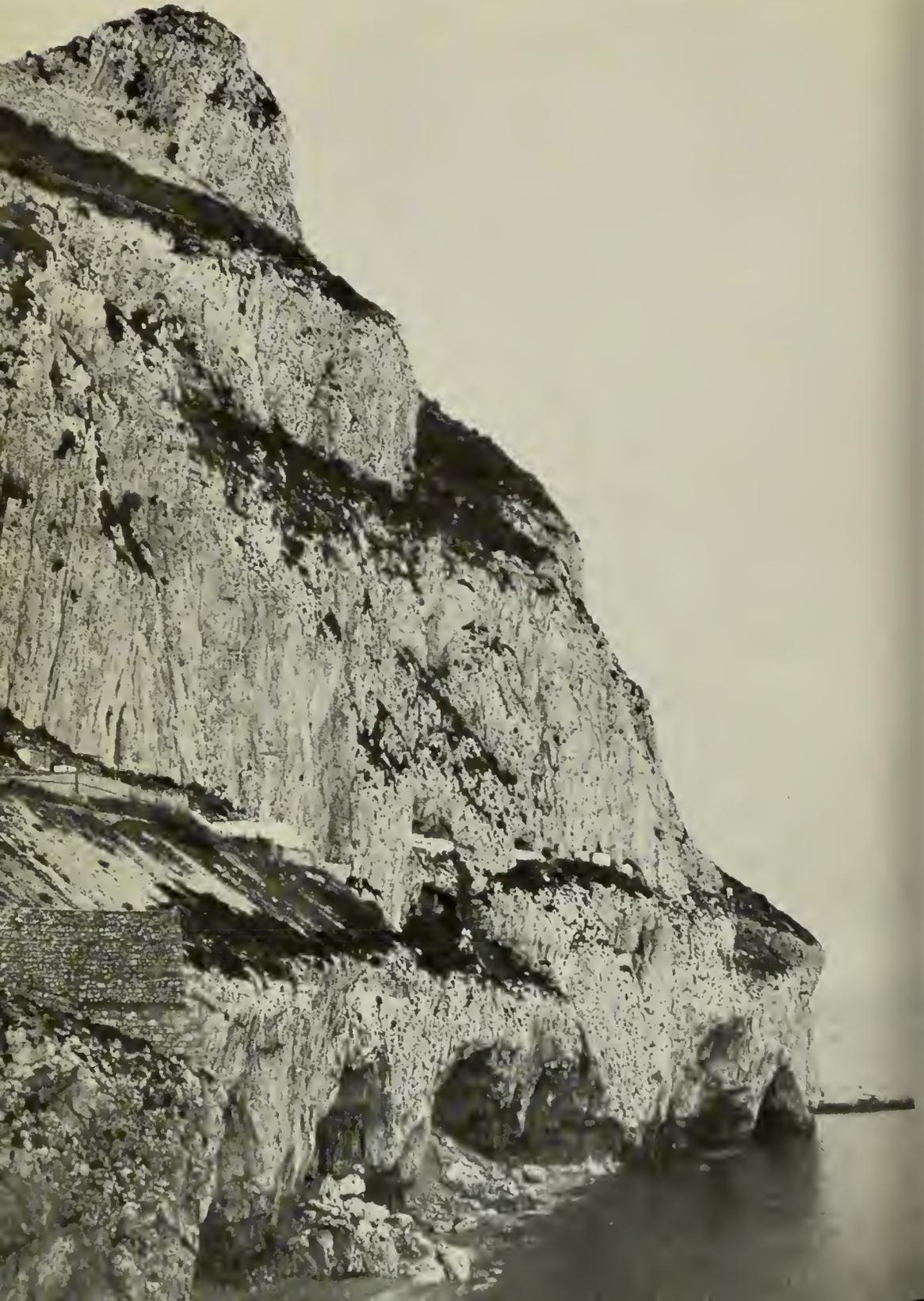


PLATE 53 (opposite). Pair of Icterine Warblers *Hippolais icterina* at the nest as that on plate 52 (photo: Ib Trap-Lind); the nest is a very flat and deep structure built in a fork of a tree or bush (page 374)

PLATE 54. Clutch of six eggs of Icterine Warblers *Hippolais icterina*, Denmark, June 1966 (photo: Ib Trap-Lind); the usual clutch size is four or five and the eggs are slightly glossy with a pale rosy or mauve-tinged background (page 374)



PLATE 55. Winter roost site of Crag Martins *Hirundo rupestris* on the east side of the Rock of Gibraltar, looking north (photo: N. Elkins). Most of the caves along the beach are used for roosting, and other sites lie in clefts and tunnel entrances in the cliffs above; the scale is suggested by the height of the buildings, the summit ridge being 250-300 metres above sea level (pages 376-387)



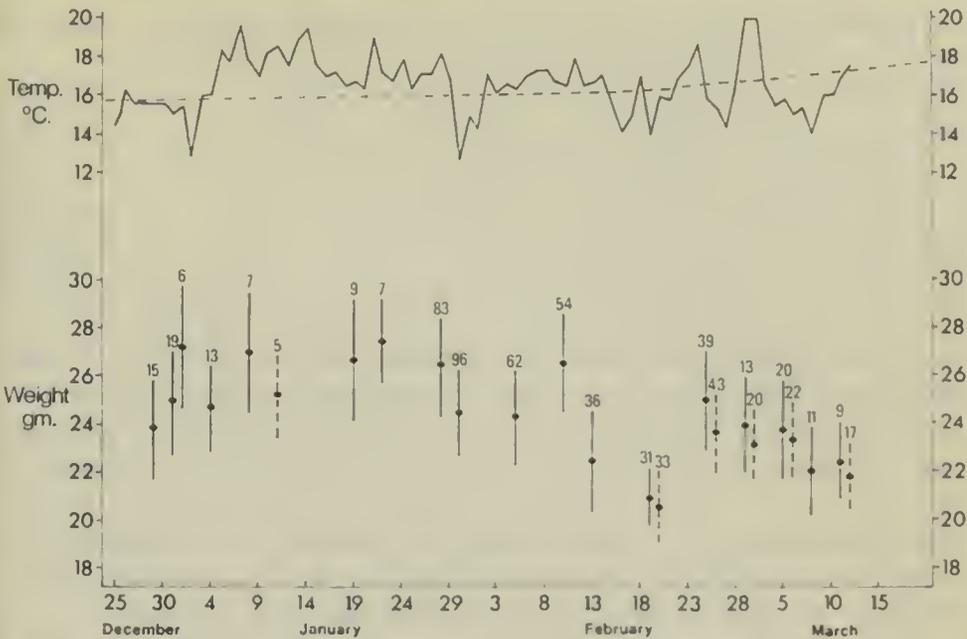


Fig. 1. Variation of weight of Crag Martins *Hirundo rupestris* trapped in Gibraltar, winter 1973/74, with maximum day temperature. The upper graph shows the maximum day temperature, a dashed line indicating the long-term mean. The series of points below shows the mean weight of each catch, the standard deviation (a vertical line above and below) and the number of birds in the sample; for morning catches the standard deviation is shown as a dashed line, all others being made in the evening

(1964), working on Swifts, found that weight could be correlated with maximum day temperatures, which affect their food of flying insects and aerial plankton. Swift weights fell with decreases in temperature. Although the Gibraltar Airport meteorological data used in the present study were not fully representative of the feeding area, a similar trend was evident with Crag Martin weights (fig. 1), but other parameters, such as rainfall amount and duration, sunshine and wind force, are important. As already shown, the occurrence of such elements as strong winds or heavy rain causes an early return to the roost, and the consequent reduction in feeding time gives rise to low weights which were, indeed, recorded on several days on which early roosting flights were noted.

In table 1, the mean weight of birds trapped during each period of the winter is compared with the corresponding difference between the mean day maximum temperature and the long-term average. The data do not include samples of less than five birds or morning catches, the only exception being the morning catch of 11th January which has been adjusted upwards by 3% to give it the estimated equivalent weight of the previous evening. Table 1 also shows that there appears to be a close connection between mean weight and temperature, but the samples were few in number and not randomly

Table 1. Weights of Crag Martins *Hirundo rupestris* trapped in Gibraltar, winter 1973/74, in relation to monthly temperature trends (see text)

Period of trapping	Number of samples	Mean weight (gm)	Difference from av. temp. (°C)	Observed weight range (gm)
November-December	3	24.9	+0.2	19.1-30.0
January	8	26.3	+1.1	20.2-33.0
February	5	23.9	0.0	17.7-32.0
March (to 11th)	4	23.1	-0.4	20.4-30.2

distributed throughout the winter; thus no statistical inference can be drawn. There were two main exceptions to this general trend (see fig. 1). On 1st January a small sample of six long-winged birds gave a rather high mean weight; and on 13th February, although the weather was mild, heavy rain and strong winds had predominated during the previous two days and the sample of 36 birds showed low weights. (It was also possible that pronounced body-moult in March depressed the weights a little in this period.)

From the data presented, it would appear that the mean weight of the Crag Martin in a winter of average temperatures is around 24 gm, and that in a period of cold or wet weather (or both) some birds lose a substantial percentage of their weight. Those handled in late February, when weights were at their lowest, appeared decidedly thin. Some individuals lost up to 25% of their weight in a few days (see fig. 2). The occurrence of poor weather obviously has a considerable effect on the population; in some winters such weather can sometimes last up to a week, though such periods are

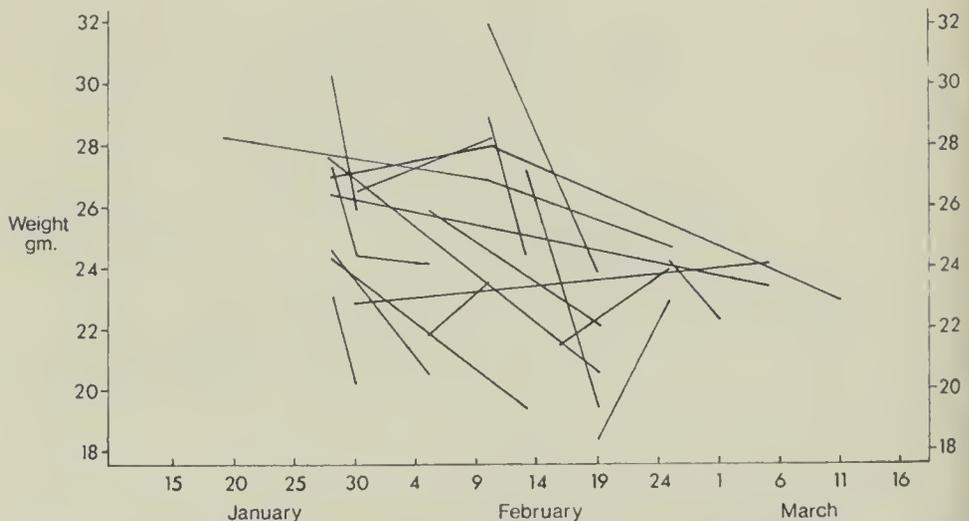


Fig. 2. Weight changes of selected individual Crag Martins *Hirundo rupestris* trapped on more than one date, Gibraltar, 1974. Morning weights have been adjusted upwards by the estimated overnight weight loss, and plotted on the previous day

infrequent. Thus this species, the only hirundine to remain in Europe in winter in such large numbers, can normally survive the season. It is, perhaps significantly, the heaviest and most robust of the European hirundines. Nevertheless, weight losses suggest that some mortality may occur from starvation. There was some evidence of this from remains of birds on the cave floors, which are scavenged by gulls *Larus spp* as well as the feral cats. In cold weather many species increase their weight by fat deposition. This occurs as long as food is available, and combats heat loss (Hope Jones 1962, Newton 1966), but when food is scarce some species lose weight rapidly. Harris (1962) thought that small passerines may die after losing only 35% of their body weight. Mead (1970) has shown that Swallows occasionally suffer heavy mortality in cold or rainy spells in their winter quarters in South Africa, and mortality of hirundines has been observed to occur in cold, wet weather in north-west Africa during spring passage (J. Pineau, verbally). Understandably, in tropical areas where food is abundant throughout the northern winter, neither Pearson (1971) nor Medway (1973) found any significant variation in weights of wintering hirundines in East Africa and Malaysia respectively. The only changes were associated with the addition of pre-migratory fat in early spring. No such increase was found during the present study, which suggests that the Crag Martins wintering in Gibraltar are short-distance migrants, perhaps coming from no further than the mountain areas of southern Spain.

ACKNOWLEDGEMENTS

We would like to thank Major Houghton, of Gibraltar Fortress Headquarters, for permission to work at the cave roosts, and Harry Van-Gils for invaluable assistance in the field. Other helpful information was supplied by P. G. C. Brudenell-Bruce, E. F. J. Garcia and J. Pineau, and the directors of the ringing schemes in France, south Germany, Italy and Switzerland obligingly answered queries. Stanley Cramp very kindly read the paper before submission. The meteorological data are published by kind permission of the Director-General, Meteorological Office.

SUMMARY

The behaviour of Crag Martins *Hirundo rupestris* wintering in Gibraltar during 1971-74 is described and their dependence on weather conditions discussed. Notes are given on their roosting sites, habits and calls. By ringing samples of birds at the roosts, it was found that during spells of poor weather the species' feeding time, and consequently its weight, was substantially reduced. The variation of weight is discussed and related to meteorological factors. Evidently, weight losses due to curtailment of feeding in bad weather, though considerable, are not severe enough to prevent the species from using the area as a regular winter habitat.

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Appendix. Measurements of Crag Martins

Few data on the measurements of the Crag Martin have been found in the literature. During winter 1973/74, 649 birds were trapped and ringed in Gibraltar. Wing measurement (fig. 3, table 2) was taken from all but six, to the nearest millimetre by the maximum chord method. Tail, tarsus and bill measurements (table 2) were taken from small samples, using standard methods (Spencer 1972), the tail being measured to the nearest millimetre, the bill and tarsus to the nearest half millimetre. Measurements of soiled or abraded tails were not taken. Fig. 4 shows wing length plotted against tail length.

Sexing of birds was not attempted, and thus all measurements apply to both sexes. A bimodal peak in the distribution of tail length suggests that birds of extreme tail measurement can be sexed. One trapped on 12th March and sexed as a female on the basis of its short wings and tail had a bare brood patch.

The ageing criteria initially applied were those of Svensson (1970) but, as his methods were based on few specimens, other criteria were sought and tested. These criteria, and moult, are being studied. Little, if any, variation was found between measurements of adults and those of first-winter birds. Primary moult finished at the beginning of the ringing period, in early November, and therefore had no effect on either measurement or weight during this study.

Data given in table 2 include the theoretical ranges (mean \pm three standard deviations) in which one would expect 99% of the population to fall.

Table 2. Measurements of Crag Martins *Hirundo rupestris* trapped in Gibraltar, winter 1973/74 (millimetres)

The bracketed figure for wing-length refers to one exceptionally long-winged individual (see fig. 3). The theoretical range is explained in the text

	Wing	Tail	Bill	Tarsus
Number measured	643	64	34	33
Mean	133.1	51.7	11.6	11.8
Standard Deviation	± 2.95	± 1.73	± 0.40	± 0.44
Observed range	125-142 (144)	48-56	11-12½	11-12½
Theoretical range	124-142	47-57	10½-13	10½-13

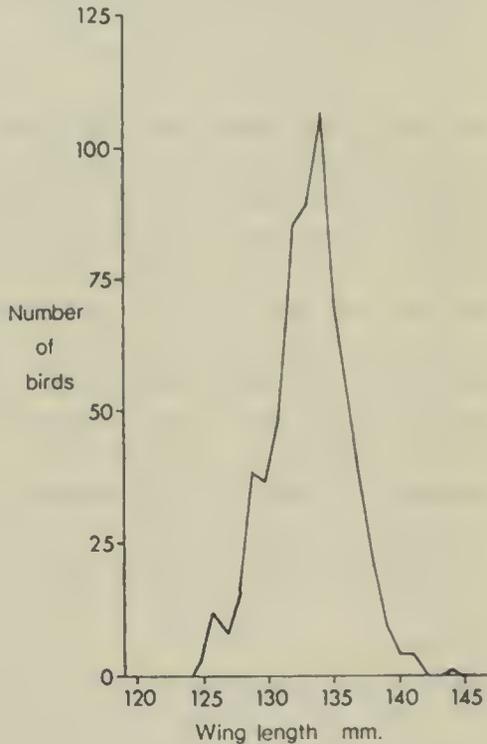


Fig. 3. Wing lengths of 643 Crag Martins *Hirundo rupestris* trapped in Gibraltar, winter 1973/74

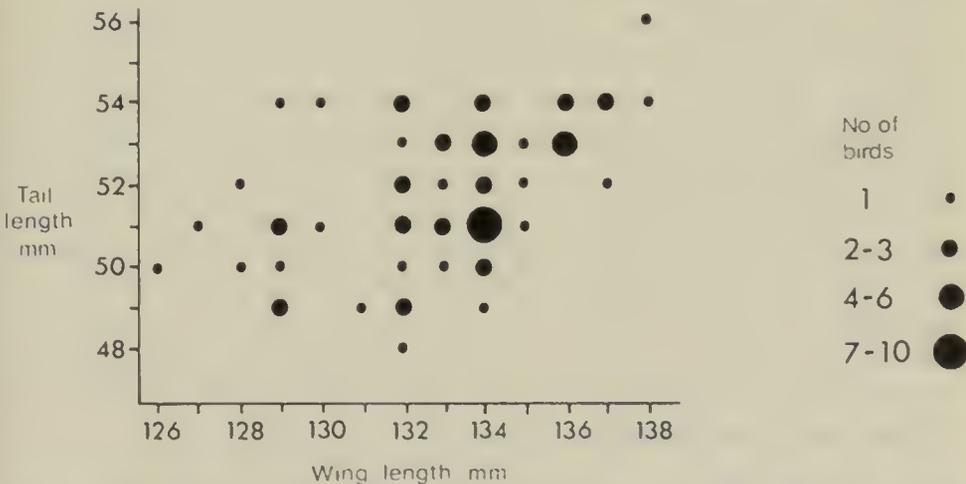


Fig. 4. Tail-length plotted against wing-length for 64 Crag Martins *Hirundo rupestris* trapped in Gibraltar, winter 1973/74

Notes

Great Spotted Woodpecker tapping on window pane At 5.30 am on 10th June 1974 I was wakened by a loud tapping on the bedroom window of my house at Bow Brickhill, Buckinghamshire. After three or four taps I drew back the curtains and saw a Great Spotted Woodpecker *Dendrocopos major* fly off the sill. I can only imagine that it had been pecking at its own reflection in the window. The bird was a male, perhaps showing aggression towards what it took to be another male in its territory.

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Anting-like behaviour and food of Wryneck On 29th August 1970, at Portland Bill, Dorset, R. M. Curber and I watched a Wryneck *Jynx torquilla* at ranges down to 20 metres for about 1½ hours. The bird spent all of this period digging out ants' nests from beneath patches of short grass and feeding on the ants and larvae. Sometimes we noticed its throat vibrating rapidly as it 'sucked up' the ants with its tongue, and there were also rapid head movements when its bill became covered with the food. On three occasions when its bill seemed full of ants, it slightly opened a wing and thrust its head deep into its axillary, as if anting. I could never be certain, however, whether or not it left any ants in the wing-pit; and on no occasion did it attempt to wipe its bill on its feathers during this operation. I collected some faeces ejected by the bird and later sent these to Dr M. C. D. Speight, to whom I am grateful for the analysis which follows.

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The Wryneck faeces examined were entirely composed of cuticular fragments of worker ants of the genus *Lasius*, together with incomplete pupal cocoons of the right size, texture and coloration to be those of worker ants of the same genus. Overwhelmingly abundant were fragments of *L. niger* (Black Lawn Ant): the ten droppings (volume c. 1½ cc) were estimated to contain remains of more than 800 individuals. These were easily identified from head capsules (see Collingwood 1964), many of which were in good condition with antennal and cephalic hairs still attached. Remains of specimens of the *L. flavus* (Yellow Ant) group were also present, but in exceedingly small numbers. It was estimated that the droppings also contained fragments of some 500 cocoons. No remains of winged castes were found.

These droppings were very similar in content to those of a Green Woodpecker *Picus viridis* examined previously (*Brit. Birds*, 66: 33-35),

in that both samples contained a vast preponderance of *Lasius* remains. The Green Woodpecker pellets, in contrast, contained remains of another ant genus, *Myrmica*, which has a much tougher cuticle than *Lasius*. It is a pity that no Wryneck pellets were available for examination, to see if any similar segregation of ant genera between droppings and pellets occurs in this peid.

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A different type of anting-like behaviour in this species was described by R. C. Stone (*Brit. Birds*, 47: 312), and this and other records of supposed anting by woodpeckers were discussed in a general review by Dr K. E. L. Simmons (*Brit. Birds*, 50: 401-424). It appears, however, that there are no indisputable records of true anting by non-passerines. Eds

Sedge Warblers singing in fields of rape On 29th May 1974 PFB was surveying a 2 × 2 km square (tetrad) for the Bedfordshire Atlas near Great Barford when he came across a Sedge Warbler *Acrocephalus schoenobaenus* singing persistently from a dry field of oil-seed rape *Brassica napus*. The crop was about 1½ metres high and in full flower. The field was about 5 ha in extent and the bird was singing about 30 metres in from the edge. The adjacent field on this side was simply bare, dry soil, and the only areas of water within 1 km were a few small muddy farm ponds, the nearest 200 metres away, with which the bird was clearly not associated. On 9th June, when the flowers had nearly all gone, the Sedge Warbler was still singing at the same spot, and its agitated behaviour when approached indicated that it probably had a nest there.

JTRS had a similar experience on 27th May 1974, when surveying another tetrad, near Bletsoe, Bedfordshire. In this case, the Sedge Warbler was also singing from the middle of a completely dry field of flowering oil-seed rape, 11 ha in extent, about 80 metres from the edge of the field and 400 metres from the nearest water, a small stream. The uniform nature of the habitat was particularly striking. The bird was still singing there when the area was revisited on 8th June, being just visible on the top of one of the rape plants.

This habitat is rapidly increasing in Britain, as a result of the need for vegetable oil. From 5,000-7,000 ha in 1968-72, the area devoted to the cultivation of oil-seed rape has increased to some 12,000 ha (provisional) in 1973 (*Ministry of Agriculture, Fisheries and Food Annual Returns*) and perhaps to treble this in 1974 (*Farmers'*

Weekly, 80 (no. 9): xv), while it has been forecast that there will be over 80,000 ha by 1977 (*Power Farming*, 51: 10).

Sedge Warblers have been breeding in dry plantations of young spruces *Picea*, as well as all kinds of overgrown waste ground, for several years in Bedfordshire, but this is the first year in which we have come across them holding territories in cruciferous crops, or any uniform habitat lacking prominent song posts. It will be interesting to see whether the habit spreads and if other species colonise this expanding habitat.

We wish to thank C. J. Mead and, especially, H. J. M. Messer for their help in obtaining the data on oil-seed rape production in Britain.

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Tree Pipit breeding habitats in Sussex Parslow (1967) concluded that the Tree Pipit *Anthus trivialis* has gradually declined as a breeding species in Britain, particularly in the south-east, though it has benefited locally from the establishment of coniferous plantations. The results of a recent survey in Sussex emphasise the relative importance of this habitat and may be of more than local interest. The survey was carried out by members of the Sussex Ornithological Society during the 1967-70 breeding seasons, primarily to determine the current distribution and status of the species in the county, though observers were also asked to report on the breeding habitat being used. Habitat details were checked during 1972-73. The methods adopted and full results have been reported elsewhere (Hughes 1972).

The habitat details provided for 444 territories were as follows:

Habitat	No. of territories
Young coniferous plantations	209 (47%)
Commons and heaths	186 (42%)
Deciduous woodlands (outskirts and glades)	22 (5%)
Hillsides, embankments and cuttings	18 (4%)
Rough pastures and lanes with well-wooded perimeters	7 (1.5%)
Recently coppiced sweet chestnut <i>Castanea sativa</i>	2 (0.5%)

Comparison of these findings with a pre-war account of the habitats occupied in Sussex (Walpole-Bond 1938) suggests that the adaptation to young coniferous plantations has been accompanied by a decrease in the use of some of the traditional habitats, such as outskirts of woodlands and woody glades. Insufficient data are available for former years to judge whether commons and heaths are used more, or less, now than in the past, but it is clear that large areas of these habitats have been lost to reafforestation.

A small population exists on the rough pastures of the north escarpment of the chalk downs in West Sussex, but none was found in similar habitat on railway embankments which were favoured before the 1939-45 war and which were still occupied in the early 1960's. In these days of intensive agriculture and mechanical maintenance of verges, it is not surprising that few territories were found in tree-lined pastures, lanes and verges. The use of recently coppiced chestnut was unexpected, and subsequent observations have suggested that this habitat may be occupied more frequently than the results indicate.

Lack of comparative figures has made it impossible to determine the overall effect of the adaptation to young coniferous plantations on the total populations, but there is some evidence of a wider distribution on the forest ridges in the north of the county, where much planting has taken place.

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Starling learning to use its feet while feeding As I have pointed out elsewhere (*Avic. Mag.*, 69: 183-193), with the evolution of the wings for flying, birds were left without prehensile front limbs and few species employ their wings or even their feet for the simplest front-leg tasks. The most specialised use of the feet by birds is in holding objects, including food. This is a basically innate, species-characteristic habit found only in certain groups including among the passerines, the crows (Corvidae), birds of paradise (Paradisacidae), tits (Paridae), shrikes (Laniidae) and babblers (Timaliidae). As a species-characteristic behaviour pattern, it does not occur in starlings (Sturnidae).

On a number of occasions since 1970, however, my wife and I have seen a Starling *Sturnus vulgaris* deliberately hold down food in its feet while feeding on scraps provided on the lawn adjoining our ground-floor flat in Leicester. This is presumably always the same individual, as only one bird, out of the many feeding at any one time, ever behaves in this way. I made brief notes on two occasions during the past twelve months. On 12th December 1973, although sometimes pecking and scattering bread in the usual clumsy and inefficient manner of its kind, it dealt with one piece (about 50 cm square) in a more accomplished way, repeatedly and carefully placing one foot and then the other on each end and removing frag-

ment after fragment. On 9th February 1974 the bird ate a piece of apple while persistently gripping it and holding it down with one foot or both. It had been the skilful way in which it similarly dealt with an apple core that had first drawn our attention to this unusual bird. Starlings not uncommonly stand or step on large food scraps incidentally while feeding, but they normally keep the feet well clear and I have never seen another use its feet in the manner of this particular individual. Thus, although the Starling does not use the feet in feeding at the species level, clearly this habit can develop in an individual, presumably solely through learning.

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Letters

Melanism in shearwaters and auks Since Bryan L. Sage (*Brit. Birds*, 65: 527) comments on the supposed rarity of melanism in Manx Shearwaters *Puffinus puffinus* and indeed the Procellariiformes in general, it may be worth pointing out that a dark specimen of the Californian race *P. p. opisthomelas* was figured by L. M. Loomis on plate 15 of his classic monograph *A Review of the Albatrosses, Petrels and Diving Petrels* (1918, *Proc. Calif. Acad. Sci.*, ser. 4, 2, no. 2). Among closely allied species, melanism is also reported to occur not uncommonly among Audubon's Shearwaters *P. lherminieri* in the Lesser Antilles; and indeed, as Loomis remarked (pages 36-37), within the order as a whole it intergrades from a rare occurrence in some populations through polychromatism in others to a stable dark coloration in certain species, including the Sooty Shearwater *P. griseus*.

Loomis also showed (fig. 16) a melanistic Guillemot *Uria aalge*, and the collection of the British Museum (Natural History) includes one from near Filey, Yorkshire, dated 24th June 1896, and a melanistic Razorbill *Alca torda* of unknown origin. Presumably this type of variation led to the development of the dark plumage of such auks as the Tufted Puffin *Lunda cirrhata*.

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Mr Sage comments that his remarks must now be qualified in the light of the information supplied by Dr Bourne, to whom he is grateful for pointing out the record in Loomis' monograph. He was, however, distinguishing between what might be termed 'normal' melanism and 'abnormal' melanism. The former refers to the situation where the species concerned has a melanistic phase as, for example, in the Wedge-tailed Shearwater *P. pacificus*. In the latter category he would include the records of the dark Manx Shear-

water on Skokholm in 1972 and of the melanic specimen of the Californian race; such 'abnormal' melanism in shearwaters does seem to be very uncommon, though it could easily be overlooked in the field. EDS

Steppe Eagle in Africa J. F. Reynolds's remarks (*Brit. Birds*, 67: 71) on the Steppe Eagle *Aquila nipalensis* (or *rapax*) *orientalis* in east Africa were interesting, but there is more to be said about the wintering of this curious bird in Africa. He did not allude to the situation south of the Zambezi River recently elucidated by Brooke, Grobler, Irwin and Steyn (1972, *Occ. Pap. natn. Mus. Rhod.*, B5: 61-114), perhaps because we dealt with an area well to the south of his. We found that only immature birds come south of the Zambezi, where they are gregarious in flocks of up to 150. They feed largely on superabundant foods—swarming termite alates, other swarming insects such as beetles and caterpillars, and nestlings of the highly colonial Red-billed Quelea *Quelea quelea*. There is no evidence for the regular occurrence of immatures in east Africa in the northern midwinter, though they are common there on southward and northward passages. It appears that the Steppe Eagle is the only landbird with discrete wintering ranges for adults (east Africa) and immatures (south-western Africa), and with discrete wintering ecologies (adults being solitary feeders on vertebrates and carrion, immatures gregarious feeders on swarming insects and Red-billed Quelea nestlings).

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Feral populations of parrakeets Most readers will already be aware that the Ringneck Parrakeet* *Psittacula krameri* has succeeded in establishing a feral population in several parts of England, for example Essex, Kent (two areas) and Surrey (two widely separated areas) (*Brit. Birds*, 67: 33, 174). Although escapes may have added to their number, deliberate liberation has almost certainly been the main cause.

In my opinion some other species of parrots are equally capable and the reason for the success of the Ringneck is probably its cheapness, not its greater capacity to survive English winters. Admittedly we have not recently had a winter harsh enough to put it to a severe test, but its almost omnivorous readiness to take advantage of food put out for other birds would undoubtedly ensure its survival except in quite abnormally prolonged hard weather. The practice of keeping free-flying birds for the pleasure of seeing them around appears to be growing in favour and the Ringneck, since it is imported in great numbers and is cheaper than most other similar species, has

*Also known as Ring-necked, Rose-ringed and Green Parrakeet

had a flying start in establishing itself. No one would deny that a flock of parrots flying round the garden is most attractive; no serious ornithologists would deny the dangers of such liberations.

At present the number of feral Ringnecks is comparatively small; at this stage it would not be difficult to stop the nonsense (to put it at its lowest) of a parrot getting on the British and Irish list, by trapping and incarcerating them; before long it may be too late. Our grandchildren will not thank us for a bird which could so easily become a menace to fruit and other crops, quite apart from its success in taking over nest-holes needed by other species and generally becoming an ecological nuisance.

Those who have access to American literature will have seen that a similar, if not worse, state of affairs is giving cause for alarm over there. Areas as far apart as south-east Florida, the environs of New York City and southern California all have increasing problems with introduced or escaped birds, especially parrots, which have established themselves in a feral state, in some cases now beyond the reasonable possibility of control (*Wilson Bull.*, 85: 491-512).

Many reasons have been advanced for the urgent need to reinstate the 'Parrot Ban' (a former restriction on the importation into Britain of parrots, rather similar to that currently applying to birds of prey), among them the obvious conservational one and the very real danger of ornithosis to human health. A not-to-be-despised addition to these reasons is the need to prevent Britain from being overrun by a potential pest, however attractive this pest may appear to be.

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Black Redstarts breeding in newly developed town centres

According to *The Handbook* (2: 183), the Black Redstart *Phoenicurus ochruros* favours, among other sites, buildings with high roof-lines, cliffs and rocky and boulder-strewn ground. The association with power stations and gasworks in Britain has been established by R. S. R. Fitter (*Brit. Birds*, 64: 117-124), as has the predilection for bombed buildings and the associated rubble waste (*Brit. Birds*, 58: 481-492).

In 1973 singing male Black Redstarts were located in the centres of Maidenhead and Bracknell, Berkshire. Both towns are fairly large, the former having a redeveloped centre and the latter being a 'new town'. In both localities the males sang from high-rise office buildings. At Maidenhead the male, which was not in adult plumage, sang throughout May and four young were successfully fledged on 26th June. Song was resumed in July and the male was still present in early August.

There would seem to be plenty of scope for expansion of the small

British breeding population if such sites continue to be used in the future.

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Mr Fitter comments that the association with high-rise buildings is long established, for example on the Senate House tower in Bloomsbury, London, as far back as 1939. He has not heard of any other pairs in new town centres, however. EDS

Effects of agricultural change on birds Those of us who expend much time and energy on promoting the cause of wildlife conservation directly to the farming community cannot but be dismayed by one or two parts of the contribution by Dr R. K. Murton and N. J. Westwood in the February 1974 issue (*Brit. Birds*, 67: 41-69).

Their paper is a valuable but needlessly provocative addition to the somewhat sparse literature on the subject. Was it really so necessary for the authors to trail their coats over hedges in such a blatant—some would say irresponsible—way? To refer to hedgerows as ‘a red herring so far as the real issues affecting the welfare of birds in Britain are concerned’ (page 63) in the context of the meagre, quoted evidence is a truly remarkable statement, particularly in view of the recent appearance of a pamphlet extolling the virtues of hedges, emanating from the same ultra-respectable Monks Wood source.

How fortunate that at Carlton, the main study area, although hedgerows were ‘lost’ they were not completely eliminated, thus enabling displaced Blackbirds to nest ‘where the ground vegetation intermixes with hedgerow stumps’. In large tracts of England, birds displaced from hedges are less fortunate. One can only assume, with sadness, that the authors have not travelled widely through farming country. If they had, they would have seen considerable areas where, quite literally, hedgerows are the *only* above-ground physical feature; not infrequently when they are removed the stumps are bulldozed and the ditches piped. Over much of arable England, the scrub, ponds, woodland and natural grassland, on which Dr Murton and Mr Westwood are so anxious for us to lavish our attention, are conspicuous by their absence.

There are other general points which should not go unchallenged. It is implied that the numbers of breeding birds are of slight consequence; it is the diversity of species that matters to the exclusion of all else. Is it? It may be so in strictly scientific terms, but it is certainly not the case in terms of practical politics. To an increasing extent, conservation has to rely on the small individual contributions from thousands of people who want to see birds. Of only little comfort to them will be the news that a nucleus of species lies buried

in the depths of Carlton or wherever. If it cannot see the Yellowhammers and Linnets regularly and widely, the public may be less anxious to dig into its pocket. Without this public there would be no actively managed Havergates, Leighton Mosses and Minsmeres.

Again in a practical context, what a curiously naïve injunction it is 'to introduce management schemes with defined objectives' (page 63). Perhaps the authors are unaware that there are around 200,000 farm holdings worthy of the name in England and Wales and that the conservation camp is in direct contact with only a minute handful of this number. How attractive it would be if we could advocate and demonstrate specific management schemes on an individual basis to fit the circumstances of small groups of holdings. Unfortunately, all that can be done to exert any significant influence is to put over, in a 'blunt instrument' way, a broad practical message on as wide a front as possible about the need to retain physical features within the constraints of modern food production.

In recent years, much has been done to reconcile the interests of birds and farming: Silsoe, the Dinas and Chalkland exercises, and all the manifold activities of the Farming and Wildlife Advisory Group have at least made a dent in the problem. But there is still much apathy and, regrettably, a strong anti-conservation attitude within some sections of the farming community. If on the word of two responsible scientists, given on demonstrably shallow evidence and without any qualification whatsoever, hedges come to be regarded as emotive red herrings of little consequence, then the authors will, unwittingly, have done a grave disservice to the conservation cause.

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Requests for information

Colour-ringed Great Black-backed Gulls A three-year study of the feeding ecology of the Great Black-backed Gull *Larus marinus* during 1974-76 includes the colour-ringing of some 3,600 nestlings at breeding colonies in Orkney with a two-colour combination on the right leg. In summer 1974 1,200 were thus ringed, and the recoveries so far suggest dispersal predominantly down the east coast of Britain. All records of these colour-ringed birds are required; details should be sent to **M. A. S. Beaman, Culterty Field Station, Newburgh, Aberdeenshire AB4 0AA.**

Checklist of the birds of Gibraltar A comprehensive checklist of the birds of Gibraltar is in preparation by the Gibraltar Ornithological Group. The list will include all species recorded on or from the Rock. Anyone having unpublished records for this area is requested to make these known to **J. C. Finlayson, 1 Fraser's Ramp, Gibraltar.** All contributions will be fully acknowledged.

News and comment *Robert Hudson*

Dockland bird reserve The Royal Society for the Protection of Birds has revealed that it has acquired, on a 21-year lease, 200 hectares of marsh to the east of Goole, Yorkshire, known as Blacktoft Sands; this land is owned by the British Transport Docks Board. The RSPB is currently undertaking a census of the breeding birds there, and drawing up plans for management and visitor facilities; the Society believes that, with intensive management, this will become an important wetland reserve. This is the fifth new reserve to be announced this year by the RSPB, which now has a membership of 160,000 and is responsible for over 50 bird reserves throughout the United Kingdom.

Release of defence lands In 'News and comment' for July 1973 (*Brit. Birds*, 66: 316), I reported the recommendations of the Nugent Committee that certain lands held by the Ministry of Defence should be returned to civilian use, including important tracts at Donna Nook in Lincolnshire, Lulworth Cove in Dorset, and Wembury and parts of Dartmoor in Devon. After considering the Nugent Report for a year, the Minister has now announced that he has accepted its recommendations apart from one: despite much local pressure, the Ministry of Defence is determined to hold on to its coastal strip of 2,800 hectares at Lulworth Cove.

National cagebird exhibition We have been advised that the National Exhibition of Cage and Aviary Birds, an annual affair, will this year be held in Alexandra Palace, London, during 6th-8th December. It is reported that changes have been made to bring more revenue into the 'National' and to plough more money back in special prizes. There was a time when foreign birds figured prominently in this exhibition, and it was worthwhile for the watcher of wild birds to attend in order to see which species were being imported that might cause problems as escapes. However, the foreign classes have been poorly supported in recent years, so that there has been little to attract the non-aviculturist.

Coins for conservation The International Union for the Conservation of Nature and the World Wildlife Fund are co-operating in a novel fund-raising project, announced at a London press conference on 10th June: they are sponsoring an unprecedented series of legal tender coins to be issued by 24 nations. Each country will issue one gold and two silver coins, the designs featuring endangered and other local animals. This will be the first time in numismatic history that a number of governments have issued legal tender coins on the same theme and to uniform dimensions and specifications. In addition to the coins circulated, limited numbers of sets will be sold to numismatists, and the proceeds of the sales will go towards conservation programmes carried out by the issuing states and by IUCN/WWF: the latter will use their portion of the proceeds to set up an endowment fund, the income from which will finance future conservation operations. All the coins will be struck at the Royal Mint, London; Spink & Son Ltd (5-7 King Street, London SW1Y 6QS) have been engaged as distributors and will begin accepting orders in October. (From *I.U.C.N. Bulletin*, vol. 5, no. 6.)

Survey of Channel Tunnel sites The Nature Conservancy Council, through its South-east Regional Office at Wye in Kent, and with help from local naturalists and nature conservation groups, is currently surveying the areas affected by the proposed Channel Tunnel works around Folkestone and Dover. This survey covers the location selected for the tunnel's British terminal at the foot of the North Downs (near Cheriton), adjacent sites of nature conservation importance, and the site at Shakespeare Cliff (near Dover) where preliminary tunnelling is now

in progress. It is being made at the request of the Department of the Environment on behalf of the British Channel Tunnel Company, to assess the plant and animal communities and physical features in these areas, and ways of protecting them. Such information will provide a basis for monitoring changes that may arise from construction work, and for subsequent restoring of affected areas, including landscaping, soil treatment and planting. The results will be published.

Two recent publications 'News and comment' for May 1973 (*Brit. Birds*, 66: 237) reviewed two booklets treating the birds of the Pennines and of Fairburn Nature Reserve respectively, both published by Dalesman Publishing Co. Ltd, of Clapham, via Lancaster. Two more in this series have appeared recently: *The Birds of Morecambe Bay* by John Wilson, 62 pages, price 40p; and *Lakeland Birds: a visitors' handbook* by W. R. Mitchell and R. W. Robson (authors of the Pennine booklet), 96 pages, price 75p. The former concentrates on coastal non-passerines, and is divided into five chapters: The Bird Species, Food and Feeding Habits, Migration and Movement, Where to Watch Birds, and Ornithological Importance; while *Lakeland Birds*, concerned mainly with the inland lakes and fells of the Lake District proper, is divided into seven parts: Basic Elements, Old Avifauna, Typical Nesting Birds, Some Bird Haunts, Migration, A Few Wintering Species, and Check List. Both of these booklets are likely to appeal most to casual visitors, to whom the low prices should prove welcome; and both can be recommended as introductions to the birdlife of their respective areas.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

June reports and spring summary *D. A. Christie*

These are largely unchecked reports, not authenticated records

In England and Wales divers are of very irregular occurrence in June. Two **Great Northern Divers** *Gavia immer* were at Spurn (Yorkshire) on 12th; at Seaton Sluice (Northumberland) a **Black-throated Diver** *G. arctica* flew north on 8th and a total of seven unidentified divers passed in the same direction between 8th and 22nd; there were five divers on the sea off Ross (also Northumberland) on 27th; and a **Red-throated** *G. stellata* was at Blackpill (Glamorgan) on 10th. An exceptional inland summer record of **Fulmar** *Fulmarus glacialis* concerned one flying before a thunderstorm on 16th at Bushey (Hertfordshire). A **Sooty Shearwater** *Puffinus griseus* was reported off Calshot (Hampshire) on 23rd, two flew north at St Mary's (Northumberland) on 26th, and one north at Seaton Sluice on 28th.

An immature **Purple Heron** *Ardea purpurea* stayed at Minsmere (Suffolk) from 19th to 30th and a sub-adult at Leighton Moss (Lancashire) from 25th June to 26th July. Single **Little Egrets** *Egretta garzetta* were at Stodmarsh (Kent) on 3rd, North Slob (Co. Wexford) on 6th and Havergate (Suffolk) on 17th; and a **White Stork** *Ciconia ciconia* was also at North Slob on 6th and in the Boyne estuary (Co. Louth) from 10th to 17th. Further **Spoonbills** *Platalea leucorodia* were reported in June, at Farlington marshes (Hampshire) from 14th to 18th, at Minsmere on 18th and 29th and at Stodmarsh on 22nd. **Velvet Scoters** *Melanitta fusca*, unusual inshore in summer, were recorded at three places, the largest party being 17 off Minsmere on 9th. A drake **King Eider** *Somateria spectabilis* appeared at Fair Isle (Shetland) from 2nd to 4th, a **Brent Goose** *Branta bernicla* at Ballykelly (Co. Londonderry) on 30th and a **Whooper Swan** *Cygnus cygnus* at the same place on 1st, while three more Whoopers (probably flightless through injury) were at Berwick-upon-Tweed (Northumberland) on 30th.

A **Red Kite** *Milvus milvus* appeared over Shrewsbury (Shropshire) on 20th, at a most unusual time of year for a bird to wander such a distance from its Welsh breeding grounds, and **Honey Buzzards** *Pernis apivorus* occurred at Hornsea Mere (Yorkshire) on 1st (two) and at Teesside (Co. Durham) on 20th. There was the usual scattering of **Marsh Harriers** *Circus aeruginosus* away from known breeding sites, including one as far north as Fettercairn (Kincardineshire) on 4th, and a **Montagu's C.** *pygargus* was seen at Spurn on 6th. The only **Osprey** *Pandion haliaetus* reported south of the Scottish border was one seen on several occasions during June and July at Rudyard Lake, north of Leek (Staffordshire). **Red-footed Falcons** *Falco tinnunculus* were reported at Bury St Edmonds (Suffolk) and Sandwich Bay (Kent), both during 1st-2nd, near Ipswich (Suffolk) on 7th, at Dungeness (Kent) for a few days from 7th, at Wells (Norfolk) on 16th, and 'in Essex' late in the month.

A **Quail** *Coturnix coturnix* on Fair Isle on 2nd was the only 1974 spring record there. **Kentish Plovers** *Charadrius alexandrinus* appeared at Minsmere on 4th and at Cley (Norfolk) on 23rd, and a vagrant **Woodcock** *Scolopax rusticola* on Fair Isle on 11th. On 22nd a **Marsh Sandpiper** *Tringa stagnatilis* in summer plumage arrived at Belvide Reservoir, the 19th British record. A **Little Stint** *Calidris minutus* at Blithfield Reservoir (Staffordshire) on 2nd, two at Cley on 3rd and one at Washington (Co. Durham) on 3rd and 4th were probably late spring migrants, as were **Temminck's C.** *temminckii* at Cley between 1st and 7th (up to five), at Minsmere on 2nd, and at Cresswell (Northumberland) on 6th (two). A **Curlew Sandpiper** *C. ferruginea* was at Blackpill on 2nd. **Pectoral Sandpipers** *C. melanotos* appeared at Minsmere on 6th and 7th and at Gunthorpe (Nottinghamshire) on 8th and 9th. An adult **Broad-billed Sandpiper** *Limicola falcinellus* in summer plumage was at Greenabella Marsh, Teesmouth, from 23rd to 29th, and **Red-necked Phalaropes** *Phalaropus lobatus* at Rye Harbour (Sussex) on 7th and 8th and at Cley from 18th to 23rd. There were several sightings of **Avocets** *Recurvirostra avosetta* away from breeding sites; a flock of 16 was at Pennington marshes (Hampshire) on 16th, four came in to Steart (Somerset) from the west on 22nd and nine were at Eling great marsh (Hampshire) on 23rd.

A very out-of-season **Ivory Gull** *Pagophila eburnea* was reported at Breydon Water (Norfolk) on 26th, while **Glaucous** *Larus hyperboreus* and **Mediterranean Gulls** *L. melanocephalus*, which have become much commoner in Britain and Ireland in recent years, were widely scattered in very small numbers. Up to 23 **Little Gulls** *L. minutus* were at Teesmouth during June. A **Caspian Tern** *Hydroprogne caspia* appeared at Chesil Beach (Dorset) on 16th and one at Milford-on-Sea (Hampshire) on 22nd, while **Roseates** *Sterna dougallii* were seen inland at Blithfield Reservoir on 2nd and at Netherfield (Nottinghamshire) on 23rd.

An **Alpine Swift** *Apus melba* appeared on Ramsey Island (Pembrokeshire) on 28th (cf. *Brit. Birds*, 66: 370) and a **Short-toed Lark** *Calandrella cinerea* stayed at Coatham marsh, Redcar (Yorkshire), from 21st and throughout July. **Hoopoes** *Upupa epops* were seen in Norfolk at Rockland Broad on 3rd and Salthouse Heath on 9th. A **Golden Oriole** *Oriolus oriolus* was on Alderney on 2nd and 9th and two were reported from Walberswick (Suffolk) on 8th and 9th, and we also heard of a sighting near Tenterden (Kent) on 25th. A **Jay** *Garrulus glandarius* arrived at Spurn on 1st and a **Hooded Crow** *Corvus corone cornix* on 8th. Single **Fieldfares** *Turdus pilaris* were found at six places in England, **Redwings** *T. iliacus* at three, the latter including a singing male at Minsmere on 25th. A **Thrush Nightingale** *Luscinia luscinia* trapped on Fair Isle on 15th was the latest ever spring record there and the 21st for Britain and Ireland at that season. Fair Isle also recorded a **Bluethroat** *L. svecica* on 3rd and single **Marsh Warblers** *Acrocephalus palustris* on 11th and 15th; a Bluethroat inland at Ditchford (Northamptonshire) on 27th was surprising. A **Greenish Warbler** *Phylloscopus trochiloides* was singing in the observatory garden on the Calf of Man on 19th, a week after a **Wood Warbler** *P. sibilatrix*

had been trapped on the island. A **Black-headed Wagtail** *Motacilla flava feldegg* was seen on Thorney Island (Sussex) on 23rd. A **Great Grey Shrike** *Lanius excubitor* at Chamberlayne's Heath, near Wareham (Dorset), on 16th was probably of southern origin; single **Lesser Grey Shrikes** *L. minor* were found not long after on Unst (Shetland) on 19th, on Fair Isle from 24th to 28th and at Billingham (Co. Durham) from 29th to 3rd July, and **Woodchat Shrikes** *L. senator* were seen at Padbury (Buckinghamshire) on 5th, on Lundy (Devon) on 20th and on St Agnes (Scilly) from 27th to 30th. A **Rose-coloured Starling** *Sturnus roseus* appeared at Methlick (Aberdeenshire) on 17th (this species occurs surprisingly frequently in summer in north Scotland). Finally, two reports of **Scarlet Rosefinches** *Carpodacus erythrinus* concerned an adult male at Sheringham (Norfolk) early in the month and a female or immature, trapped, on Fair Isle on 15th and 16th.

Spring migration

Some of the main movements during the period from the end of March to the beginning of June are summarised here. A warm spell in the last week of March was short-lived and April was a cold, dry month of anticyclonic weather with winds between north and south-east, inhibiting immigration to a large extent. May began with easterlies, producing abnormal passage of some species in the English Channel, while southerlies which followed allowed a relatively easy, though late, entry into Britain and northern Europe. Similar late and slow migration was recorded in southern Europe, caused by unfavourable weather in the Mediterranean and in Africa.

SEABIRDS, SCOTERS AND SOME WADER FLOCKS

A maximum of 1,975 **Manx Shearwaters** *Puffinus puffinus* was recorded at Portland Bill (Dorset) on 1st May and small northerly movements were recorded on the east coast later in that month. (Omitted from the April summary were two **Cory's Shearwaters** *Calonectris diomedea* and a **Sooty**, reported off Rye Harbour on 26th.) Easterly passage of **Common Scoters** *Melanitta nigra* on the south coast was noted mainly at Dungeness and Beachy Head (Sussex): at the former promontory 2,500 were counted in two hours on 10th April, the main passage being between 1st and 18th May with a peak of 1,700 on 4th; while at Beachy Head the peaks were 2,956 on 12th April and 1,585 on 4th May. Inland passage was primarily in the second half of April, with highest numbers between 15th and 20th—eleven at Eye Brook Reservoir (Leicestershire) on 15th, eleven at Staines Reservoir (Middlesex) on 17th, again eleven at Blithfield Reservoir on 20th, and 17 at Ogston Reservoir (Derbyshire), also on 20th.

The annual roost of **Whimbrels** *Numenius phaeopus* at Steart peaked at about 950 on 3rd May. On the Isle of Sheppey (Kent) 490 **Black-tailed Godwits** *Limosa limosa* were counted on 11th April, the only number of any significance. Record numbers of **Bar-tailed Godwits** *L. lapponica* were noted on the south coast between mid-April and mid-May, the extraordinary total of 10,027 passing east off Hurst/Pennington (Hampshire) in this period; the peak came on 21st April, with 3,090 at Hurst/Pennington, 909 off Gilkicker/Hill Head (also Hampshire), 1,060 at Beachy Head and 2,225 at Dungeness. Abnormal numbers of **Avocets** were noted during April and May, the species being recorded in eleven coastal counties from Glamorgan to Co. Durham and in five inland counties. Three main passages were evident, during 2nd-10th April, 21st-28th April and 3rd-6th May, and of particular note were flocks of 27 at Cley and 17 at Teesmouth on 4th May.

SKUAS, GULLS AND TERNS

Skuas, terns and Little Gulls were noted in high numbers and heavy passage of

some species was recorded on 3rd-4th May when exceptionally large movements were seen. The main passage of **Arctic Skuas** *Stercorarius parasiticus* took place during 2nd-14th May, with peaks on 3rd and 9th-10th: at Hurst/Pennington there were 27 on 3rd and 20 on 9th; at Gilkicker/Hill Head 24 on 3rd and twelve on 9th; at Beachy Head 132 east during May, with 18 on 3rd and 22 on 10th; and at Dungeness a maximum of 26 on 9th. On 3rd May the record passage of **Little Gulls** became evident: at Portland Bill over 100 passed east, at Hurst /Pennington 315, and at Gilkicker/Hill Head 152; and on 4th 148 were counted at Beachy Head and 355 at Dungeness. Inland there were 86 at Cheddar Reservoir (Somerset) and over 15 at Blithfield Reservoir on 4th, and 20 at Pitsford Reservoir (Northamptonshire) on 5th.

The main passage of **Black Terns** *Chlidonias niger* took place on 3rd, 9th and 15th-18th May, the highest counts being on 3rd when there were 120 at Hurst/Pennington. **Common/Arctic Terns** *Sterna hirundo/paradisaea* followed a similar pattern on the south coast. Although there was a large passage during the last ten days of April, with heavy movement north in the Bristol Channel followed by counts of 40 or more at several Midland reservoirs, 3rd May witnessed exceptionally large numbers. At Portland Bill 2,000 or more were counted on that date, at Hurst/Pennington 3,530, at Gilkicker/Hill Head 2,805, at Beachy Head 2,371 (1,192 on 4th) and at Dungeness 3,600 (2,700 on 4th and 1,200 on 5th). A notable inland passage of **Arctic Terns** occurred between 19th and 28th April: the largest flocks were 22 at Pitsford Reservoir on 19th, 17 at Eye Brook Reservoir on 19th, 17 at Blunham gravel pits (Bedfordshire) on 22nd (with 33 there on 23rd) and 28 at Ogston Reservoir on 26th (with 37 there on 28th); another movement was apparent during 3rd-5th May, with 15 at Attenborough and 48 at Gunthorpe (both Nottinghamshire) on 3rd, 25-30 at Cliffe (Kent) on 4th (when it was estimated that 25% of the 2,700 'Commie' Terns at Dungeness were Arctic), and 15 at Staunton Harold (Derbyshire) and over 37 at Steart on 5th. Later there were 37 at Belvide Reservoir on 25th May. Passage of **Little Terns** *S. albifrons* was small, 157 at Dungeness on 4th May being the peak, and likewise the highest counts of **Sandwich Terns** *S. sandvicensis* on passage were of only 447 at Beachy Head on 28th April and 358 there on 10th May.

WRYNECKS AND PASSERINES

There was a distinct passage of **Wrynecks** *Jynx torquilla* on the east coast from 27th April to about 7th May, particularly during 28th-30th. About 60 individuals were noted altogether, with peaks on Fair Isle of six on 30th April, eight on 3rd and nine on 6th May; the island's last spring record was on 5th June.

A total of 2,200 **Fieldfares** was counted on the Ouse Washes (Cambridgeshire/Norfolk) on 19th April, the day before a fall of 360 at Bempton (Yorkshire); on 26th a huge movement involved over 10,000 passing north over Cambo (Northumberland) in half an hour, and the next day 1,500 arrived on Fair Isle and left later in the evening; 2,400 flew north at Bempton in two hours on 30th, and between 3rd and 6th May a very large exodus occurred on Fair Isle, with a maximum of 3,000 on 3rd. Another influx on Fair Isle on 30th April produced over 350 **Robins** *Erithacus rubecula*, 60 **Dunnocks** *Prunella modularis*, 90 **Bramblings** *Fringilla montifringilla* and 25 **Reed Buntings** *Emberiza schoeniclus*.

Peak passage of **Firecrests** *Regulus ignicapillus* was noted in Kent at the end of the third week of March, with maxima of ten at Sandwich Bay on 21st and 15 at Dungeness on 23rd. **Goldcrests** *R. regulus* followed a few days later: 20 daily at Sandwich Bay from 21st, a maximum of 17 on Fair Isle on 23rd, an arrival of over 50 at Spurn on 25th, and peaks of 40 at Dungeness on 26th and of 150 on the Calf of Man the next day, with comparable counts at several localities during the first half of April. On 17th April a huge southerly movement of **Chaffinches** *F. coelebs* at Spurn involved many more than 1,000 birds, while on Bardsey (Caern-

arvonshire) the largest fall of *Phylloscopus* warblers was of 400 on 22nd April.

Apart from a female trapped on the Calf of Man on 26th May, all reports of migrant **Red-backed Shrikes** *Lanius collurio* were from the east coast: a pair at Minsmere on 17th May, one at Spurn on 30th and the first five spring migrants at Fair Isle on 31st, later than usual; in June there were records on Fair Isle on 14 days up to 20th, with a peak of eight on 4th, and singles at Spurn on 8th-9th and 14th, Hornsea Mere on 16th and near Matfen (Northumberland) from 30th into July.

SOME EARLY ARRIVALS AND INFLUXES

Garganey *Anas querquedula* Two early arrivals at King George VI Reservoir (Middlesex) on 2nd March, followed by a small passage in southern England on 8th and 9th; a few more until an influx during the last week. Small steady arrival through April.

Hobby *Falco subbuteo* The first at Warsash (Hampshire) on 6th April, followed by one at Belvide Reservoir on 13th and three more in the last six days of that month. Widespread influx in May, as usual, with reports from nearly 30 places in Britain.

Little Ringed Plover *Charadrius dubius* After the overwintering records (*Brit. Birds*, 67: 176, 220), one at Brandon (Warwickshire) on 4th March and another in Worcestershire on 10th were the first migrants. About half a dozen more until a small influx on 30th-31st. Main arrivals in April between 5th and 10th and from 19th.

Whimbrel *Numenius phaeopus* One at Pegwell Bay (Kent) on 5th March may have wintered. Small parties of up to five reported in last six days of that month from the south and west, while 50 in high from the south at Steart on 31st were the vanguard of the annual large movement of Icelandic birds. In April very few until 13th, then steady numbers through to end of month.

Common Sandpiper *Tringa hypoleucos* One at Calshot on 9th March and five at Dartford (Kent) on 10th were considered to be migrants. Eight reports between 6th and 11th April, and main arrival from 14-15th involving small numbers.

Greenshank *T. nebularia* A small spring passage from 2nd April with no particular pattern.

Stone Curlew *Burhinus oedipnemus* The first reported to us was noted at Weeting Heath (Norfolk) on 1st April, four having returned by 12th. Two at Cheesefoot Head (Hampshire) on 17th.

Black Tern *Chlidonias niger* One at Cliffe on 11th and 14th April, one flying east at Steart on 20th, and one at Langley Mill Flash (Derbyshire) on 21st; see also page 401.

Common Tern *Sterna hirundo* First at Pennington marshes on 6th April; small numbers then until May, but 50 back at Minsmere by end of April.

Roseate Tern *S. dougallii* One in the Exe estuary (Devon) and another at Eye Brook Reservoir on 27th were the only April records; about 22 more were reported in May.

Little Tern *S. albifrons* First at Pennington marshes and at Arne (Dorset) on 6th; very few more in April and only 15 back at Minsmere by end of month.

Sandwich Tern *S. sandvicensis* Four exceptionally early February records have already been mentioned (*Brit. Birds*, 67: 220). In March one at Arne on 14th and nearby Poole on 16th. A dozen or so during the last week and a small arrival during April, with 400 at Minsmere by end of month.

Turtle Dove *Streptopelia turtur* One at Bromley Common (Kent) on 24th March was exceptionally early and may have overwintered (*cf. Brit. Birds*, 67: 132, 176). In April reported from Suffolk at Westerfield on 8th and Aldeburgh on 9th. Two

more on 13th and small numbers from 19th. Earlier than average but numbers small.

Cuckoo *Cuculus canorus* First at Congresbury (Somerset) on 4th April; two in Kent on 7th. Influxes during 9th-13th and main arrival from 17th-19th, with widespread records by end of month.

Swift *Apus apus* Later than usual. One at Folkestone (Kent) on 14th April and one at Luton (Bedfordshire) on 16th. Only about 35 more reported during April and main arrival, very sudden, on 9th-10th May.

Wryneck *Jynx torquilla* First arrivals on 17th April—one in west Kent and two in Leicestershire. Singles at Beachy Head on 20th and 24th (see also page 401).

Swallow *Hirundo rustica* In March reported from Sutton Bingham Reservoir (Dorset/Somerset) on 23rd, Dunton Green (Kent) on 27th and Foxcote (Berkshire) on 28th (two). Definite influx 7th-14th April and major arrivals from 18th (noticeably late).

House Martin *Delichon urbica* One at Folkestone on 26th March and two at Donaghadee (Co. Down) on 31st. Remarkably few during April with small arrival 10th-15th, but main arrival in May (again very late).

Sand Martin *Riparia riparia* As with last species, many fewer than average until May. March records from Warwickshire, Worcestershire and Kent on 19th, eleven at Lough Beg (Co. Antrim/Co. Londonderry) on 24th, and very small numbers widely scattered during the last ten days. A small April passage was at its height in the middle of the month.

Ring Ouzel *Turdus torquatus* After one reported from Kent in February (*Brit. Birds*, 67: 220) the first was one at Holme (Norfolk) on 17th March. A widespread influx from 24th included a fall of 22 on the Calf of Man on 26th, and there were later arrivals through April, particularly during the last six days with 30 males at Warlingham (Surrey) on 27th and 27 at Winterton (Norfolk) on 30th.

Wheatear *Oenanthe oenanthe* One in Guernsey on 2nd March and another at Sand Point (Somerset) on 5th. Main arrival a little early from 19th March when as many as twelve at Papplewick Moor (Nottinghamshire). Large influxes from 23rd, on 24th 60 at Portland Bill and 20 at Porthgwarra (Cornwall), and on 26th 200 on the Calf of Man.

Whinchat *Saxicola rubetra* A male at Pensford, Bristol, and a pair at Teffont Down, near Wylc (Wiltshire), on 19th March, two at Tring (Hertfordshire) on 21st and one at Foreness Point (Kent) on 25th. Reported from only about 20 places in April, including one on 7th at Lunan Water (Kincardineshire), very far north for so early a date, and main arrival in May.

Redstart *Phoenicurus phoenicurus* One at Bletchingley (Surrey) on 23rd March, at Crowthorne (Berkshire) on 28th and Coombe Hill (Gloucestershire) on 30th. Again very few in April and main arrival much later than usual, in May.

Nightingale *Luscinia megarhynchos* First at Cliffe on 12th April, and about 14 more to end of month.

Grasshopper Warbler *Locustella naevia* First at Allscott Sugar Factory (Shropshire) on 1st April, and two in Derbyshire on 8th. Scattered singletons until a few more in the last two days of April. Much scarcer than usual.

Reed Warbler *Acrocephalus scirpaceus* Very few in April and main arrival in first week of May.

Sedge Warbler *A. schoenobaenus* First noted at Stodmarsh on 2nd and Tring on 3rd. Steady arrival through April but again most came in during May.

Blackcap *Sylvia atricapilla* Winter records make assessment difficult but there was apparently a small arrival during the last week of March and a distinct arrival during 7th-17th April.

Garden Warbler *S. borin* An exceptionally early bird at Old Winchester Hill (Hampshire) on 17th March may have overwintered. One at Doynton (Gloucestershire) on 24th and another at Rye Harbour on 30th. Extremely few in April, with arrival not really commencing until early to mid-May.

Whitethroat *S. communis* Four at Allscott Sugar Factory on 1st April. Very few more until a small influx during 27th-30th.

Lesser Whitethroat *S. curruca* One at Sandy (Bedfordshire) on 3rd April. Very few more until main arrival, like that of most other warblers, in early to mid-May.

Willow Warbler *Phylloscopus trochilus* An early bird at Finmere (Oxfordshire) on 7th March was presumed to be wintering, otherwise the first was at Leamington (Warwickshire) on 20th. Generally an early arrival from 24th March, including the earliest ever for some places. A heavy arrival during the first half of April, particularly 4th-10th, with birds reported as common in many places by 20th. Falls of 100 at Beachy Head on 22nd, in Scilly on 29th and on the Calf of Man on 30th.

Chiffchaff *P. collybita* Two at Graveney (Kent) on 2nd March, possibly migrants. Twenty-one more reported until major arrivals from 23rd, a few days later than average. A fall of about 40 at Porthgwarra on 24th and the first 30 on the Calf of Man on 26th.

Wood Warbler *P. sibilatrix* One reported at Graveney on 2nd April but only a few isolated reports during the rest of the month.

Spotted Flycatcher *Muscicapa striata* The first at Wrockwardine wood (Shropshire) on 10th April, one at Mereworth (Kent) on 12th, and three more between 28th and 30th.

Pied Flycatcher *Ficedula hypoleuca* One at Ruxley (Kent) on 8th April and one at Ynys-hir (Cardiganshire) on 11th. About 14 more from 17th to end of month.

Tree Pipit *Anthus trivialis* One at Wade (Kent) on 30th March. Two in first week of April, small influx 9th-12th, and steady small arrival through the rest of that month.

White Wagtail *Motacilla a. alba* One at Lightshaw Hall Flash (Lancashire) on 7th March and another at Staunton Harold on 8th. Many more from 10th, then a steady arrival through April, including maxima of 29 at Ainsdale/Marshside (Lancashire) on 21st and 60 in the Bann estuary (Co. Londonderry) on 28th.

Yellow Wagtail *M. flava* A very early bird at Clipstone (Nottinghamshire) on 17th March and one at Steart on 30th. A small arrival in first week of April and major influx 9th-14th, continuing steadily through the rest of April.

STOP PRESS

Recent reports (all September) include: a Buff-breasted Sandpiper at Sidlesham Ferry (Sussex) on 9th, six at Portland on 12th, and about six on St Mary's (Scilly) between 8th and 19th; a Solitary Sandpiper on Tresco (Scilly) from 8th to 11th; a Spotted Sandpiper on St Mary's until about 10th; a Long-billed Dowitcher at Rodbourne sewage farm, near Swindon (Wiltshire) from 13th to 23rd; Sabine's Gulls at Ferrybridge (Dorset) on 7th, Scilly on 10th (two) and Dungeness on 13th; Cetti's Warblers at Beachy Head on 15th and at Marazion (Cornwall) on 16th; a Bonelli's Warbler on St Agnes on 11th; about twelve Tawny Pipits on the south and south-east coasts; three Serins on St Mary's on 15th; and a notable influx of Wrynecks during 14th-15th, with at least ten in the Portland/Hengistbury area.

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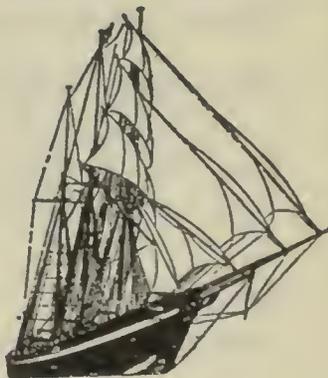
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BRITISH BIRDS

Volume 67 Number 9 September 1974

- 361 Feeding ecology of the Long-eared Owl in Britain and Ireland
David E. Glue and Geoffrey J. Hammond
- 370 Studies of less familiar birds 173 Icterine Warbler *Dr Geoffrey Beven* and *Ib Trap-Lind* Plates 52-54
- 376 The Crag Martin in winter quarters at Gibraltar *N. Elkins* and *Cpl B. Etheridge* Plate 55

Notes

- 388 Great Spotted Woodpecker tapping on window pane *Peter Smith*
- 388 Anting-like behaviour and food of Wryneck *Bernard King, and Dr M. C. D. Speight*
- 389 Sedge Warblers singing in fields of rape *P. F. Bonham and Dr J. T. R. Sharrock*
- 390 Tree Pipit breeding habitats in Sussex *S. W. M. Hughes*
- 391 Starling learning to use its feet while feeding *Dr K. E. L. Simmons*

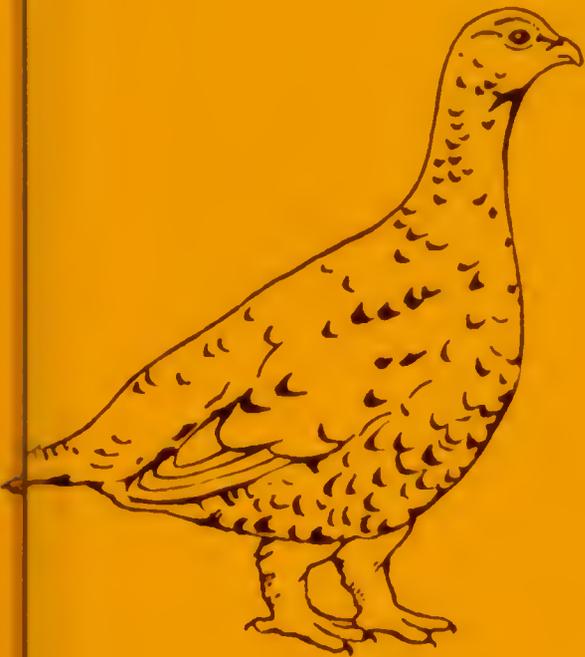
Letters

- 392 Melanism in shearwaters and auks *Dr W. R. P. Bourne*
- 393 Steppe Eagle in Africa *R. K. Brooke*
- 393 Feral populations of parrakeets *M. D. England*
- 394 Black Redstarts breeding in newly developed town centres *R. E. Youngman*
- 395 Effects of agricultural change on birds *Derek Barber*

Requests for information

- 396 Colour-ringed Great Black-backed Gulls *M. A. S. Beaman*
- 396 Checklist of the birds of Gibraltar *J. C. Finlayson*
- 397 News and comment *Robert Hudson*
- 398 June reports and spring summary *D. A. Christie*

Volume 67 Number 10 October 1974



BRITISH BIRDS

PALEARCTIC RECORDS OF
ALLEN'S GALLINULE

GREAT CRESTED GREBE BREEDING
ADAPTATIONS

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BRITISH BIRDS

Allen's Gallinule in Britain and the Palearctic

Robert Hudson

INTRODUCTION

Allen's Gallinule *Porphyryla alleni*, a tropical African bird, has but once been obtained in Britain: off the Suffolk coast in January 1902. The species was not then admitted to the British and Irish list; there was some incredulity at the concept of a tropical species 'migrating' north into the European winter, while a reputed escape possibility was the official reason given for exclusion (British Ornithologists' Union 1915). In recent decades much more has been learnt about this species' annual cycle, and about bird movements in relation to weather. At my request, the BOU Records Committee recently reconsidered the record, and has now accepted it for the British and Irish list, in category B since it is more than 50 years old. The main purpose of this note is to outline the evidence on which the record is now accepted; as this in part involves comparison with other European occurrences, the opportunity has been taken to bring together details of all Palearctic records, which are scattered in the literature.

It is outside the scope of this text to cover field identification aspects. Allen's Gallinule is essentially a small version of the American Purple Gallinule *P. martinica*, the latter being described and figured in several recent British bird books; both are illustrated in Heinzel *et al.* (1972). *P. alleni* has a total length of 24-25 cm and wing measurement of 140-160 mm, while *P. martinica* is 30-35 cm long and with a wing length of 165-185 mm.

THE SUFFOLK RECORD

This Suffolk occurrence was first published by Gurney (1902), who identified the bird from skins and books lent by Professor Alfred Newton. On the morning of 1st January 1902, a juvenile Allen's Gallinule was captured alive when it alighted in an exhausted state on a fishing boat off the village of Hopton; there had been high winds from the south-west the previous day, though by the 1st the wind had moderated a little and veered WSW. The distance from the coast at which the bird was captured was not stated; but since it was recorded as off the little village of Hopton, rather than off the towns of Lowestoft or Great Yarmouth, it must have been quite close inshore. The bird was taken to a Great Yarmouth taxidermist, who kept it alive for two days. It was then preserved, and passed into the collection of J. B. Nichols, where it remained for over 25 years; but its present whereabouts are unknown to me.

Gurney ascertained that no Allen's Gallinules had been lost from the Woburn ornamental collection in Bedfordshire. However, it is known that in the early years of the century small numbers were imported from time to time, and kept by the London Zoo and several wealthy landowner-aviculturists (M. D. England *in litt.*), though possibly dealers might have been less interested in importing the dowdy juvenile than the brightly coloured adult. Gurney noted that the plumage of the Suffolk specimen showed no traces of captivity. It is not unreasonable to suppose that large birds imported by commercial dealers would have shown physical signs of close confinement, since at that period tropical birds inevitably experienced a lengthy sea voyage in transit. As a juvenile, the Suffolk bird could not have moulted in captivity. Publication of the record in *The Zoologist*, abstracted in the *Avicultural Magazine* for March 1902, failed to produce any reports of losses. Thus I do not believe that there is any particular reason to suppose that this bird was an escape; indeed, for a juvenile to be found exhausted on a boat after a southerly gale constitutes a set of circumstances more indicative of genuine vagrancy. Ticehurst (1932) eschewed square-brackets for this record; Witherby *et al.* (1941) referred to it in neutral terms, pointing out other occurrences the same year in Tunisia and Morocco; while Bannerman (1963) recommended complete acceptance.

OTHER PALEARCTIC OCCURRENCES

There are now 19 Palearctic specimen records of Allen's Gallinule; these are set out in table 1, and then summarised by age class and month of occurrence in table 2. Additionally, there are bald assertions, lacking any detail, of the species' past occurrence in Madeira (Harcourt 1855) and Algeria (Loche 1858); these may have

Table 1. Palearctic specimen records of Allen's Gallinule *Porphyryula alleni*

Age (see table 2)	Date	Locality	Reference(s)
Unspecified	25 Dec 1968	Nicosia, Cyprus	Stewart and Christensen 1971
Immature	27 Nov 1867	near Alexandria, Egypt	Dresser 1880
Unspecified	December 1902	near Bizerte, Tunisia	Whitaker 1903
Adult	26 Dec 1902	Oulad Aïssa (Mazagan), Morocco	Hartert and Jourdain 1923
Immature	'Autumn' 1854	Mar Menor (Murcia), Spain	Dresser 1880
Immature	'Autumn' 1857	Lucca province, Italy	}
'Nearly adult'	20 Dec 1874	Massaciucoli Marsh (Lucca), Italy	
Immature	9 May 1890	Stagnoni (Spezia), Italy	}
'Nearly adult'	17 Dec 1881	Pachino (Siracusa), Sicily	
Adult	4 Dec 1902	Pantano di Catania, Sicily	}
Adult	December 1879	Ribeira Grande (São Miguel), Azores	
Immature	6 Feb 1902	Furnas (São Miguel), Azores	}
Adult	November 1910	Vila Franca do Campo (São Miguel), Azores	
Immature	before 1903	Sete Cidades (São Miguel), Azores	}
Adult	October 1895	Gapeau-Hyères (Var), Mediterranean France	
Immature	29 Dec 1951	Vergèr-en-Cancale (Ille et Vilaine), Brittany, France	}
Immature	First week of February 1936	Schny, Coburg (Ober Franken), Bavaria, West Germany	
Adult	30 Dec 1929	Silkeborg (Skanderborg), Jutland, Denmark	}
Immature	1 Jan 1902	off Hopton (Suffolk), England	
			von Boetticher 1936, Niethammer <i>et al.</i> 1964
			Knudsen 1930, Salomonsen 1963
			Gurney 1902

Table 2. Breakdown of Palearctic specimen records of Allen's Gallinule *Porphyryla alleni* according to age and time of year

'Nearly adult' was not defined by the author concerned (Arrigoni degli Oddi 1929)

Plumage	TIME OF YEAR								TOTALS
	Unknown	'Autumn'	Oct	Nov	Dec	Jan	Feb	May	
Immature	1	2	—	1	1	1	2	1	9
'Nearly adult'	—	—	—	—	2	—	—	—	2
Adult	—	—	1	1	4	—	—	—	6
Unspecified	—	—	—	—	2	—	—	—	2
TOTALS	1	2	1	2	9	1	2	1	19

been genuine, but do not meet modern standards in authentication.

From the tables, it may be seen that Palearctic records have involved rather more immatures than adults; while, of 16 dated records, no fewer than 14 fell between November and early February, with an obvious peak in December. The Suffolk record conforms to these patterns, while the occurrence of another immature in the Azores only five weeks later confirms northward vagrancy by the species that season. In all, there were five Palearctic records of Allen's Gallinule in 1902 (one in January, one in February, and three in December); it seems unlikely to have been a coincidence that over 25% of all such occurrences should fall within one year, but the ultimate factors responsible are unknown; little scientific work was being done in the northern tropics of Africa before the First World War. Now that there are accepted records from Brittany, Bavaria and Denmark, the Suffolk one is no longer the unique occurrence for temperate Europe that it was in 1902.

That species in the family Rallidae are particularly susceptible to long-distance vagrancy is a point now so widely appreciated as not to require full documentation. Certainly the appearances of Allen's Gallinule in Europe are no more remarkable than the wanderings of the congeneric American Purple Gallinule to Newfoundland, Greenland, Norway, England, Switzerland, the Azores, Liberia, Ascension, St Helena, South Africa, Tristan da Cunha, and even South Georgia in the Antarctic.

THE AFRICAN SITUATION

Allen's Gallinule breeds in Madagascar and over much of tropical Africa north to Senegal, the Niger Inundation Zone, Lake Chad basin, and Upper Nile in Sudan; but not on the Mascarene island of Mauritius as sometimes stated (Benson 1971). The nature of its normal migrations and dispersals is not properly understood, as is so often the case with African species. It appears to be mainly a rains migrant in southern Africa (Brooke 1968), and this is probably

true for much of the northern tropics also. In Nigeria it is widespread and common in the wet season (breeding mainly from July to September); in the dry season records are few and sporadic, though it occurs on flooded ground in the Lake Chad area until December (Elgood *et al.* 1973). In the Cameroons, Serle (1954) found it in all months except August to November, and he shot a fat female on 1st December which seemed to be a migrant. These observations suggest northward movement in the rains from the Cameroons to Nigeria where, however, some birds apparently remain on suitable permanent waters in the dry season. That Allen's Gallinule is an inveterate wanderer is indisputable. Apart from the Palearctic records in table 1, it has occurred on Ascension and St Helena in the South Atlantic (Lowe 1924, Kinnear 1943, Olson 1973), which are 1,600 and 1,900 km respectively from the nearest points of the African continent; on various Gulf of Guinea islands (Fry 1961); and in the Indian Ocean on the Comoro Islands (Benson 1960) and isolated Rodriguez Island (Bourne 1968), the latter being 1,500 km east of Madagascar.

In his account of the Suffolk record, Gurney (1902) felt that the month of occurrence might weigh against it, though he knew of December records from the Mediterranean; contemporary ornithologists could not understand why a tropical species should travel north into the European winter, and I have no doubt that this was a factor which helped to keep Allen's Gallinule off the British and Irish list then. Nowadays we have a better understanding of the involuntary processes which lead to vagrancy. This can be caused through reversed migration, that is, moving in the opposite direction to the appropriate one for the season; or through disorientation, perhaps due to overcast conditions blotting out visual clues and resulting in downwind drift; or through simply being blown off-course by winds of opposing direction and greater speed than the bird's airspeed.

We now know that it is usual for Palearctic records of this species to fall in the first half of the northern winter (table 2); and indeed this is the season when informed ornithologists, armed with modern knowledge, would expect them. South of the Sahara, breeding and migration seasons are regulated not by temperature or day length, but by seasonality of rainfall; waterbirds tend to breed in the later part of the rains and just after, when watery areas are most extensive (Moreau 1950), and then dispersive elements move away for the duration of the dry season. In the northern tropics, Allen's Gallinules are at peak breeding activity from July to September; between latitudes 8°N and 20°N the dry season is pronounced from December to March, and I have already quoted references that specifically mentioned December in connection with the species' disappearance

from Lake Chad and arrival in the Cameroons. Thus events in the annual cycle of Allen's Gallinule occur two to three months later than in those of north-temperate zone Rallidae.

There is some evidence, mainly from Nigeria, that in the northern tropics migrants return from April-May (Elgood and Sibley 1964, Dowsett 1968); and in this connection it should be noted that the one atypically dated Palearctic specimen was taken in Italy on 9th May.

METEOROLOGICAL CONSIDERATIONS

Knowing that Allen's Gallinule does straggle to the (mainly south-western) Palearctic Region, the question arises whether the pattern of weather over western Europe in the closing days of 1901 was consistent with onward drift into higher latitudes. On this point I sought the advice of David E. Pedgley, who until recently was editor of the journal *Weather*. He drew my attention to the *Historical Weather Maps* series, drawn in retrospect and published in the USA during the Second World War; copies of these are held in the Meteorological Office Library at Bracknell, Berkshire, and they give adequate coverage for the period relevant to the present discussion. The following is based on information extracted by Mr Pedgley.

From 15th December 1901 there was a large anticyclone well to the north over the mid-Atlantic, moving to a more normal position near the Azores by the 19th. This gave northerly-type weather over Britain and Ireland and the north-west Atlantic, but westerly weather spread across by the 23rd. In particular, a vigorous depression moved north-eastwards to north-west Scotland during 29th-31st December, with winds widely strong to gale force. During the same three days the Azores anticyclone split into two: one cell moved west into the Atlantic, while the other moved east to Algeria and then southern Europe. Such a splitting is not a common event (it had not occurred during the previous six weeks), and it allowed the development of south-easterly winds across Morocco, turning through south to south-west as they approached France and Britain within the warm sector of the depression off Scotland. The associated cold front was slow-moving, with waves over central Britain during 30th-31st, but it had cleared south-east England by 1st January; hence the reported decrease and veering of the wind between 31st December and 1st January, referred to by Gurney in his original account of the Suffolk record. Thus there was an anticyclone temporarily over Algeria, and strong south-westerly winds between it and Britain, conditions eminently suitable for downwind drift from the western Mediterranean Basin to southern England.

To complete the picture, Mr Pedgley has also examined for me

the meteorological conditions preceding the three other records from temperate Europe. The following is a résumé:

30th December 1929, Denmark South-westerly airstreams covered north-west Europe during 25th-30th December, with a sequence of frontal disturbances. On 27th and 28th strong south-west winds were blowing between the Azores and north-west Europe, and in the latter region winds were strong to gale force on 29th and 30th, with a depression slow-moving between Scotland and Norway.

Beginning of February 1936, Bavaria During 24th-26th January there was a depression over western Europe, giving good southerly winds from north-west Africa. Winds fell light and variable by the 30th, with south-westerlies from the Atlantic picking up next day. During the first week of February winds over Bavaria were at first westerly, veering to northerly by the 3rd.

29th December 1951, Brittany During 11th-23rd December there was an anticyclone over north-west Europe, with generally light south-easterly winds between it and a depression over north-west Africa. These south-easterlies were strongest on 22nd and 23rd, and it seems likely that the bird arrived then. From 24th to 29th December a disturbed westerly type of weather covered north-west Europe, and the bird was shot '... après une violente tempête, par fort vent du nord-ouest' (Berlioz 1952).

Thus in each case the bird was obtained during disturbed weather, prior to which there had been a spell of a week or more of anti-cyclonic conditions, with favourable southerly winds blowing from north-west Africa.

In conclusion, it may be noted that, while there are many vagrant species on the British and Irish list, Allen's Gallinule is particularly interesting for being the only one of them to have originated from the African tropics. In the words of Professor Dr K. H. Voous (*Brit. Birds*, 67: 172), Allen's Gallinule is probably the only truly Ethiopian Region species which regularly straggles (if one may use this expression) to Europe.

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SUMMARY

The record of a juvenile Allen's Gallinule *Porphyryula alleni* from the Suffolk coast on 1st January 1902 has been reconsidered, and the species admitted to the British and Irish list. The grounds for the reassessment are detailed. As this in part involves comparison with other Palearctic occurrences, details of the latter (scattered in the literature) are brought together for general discussion in the context of the species' annual cycle in the African tropics.

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Adaptations in the reproductive biology of the Great Crested Grebe*

K. E. L. Simmons

Photographs by W. N. Charles

Plates 56-62

I. INTRODUCTION

The Great Crested Grebe *Podiceps cristatus* shows many striking and puzzling features in its reproductive biology, these being the subject of the present paper which is primarily concerned with adaptive aspects.

My own studies on this species, which involved over 1,350 visits to various waters and some 3,000 hours in the field, were made in 1948-62 and 1966-70, mostly at gravel-pits in the Kennet Valley area of Reading, Berkshire, and at Chew Valley and Blagdon Lakes, Somerset, respectively. In all, well over 100 broods were kept under general observation, 39 intermittently more or less throughout the period the chicks remained with their parents. Up to 1957, most work was done at Burghfield Gravel-pit, especially on the pairs occupying the mainly enclosed 0.8-ha (2-acre) section in the north-west corner (the 'Pool'). In 1957, however, special watches were maintained on three broods (A, B and D) at Old Theale Gravel-pit. Similar watches were also undertaken later on four families at Chew: those occupying the separate 8-ha (20-acre) Herriotts Pool in the three seasons 1967-69 and that living in the 3-ha (8-acre) inner part of Herons Green Bay (the 'Arm') in 1968. Full details of this work, with complete case-histories of the study families, were given in Simmons (1970c).

*Dedicated to Niko Tinbergen in the year of his retirement from the Chair of Animal Behaviour, University of Oxford

Ecological determinants of breeding co-adaptations

Of the many interrelated factors that influence the evolution of a species' dispersion pattern, social system and breeding behaviour, two are of particular importance: food supply and predation. Much recent work on bird biology has been orientated to exploring breeding adaptations as affected by these parameters: see, especially, Crook (1965) and Lack (1968). My own work on the Brown Booby *Sula leucogaster* (Simmons 1967a, b, 1970b) demonstrated how food supply strongly influences the species' whole life-history at Ascension Island, where it is faced with a prevailing situation of food unpredictability. This imposes great difficulties for successful breeding and, consequently, the booby seems to have developed a system of co-adaptations for raising young in such conditions. Thus, certain 'anticipatory' adaptations ensure that pairs are ready to breed should conditions become favourable; 'initiating' adaptations ensure that they start breeding as soon as possible when conditions are favourable; and 'sustaining' adaptations ensure the continuation of breeding as far as possible, even if feeding conditions later deteriorate. In the case of the booby, natural predation was not one of the selection pressures involved. In many other seabirds, however, predation is important in forming breeding adaptations, as was exemplified by the classic study of the Kittiwake *Rissa tridactyla* by Cullen (1957) and by the later work of Tinbergen and his colleagues on the Black-headed Gull *Larus ridibundus* (Tinbergen *et al.* 1962, Kruuk 1964, Patterson 1965, Tinbergen 1967).

During the second phase of my study on the Great Crested Grebe, it became evident that the 'etho-ecological' approach that had been of such value in understanding the behavioural ecology of the Brown Booby could be of equal importance in interpreting many of the peculiar attributes of the grebe. As I have pointed out elsewhere (Simmons 1968a), while it is possible to indicate likely functions of a number of individual adaptations, there is even more profit in taking the wider view and studying the interrelations between them. Apart from a preliminary summary of my own (Simmons 1970b), no general survey of the adaptive significance of the various features of the Great Crested Grebe's reproductive biology has previously been attempted. As I hope to show, the selection pressures of both predation and food shortage are very likely involved in determining the breeding co-adaptations of this species.

2. THE GREBE AS AN OPPORTUNISTIC NESTER

Breeding season

The breeding season of the Great Crested Grebe, which may be

defined for our purposes as the period from the laying of the earliest clutches until the last young become independent, is extremely protracted, in England normally lasting seven to eight months and sometimes covering almost the full year. At the extreme, laying continues for eight months, from February to September, and even normal laying extends over six months, from March to August. The first chicks hatch in March, though more usually from April onwards; the last hatch in August or even September and early October, while some young remain semi-dependent until November, December, or even January (one case at Chew). The exact time of breeding often shows considerable variation, not only from year to year and from water to water, but even among different pairs living on the same lake.

Siting and dispersion of nests (plates 59-60a)

The fluctuation in the laying dates is, to a large extent, caused by variations in the availability of cover, and breeding may be 'delayed' until emergent vegetation is sufficiently grown to shelter the nest (Harrisson and Hollom 1932, Witherby *et al.* 1940). Reduction of predation on the vulnerable eggs and tiny young in the nest would seem to be the major factor here: the nest needs to be sited as safely as possible, especially from the attention of predatory mammals operating along the margins of the lake and from birds such as crows (Corvidae) and gulls (Laridae). This requirement to protect the nest seems to be the chief determinant of breeding dispersion on any one water.

Compared with many other waterbirds, the Great Crested Grebe is much more limited in its choice of nesting place, largely because of its physical specialisations as a highly efficient diver. Sites have, therefore, to be accessible from the water, either at the water's edge or among flooded vegetation (as long as the nest can be anchored); even then, the grebe can make only the lowest of leaps to get out of the water. Should sites dry out due to falling water-level, they are abandoned if they become accessible to land predators or if the nest is stranded too far from the water or with too steep an approach. The main danger from land comes from mammals such as the Red Fox *Vulpes vulpes* and, of course, Man. The latter, especially, besides directly robbing nests, often flushes the sitting grebe and thus increases the likelihood of losing the unattended eggs or 'hatchlings' (recently emerged young) to predatory birds (though this is offset to some extent by the deliberate covering of eggs, and even young, with nest material).

Great Crested Grebe sites are either 'concealing' (that is, hidden by screening vegetation, at least at floor level and from the landward side) or 'protective' (inaccessible from the mainland bank),

some being both. At the Kennet Valley gravel-pits, the majority of nests were situated in flooded willows *Salix* and on islets where they were clearly visible but inaccessible from land. At Chew, many were sited in a large, flooded reed-bed where they were both hidden and inaccessible; others were located inaccessibly in flooded *Salix*, while those that were accessible were mostly hidden in small clumps of fringing vegetation. At Blagdon, most nests were hidden in fringing vegetation but some were exposed and wholly beyond reach in flooded *Salix*. Thus it appears that the dispersion and siting of nests are intimately connected. Where the aquatic vegetation is largely fringing and not very wide, or divided into small, discrete units, most nests are well concealed within large territories and widely dispersed, as, for example, at Blenheim, Oxfordshire (McCartan and Simmons 1956), and over much of Blagdon; such nests are, of course, the most vulnerable to predation. On the other hand, some pairs may nest much closer together, even forming loose colonies such as were found at Burghfield and Blagdon (in flooded *Salix*) and at Chew (in reeds). Although such an arrangement seems sometimes correlated with a shortage of sites at a particular water, for example on Lough Neagh, Northern Ireland, when the water-level dropped (Mylne 1963), in general it would seem to be favoured because of the increased safety from predators it imparts. At Burghfield, more nests were successful in the loose colony in the Pool than elsewhere, while at Blenheim the two or three pairs nesting on the Island in Queen Pool in 1954-55 were more successful than the six nesting well apart from one another off the shore of the main lake (McCartan and Simmons 1956). At Chew, most young originated from the loose colony in the reed-bed.

Other factors determining the start of nesting

Thus, the availability of cover for safe nesting appears to be of prime importance in determining the grebe's timetable; but the start of egg-laying is also influenced by other local factors such as water-level and weather. At the Kennet Valley gravel-pits, for example, early nesting (usually in March) was possible because of the presence of flooded willows safely away from the main banks. Here, presumably, the grebes started to nest as soon as the worst of the winter was over and days were lengthening, with occasional laying in February when the weather was particularly mild (as in 1957). At Chew, however, lack of suitable cover seemed to be the most obvious cause of breeding delay, the birds having to wait until the seasonal vegetation grew up. This was especially true of those breeding in the dense reed-bed, most of the broods originating from here not appearing out on the lake until July or August, though the adults would first frequent the old reeds many

months earlier. The availability of cover at Chew, particularly in the reed-bed, was also much affected by the water-level. Here the balance was very delicate: often the water was too deep in spring, and too shallow later in the summer, when sometimes the cover dried out completely. Thus, in 1968 the pair in the Arm was prevented from nesting at the usual time by a drop in level after the cover had grown up, but breeding was possible later when exceptionally heavy rain flooded it out again. In 1969, breeding was prevented altogether by low water in the Arm and many other sites at Chew. In the national census year of 1965, no young at all were known to be reared at Chew due to low water; the same situation also occurred in 1973 (R. J. Prytherch, verbally).

The availability of food must be another important proximate factor in determining the onset of laying; see, for example, Perrins (1970) for a general review. There has to be sufficient food above normal requirements for (1) the female grebe to form her eggs, a clutch of four being the equivalent of 16-20% of her body weight; and (2) both male and female to maintain their co-operative incubating routine, when they must readily be able to find enough food for their own needs in the reduced time available for hunting (approximately half of normal).

Freshwater lakes as unstable habitats

My observations at the Kennet Valley gravel-pits and at Chew suggest that there is considerable variation in the hunting success of grebes frequenting different waters, as well as at different times on the same water. Much depends on the availability and, especially, the size of the prey fish. At the gravel-pits, which were artificially stocked with suitable coarse fish, including Roach *Rutilus rutilus* and Perch *Perca fluviatilis* (both favoured foods of the Great Crested Grebe), the birds fed chiefly on 'big' fish 7.5-15 cm (3-6 inches) long and spent relatively little of their time hunting. In such circumstances, given suitable nest-sites, it is easy to understand why they bred early there. At Chew, which was stocked with trout *Salmo spp* and not coarse fish, the opposite situation held. Feeding conditions were much more variable: while sometimes catching 'big' fish (mainly Roach), the grebes there had to rely much more on fish less than 7.5 cm long and, correspondingly, spent much more time on average in fishing. Breeding at Chew was probably delayed not only by lack of suitable cover, but also until the days were long enough to give more time for feeding. Further, there is good evidence that the supply of Roach fluctuated greatly at Chew. The history of this fish there up to 1969 was given by Wilson (1971). In the early years after the completion of the reservoir, from 1956 onwards, coarse fish were eliminated from the inflow waters, but by 1964

Roach had recolonised the lake in such large numbers that a policy of netting was instituted. The haul catch of large Roach was nearly 21,000 in 1964, rose to 60,000 in 1966, but then declined drastically to 'very few' in 1969. The fall over the years 1965-68 was confirmed by independent hauls made by the Zoology Department, University of Bristol, and was attributed to heavy infestation by plerocercoids of the tapeworm *Ligula intestinalis*. Since 1969, the Roach population at Chew has fluctuated: 1971 was a good year, 1972 a poor one, while Perch reappeared in the lake in the latter year (K. T. Standing *in litt.*).

Other factors that influence feeding efficiency include the depth and clarity of the water and these, too, like the food supply itself, vary from time to time and from water to water. The clarity of the water, for instance, depends on local factors such as the concentration of plankton, agricultural practice, and the nature of the local soil. At Chew, after heavy rain, the water on Herriotts Pool especially becomes impregnated with a suspension of the local marl and discoloured red. In addition, individual waters vary in their physical features, such as the conformation of the banks, the presence and distribution of islands, and the availability and type of nesting cover. Moreover, the ecosystem of a lake is constantly changing (see, for instance, Macan and Worthington 1951).

All in all, therefore, it may reasonably be argued that the fresh-water lake habitat of the Great Crested Grebe is essentially an unstable one. This applies not only to Britain and western Europe but throughout most of the species' large, discontinuous range, both now and in the past when its breeding adaptations were being evolved.

The successful rearing of young

The prolonged breeding season of the Great Crested Grebe is not linked with the rearing of multiple broods as it is, for instance, in the Rock Dove *Columba livia* (Lees 1946). I previously thought (Simmons 1955) that it indicated that food for the young grebes was abundant over a long span so that the precise time of laying, determined by the suitability of cover for the nest, was unimportant. This interpretation was in line with the argument of Baker (1938), Lack (e. g. 1950), Thomson (1950) and others that 'the ultimate determination of a reproductive cycle depends on the survival of progeny to a reproducible age and natural selection will have favoured the gene-complexes of those individuals producing their young at the most propitious season' (Lofts and Murton 1968). I now believe, however, that the Great Crested Grebe is capable of breeding for so much of the year because it has been forced by ecological factors to become, in one sense, an opportunistic nester: because of the need to site the nest safely, it has to breed when it

can within a wide span of months and not necessarily at a favourable time for the rearing of young, unlike the majority of species breeding in temperate latitudes with well-defined climatic seasons. Such a system may result in pairs attempting to raise young even when the food situation is poor, as happens in certain tropical seabirds such as the Brown Booby.

To cope with this situation, the Great Crested Grebe appears to have developed a number of interrelated adaptations that enable it to breed successfully in its unstable environment. These are listed and discussed in sections 4-7. First, however, a summary of the breeding cycle is given in section 3 following, based mainly on my own work; see Simmons (1955 and, especially, 1970c) for full details.

3. AN OUTLINE OF THE BREEDING CYCLE

The breeding cycle of the Great Crested Grebe may be divided into two main parts: the 'pre-egg' (or sexual) stage, and the 'parent-chick' (or parental) stage. The first consists of four temporal phases: (A) initial courtship and pairing; (B) establishment of territory, site-selection, and later courtship; (C) initial platform-behaviour; and (D) functional mating and nest-building. The parent-chick stage follows in five temporal phases: (E) egg-laying and incubation; (F) hatching period and abandonment of the nest; (G) carrying and guarding the young; (H) brood-division; and (J) semi-dependence of the young and their departure. I also term phases B and C the 'engagement period', phases F-J the 'dependence period of the young', and phase J the 'later phase'.

Initial pairing (plates 56, 57 inset)

In Britain and Ireland, Great Crested Grebes typically associate in dispersed, territorial pairs during the breeding season but tend to be asocial and free-ranging afterwards, hunting singly over a much wider area of water and aggregating only loosely (if at all) with other individuals when loafing. On some wintering lakes, however, notably at Chew, temporary feeding congregations of 100 or more (often flightless) birds occasionally form in late summer, while loafing parties can reach large size (100-350 out of a total population of 500-600), especially in autumn and early winter. Thus, though a minority overwinter in pairs, the pair-bond is usually of seasonal duration and there is little sign of heterosexual association in winter parties of loafing grebes, either at Chew (Simmons 1968c) or elsewhere. The birds remaining in pairs are usually those with large breeding territories which they continue to occupy during the winter, weather permitting, or with which they at least

maintain loose contact at that season. Some lone individuals, probably mainly males, also remain in territory during winter, or at least revisit it from time to time or settle in early. A few grebes at Chew maintained small, individual feeding territories in mid-winter but these were abandoned before spring.

Many Great Crested Grebes start to develop their ornamental display plumes during winter, from December onwards, most being in full nuptial dress (plate 60b) before spring, at the latest by February or March. Concurrently, there is a movement back to the breeding waters, weather permitting, by those that have wintered elsewhere on larger lakes or the sea. At Chew, winter numbers in 1966-70 built up to a peak in October and November but declined noticeably later, especially from January onwards. At the same time as the development of display plumage, the incidence of intense heterosexual courtship and of antagonistic encounters increases, though some individuals start displaying while still in winter plumage. At first, such behaviour occurs mostly in 'open' water away from likely nesting places—indeed, sometimes starting on the sea or wintering lake—and is concerned largely with initial pair-formation (the first stage of pair-bonding). Contact between separated individuals, especially those unpaired, is greatly facilitated by vocal 'advertising' (Simmons 1954), while couples engage in the complex courtship ceremonies for which the species is renowned, the three distinctive rituals mostly involved at this stage being the 'discovery ceremony', the 'head-shaking ceremony' and the 'retreat ceremony' (see Simmons 1970a, in press).

Engagement period (plates 57a, 57b, 58)

Following initial pairing, the grebe couple often seeks out sites together and establishes a territory where courtship continues for a variable period, being especially intense and prolonged if close neighbours or intruders are present. A fourth ritual, the particularly complex 'weed ceremony' (see Simmons 1968b, in press), now becomes increasingly common; this ritual is characteristically associated with site-selection and early 'platform-behaviour', and it indicates that the pair is firmly formed. At this stage, the platform-behaviour may consist simply of 'inviting-on-the-water' at potential sites, even before any vegetation has emerged; later, the building of one or more rudimentary mating platforms upon which the sexes in turn perform their soliciting displays is more typical (Simmons 1955, in press). Subsequently copulatory behaviour is added, with the female at times mounting the male, as well as vice versa. As such copulations often occur long before egg-laying, they obviously do not lead to insemination at this time.

By the last phase (D) of the pre-egg stage, courtship has declined

considerably or stopped, more or less; soliciting leads to full, functional copulations, and the true nest is built. This may be at one of the sites used for early platform-behaviour but, as these are often too exposed or otherwise unsafe for nesting, a new site may be chosen.

Timetable

The duration of the events in the pre-egg stage varies considerably and phase D may be separated from phases A-C by a few or many weeks. At the Kennet Valley gravel-pits, providing there was no prolonged spell of cold weather, I often found some pairs already formed, established in territory, and carrying out early platform-behaviour in late December and January. In most years, however, functional copulation and egg-laying did not follow until March, after a delay of at least eight weeks, often longer. Thus, pair 'A' at Old Theale was carrying out weed ceremonies on 27th December 1958 and both sexes were soliciting in turn at a platform; but laying did not occur until about 17th March, over twelve weeks after the start of pairing. Bad weather not infrequently drove the gravel-pit birds away, but often this clearly was not the factor in delaying breeding. However, events were sometimes less prolonged. In 1957 at Old Theale, pair 'E' had already started to lay by about 11th February; on the other hand, some pairs at Burghfield did not settle on territories in the crowded Pool until March or April or even later but then soon starting nesting, laying within two or three weeks. At Chew, events were usually protracted. Thus, the study pair on Herriotts Pool was re-formed and present by mid-January (1967), the first half of February (1968), and the last week of January (1969), but did not lay until 23rd May, 3rd May, and 29th April respectively—up to 18 weeks later. In the Arm in 1968, a pair that had settled in by the first half of February was replaced by a second pair on 20th March, but laying did not take place until about 22nd July, 18 weeks later or 23 weeks after the first pair took up territory. In 1969, a pair was established in the Arm throughout the spring and summer but never bred at all.

Non-breeders

Thus, the first stage of the breeding cycle, especially the engagement period, can be very extended, the delays in nesting being due to a variety of factors as discussed earlier. This raises the question of non-breeders. It is often stressed in the literature that such birds are present in many local populations of Great Crested Grebes, though the term 'non-breeding' has been used in a variety of senses and no specimens for physiological study seem to have been

collected. One has to distinguish 'late breeders' (those that have been considerably delayed in nesting by unfavourable environmental conditions), 'would-be breeders' (those that have been totally prevented from breeding by the same factors) and 'failed breeders', from true 'non-breeders' (those that do not attempt to breed for physiological reasons). Tucker (1934), in an enquiry on the Great Crested Grebe in Berkshire, Oxfordshire and Buckinghamshire during 1931-32, maintained that all birds would eventually attempt to breed on any one water, and this was my experience at the Kennet Valley gravel-pits during 1948-62. It would seem that many so-called non-breeders are in fact birds that have either failed in their nesting attempts or been prevented from breeding owing to lack of sites and other factors. Infertility due to organic pesticides was suggested as a factor producing true non-breeding in the grebe, but a recent survey (Prestt and Jefferies 1969) found the species surprisingly unaffected.

It remains possible that reported non-breeders on some waters are in fact young adults incapable of breeding, so that there is delayed maturity in the Great Crested Grebe as, for example, in many seabirds. However, young grebes assume normal display plumage, pair and seem capable of breeding in their first year, at least in those seasons when the population has been depressed following severe winters (see Hollom 1951, Simmons 1955). Of course, young grebes are much more likely to be prevented from breeding than older, experienced birds and may, therefore, be in the majority among unemployed adults at any one water or may be largely the ones pushed out into marginal habitats for breeding (such as reservoirs lacking suitable vegetation). Kop (1971) has discussed the possibility that some non-breeders are homosexual pairs of males, this situation arising from a surplus of that sex among young grebes.

Clutch-size

The Great Crested Grebe usually lays three or four eggs in Britain, but clutches of two or five are not infrequent, while six has been reliably reported (Harrison and Hollom 1932, Tucker 1934, Prestt and Jefferies 1969, Simmons 1970c). In continental Europe, two to six eggs seem normal, three to five being most common (Meldc 1973). Weighing approximately 38 gm, some 4-5% of the female's body weight, each egg is small compared with the size of the bird.

There was no indication in my own records from Berkshire of any significant seasonal trends in clutch-size. This held also for 207 Swiss clutches, which varied from a mean of 4.1 eggs in May to 4.5 in July (Bauer and Glutz 1966); in contrast, 67 clutches from East Germany declined from 5.5 in April to 4.2 in June (Meldc 1973).

Incubation and hatching (plates 59b, 61a)

Female Great Crested Grebes lay their eggs at approximately 48-hour intervals and incubation starts early in the laying period. (For details of egg-laying behaviour, see page 438 and plate 63.) 'Premature' sitting occurs spasmodically a few days before laying, then true incubation on the day the first egg is laid or on the day after at the latest (that is, on the interval day between the laying of the first and second eggs). Thus, the development of the embryos is progressive, not synchronous, and this system affects their relative hatching intervals. Both sexes incubate in turn, taking equal shares. In a total of 556 hours of observations at eight nests, males sat for 289 hours, females for 267; 181 spells lasted from ten to 492 minutes, averaging 108 minutes and increasing in mean duration as incubation progressed from, for example, 75 minutes in the second week to 141 in the fourth. Each egg takes 27-29 days to hatch, usually 28, and the brood emerges asynchronously, as would be expected, so that there is an extended hatching period (up to five days for a clutch of three and up to seven days for a clutch of four). The young usually remain with the sitting bird throughout the hatching period and the nest is then abandoned when the last chick has dried out; sometimes, however, viable eggs are left behind (Schiermann 1927, Hanzák 1952). Neither the adults nor the young normally return to the nest, or any other platform, afterwards. The family may or may not remain in the original territory after hatching, much depending on the type of territory maintained. Pairs with tiny territories, such as those in the loose colonies at Burghfield, Chew and Blagdon, usually abandon them and either set up brood territories elsewhere or wander over the free area of the lake. Those with large territories, however, often rear their young within them.

Carrying and guarding (plate 61b)

During the hatching period, the chicks spend their time on the back of the sitting adult. When the nest is abandoned, the parents continue to take turns in carrying the young out on the water during the second week, but do so less and less during the third. Thus, the carrying period lasts up to three weeks, not ten days as stated by Simmons (1955). The adults usually continue to guard the young to a greater or lesser extent during the third and fourth weeks, sometimes longer in the case of small broods, tending to take turns in remaining with the chicks. At times, however, both parents of larger broods (especially) may hunt simultaneously, leaving the chicks unattended even in the later part of the carrying period.

During these early weeks away from the nest, a simple hierarchy is established within the brood and larger chicks tend to dominate their smaller siblings which respond to the former's hostility with

appeasing and submissive behaviour. Disputes among the young occur especially when they find themselves in the water near the parent or when two or more go to get food from the same adult.

Brood-division (plate 62)

Both parent Great Crested Grebes share equally in carrying, guarding and feeding the whole brood when the young are small, but later a different system operates in families of two or more. That the adults later 'divide' up the young between them was first clearly indicated by Harrisson and Hollom (1932) and subsequently established as a regular feature of the species' breeding behaviour by my own work. Such brood-division results in the formation of two family sub-groups with each parent usually feeding only its 'own' young and showing hostility to the 'other' young if they approach closely. The two sub-groups typically associate only loosely, mainly when loafing, and may sometimes separate more or less entirely. The adult pair-bond grows progressively weaker after the brood has been divided, unless there is an attempt at a second brood, and male and female may even be hostile to one another if and when they meet.

Observations at Old Theale in 1957 and later at Chew revealed a further aspect of the complex organisation of the grebe family. Within each sub-group, if of more than one young, one chick associates more closely than the other with the adult; this 'in-chick' is fed regularly and tolerated near the parent, whereas the 'out-chick' receives food only when the in-chick is satiated or elsewhere, and is not allowed close to the parent. Thus, in many grebe families there are three grades of young for each adult: (1) its own in-chick, (2) its out-chick, and (3) the young of the mate.

The later phase

Analysis of my records for 39 broods kept under general observation shows that the young stayed with their parents from eleven to at least 16 weeks, some longer than others in the same brood. There was no evidence of full independence before week 11 and some young were still being fed up to at least week 15, some families remaining together as late as November or December.

Observations at Old Theale in 1957 and later at Chew gave more precise information, as follows:

- (1) the young usually began to catch fish efficiently for themselves in week 8 or 9;
- (2) they became food-independent from week 10 onwards;
- (3) they made their first flights in weeks 11 or 12, in eight cases when 71-79 days old;
- (4) they stayed with their parents until at least week 11;
- (5) there was wide variation in the age of departure even within the same family;

(6) some young left in week 11 as soon as they could fly, while others remained up to week 23 (in some cases until November or December and once until January), so that they left 3-15 weeks after the start of self-feeding, an extremely variable span;

(7) out-chicks tended to leave first (mean, twelve weeks), in-chicks later (mean, 17 weeks);

(8) parental feeding lasted on average 13 weeks, ending earlier (in weeks 10 or 11) for out-chicks but continuing up to week 15 (once until week 23) for in-chicks;

(9) the total duration of the parent-chick stage, from the first egg to the departure of the last young, ranged from 15 to 25 weeks (mean 20).

Those adults still engaged in rearing young in late summer undertake their annual wing-moult during the last phase of the cycle, becoming flightless for a period of 3-4 weeks, usually in August and September (October in one late-nesting pair). Males usually moult 2-3 weeks before females, somewhat before or concurrent with the departure of the first young of the brood but well before the departure of the last. Females, however, tend to start their moult only after the first young have gone, while many depart to moult elsewhere, leaving the mate (and in some instances the last young) behind. Although my general observations show that some grebe pairs occasionally winter together after the departure of all the young, weather permitting, in only one of the six main study families did this happen. In another case, the male of the pair remained and wintered alone; in a third it was the female that stayed, accompanied by her in-chick. Most females departed in September and October, most males in November and December; in no case did mates depart together. Sometimes, however, the departure of adults and particular young, usually their 'own' in divided broods, was concurrent and there is some evidence of the association between parent and in-chick continuing elsewhere.

Brood-size

Of 124 broods in the Reading area during 1948-65 (including some at gravel-pits and lakes not previously mentioned), 25% were of one young, 47% of two, 22% of three, and 6% of four: mean, 2.1. Brood-size varied between waters: of the two main study pits, Burghfield averaged lower (1.7) than Old Theale (2.3), the latter having all the fours and several threes; elsewhere in the Reading area, Whiteknights Lake had the highest mean of all the local waters (2.8), three young being the usual complement. In a much smaller sample from Chew in 1966-69, broods of two were most common, then ones and threes (both well behind); as in the Reading area, broods of four were the least numerous and larger broods unknown. These trends are similar to those found in other studes (e.g. Tucker 1934, Prestt and Jefferies 1969, Bacon 1972, Melde 1973). Although in exceptional circumstances broods of five may apparently be

successfully raised (Harrisson and Hollom 1932, Tucker 1934), it is clear that broods of over four—and hence family sub-groups of more than two young—are unusual.

Clutch-size consistently averages much higher than brood-size in the Great Crested Grebe. Of the possible factors causing a reduction in the number of young, egg infertility is evidently unimportant (Harrisson and Hollom 1932), while egg loss through causes such as drought and predation by crows usually affects whole clutches. Predation of small chicks by Pike *Esox lucius*, however, is clearly a major factor (Harrisson and Hollom 1932, Tucker 1934, Simmons 1955), the presence or absence of large Pike probably being one likely explanation of variation in brood-size and breeding success between waters. Competition between siblings for food has also been found to cause chick mortality, at least in Surrey and perhaps elsewhere (Harrisson and Hollom 1932). Of mortality factors occurring during the hatching period, bad weather causes many deaths, hatchling grebes being most susceptible to cold and damp. Another major factor in brood reduction, however, may be the deliberate desertion of unhatched but viable eggs, at least on some waters. No cases came to light during my study but could easily have been overlooked; though it is not known how widespread this peculiar practice is in Britain, Hanzák (1952) found that it occurred on a few waters in Bohemia.

Productivity

In 1931, Great Crested Grebes in England and Wales (including failed and non-breeding pairs) reared a mean of 1.3 young per pair with, however, considerable variation between counties, ranging from 2.6 in Leicestershire to 0.6 in Bedfordshire (Harrisson and Hollom 1932). In 1965 the national average was 1.5 (Prestit and Jefferies 1969). The mean for Burghfield and Old Theale in eight seasons was 1.2, compared with 1.8 for Berkshire and Oxfordshire as a whole in earlier years (Tucker 1934); however, breeding success was consistently higher at Old Theale (mean 2.0 young per pair) than at Burghfield (0.9). In Derbyshire in 1972, total productivity was 0.7 young per pair (Bacon 1972), much the same as in 1931. Data from the Continent summarised by Melde (1973) gave an average of 1.7 young per pair.

Great Crested Grebes will replace both lost clutches and broods within 15-18 days, but data are scanty. Normally only one brood is attempted, but true second broods involved, for example, 4.3% of all breeding records in 1931 (Harrisson and Hollom 1932). At Burghfield and Old Theale, only 4.6% of pairs successfully reared double broods during 1948-57. Harrisson and Hollom had stressed the large brood-sizes (averaging 2.3 and 2.7 for first and



PLATE 56. Courting pair of Great Crested Grebes *Podiceps cristatus* 'head-shaking', Lough Neagh, Northern Ireland, May 1962 (photo: W. N. Charles). Birds assume nuptial plumage and often start forming pairs during the winter, thus being ready to nest whenever ecological conditions later permit (pages 413-437)



PLATES 57 and 58. Above, Great Crested Grebes in territorial dispute; below, courting pairs at climaxes of 'discovery ceremony' (inset) and 'weed ceremony'; Lough Neagh, May 1962. After a period of initial courtship, pairs often establish territories from midwinter onwards so as to be ready to breed later whenever they can. Opposite, 'platform-behaviour': top and centre, 'inviting' and 'rearing' soliciting displays; below, copulation; Burghfield Gravel-pit, Berkshire, April 1956. Like courtship, soliciting (by both sexes) and copulation (at times 'reversed') often occur well before nesting, thus helping to strengthen the pair-bond while the birds wait to nest (*photos: W. N. Charles*) (pages 419-421)

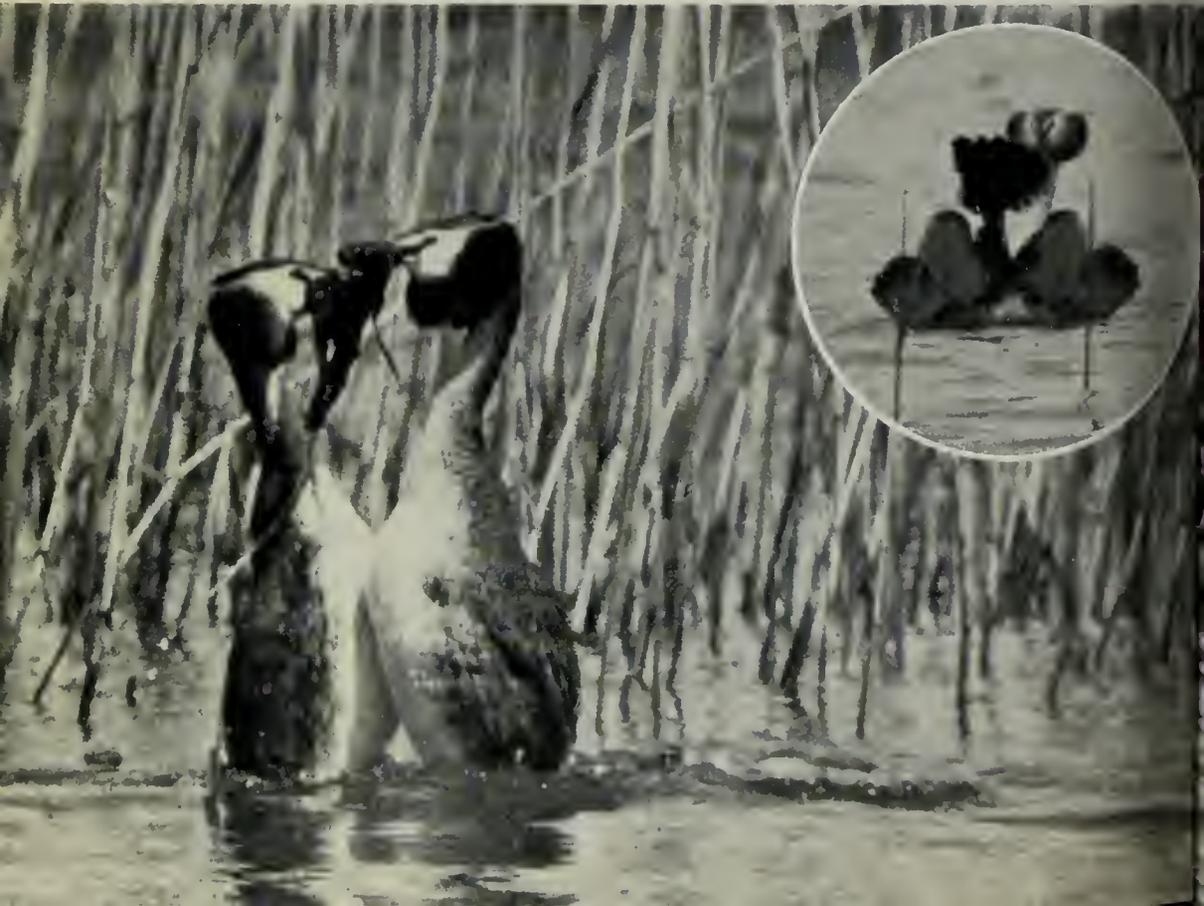






PLATE 59. Great Crested Grebes off reed-bed prior to nesting, Lough Neagh, May 1962; below, adult about to settle on eggs at nest in reed-bed, same locality, June 1962 (*photos: W. N. Charles*). Breeding is often 'delayed' in this species until emergent vegetation is sufficient to hide or protect the nest





PLATE 60. Group of close nests of Great Crested Grebes in reed-bed, Lough Neagh, June 1962. Nest dispersion is largely dependent on the available cover; most nests are widely spaced, but colonies are sometimes formed at particularly favourable sites, such as reed-beds (pages 415-416). Below, adult in nuptial plumage, Old Theale Gravel-pit, Berkshire, April 1958 (*photos: W. N. Charles*)





PLATE 61. New-hatched Great Crested Grebe chick in nest; below, male giving feather to young carried on female's back; Old Theale Gravel-pit, Berkshire, April 1958 (*photos: W. N. Charles*). The brood hatches asynchronously and the nest is then abandoned, the young being carried on the parent's back for several days after. As the time of breeding is determined by the availability of nest cover, it may not always coincide with conditions favourable for rearing young





PLATE 62. Above, family sub-group of Great Crested Grebes, Aldermaston Main Gravel-pit, Berkshire, May 1957; below, adult feeding its 'in-chick', New Theale Gravel-pit, also Berkshire, May 1960 (photos: H. N. Charles). When about half-grown, broods of two or more young are 'divided' between the parents which each then favour one particular chick above any of the others. These and related adaptations help to ensure the survival of at least some young if food becomes scarce





PLATE 63. Two stages in the egg-laying behaviour of the Great Crested Grebe *Podiceps cristatus* (photos: M. Wiechmann): above, the egg being slowly ejected (horizontally) from the cloaca; below, immediately after laying, the female standing up on the edge of the nest and beating her half-open wings (page 438)



second broods respectively) and high seasonal productivity of double-brooded pairs in 1931; it was evident also that second broods were attempted mainly on waters with low population densities, usually with only one or two pairs. At the Berkshire gravel-pits, however, breeding populations were much higher (averaging ten pairs) and the mean sizes of both first broods (1.6) and second broods (1.4) were lower. On the other hand, records from two ornamental lakes in the Reading area, Whiteknights and Bulmershe, during 1949-63 were closer to the earlier ones in that there were higher mean brood-sizes (2.2 and 2.3 respectively) and populations of only one pair. At Chew in 1967-69, all of the many pairs watched closely were single-brooded; in 1966, however, the pair in the Arm successfully raised broods of one and four young. My own data indicate that first-brood clutches appear early (March to the first part of May) and the two broods overlap, the second clutch usually being started when the first-brood young are 6-7 weeks old (five out of seven records) or 9-10 (the other two).

4. ANTICIPATORY ADAPTATIONS FOR BREEDING

The need for Great Crested Grebes to be ready to nest whenever conditions become favourable seems to have resulted, as in the Brown Booby, in a number of anticipatory adaptations, namely (1) early pairing, (2) early establishment of territory, and (3) long sexual cycle.

Early pairing and establishment of territory

Birds which remain permanently paired would, ideally, be in the best position to be opportunistic nesters. This was found to be the case with the Brown Booby at Ascension and, indeed, some Great Crested Grebes in Britain do remain paired between breeding seasons. These, however, are in a minority, for many pairs split up at the end of their breeding cycle when family sub-groups separate and females depart on moult migration. There is also a tendency for hostile incompatibility to develop between mates when rearing young, the bond being transferred to the young (especially the in-chick), while the pair evidently also tends to become separated after departing on weather-movement flight, especially in higher latitudes and wherever there are seasonally unfavourable periods which make breeding waters temporarily uninhabitable, such as through ice or drought.

Although factors combine to make permanent pairing impracticable in many parts of the range, Great Crested Grebes in Britain do start to pair very early, as we have seen. Indeed, so strong is this tendency that some of my study birds began pairing again with their former mates at the end of the breeding cycle, in the autumn

following the period of estrangement while rearing young. While early pairing may be advantageous because there is a measure of competition for mates—at least among young males, which Kop (1971) found to be somewhat more numerous than young females—I believe such a factor to be at most secondary. It is much more likely that early pairing is primarily anticipatory so that pairs are ready to breed as soon as it is ecologically favourable to do so. Thus, many pairs are formed several weeks or even months before they have the opportunity to nest, though they are ready virtually from the start should conditions permit.

Soon after initial pairing, many Great Crested Grebe couples establish themselves in a territory, often in traditional areas long before there is even a sign of cover for the nest. Indeed, a minority are more or less permanently resident between seasons though, as in the case of permanent pairing, this is usually impossible for some of the same reasons. Such early site attachment would seem to be anticipatory, in the same way as early pairing, but another factor may also be involved—a general shortage of premium sites. So demanding are the grebe's nesting requirements that such sites must always be limited on any one water: hence such phenomena as colonial nesting, when a number of pairs make use of a particularly favourable feature of the local habitat (such as a reed-bed: see plate 60a). Given this shortage, there must be strong competition for good sites and this would also favour early and prolonged occupation of the future breeding areas.

Over the Great Crested Grebe's whole range, the extent to which pair-bonds and territorial occupation are maintained over the year must be subject to adaptive variation through local ecological pressures. Mate and site permanency could occur regularly where environmental conditions are more stable than in Britain and much of central and northern Eurasia, for instance in tropical Africa where the species mainly frequents temperate montane lakes. Permanency may also be correlated with non-seasonal, opportunistic breeding and the retention of the nuptial plumes throughout the year, as in the race *infuscatus* of the Ethiopian region.

Long sexual cycle

Judging from the wide spread in laying, the differences in egg dates from water to water in the same season, the quick replacement of lost clutches and broods, and the occasional production of overlapping broods, the Great Crested Grebe must remain in active breeding condition for many months of the year. Again, I interpret this as an anticipatory adaptation for opportunistic nesting. Its ability to breed early in the year would indicate that the species either has no photosensitivity or a very low threshold of photo-

sensitivity and probably no refractory period in its annual physiological cycle (see Lofts and Murton 1968). In either case, it is evidently physiologically adapted to be able to breed over many months of the year. The hormonal control mechanism involved remains to be investigated but may resemble that suggested by Farner (c.g. 1967) for opportunistic desert breeders. Here, the hypothalamus is thought to exert an essentially tonic, gonadotrophin-stimulating rôle that maintains the gonads in a functional stage for as long as it is not inhibited by totally unfavourable environmental conditions.

Significance of courtship and other heterosexual rituals

Early pairing and early site attachment impose upon male and female the need to remain together perhaps for a prolonged period before breeding. Meanwhile, they often have to face serious competition from rivals for their territories and also, in part arising from this, for their mates, at least until the pair-bond is firm (see below). It is against such a background that the significance of the species' heterosexual rituals, especially the highly elaborate courtship, needs to be assessed. The courtship rituals in particular, first studied by Huxley (1914) and now under re-examination by myself and other workers, pose many problems of interpretation. Leaving aside the intriguing question of why there are no less than four distinctive rituals, it is instructive to examine general aspects.

As courtship virtually ceases once incubation begins (Simmons 1955), its major functional rôles would seem to relate primarily to events in the pre-egg phases of the cycle. These would seem to be both bond-forming and bond-maintaining. Certainly, in spite of assertions in the early literature to the contrary, courtship does accompany pair-formation, the process being a gradual one extending over many days or weeks. During this time the pair-bond is potentially terminable, as indicated, for example, by some individuals' tendency to 'flirt' (Huxley 1914) with birds other than the mate. Intense and frequent courtship occurs during the engagement period, especially when pairs establish territory, investigate potential nest-sites and get involved in antagonistic encounters with intruders and neighbours. Thus the pair-bond is kept intact until nesting can finally get under way. In the advertising behaviour which serves to re-establish contact when members of the pair are well separated, the characteristic 'croaking' calls vary considerably between individuals, facilitating personal recognition of the mate and thus further strengthening the pair-bond. Courtship probably also has a mutually stimulating, physiological effect; for instance, the displays could contribute to environmental factors causing the tonic effect of the hypothalamus on the gonads discussed earlier, as

well as bringing the breeding rhythm of the two sexes into synchrony, as suggested for bird display generally by many earlier writers (e.g. Howard 1929, Marshall 1936).

As it occurs regularly early in the engagement period, when obviously not proximately linked with egg production, the platform-behaviour of the Great Crested Grebe is likely to have similar bonding and physiological functions as the courtship. This interpretation of initial platform-behaviour would explain certain apparently anomalous features such as the use of very rough weed structures, often at sites quite unsuitable for nesting, the resort to 'substitute sites' (see Simmons 1955) and, above all, reversed soliciting and mounting.

5. INITIATING ADAPTATIONS FOR BREEDING

It is uncertain whether there are well-developed adaptations in this category in the Great Crested Grebe comparable, for example, with those of a bird such as the Brown Booby in which the availability of sites usually offers no problem but which is subjected, presumably, to much grosser fluctuations in food supply. This latter situation places a premium on *rapid* responses to improved conditions. The whole problem obviously requires much further study in the grebe, but the rapidity with which the true nest can be built (in a day or less), plus the relatively small size of each egg, might be important in certain circumstances in which it is advantageous to start breeding as soon as possible.

6. SUSTAINING ADAPTATIONS FOR BREEDING

As a result of the wide variability in the timing of nesting, both from water to water and from season to season, a favourable food supply for Great Crested Grebe chicks cannot be anticipated and they are liable to hatch at a time of food shortage, or may experience it at some time during the dependence period. Their parents, therefore, may run into difficulties in finding enough food to feed all the young adequately, a brood of four needing in excess of the equivalent of 20,000 small fish during the main rearing period (see Simmons 1970c), the adults' own requirements being an additional demand on local resources. To cope with having to provide a large biomass of food in a potentially unstable environment, the Great Crested Grebe seems to be able to 'control' the output of young at various points in the parent-chick stage to conform with the feeding conditions operating at the time, thus ensuring if possible the survival of at least some chicks. The sustaining adaptations involved include some or all of the following: (1) variable clutch-size, (2) asynchronous hatching, (3) abandonment of viable eggs, (4) age-hierarchy among the young, (5) brood-

division, (6) the favouring of certain chicks, (7) the separation of family sub-groups, (8) prolonged dependence of the young, (9) replacement of lost clutches and broods, and (10) the rearing of second broods.

Variable clutch-size

The largest normal clutch of the Great Crested Grebe may be three times as great as the smallest, a difference that transcends the variation in clutch-size found in most birds. Moreover, there is no evidence of any consistent seasonal variations in mean clutch-size characteristic of other birds with an extended breeding season (see Lack 1947): it can fluctuate irregularly, show a slight seasonal increase, or even decrease sharply. In itself, this situation points to the food locally available for the laying female as being the main proximate factor in determining how many eggs shall form the clutch at any particular time. It also indicates that the availability of food fluctuates unpredictably, which is in keeping with my general hypothesis, and this alone may be a sufficient explanation of variable clutch-size in the species. However, it also remains probable that current clutch-size is correlated with the number of young most likely to survive later if the food conditions operating at laying continue at the time of hatching.

Asynchronous hatching and its effects

In most species with precocial young, such as waterfowl (Anatidae) and waders (Charadriiformes), effective incubation starts with the last egg and the chicks hatch out more or less together. The asynchronous hatching of the Great Crested Grebe, therefore, is distinctly unusual and is similar to that found in many species with altricial or semi-altricial young with long nestling periods, such as various owls (Strigiformes) and diurnal raptors (Falconiformes); it is also found in many other fish-eating birds, including herons (Ardeidae). Most of these, however, have fixed and restricted laying seasons, unlike the grebe; in the Grey Heron *Ardea cinerea*, for instance, eggs are laid in March-April and the young are in the nest at the period of maximum availability of food (Owen 1960). It is generally accepted that species which have evolved asynchronous hatching are likely to experience food shortage when rearing young, the advantage for survival thus being placed on the first-hatched and, therefore, larger young.

It cannot be doubted that, in the Great Crested Grebe, the older young (especially the first and, to a somewhat lesser extent, the second chicks) have an advantage during the hatching and carrying periods and immediately afterwards. Not only are they stronger but they are better able to get to the feeding adult first for food and can take up positions of advantage on the water earlier than

their smaller siblings. Thus, they are more likely to obtain food should it be in short supply, as was clearly the case at this stage in at least two of my study broods (family 'D' at Old Theale in 1957 and the 1969 Herriotts Pool family at Chew). The advantages of size and strength bestowed on the first-hatched young by asynchronous hatching are enhanced by the establishment of a hierarchy within the brood; this simple dominance system persists while the whole brood is together but is later replaced by more complex relationships.

Another possible option that asynchronous hatching gives to the grebe parents at times of food scarcity at hatching is to carry away a reduced brood from the nest by abandoning viable eggs, the mechanism for such an adaptation presumably operating largely through the adults' own feeding rates. The whole question of the desertion of the nest before all the young have hatched requires thorough investigation; if not always due solely to factors such as disturbance, such apparently dysgenic behaviour only makes sense if it has evolved as a sustaining adaptation for controlling the size of the brood in critical conditions.

Brood-division and its effects

The splitting of the Great Crested Grebe brood into two units, each in charge of a single adult, usually operates effectively when the young are becoming fairly large (Simmons 1968a). Such division, however, tends to be established earlier if the parents are faced with difficulties in feeding the young, as in the case of family 'D' at Old Theale in 1957 and the 1969 Herriotts Pool family at Chew. Its main function seems to be to reduce competition for food within the brood and to increase parental feeding efficiency. Although in theory there would seem to be no difference between the joint feeding by the parents of, say, a brood of two and the same two adults each feeding a single chick, in fact I found that in some of my study families there was a dramatic rise in the overall feeding rate and in the rate per chick after brood-division. The full significance of brood-division can be more fully assessed when it is considered with two closely linked phenomena: the favouring of certain chicks ('in-chick/out-chick situation') and the separation of family sub-groups.

In divided families, each parent gives most attention to one chick in its sub-group; this receives preference at feeding over any second chick. The in-chick is not necessarily the elder of the two. Thus, the system of brood-division and in-chick favouritism replaces the earlier one in which the advantage lay definitely with the larger young for, as the chicks grow, the new system is required to facilitate the survival of at least the in-chicks of the family in the

face of any serious food shortage when age differences between siblings no longer count. At the extreme, the in-chick in each sub-group would be expected to get all the food provided at the expense of any out-chicks, the latter being expendable (as were the last eggs in partly abandoned clutches) and reared only if the food situation permitted. In none of the study families, nor in any of those watched less intensively, did the extreme situation occur, but it was possibly approached on Herriotts Pool at Chcw in 1967 where the odd chick in a brood of three received relatively little parental attention. Further, the case-history of family 'D' at Old Theale was particularly instructive and provided a natural experiment. There was evidence of food shortage, especially when the young were small; then the female became incapacitated and could not feed her young. The male continued to feed mainly just his single chick and later the female started feeding her in-chick again, but the female's out-chick was almost totally neglected and eventually died of starvation.

After brood-division, the family units may separate to a greater or lesser extent. I see this as a mechanism for reducing food competition within the family, the degree of disassociation probably mediated by the current food situation, the sub-groups being more likely to separate if feeding conditions are poor. Something approaching this occurred on Herriotts Pool in 1967 and it was noticeable that the adults sought food mainly in different places, only the females persistently searching the flooded littoral vegetation.

Prolonged dependence of the young

Parental feeding in the Great Crested Grebe usually continues at least until the time of fledging at eleven weeks when the full-grown chicks have been able to catch some food themselves for two or three weeks; in the case of in-chicks especially, it may continue for a few weeks longer, up to twelve in one case. Such a prolonged period of semi-dependence is clearly adaptive in ensuring the survival of the juvenile grebe in the face of food difficulty while it perfects skilled hunting techniques. The situation in the Great Crested Grebe recalls that in boobies and is likely to prove widespread in fish-eating and predatory birds, having been recorded, for example, in various terns and gulls (Ashmole and Tovar S 1968, Holley 1970), owls and diurnal birds of prey (Southern *et al.* 1954, Brown and Amadon 1968). In most or all of these birds, as with the Brown Booby and Great Crested Grebe, the juveniles have elaborate begging-cum-appeasing behaviour which continues, often at high intensity, for as long as they associate with the parent.

Replacements and second broods

After total loss of eggs or young, it is of obvious adaptive advantage for the grebe pair to breed again as soon as possible, provided that

ecological conditions are favourable for laying. Then, when conditions are particularly good, the rearing of double broods permits the production of additional young. From all available information, it would seem that the main conditions facilitating normal attempts at double broods are an early first nesting and a small breeding population, preferably one pair. Low population density is in all probability linked chiefly with the ability of a single pair to utilise a large area for hunting—for example 5 ha (over 12 acres) at Whiteknights and 8 ha (15 acres) at Bulmershe, two of the Reading waters where double-brooding occurred—and with the absence of competition from other pairs. Thus, the food supply itself emerges as the true main factor, as first indicated by Harrisson and Hollom (1932). At Burghfield, a good food supply coupled with early nesting would seem to have favoured the occasional double broods, in spite of a large population. Another factor in such marginal cases would be the small size of the first brood, as also at Chew in 1966.

In view of the apparent selective advantage in double-brooding, the feeding and other conditions favouring it must, presumably, occur only infrequently. These must have been better than average in 1965 when no less than 11% of the breeding pairs counted nationally raised a second brood (Prestt and Jefferies 1969), a much higher proportion than that recorded in 1931 or during my studies at the Kennet Valley gravel-pits. As second-brood young are usually still being cared for into the early part of the winter, their chances of survival may be reduced and this may be a selective factor operating against second broods. In any case, in Britain (which is at the western edge of the species' range), second broods just cannot be attempted on many waters where the grebes are unable to nest until June or later.

7. CONCLUSION

It remains yet to demonstrate fully that all these adaptations of the Great Crested Grebe indeed operate in the manner suggested. There was, in fact, no real evidence during the course of my studies of obvious gross food shortage causing the death of young through starvation, though there was clear indication that food difficulties of sorts did arise. For instance, in the 1969 Herriotts Pool family at Chew the trouble was a deficiency in fish of an economical size for the feeding of the young, entailing a great expenditure of energy by the parents who maintained the highest feeding rates recorded coupled with a very low biomass rate (see Simmons 1970c). No long-term work on the feeding ecology of the Great Crested Grebe has yet been done and, indeed, the natural situation is hard to assess because so many waters in Britain and Europe are artificially affected by fish stocking, fish management, angling and other human

activities. The position was further confounded during my study by the difficulty in examining a sufficient sample of nests and by the loss of young from causes other than starvation, such as from exposure and (at the gravel-pits) from predation by large Pike.

I am also aware of the dangers, in syntheses of this sort, of oversimplification, circular argument, confusion of cause and effect, and semantic errors. Perhaps not all the phenomena that I have grouped together as 'adaptations'—that is, the results of selective processes—are comparable. Nevertheless, the hypothesis offered here remains highly plausible, stresses certain important consistencies in the available data, and is subject to test in future etho-ecological research and controlled field experimentation (involving, for example, manipulation of the food supply and brood-size). In any case, as with the Brown Booby, it certainly seems true that a better understanding of the breeding biology (and social behaviour) of the Great Crested Grebe is likely to follow careful consideration of ecological factors.

ACKNOWLEDGEMENTS

The first phase of my study was undertaken privately; the second was financed by a special research grant from the Nature Conservancy and later from the Natural Environment Research Council while I was working at the Department of Psychology, University of Bristol, through the good offices of the late Professor K. R. L. Hall and Dr J. H. Crook. I am greatly indebted to the many people who have helped me in my grebe work over the years; these were mostly listed in Simmons (1970c). In connection with the present paper, however, I would like to thank those specifically mentioned in the text; W. N. Charles for his photographs, some of which were taken at Reading waters during my field work; my many other friends in the Reading and Bristol Ornithological Clubs, particularly C. E. Douglas and Bernard King; and Dr U. Weidmann, the late Professor S. G. M. Lee, and Professor W. Sluckin for facilities at the Department of Psychology, University of Leicester, during the writing of this paper. Finally, I must mention that the annual report of the Reading Ornithological Club and the monthly bulletin of the Bristol Ornithological Club, *Bird News*, both provided valuable supplementary local information on grebes.

SUMMARY

The Great Crested Grebe *Podiceps cristatus*, a highly specialised, fish-eating water-bird, has a variable and extended breeding season, usually nesting only when safe sites are available. Unlike most birds of temperate regions, therefore, and because it occupies a basically unstable habitat, it cannot always time its egg-laying to coincide with periods favourable for the rearing of young. Consideration of various aspects of the breeding cycle, from initial pairing to the wing moult and departure of the adults, suggests that many of the striking and puzzling features of the grebe's reproductive biology may be interpreted mainly as interrelated adaptations for (1) opportunistic nesting, and (2) the successful raising of young in conditions of food shortage.

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Notes

Egg-laying by the Great Crested Grebe Although the behaviour of Great Crested Grebes *Podiceps cristatus* has been intensively studied, many questions are still open. One such question is how Great Crested Grebes lay their eggs, and whether they exhibit any special behaviour during and after laying.

The photographs on plate 63 show two stages in the laying process. This begins when the female sitting on the nest suddenly raises and then quivers the closed wings a little, without opening them. After one to two minutes this behaviour is replaced by treading movements of the feet. Although the bird does not raise herself at all, these movements slowly push her on to the edge of the nest, and any eggs already laid become visible. When her cloaca is approximately above the nest hollow, rhythmic movements of the orifice indicate that the egg is coming, which then appears as a bright whitish-green patch in the widening cloaca. Slowly, almost hesitatingly, the egg is squeezed out (plate 63a); deposition occurs after more than half a minute of intensive pressing.

Because part of the upper femur, as in all grebes, is developed in such a way that the legs protrude far back on the body, the cloaca is lifted so much when the bird is lying on the nest that the egg is ejected horizontally.

Once the egg is laid, the female raises herself and beats her wings, only half open, for one to two minutes (plate 63b). After a further period of standing over the nest hollow, she slips into the water. She may resume incubation after she has jumped up on to the nest platform again, or she may leave this to the male; in the latter situation she accompanies him to the nest, as if to reassure herself that laying has been successful.

From these observations it seems probable that the wing-beating of the Little Grebe *Tachybaptus ruficollis* noted by H. Bandorf (1970, *Der Zwergtaucher*, p. 113) in similar circumstances was part of the normal behaviour following egg-laying; the author suggested that its function might be to dry out the wing feathers, since it was raining heavily at the time.

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Dr K. E. L. Simmons, whose paper on the breeding biology of the Great Crested Grebe appears on pages 413-437, informs us that sequences showing the behaviour of the female after laying the egg are included in the film 'A Waterbird's World' made a number of years ago by C. K. Mylne for the Royal Society for the Protection of Birds and that what seem to be similar 'wing-beating' movements

are sometimes performed by the relieved bird (apparently of either sex) at change-over during incubation. EDS.

'Foot-paddling' behaviour of Pied-billed Grebes In March and April 1972, in central Florida, USA, I spent many hours watching Pied-billed Grebes *Podilymbus podiceps* on lakes in and around Orlando and Winter Park. On four occasions I noted a form of 'foot-paddling', in which the birds swam close to the bank where there was a narrow rim of emergent vegetation, and, while squatting in shallow water, made vigorous and alternate paddling movements with the feet. These stirred up sediment and dislodged small fish from crevices in the bank, which were avidly swallowed.

Incidentally, it may be of interest that twice I noticed feather-eating while preening was taking place. The feathers in question appeared to be plucked from the flanks. BERNARD KING

Gull Cry, 9 Park Road, Newlyn, Cornwall

Purple Heron chick regurgitating young Little Grebe On 25th May 1970 I was ringing nestling Purple Herons *Ardea purpurea* in a colony near Las Nuevas in the Parque Nacional de Doñana, south-west Spain. One of them regurgitated a dead half-grown Little Grebe *Tachybaptus ruficollis* immediately following handling. The grebe weighed 62 gm and had been swallowed whole. The heron was probably being fed exclusively by its parents, since it was still on the nest.

Referring specifically to the Coto Doñana colonies, *Archivos del Instituto de Aclimatación* (Almería), 9: 72, lists carp *Carassius*, eels (Apodes), Water Snakes *Natrix maura*, and larvae of dragonflies (Odonata) and beetles (Coleoptera) as recorded prey of the Purple Heron. *The Handbook* (3: 135) included young Great Crested Grebe *Podiceps cristatus* among recorded prey, but did not mention Little Grebe. The weights of eight full-grown Little Grebes mist-netted on the Coto Doñana in 1970 were 135-185 gm (mean 159 gm).

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P. J. Olney comments that the Purple Heron, throughout its range, takes a wide variety of prey, though fish and insects (and their larvae) probably make up the majority of the food in most areas. Birds have been recorded before—see *Birds of the Soviet Union* (1966-68), vol. 2; *Birds of West Central and Western Africa* (1970), 1: 34 (which mentions 'young waterfowl'); *Alauda*, 7: 177-197; and *Proc. Int. Orn. Congr.*, 9: 415-422, as well as *The Handbook*—but these are rarely identified and do not appear to form a significant part of the diet. EDS

Common Sandpiper eating butterflies In the morning of 7th September 1973, on the Scrape at Minsmere bird reserve, Suffolk, I watched a Common Sandpiper *Tringa hypoleucos* catching butterflies. It ran a few steps into a clump of sea aster, emerging almost immediately with a butterfly in its bill. It then ran to the nearest pool of water, dunked the prey several times and swallowed it whole with remarkable ease. The bird did this three times in close succession. I also noted a repeat performance, possibly by the same bird, in the afternoon. On two occasions the butterfly was identified as a Small Tortoiseshell *Aglais urticae*; this species was particularly numerous at the time.

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Woodpigeons cooing while on the ground In 1941 I submitted a note, published in *Brit. Birds*, 34: 263, of a Woodpigeon *Columba palumbus* uttering the 'song' coo while on the ground. In his editorial comment, the late B. W. Tucker stated that, although the courtship coo may sometimes be given on the ground, he himself knew of no instance of the 'song' coo being so given, but that this had been mentioned by J. F. Naumann as of rare occurrence. A second instance was recorded by me in *Brit. Birds*, 50: 254.

I now have a further record of this unusual behaviour in the Woodpigeon. On 16th April 1974, at Newcastle, Co Wicklow, a bird that had been feeding on my garden lawn stood up and 'sang' its full coo twice. Watching it from only ten metres, I noticed that the bill remained closed during cooing, the throat being puffed out.

R. F. RUTTLEDGE

Doon, Newcastle, Greystones, Co. Wicklow

Starling feeding lavender leaves to juvenile At 10.00 hours on 19th May 1974, in my garden at Brentry, Bristol, I saw an adult Starling *Sturnus vulgaris* pull off two leaves, each about 2 cm in length, from a bush of lavender *Lavandula spica*. The leaves were then fed to a newly flown juvenile which accompanied the adult.

A. P. RADFORD

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Starling feeding dandelion flower to juvenile In May 1973, on the lawn of my garden at Ipswich, Suffolk, I watched a parent Starling thrust a flower-head of dandelion *Taraxacum officinale* into a juvenile's mouth. After one or two abortive attempts, the juvenile apparently swallowed the flower-head successfully. I did not see the parent pluck the flower-head off the plant.

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Dr Radford also writes that in his garden ten days earlier he had watched a male Blackbird *Turdus merula* eat two whole flowers and several individual petals of fallen apple blossom. Last year we published two notes on the use by birds, for food or nest material, of various common garden herbs and flowers (see *Brit. Birds*, 66: 231, 235). G. W. H. Davison, author of the second of these, adds that he has frequently seen Starlings sitting in a clump of male fern *Dryopteris filix-mas* and pulling pieces of dead brown fronds from it, though for what purpose he has been unable to ascertain. There was also a report by P. Saltaire in the *Daily Mirror* of 13th June 1974 of Starlings carrying away beakfuls of leaves of sage *Salvia officinalis* from a large bush in his garden at Highcliffe, Hampshire, 'each year about the time the young hatch . . . , presumably to their nests'. EDS

Letters

Gapeworms in waders In connection with the note by David Cabot (*Brit. Birds*, 66: 365), I should like to point out that earthworms, slugs and snails are not true intermediate hosts of the gapeworm *Syngamus trachea*. Invertebrates act merely as transport hosts. The infective larvae of these nematode worms may be swallowed by various invertebrates in which they become encysted (see, e.g., Soulsby 1969) but do not undergo development as in an intermediate host. Transport hosts are not essential and birds may become infested by merely eating infective larvae, though there is some evidence that passage, at least through earthworms *Lumbricus terrestris*, renders the larvae more highly infective to birds such as poultry and presumably, to other species.

Although there are few published records of gapeworms in waders, I see no reason why the parasites should be rare in these birds. It is known that *Syngamus trachea* is widespread in birds, occurring in at least eleven orders, namely Anseriformes, Falconiformes, Galliformes, Gruiformes, Charadriiformes, Columbiformes, Psittaciformes, Strigiformes, Apodiformes, Piciformes and Passeriformes (Keymer 1969). It is also well known that young birds of many, and probably all, species are more susceptible to the infestation than adults. It is likely, therefore, that waders become infested on the breeding grounds when young. As the parasites are not host-specific, birds other than waders are therefore also presumably capable of spreading the disease directly, or indirectly through invertebrate transport hosts such as earthworms. According to Rev F. C. R. Jourdain (in *The Handbook*, 4: 169, 236, 399), earthworms of the

genus *Lumbricus* are eaten by Lapwings *Vanellus vanellus*, Curlews *Numenius arquata* and Dunlins *Calidris alpina*, all of which were listed as known hosts by Mr Cabot. There seems no reason, therefore, why these species of waders at least should not become infested by eating earthworms.

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Cuckoos and Reed Warblers Dr D. C. Seel's paper (*Brit. Birds*, 66: 528-535) on egg-laying by the Cuckoo *Cuculus canorus*, based on data collected by the late E. P. Chance, brought back vivid memories to me of the first serious field-work I undertook as a schoolboy in the Droitwich area of Worcestershire during the Second World War. Lacking the guidance of any other birdwatchers or naturalists, I had become (like so many of my own and previous generations) an egg-collector. A Cuckoo's egg was a particularly treasured find. I read Chance's book on *The Truth about the Cuckoo* (1940) avidly and, thus inspired, worked a small section of disused canal between Droitwich and Salwarpe where Reed Warblers *Acrocephalus scirpaceus* were the hosts. Success was at first moderate, with three eggs in 1943 and one in 1944. In 1945, however, after more or less casually finding the first Cuckoo's egg on 29th May, I put Chance's methods into more determined use and tried to find every Reed Warbler nest, from which I removed all eggs. I went on to find five more Cuckoo eggs in the area: on 6th, 13th, 15th, 17th, and 22nd June. The first of these was laid in the afternoon (between visits), and the others all found probably on the day after laying. All nine eggs collected in the Salwarpe area of the canal in 1943-45 were identical in colour and markings, as was a tenth found on 18th June 1945 on another part of the canal between Droitwich and Hanbury, about 5 km away. I still have seven of these eggs and have no doubt that they were all the product of one female (which I called A1), all being of a grey, speckled variety and quite different from the eggs of two other female Cuckoos using the Hanbury end of the canal—B1 (with brown eggs) and D1 (with greenish-grey eggs). Cuckoo A1 obviously used at least two distinct areas for laying in 1945; this would explain the apparent lulls in laying on the Salwarpe section of the canal for example between 29th May and 6th June, but it should also be remembered that Chance was of the opinion that the Cuckoo lays its eggs in batches equivalent to the clutches of non-parasitic species, a point not mentioned by Dr Seel.

I am not claiming there is anything unusual or highly original in these juvenile observations of mine, but they do show that (1) the same Cuckoo will frequent the same area for at least three years, and (2) she may have exclusive use of hosts in one area while sharing another with at least two more Cuckoos. But it is a third discovery I made—and which I have never seen mentioned in the literature—that is of particular interest. In taking all eggs, from both parasitised and non-parasitised Reed Warbler nests, I found a clear dichotomy in the subsequent behaviour of the hosts: in all cases when nests free of a Cuckoo's egg were robbed, the owners deserted that nest and built again elsewhere; however, when a Cuckoo egg had been removed as well, the nest was not deserted but was used again for the replacement laying and even for a third clutch if robbed again. Now I am fully aware that this finding, which I still remember clearly, needs substantiating and documenting properly by further research; but, if true, it would suggest that, while there is survival value in not using the same nest again after the predation of non-parasitised clutches (in case the predator should return), it is of greater survival value to retain that nest after the predation of parasitised clutches, because a Cuckoo does not normally use the same nest twice.

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The origin of British Aquatic Warblers In analyses of the 1958-67 records of Aquatic Warblers *Acrocephalus paludicola* in Britain and Ireland (Sharrock 1973, 1974), I have previously interpreted the pattern of autumn occurrences as minor displacement of birds migrating south-westwards from the most north-westerly parts of the European breeding range. With many additional records now available, the pattern now suggests an alternative explanation. Almost 70% of the records have been in the eight English south coast counties from the Isles of Scilly to Kent and were distributed as follows:

Scilly	Cornwall	Devon	Dorset	Hampshire & Isle of Wight	Sussex	Kent
6%	9%	13%	18%	15%	6%	3%

If the birds were arriving from the east, one would expect a more south-easterly bias, with more in Sussex and Kent (as well as Essex, Suffolk, Norfolk, Lincolnshire and Yorkshire, which together produced only 5%). The concentrated distribution (nearly half of all records—99 out of 214—in Dorset and adjoining counties) is reminiscent of species such as Barred Warbler *Sylvia nisoria* and Scarlet Rosefinch *Carpodacus erythrinus* (36% and 67% of 1958-67 records in Shetland), the occurrences of which have been attributed to reverse migration.

It seems distinctly possible that the autumn occurrences of Aquatic Warblers result from reverse migration on a north-westerly course of birds from Italy. Perhaps a recovery or control of a foreign-ringed bird may one day suggest which of the alternative explanations is correct.

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News and comment *Robert Hudson*

Growth of the British and Irish list The number of full species admitted to the British and Irish list during the 17 decades which have elapsed since 1800 has varied from as few as four to as many as 27 per decade, the average being 13; Kenneth Williamson has recently written an interesting analysis of these, entitled 'New bird species admitted to the British and Irish lists since 1800', published in the Systematics Association Special Volume no. 6, *The Changing Flora and Fauna of Britain*, edited by D. L. Hawksworth (1974, Academic Press). The climatic amelioration in north-west Europe since the 1890's permitted westward expansions of breeding range by a number of northern species, resulting in a greater incidence of vagrant appearances in Britain by them; while northward range expansions by several southern species has led to their appearing with increased frequency in Britain and Ireland, mainly as a consequence of spring overshooting in anticyclonic weather. However, the most dramatic change in vagrancy patterns has concerned American species. During the last 170 years, the decadal average of Palearctic newcomers has been 7.4, and of Nearctic species 3.6. Yet during the last 20 years over half of the new species have been of American origin, representing four out of five new families and 20 out of 25 new genera; there has also been a corresponding dramatic increase in the numbers of records of long-standing Nearctic vagrants. During these 20 years the relative positions of the Azores high pressure and Icelandic low pressure systems have altered, the latter now being about ten degrees of latitude farther south, and also farther west, than was the case earlier this century. A probable consequence of this is that the mean path of the Atlantic storm-track on the south side of depressions is now more opportunely placed than previously to bring about transatlantic flights from North America to Ireland and Britain. Twitchers have never had it so good!

New reserves at home and abroad The *Sussex Trust for Nature Conservation Newsletter* (no. 47) reports its acquisition of the largest remaining reed-bed in the county: 12 hectares (29½ acres) at Filsham, near Hastings. The area has a particularly rich flora, and is also important for its bird life; over 170 species have been recorded, 42 have bred, and even Bearded Tits have been numerous there on occasion. For birds, the area is particularly important in autumn, when many thousands of *Acrocephalus* warblers pass through, and up to 70,000 hirundines roost in the reeds. Elsewhere in Sussex, it is reported that 6½ km of unspoilt coastline.

with 150-metre cliffs, three deep glens and views over Rye Bay to Romney Marsh. are among the attractions of the Hastings Country Park which opened in mid-July (*Habitat*, August). Farther north, the Yorkshire Naturalists' Trust has declared its first reserve, the Tow Hill Nature Reserve on the western slopes of Snaizeholme Valley, near Hawes. The area, formerly two hill farms, will comprise 20 hectares (50 acres) of commercial forestry enterprise, a two-hectare (five-acre) pinetum, collections of birds and willow species, while the rest will be grazed by sheep and cattle. It is intended that Tow Hill Reserve will provide facilities for research and education.

Abroad, we learn (*Council for Europe Newsletter*, 74-8) that two important national parks are to be created in west Norway. One will be in the Dovre Mountains, consisting of 265 square km, of which 57 square km will be designated protected landscape, where road-building, housing and the construction of hydro-electric power stations will normally be prohibited. The other will cover 3,400 square km of public and private land on the Hardangervidda. There are proposals that five more areas, covering 1,190 square km, be designated as protected landscapes.

New to science Considerable interest has been shown in a report, earlier this year, that a new honeycreeper (Drepanididae), as yet unnamed, had been discovered on the island of Maui, Hawaii—a House Sparrow-sized bird having a black mask as its most distinctive plumage character. This discovery is mainly of surprise for being made on a comparatively well-worked archipelago; but bird species new to science are still being described at the surprising rate of three per year, on average. Since 1966 (inclusive) 31 new species have been described and named, though some of these are likely to be sunk into the synonymies of previously known species. Eleven new species (excluding the aforementioned honeycreeper) have been described in the last four years. Only one of these is Palearctic: *Locustella amnicola*, a grasshopper warbler from Sakhalin, east Siberia (1972, *Zool. Zh.*, 51: 1896). South America has produced *Cypseloides phelpsi* from Venezuela and Guyana, a swift previously confounded with *C. rutilus* which is now restricted to Trinidad (1972, *Contrib. Sci.*, no. 229); *Synallaxis coursei* from Peru, a member of the Furnariidae or ovenbirds (1971, *Auk*, 88: 179); *Conirostrum tamaraguensis*, a warbler from Chile (1974, *Auk*, 91: 203); and *Hemispingus parodii*, a new tanager also from Peru (1974, *Wilson Bull.*, 86: 97-103). A distinctive wood warbler, *Dendroica angelae*, has been discovered on Puerto Rico (1972, *Auk*, 89: 1-18), a Caribbean island whose avifauna had been considered well known. Turning to Africa, the little-known area of south-west Madagascar has produced a new rock thrush, *Monticola bensoni* (1971, *Ostrich*, suppl. 9: 83-90), and a bulbul, *Phyllastrephus apperti* (1972, *Ibis*, 114: 89-92); while another new bulbul, *Andropadus hallae*, has been described from the Zaïre Republic, formerly the Belgian Congo (1972, *Bull. Brit. Orn. Cl.*, 92: 138-141). More controversial, perhaps, is the claim for two new weavers, *Hypochera lorenzi* and *H. incognita*, from Nigeria and Angola respectively; these were named on the basis of host-specific brood parasitism, the young having mouth-markings and begging calls specialised to single estrildine host species (1972, *J. Orn.*, 113: 229-240). The classification of the parasitic weavers in the subfamily Viduinae is still a matter of debate.

It is hardly surprising that most novelties discovered nowadays are from the wilds of South America, Africa and Australasia. Probably there are exceedingly few Palearctic birds worthy of species rank awaiting discovery; other than *Locustella amnicola* (above), the last 40 years have seen only three serious claimants. These concern the Afghan Snowfinch *Montifringilla theresae*, reported in 1937 from Afghanistan (*Bull. Brit. Orn. Cl.*, 58: 10); Vaurie's Nightjar *Caprimulgus centralasicus*, described in 1960 from Sinkiang, western China (*Amer. Mus. Novit.*, no. 1985); and a hooded gull, *Larus relictus*, which was known from a single Mongolian specimen, thought to be a hybrid (1962, *Auk*, 79: 303), until the discovery of a

breeding colony in Kazakhstan in 1969 led to the realisation that this appears to be a valid species (*Zh. Kazakh. Acad. Sci.* 1970: 1).

British Library of Wildlife Sounds BLOWS has now completed five years' progress, and feels the time has come for it to be brought to the attention of zoologists. Its purpose is twofold: to build up as large a collection as possible of both published and unpublished recordings of animal sounds, and to enable scientific workers to make use of this material. Commercially published gramophone records currently held by the Library amount to 170 sets comprising over 450 discs, containing about 10,000 recordings (or 'cuts') covering some 2,500 animal species. Unpublished recordings consist of duplicates of the natural history section of the BBC sound archive (4,000 cuts of 1,000 species), and recordings on tape (over 1,500 cuts of nearly 700 species) contributed by individual recordists of wildlife sound. These last are concerned mainly with European, Antarctic and African species, but there have recently been a few contributions from Argentina, New Zealand and Australia. To date, the vast majority of recordings are of birds but the collection does include many amphibian, mammal, insect, reptile and even fish sounds. Gramophone records cannot be lent, but they can be listened to at the Institute. Copies of tape recordings can be supplied for a nominal copying fee to anyone wishing to use them for private research. Offers of new material, and any other queries, should be sent to BLOWS at the British Institute of Recorded Sound, 29 Exhibition Road, London SW7.

Brent Goose research For the past two winters the Wildfowl Trust has been trapping and marking Brent Geese on the Essex coast and, in smaller numbers, on the Wash, in order to study their movements and social behaviour. The geese are given a 24 mm high coded Darvic ring on each leg, yellow in Essex, white elsewhere in England, while green is to be used for a similar exercise in the Netherlands. Each ring bears a combination of letters and numerals for individual identification, and these can be read at up to 250 metres. As these Darvic rings are being used on both legs, conventional metal leg rings are not being used except in a few special circumstances. In addition, the geese have their undertail-coverts dyed yellow (with picric acid) so that they can be picked out at longer ranges. Of 60 marked during the first season, 38 were identified the following winter, and two more were shot abroad on the autumn migration. A further 531 were colour-ringed last winter, and produced many subsequent sight records between the Wash and Poole Harbour, while nearly 80 were identified in Germany and the Netherlands on spring passage back to the breeding grounds. Much useful information has been obtained about winter movements in Britain, in particular. This work will be continued in the coming winter, though this may well be the final season; and it is therefore vital that all sightings of marked birds be reported to: The Wildfowl Trust (Brent Project), c/o Rugwood Farm, Foulness Island, Southend-on-Sea, Essex.

Recent appointments We learn that Professor George Dunnet has been appointed to the Regius Chair of Natural History at Aberdeen University, replacing Professor V. C. Wynne-Edwards who retired in September. George Dunnet has been Professor of Field Studies since 1971 (see 'News and comment', September 1971), prior to which he had established and developed the Culterty Field Station, Newburgh, while senior lecturer in ecology to the University.

The Nature Conservancy Council has announced that Dr Michael Gane has been appointed to the new post of Director England, and will take up his duties on 1st December. Dr Gane is at present Director of the Project Planning Centre for Developing Countries at the University of Bradford; previously he was Senior Research Officer in economics at the Commonwealth Forestry Institute, Oxford

University, following service as a Forest Officer in Africa. As Director England of the NCC, he will have his own headquarters, and, through his Regional Officers, will direct a staff of 160 and be responsible for 67 National Nature Reserves and 2,010 Sites of Special Scientific Interest.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

July reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

A **Black-browed Albatross** *Diomedea melanophris* was present in the gannetry on Hermaness, Uist (Shetland), throughout the summer. Following the June report of a **Fulmar** *Fulmarus glacialis* inland (*Brit. Birds*, 67: 398), another was seen in July even further from the coast, at Walton Dam, Chesterfield (Derbyshire), on 6th after strong WNW winds; it eventually flew off south-east (*cf. Brit. Birds*, 67: 175). On the last day of the month a **Sooty Shearwater** *Puffinus griseus* appeared at Teesmouth (Co. Durham), but that was the only July report of this pelagic species (*cf. Brit. Birds*, 66: 458). Two **Cory's Shearwaters** *Calonectris diomedea* passed Folkestone (Kent) on 11th. A belated report concerns a **Little Shearwater** *P. assimilis* off Islay (Argyll) on 30th June.

Very few southern herons were found: single **Little Egrets** *Egretta garzetta* in the Axe estuary (Devon) on 11th and at Dungeness (Kent) on 30th; and single adult **Cattle Egrets** *Bubulcus ibis* at Maytham Wharf in the Rother Valley (Kent/Sussex) from mid-month to about 16th August and in the Horsey area of Norfolk for a week towards the end of July. At Cley (Norfolk) **Spoonbills** *Platalea leucorodia* increased to three at the end of June and some or all of these were present throughout July, while up to two were at Minsmere (Suffolk) from 2nd; one appeared at Stodmarsh (Kent) on 20th with two there on 22nd, and one was seen at Blithfield Reservoir (Staffordshire) on five dates between 13th and 22nd, presumably the same bird visiting Belvide Reservoir (also Staffordshire) on 14th; there was another reported at Pitsford Reservoir (Northamptonshire) on 21st. The most intriguing Spoonbill report, however, came from Hickling Broad (Norfolk) where two adults which arrived on 11th were observed carrying sticks the next day, later being joined by an immature on 17th; unfortunately we have no reports of any subsequent activity. A **Long-tailed Duck** *Clangula hyemalis* at Whittle Dene (Northumberland) on 26th and 27th was most unusual for the time of year, and the only **Velvet Scoters** *Melanitta fusca* which came to our notice were two which flew north at Seaton Sluice (also Northumberland) on 21st. A female **King Eider** *Somateria spectabilis* was seen between Burray and South Ronaldsay (Orkney) on 4th.

A **Honey Buzzard** *Pernis apivorus* appeared on the Calf of Man on 16th, and a male **Lesser Kestrel** *Falco naumanni* was present at Rainham (Essex) for a few days from 31st.

We received reports of only two **Kentish Plovers** *Charadrius alexandrinus*, one at Warsash (Hampshire) on 17th and another at Sandwich Bay (Kent) on 26th; while there were just three **Temminck's Stints** *Calidris temminckii*, one at Teesmouth from 7th to 11th, another at Lightshaw Hall Flash (Lancashire) during 14th-23rd and the other at Farlington marshes (Hampshire) from 20th until 11th August; and one **Red-necked Phalarope** *Phalaropus lobatus*, at Cley on 16th and 17th. In Scilly there was a **Solitary Sandpiper** *Tringa solitaria* on Western Rocks on 23rd and on Tresco on 25th, while other vagrant American waders were a **Long-billed Dowitcher** *Limnodromus scolopaceus* in breeding plumage at Hornsea Mere (Yorkshire) on 24th, **Wilson's Phalaropes** *P. tricolor* at Washington (Co. Durham) from 17th to 22nd (*cf. Brit. Birds*, 66: 459) and at Havergate

(Suffolk) from 25th into August, and **Pectoral Sandpipers** *C. melanotos* at Wisbech sewage farm (Lincolnshire/Norfolk) from 18th until at least 30th, at Dungeness from 23rd to 4th August, at Chichester gravel pits (Sussex) for a few days from 27th and at Grasham Water (Huntingdonshire) on 30th. An **Avocet** *Recurvirostra avosetta* was at Slimbridge (Gloucestershire) and two at Sandwich Bay, all on 12th, while further north a single bird appeared at Whittle Dene on 17th and there was an exceptional record of a flock of 35 heading north (passing only about ten metres from the watch tower) at Seaton Sluice on 25th. A **Collared Pratincole** *Glareola pratincola* was at Belmont, Unst, on 2nd.

The first autumn **Long-tailed Skua** *Stercorarius longicaudus* was at Spurn (Yorkshire) on 27th and 28th. A **Glaucous Gull** *Larus hyperboreus* was still present at Clogher Head (Co. Louth) during July and an immature remained in the Alt estuary (Lancashire) for most of the month, while one was at Teesmouth on 4th and 11th; an **Iceland Gull** *L. glaucoides* was still at St Mary's (Scilly) at the end of July and another was reported at Sandwich Bay on 23rd. There were single **Mediterranean Gulls** *L. melanocephalus* at Teesmouth on 20th and at Lade (Kent) on 30th, while at Blackpill (Glamorgan), a much-favoured locality for this species (see *Brit. Birds*, 67: 17-24), an immature was present from 1st to 20th and an adult from 15th July to 31st August. A second-year **Ross's Gull** *Rhodostethia rosea* found at Stanpit marsh (Hampshire) on 1st was still being watched well into August, and another Ross's Gull was reported in Harris Sound (Outer Hebrides) during the month. On 28th a **Gull-billed Tern** *Gelochelidon nilotica* was identified at Cliffe (Kent), and in the same county there was the most unexpected sight of a **Puffin** *Fratercula arctica* inland at Bough Beech Reservoir on 20th.

On 27th a **Great Spotted Cuckoo** *Clamator glandarius* appeared at Covehithe (Suffolk). A **Snowy Owl** *Nyctea scandiaca* was watched for six days at the end of the month between Sea Palling and Ingham (Norfolk), presumably either an escape or a non-breeding individual. A female **Golden Oriole** *Oriolus oriolus* was seen at Shepperton (Middlesex) on 6th and a **Marsh Warbler** *Acrocephalus palustris* was on Fair Isle (Shetland) the day before. Perhaps the most surprising event in a month very poor for rare passerines, however, was the discovery of an **Aquatic Warbler** *A. paludicola* at Berrow marsh (Somerset) on 7th, the previous earliest date for this visitor in the last 16 years being 2nd August (*Brit. Birds*, 53: 423; 55: 578). A male **Red-breasted Flycatcher** *Ficedula parva* near Westerham (Kent) on 18th was equally out of season—we have come to expect this species only from late August onwards. Coming finally to shrikes, a **Woodchat** *Lanius senator* was found at Great Bradford Wood (Wiltshire) on 17th, while in Northumberland a male **Red-backed** *L. collurio* which appeared near Matfen on the last day of June stayed until 13th July and a female turned up at Seaton Burn on 25th.

STOP PRESS Limited by space, dates refer to October unless otherwise stated. A Little Shearwater was reported off St Agnes (Scilly) on 7th. There was a Black-throated Thrush at Sumburgh (Shetland) on 7th, a Booted Warbler on St Mary's (Scilly) on 8th, and Pallas's Warblers at Holy Island (Northumberland) on 7th, Hartlepool (Co. Durham) on 9th and on St Mary's from 12th to 14th; a Lesser Grey Shrike at Rye Harbour (Sussex) on 10th; a Little Bunting on Gugh (Scilly) on 10th; at least ten Serins on St Mary's during the first half of October. In September there was a Baltimore Oriole on Fair Isle on 19th and 20th.



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BRITISH BIRDS

Volume 67 Number 10 October 1974

- 405 Allen's Gallinule in Britain and the Palearctic *Robert Hudson*
- 413 Adaptations in the reproductive biology of the Great Crested Grebe *Dr K. E. L. Simmons* Plates 56-62

Notes

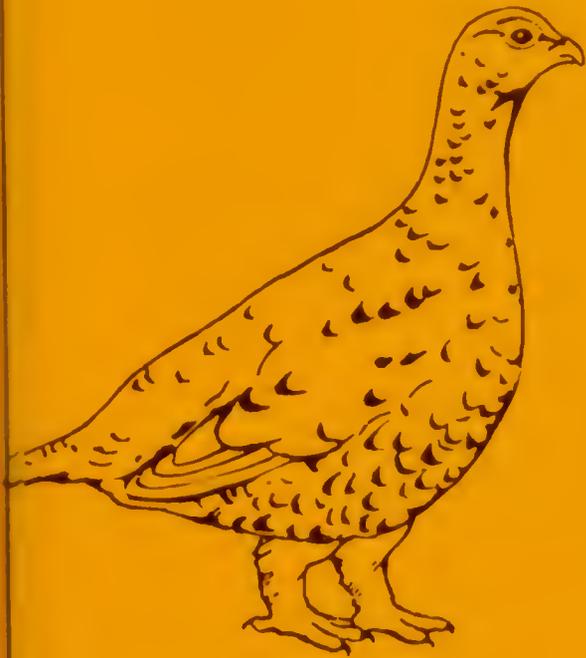
- 438 Egg-laying by the Great Crested Grebe *M. Wiechmann* Plate 63
- 439 'Foot-paddling' behaviour of Pied-billed Grebes *Bernard King*
- 439 Purple Heron chick regurgitating young Little Grebe *P. J. Belman*
- 440 Common Sandpiper eating butterflies *R. J. Waters*
- 440 Woodpigeons cooing while on the ground *Major R. F. Rutledge*
- 440 Starling feeding lavender leaves to juvenile *Dr A. P. Radford*
- 440 Starling feeding dandelion flower to juvenile *Mrs D. R. Warren*

Letters

- 441 Gapeworms in waders *Dr I. F. Keymer*
- 442 Cuckoos and Reed Warblers *Dr K. E. L. Simmons*
- 443 The origin of British Aquatic Warblers *Dr J. T. R. Sharrock*
- 444 News and comment *Robert Hudson*
- 447 July reports *D. A. Christie*

Robert Gillmor drew the Great Crested Grebe and young (page 437)

Volume 67 Number 11 November 1974



BRITISH BIRDS

BIRDS OF REGENT'S PARK

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BRITISH BIRDS

The birds of Regent's Park, London, 1959-68

D. I. M. Wallace

Plate 66

INTRODUCTION

Regent's Park has been visited by London ornithologists for at least 130 years. Since 1945 it has been adopted as a place of regular observation by many observers, notably Stanley Cramp who, in 1945 and 1947, made the first systematic study of the bird population (Cramp 1949). Then the park supported fewer species than Hyde Park and Kensington Gardens and this situation appeared to obtain until 1958 when I began frequent observations and found evidence of changes in the bird population, in both diversity and total numbers. My study became compulsive in 1959, and although I had to leave London in 1965 fellow enthusiasts, notably R. C. Green, maintained it for ten full years. I published a general description of the area and preliminary findings in 1961, when study aims and methods had been standardised into two basic disciplines, one to monitor population dynamics and the other to sample migration. This paper summarises the major findings resulting from the former.

Reference to appendix 1 on pages 467-468 is essential for an understanding of the means by which the data were collected.

THE STUDY AREA AND ITS SUITABILITY TO BIRDS

Regent's Park now covers 197 hectares (487 acres). From its northern edge rises Primrose Hill, covering 35 ha (87 acres), and around it

are border habitats of about 11 ha (27 acres) which are integral as far as the birds are concerned. The total size of the study area was thus 243 ha (601 acres) (see plate 66).

The residences of St John's Wood link the park by a 'pathway' of large gardens to the northern suburbs and Hampstead Heath. On its other sides, tall buildings crowd in and the densely built-up areas beyond them are relieved only by relatively bird-barren squares. Large railway complexes lie 400 metres away to the west and 700 metres to the east. Within the study area there is only one dominant habitat, greensward (or well-trodden grass). Most others occur piecemeal: their essential characters are classified in table 1. Not all the habitat types allowed a permanent bird population or even regular use. The wide dispersal of feeding or resting birds masked how much more restricted they were in the availability of safe breeding habitat which, in turn, was impaired by human noise, close passage and direct interference. The variations in breeding habitat suitability are given in table 2. Evidently less than a third of the study area afforded regular opportunities for successful breeding. There were also marked seasonal changes in habitat suitability and a judgement of these is given in table 3.

Direct but erratic conservation of bird habitats was carried out throughout the study period. The most successful operations provided a 'lakefowl' refuge, and a small passerine retreat on the long-wild site of the demolished Baptist College.

MINIMUM BREEDING POPULATION

During the ten years, 40 species attempted to breed and 37 of these reared young. The annual number of species breeding varied from 26 to 34, and 23 were successful every year.

The annual register (see appendix 1 for this and other terminology) of the minimum population for 36 out of the 40 species making breeding attempts is shown in table 4. The omission from it of four species is due to the lack of any comparable annual measurements of their populations other than those following. The feral pigeons* breeding within the park were few (probably no more than five pairs

*Scientific names of all bird species mentioned in the text and tables are given in appendix 2 on page 468

Table 1 (opposite). Type and area of habitats in Regent's Park study area, based mainly on 1965 survey

'Bread' here and elsewhere in the paper includes all food left or distributed by man. Assessing the volume of bread within each habitat type was impossible, but the frequency of its provision is indicated thus: 0 = never; 1 = rarely; 2 = often; 3 = very often or daily

Type of habitat	Approximate area		Description
	ha (acres)	% of total	
Greensward	60 (150)	25%	Grass with daisies and clover communities; cut low except in winter; incorporates games pitches (with bare soil); 1½ ha (3 acres) flood; <i>bread 2</i>
Greensward, thinly wooded	47 (115)	19%	As 1, with isolated trees or shrubs, less severely cut with resultant growth of weeds such as thistle and chickweed; ¾ ha (2 acres) flood; <i>bread 2</i>
Tree avenues and clumps	22 (54)	9%	Generally mature stands, notably of elm, plane, lime, ash, willow, oak, thorns and flowering cherry; undergrowth mainly as 2; <i>bread 2</i>
Formal gardens	17 (42)	7%	Intricate patchwork of lawns, shrubberies and set pieces, featuring roses, dahlias, etc., and a few aquatic plants; also as 2 and 3; <i>bread 3</i>
Zoological gardens	15½ (38)	6½%	Buildings interspersed with rather bare enclosures, also artificial rock mounds and terraces, small ponds with cover; also as 4; <i>bread 3</i>
Roads and paths	14½ (36)	6%	Generally tarmac or concrete, well guttered and most continually used during daytime; <i>bread 2</i>
Open water	14½ (36)	6%	Boating lake of 9 ha (22 acres), 1½ ha (4 acres) enclosed, and small ponds; generally free of surface vegetation but small channels often choked with leaves; <i>bread 3 (round edge)</i>
Shrubberies, wild gardens	9¾ (24)	4%	Dense stands of shrubs or small trees, notably of laurel, privet, etc., with naturally seeded holly, elder, etc.; usually some tall trees; <i>bread 0</i>
Garden plots	9¾ (24)	4%	Tiny grass lawns or strips, some also possessing features of 4; <i>bread 1</i>
Amenities	9 (22)	3½%	Car parks, restaurant areas, playgrounds, park offices; generally barren of vegetation (though not necessarily of food); <i>bread 3</i>
Large houses	3¼ (8)	1%	Generally occupied or partly so; almost totally barren; <i>bread 2</i>
Semi-natural woods	2¾ (7)	1%	Generally mature stands, particularly of elm; where canopy open, marked undergrowth; where closed, little except leaf mould; 0.6 ha (1.5 acres) fully protected as bird sanctuary; <i>bread 0</i>
Nurseries	2 (5)	1%	Glasshouses and flower seeding beds, usually with fallow areas and many weeds; <i>bread 1</i>
Wooded islands	2 (5)	1%	As 12 but with high incidence of willows; canopy closed, thus little undergrowth; <i>bread 1</i>
Scarfyard and rubbish dumps	1 (2)	½%	Basically open soil or concrete, with variable covering of plant and human waste; remarkable summer 'flush' of tall weeds and grass; adjacent to bird sanctuary; <i>bread 3</i>
Unstable or uncertain	13½ (33)	5½%	Work areas, excavations, boat wharfs, etc.; no vegetation; <i>bread 1</i>

Table 2. Suitability of habitat types for successful breeding, Regent's Park, based on 1961-65 surveys

Habitat types (from table 1)	Percent of total area	Registered no. of breed- ing species	Degree of suitability
1, 6, 7 (<i>except banks</i>), 16	42½%	0	Totally unsuitable
2, 9, 10, 11, 13	28½%	3-7	Marginally suitable
3, 5, 15	16%	14-19	Fairly suitable
4, 8, 12, 14	13%	18-22	Very suitable

outside the zoo in any year) and most were non-breeding loafers and foragers from street colonies. Breeding Woodpigeons, favoured by the extensive canopy and the food potential of the greensward and several tree species (Goodwin 1960), were estimated at 100 pairs in 1961, rising to 150 pairs by 1965. The fortunes of the Starling were obscured by its volatile behaviour in summer, but clearly its population grew to 100 pairs by 1963 and was unchanged in the next

Table 3. Judgements of seasonal changes in passerine habitat suitability, Regent's Park, based on 1961-65 surveys

Suitability 'scores' (estimated from frequency of bird occurrences): 0 = virtually or wholly unsuitable; 1 = marginally suitable (rarely frequented); 2 = fairly suitable (often or periodically frequented); 3 = suitable (continuously frequented); 4 = very suitable (continuously frequented with marked seasonal concentration)

Habitat types (from table 1)	Percent of total area	SPRING	SUMMER AUTUMN	WINTER		
				No snow or ice	Light snow with ice	Heavy snow with ice
1. Greensward	25	1	3	4	1	0
2. Greensward, thinly wooded	19	2	4	3	2	1
3. Tree avenues and clumps	9	3	4	3	3	2
4. Formal gardens	7	4	4	3	3	2
5. Zoological gardens	6½	3	3	4	3	3
6. Roads and paths	6	1	2	3	2	1
7. Open water (<i>except banks</i>)	6	0	0	0	1	1
8. Shrubberies, wild gardens	4	4	4	3	3	2
9. Garden plots	4	2	3	2	1	1
10. Amenities	3½	1	2	1	2	1
11. Large houses	1	2	1	1	2	2
12. Semi-natural woods	1	4	4	3	3	2
13. Nurseries	1	2	3	2	1	1
14. Wooded islands	1	2	4	3	3	2
15. Leafyard, rubbish dumps	½	2	4	4	3	2
16. Unstable or uncertain	5½	1	2	2	2	1

TOTAL SEASONAL 'SCORE'

(sum of all area % × 'score')

185.5 305.5 297.0 194.0 111.0

INDEX OF SEASONAL SUITABILITY

(spring = 100)

100 165 160 104 60

Table 4. Minimum numbers of pairs of 36 species breeding and/or attempting to breed, Regent's Park, 1959-68

An asterisk denotes bird(s) exhibiting initial breeding behaviour

	59	60	61	62	63	64	65	66	67	68
Great Crested Grebe	-	-	-	-	-	1	*	-	-	-
Grey Heron	-	-	-	-	-	-	-	-	-	2
Mallard	50	50	70	78	65	60	55	55	47	46
Tufted Duck	5	10	12	11	12	10	13	14	15	11
Pochard	5	8	9	11	5	12	10	11	10	9
Canada Goose	-	-	*	*	4	4	*	8	10	10
Mute Swan	-	1	1	-	*	1	1	1	1	1
Moorhen	9	17	20	17	18	14	15	14	12	12
Coot	3	3	4	5	5	5	6	6	6	10
Lesser Black-backed Gull	-	-	-	-	-	-	-	-	-	1
Herring Gull	-	-	1	1	2	3	3	2	2	2
Stock Dove	3	1	*	-	-	-	-	-	*	1
Tawny Owl	1	1	2	1	2	*	2	1	2	4
Swift	1	*	5	-	-	-	-	-	-	-
Great Spotted Woodpecker	1	1	1	*	-	-	-	-	-	-
Swallow	-	*	-	-	-	-	-	-	-	1
Carriion Crow	6	8	7	8	8	8	8	8	10	10
Jay	2	1	3	3	3	2	3	4	5	5
Great Tit	6	7	7	6	6	10	12	14	12	18
Blue Tit	11	13	15	15	15	17	20	18	20	24
Coal Tit	-	1	-	-	-	-	1	1	2	4
Wren	10	13	12	6	5	5	6	8	11	13
Mistle Thrush	7	7	8	8	8	10	10	10	11	11
Song Thrush	35	35	48	50	60	60	80	50	50	50
Blackbird	100	100	120	150	175	185	200	160	160	150
Robin	14	15	18	15	17	19	20	20	20	20
Blackcap	-	-	1	-	-	-	2	-	2	3
Willow Warbler	1	-	-	-	-	-	-	-	-	1
Spotted Flycatcher	4	5	6	8	8	8	9	10	8	10
Dunnoek	41	47	52	57	55	55	55	50	50	50
Pied Wagtail	1	1	1	1	*	1	1	1	*	1
Greenfinch	9	11	15	10	20	20	25	20	19	20
Goldfinch	3	5	5	4	6	6	3	8	5	6
Linnet	-	-	*	*	-	*	-	-	*	1
Bullfinch	1	1	2	2	3	3	3	3	3	7
Chaffinch	14	15	17	20	17	15	10	8	10	12
TOTALS	343	377	462	487	519	534	573	505	503	536

two years. However, the numbers of Woodpigeons and Starlings were apparently reduced by 30-50% by 1968. The only estimates of the House Sparrow population comparable with the above are for 1962-65 when 150-200 pairs were noted.

The 23 species breeding annually represented about two-thirds of those breeding regularly in Inner London by 1965 (Cramp and Tomlins 1966) and were only two fewer than those breeding regularly around Brent Reservoir, Middlesex from 1957 to 1970

(Batten 1972). The community definitely attracted new permanent member species during the study period, the average number rising from 26 in the first five years to 29 in the last. It was only 18 between 1948 and 1953 (Wallace 1961, from Ministry of Works reports). Recent records from Regent's Park indicate that the area can support, at least temporarily, further new breeding species such as Great Crested Grebe, Grey Heron and Magpie (*Lond. Bird. Rep.*, 33: 17; 34: 14; 35: 8; 36: 9, 45; 37: 8, 9, 39).

By indexing the changes in the non-passerine population and various groups of passerines separately, a partial analysis of the breeding population growth in Regent's Park over the ten years is possible:

(i) New or irregular breeding species made no significant contribution to the total population growth.

(ii) Excluding the Woodpigeon, the non-passerine population grew by only 3%. Habitat restriction and excessive competition constantly frustrated an overall increase in the lakefowl. The potential of the area had apparently been reached by 1961. Further additions are likely to be limited to species with unique niches, such as has happened with the Grey Heron.

(iii) The passerine population grew by at least 45%. Direct observation of the factors influencing growth was not obtained, but some are suggested later. Growth was steadiest from 1959 to 1962 and showed the largest surge in 1964. In 1965 a peak population of at least 568 pairs was reached. This collapsed in 1966 with a notable reduction in the previously rapidly expanding numbers of Song Thrushes and Blackbirds. Thereafter the passerine population showed remarkable stability except for the three tits and the Wren, the last still recolonising the park following a collapse in 1962.

(iv) The passerines showing the most growth were tits and thrushes, Robin, Spotted Flycatcher, Bullfinch and Greenfinch, the last overtaking the Chaffinch as the dominant finch.

(v) All passerine species exhibiting high growth are partly insectivorous and only three of them regularly took 'bread' (see table 1).

(vi) The severe winter of 1962/63 which caused striking withdrawals of several species during the period of snow cover did not interrupt the total population growth. (During that winter I found only two corpses.)

SUMMERING POPULATION

A separate measure of the total summering population was obtained from 1962 to 1965. It included all visible birds and allowed the estimates presented in table 5. Their trend is consistent with that of the register and the exceptional population in 1965 is again obvious. The 1963 figures confirm that *total* population growth was uninterrupted by the preceding severe winter.

The summer 'census' also isolated the population profiles of habitat types. Ignoring the inevitable dichotomy on or around the lake, the most distinct was that of the Zoological Gardens. Although occupying only 6½% of the study area, it held on average 13% of all birds and showed high incidences of commensal species, notably 16%

Table 5. Estimates of total summering population, Regent's Park, June 1962-65

	1962	1963	1964	1965	Degree of interpolation
Lakefowl	541	679	572	601	none
Feral pigeon	223	246	273	235	none
Woodpigeon	300	250	700	640	5%
Starling	550	780	690	900	5%
House Sparrow	790	1,210	1,000	1,155	5%
Other passerines	715	860	900	1,660	20%
TOTALS	3,119	4,025	4,135	5,191	
Index (1962 = 100)	100	129	133	167	

of all Starlings, 17% of all feral pigeons, and 22-25% of all House Sparrows.

The summer 'census' also demonstrated that many birds used the park only for feeding and that the populations of several species contained large non-breeding elements, these being very evident in the Mallard (at least 200 surplus drakes in any year, in spite of determined culling and exportation), Woodpigeon (about 300 non-breeding birds in 1964 and 1965) and Blackbird (up to 75 apparently unmated cocks in any year).

LOCAL FACTORS OF THE BREEDING POPULATION INCREASE

Establishing the direct causes of the increase in the breeding population was beyond the practice of the study. However, various local factors were identified:

(i) Notwithstanding earlier comments, the habitat of the study area is *relatively* natural. Regent's Park features in particular a greater incidence of undisturbed undergrowth, closed canopy and flower cultivation than any other similarly sized London park. Only the much smaller Holland Park and the gardens of Buckingham Palace are noticeably richer in plant cover. Furthermore, the layout of pathways and the privacy of several residences, notably Winfield House, protect its north-west corner from mass human traffic. Finally, the tree community is well balanced, with many groups of oaks *Quercus robur*, hawthorns *Crataegus monogyna* and willows *Salix*, and happily few of the bird-barren London plane *Platanus hybrida*.

(ii) The access to nearby suburban bird communities provided by the garden pathway to the north is unique for a Central London park.

(iii) Conservation, both conscious and unconscious, had a beneficial effect. The two sanctuaries offered not only rarely disturbed retreats but also important sources of food, either through theft of that specially put down (for ornamental wildfowl) or derived from dense stands of seed-bearing weeds and their insect fauna. As noted in table 1, the provision of 'bread' in various forms occurred throughout the study area but was particularly frequent in the zoo (where several passerines even stole food from Guy, the Gorilla!), around the lake and at sheltered seats. Partly edible rubbish was dumped in the leafyard and, owing to changes in park management, this source of food at least trebled in the ten years.

(iv) The reduction in smoke pollution achieved in Central London (Cramp and Tomlins 1966) had a visible effect on the park vegetation. Broad-leaved trees in particular became noticeably cleaner during the study period, and in 1964 and 1965 their insect fauna was very obvious. Indirect evidence of increasing insect food came from the more frequent occurrences of bats (Chiroptera), the establishment in 1966 just north of Primrose Hill of a colony of House Martins (Cramp and Gooders 1967), and the steady increase in other insectivorous birds already noted.

(v) The 'heat isle' in the central conurbation (Homes *et al.* 1957) cannot be ignored, but that its effect is beneficial is only a presumption.

To sum up, I believe that several inherently suitable habitats in the park were made more attractive by a reduction in pollution and an associated rise in food supply, both natural and provided. The arrival of species and individual birds to take this up was probably assisted by the garden pathway to the north (though there was also evidence to show that the population was recruited from much farther afield as well), and the productivity of the population was partly secured by conservation. Even so, in 1965 the population seemed to exceed its optimum level. A further increase in passerines, which were responsible for most of the population growth from 1959 to 1968, must be considered unlikely and the few observations that I have made in Regent's Park in more recent years support this conclusion.

EXTERNAL FACTORS OF THE BREEDING POPULATION INCREASE

However the local factors affected the park population, it would have been surprising if national dynamics had not been reflected. As demonstrated in table 8, few species were strictly resident and probably none was isolated. Comparison with other studies shows many coincidences in trends, but, since the Common Birds Census of the British Trust for Ornithology did not begin until 1962, only seven years' data are directly comparable with national results. It is therefore necessary to discuss the ten-year period in two parts.

1959 to 1961

Of the park's common species, none failed to increase over these three years. It is particularly frustrating that this *overall* advance cannot be compared with contemporaneous local and national results similarly acquired. However S. Cramp (in Homes *et al.* 1964) gave an assessment of the changes in the Inner London bird population from 1955 to 1961, pointing to an increasing diversity of irregularly breeding passerines (notably warblers), steady increases in some common species (notably Woodpigeon, Song Thrush, Blackbird and Dunnock), and the establishment of more diverse lakefowl communities (of mixed feral and wild ancestry). The first of these changes was most evident in Holland Park (Brown 1963, 1964), but the second and third were characteristic of the study area. Indeed, they were more visible there than elsewhere in Inner London (Wallace 1961, *cf.* Cramp 1949 and Ministry of Works reports). Comparison with national data on breeding birds, as summarised by Parslow (1967-68), indicates that all but three of the common park species showed changes in abundance that

conformed with either the relevant regional or national trends. The exceptions were Mallard, Song Thrush and Spotted Flycatcher. The last two of these exhibited lasting growth between 1959 and 1962, and the unique trend of the Song Thrush was reinforced by the fact that it held its own against the Blackbird, maintaining a ratio of breeding abundance close to 1:3 (and in 1965 even reaching 2:5). Finally, it may be noted that by 1965 Cramp and Tomlins (1966) had found evidence that no fewer than twelve species were increasing in Inner London. Their comments were based on a wide survey of localities, including Regent's Park. Thus from 1959 to 1961 the growth of the park's breeding population was associated with a general advance in bird numbers, though its rate of growth was extraordinary for Inner London.

1962 to 1968

Over these seven years, the park population did not show the overall advance of the previous three. The growth wave broke after 1965. By indexing the numbers of 13 common species (at least 80 pairs over the ten years) on the same base year as is used in the Common Birds Census, their population trends have been compared with the equivalents published for farmland and woodland (Batten 1971a). Four results stand out:

(i) The effect of the 1962/63 winter was far less severe in the park than in farmland, the only species showing a markedly correlated decline being the Mallard (which was already subject to population control). Only three other species common to the indices—Wren, Dunnock and Chaffinch—showed any reduction in breeding numbers (and then an insignificant six pairs in total). In particular contrast to the national situation, the park Moorhens were untouched.

(ii) From 1962 to 1968 seven park species—Carrion Crow, Great and Blue Tits, Wren, Mistle Thrush, Robin and Greenfinch—showed trends essentially similar to those in farmland (and latterly woodland), indicating either growth or a more or less stable population. In particular, the index movement for the Wren was uncannily identical from 1964 onwards, and the only marked divergence was the continued increase in both tits in 1968. Batten associated the general growth in common resident numbers in these years with a recovery from the trough caused by the 1962/63 winter, but, as shown above, that correlation cannot be more than marginally identified in Regent's Park.

(iii) From 1963 to 1968 the shifts in the populations of four park species—Song Thrush, Blackbird, Dunnock and Chaffinch—clearly diverged from the national trends. The breeding numbers of the two thrushes were strikingly reduced (by 25%) in 1966 and were lower in 1968 than in any year since 1962. In the same three years from 1966 to 1968 the national populations were either still expanding or steady. The trend of the Blackbird population can also be related to those assessed from ringing data for the whole London area and for southern England during 1957-67 by Batten (1973). Both the park and all-London birds recovered immediately from a local trough in 1960, and once again it appears that their advance was unhindered by the cold winters of 1961/62 and 1962/63 from which other southern English birds suffered severely enough to produce a regional trough in 1963. The all-London population growth lasted one year longer than that in the park, but both were arrested in 1967 when the southern English birds in total suddenly increased by over 30%. The park Dunnocks were most numerous in 1962 and there was no reflection of the dramatic growth in the national population from 1963 to 1965 (farmland) and from 1964 to 1968 (woodland). The park Chaffinches also showed a peak in 1962 but then decreased steadily for four years. By 1968 their population had yet to recover its 1959 level. Farmland Chaffinches did well from 1962 to 1965 and remained almost constant until 1969, as did their woodland counterparts from 1964 onwards.

What is so striking about these four exceptions to the national trend is that the species concerned are all dominant members of the resident passerine avifauna in lowland Britain. Indeed, they are four of the seven most successful, and yet clearly their advance was frustrated in the later years of the study. As pointed out later, there was sexual imbalance in the Chaffinch population, but for the three other species it is likely that habitat restriction was the fundamental control.

(iv) The fortunes of the scarce or irregular breeding species in the park show echoes of external population changes (*cf.* Batten 1971b, 1972, Cramp and Tomlins 1966), the clearest being the withdrawal of the Great Spotted Woodpecker in 1962, the absence of breeding Stock Doves from 1961 to 1967, the colonisation by the Coal Tit from 1965, and the arrival of the Bullfinch from 1958. Even more intriguing (in their indication of the park's ability to attract breeding attempts from essentially migrant species during periods of marked population expansion) were the correlation of the peak Goldfinch population in 1966 with the largest surge yet recorded in farmland, and the arrival of a pair of Willow Warblers in 1968 after almost continuous growth in the national numbers since 1962.

It would be idle to expect the population trend of any one bird community to mirror the national whole, and certainly this did not happen in Regent's Park from 1959 to 1968. While the underlying movements are consistent for most species, the facts that the community was almost untouched by the coldest winter in southern and central England for at least fifteen years, and that it could not sustain growth in common species beyond 1965, are strictly at variance with the national trends for farmland and woodland. Here, perhaps, are the most obvious clues to the advantages and disadvantages of being a common bird in a central London park. In such a discrete habitat, local factors can provide favourable growth circumstances (even protection) for a time, but insufficient space will dog too much success in the end.

WINTERING POPULATION

As indicated in table 3, the stability of the study area as a wintering ground was judged to be relatively high unless there was snow. Human disturbance fell quickly from October and was minimal from December to early March. Boating ceased and the playing of ball games, which increased greensward disturbance, was nevertheless contained within a short *per diem* period. Slow clearance of dead or broken plants resulted in ground cover remaining thick and providing excellent shelter for most of the winter.

Not surprisingly the spectrum of wintering species was wide, with no fewer than 30 being regularly present, another eleven occurring frequently and hard weather often bringing in at least three more. The normal diversity of species in winter was therefore greater than that in summer, being also about 80% of that occurring in the northern parts of Epping Forest, Essex (Wallace 1972).

Although some of the resident species, notably the Dunnock, remained around their breeding territories in winter, continuing

Table 6. Maximum counts of common lakefowl in winter, Regent's Park, 1958/59 to 1967/68

	58/ 59	59/ 60	60/ 61	61/ 62	62/ 63	63/ 64	64/ 65	65/ 66	66/ 67	67/ 68	Peak dates within
Mallard	724	738	734	672	721	562	555	471	<400	360	8.xii-16.i
Tufted Duck	86	77	87	107	68	135	89	80	104	>100	28.i-8.iii
Pochard	28	36	76	83	65	79	69	76	81	90	20.xii-23.iii
Moorhen	86	56	70	85	73	84	71	49	49	50	12.xii-1.iii
Coot	25	26	31	60	63	73	61	65	35	53	12.i-late ii

the mapped register of the population in winter proved impossible. However, other disciplines did allow measurement of the wintering population. Table 6 gives the winter maxima for the most common lakefowl. The assessment of the complete winter use of the park waters by them is prevented by erratic counts from late 1964 onwards. However, partial analysis of all counts from October to April confirms for the Mallard a real fall of 18% from 1959/60 to 1963/64 and indicates an overall decrease of 45% over the ten years. Conversely, the use of the area by both diving ducks rose by more than the maxima indicate. From 1959/60 to 1963/64 the overall numbers of Tufted Duck and Pochard rose by 159% and 155% respectively. Over the ten years the increase in Pochard may have been as much as 250%. The increases in the overall winter presence of Moorhen and Coot were also striking, up by 46% and 161% respectively between 1959/60 and 1963/64. Thus, of the common lakefowl, only one species decreased and four made significant gains which were more or less held. The winter numbers of a feral flock of Canada Geese grew from under 30 to around 60 in the middle years of the study.

Gulls were included in the lakefowl counts and again a general increase in the total wintering population took place. In 1965/66 it exceeded 2,300 birds diurnally. Only the Common Gull became rarer (and it decreased as a migrant, too). In the case of Herring and Lesser Black-backed Gulls, whose numbers reached 35 each by 1968, the formation of small breeding populations in Inner London (Wallace 1964 and *London Bird Reports* for 1964-72) should be remembered.

Quantifying the winter population of other species depended mainly on a winter 'census'. The results for eight years follow in table 7. Other species that came regularly in winter included Redwing and Linnet, the numbers of the latter reaching 213 in February 1960. While the underlying trend is again of a substantial increase in wintering birds (at least between 1960/61 and 1964/65), it cannot be linked certainly to the known growth in the minimum number of breeding pairs (and the total summering population) up to 1965.

Table 7. Winter censuses of 17 regular species (other than lakefowl and gulls) Regent's Park, 1958/59 to 1965/66

An asterisk denotes that the species, though unseen during the census period, was present in that winter. The bracketed figures for 1958/59 are suspiciously low, perhaps owing to observer inexperience

Census period:	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
	3.i	12.xii- 13.xii	10.xii- 11.xii	13.xii- 17.xii	16.ii- 23.ii	28.xii- 3.i	16.xii- 24.xii	8.i- 16.i
Feral pigeon	401	200	305	159	222	278	212	no count
Woodpigeon	244	75	116	222	508	458	825	370
Carrion Crow	6	12	14	17	24	19	25	31
Jay	2	6	5	5	6	9	7	6
Great Tit	1	4	12	7	14	19	17	21
Blue Tit	(3)	12	15	29	30	33	23	43
Wren	3	12	6	9	*	2	4	4
Mistle Thrush	6	5	10	9	10	12	11	8
Song Thrush	42	20	58	84	23	52	74	59
Blackbird	233	396	489	347	278	441	524	423
Robin	(4)	16	24	27	25	14	16	14
Dunnock	(5)	33	46	44	56	61	86	67
Starling	487	115	276	395	522	474	473	350
Greenfinch	*	8	1	11	18	14	30	31
Bullfinch	*	3	2	*	*	10	10	8
Chaffinch	2	4	3	6	11	7	8	8
House Sparrow	1,020	1,000	1,148	550	947	1,191	1,310	1,000
TOTALS (except feral pigeon)	(2,058)	1,721	2,225	1,762	2,472	2,816	3,443	2,443
Index (1962/63 = 100)	(83)	70	90	71	100	115	139	99

Comparison of the summer and winter censuses in the five years when both were possible is made in table 8. Particular attention is drawn to the status comments which stem from the almost daily observations under other disciplines. *A priori* views on the status of species failed continually throughout the study.

TOTAL NUMBER OF BIRDS BY SEASON

As already indicated in the discussion of summering and wintering populations, fig. 1 fully illustrates how much higher bird numbers were from August to February than from March to July (*cf.* table 3). It also shows the rapid withdrawal of part of the breeding population (both parents and young) in October and November, pointing again to the actually very complex changes that took place within an apparently settled community (*cf.* table 8). In 1959 and 1960 the diurnal population was at its peak in January. In 1964 and 1965, given the growth in both breeding population and productivity, it was so in September.

In 1959 and 1960 sample counts in association with the mapped register and winter census provided sufficient data for the annual

Table 8. Comparison of winter and summer diurnal populations of 15 regular species, Regent's Park: average counts, winter 1960/61 to 1964/65 and summer 1961-65

The 'change' column gives the difference as a percentage of the winter average

	Winter	Summer	Change	Comments
Rock Pigeon	235	240	+2%	Virtually sedentary, but few breeding within park
W. Pigeon	426	406	-5%	Little apparent change, but status actually complex, with some emigration of young in autumn, marked autumn passage and winter immigration (with increased roosting)
Common Crow	20	13	-35%	Apparent change wholly a function of breeding behaviour (birds becoming secretive)
Coal Tit	14	15	+7%	Mainly resident
Blue Tit	26	30	+15%	Not resident, with marked emigration in autumn and obvious spring return
W. Wren	4	8	+100%	Essentially migrant as a breeding species, withdrawing completely in 1962/63 winter (winter birds possibly from different, external population)
Male Thrush	10	10	nil	Apparently resident
Sp. Thrush	58	103	+78%	Essentially migrant, with under 30 in 1962/63 winter; obvious autumn emigration, occasional winter immigration, obvious spring return
Robin	416	392	-6%	Little apparent change, but status probably complex with at least some winter immigration
Ch. Tit	21	28	+33%	Partly resident, but also obvious autumn emigration and spring return
Blackbird	59	64	+8%	Mainly resident, but also observed autumn emigration and apparent spring return
Song Sparrow	428	631	+47%	Marked change, but causes difficult to determine except marked summer influx of surrounding populations
Chaffinch	15	39	+160%	Essentially migrant; obvious autumn emigration and spring return (some strictly resident)
Goldfinch	7	31	+340%	Almost totally migrant, with obvious autumn emigration and spring return, large autumn and small spring passages, winter vagrancy (as few as three males certainly resident)
Field Sparrow	1,039	735	-29%	Local immigrant in winter

cycle of the population to be approximated. This is shown in fig. 1. Later experience caused doubts over the numerical scale of the 1959/60 cycle (probably underestimated by at least 5%), but the basic rhythm was confirmed. No concerted attempt was made to repeat the exercise, but the summer and winter censuses and breeding

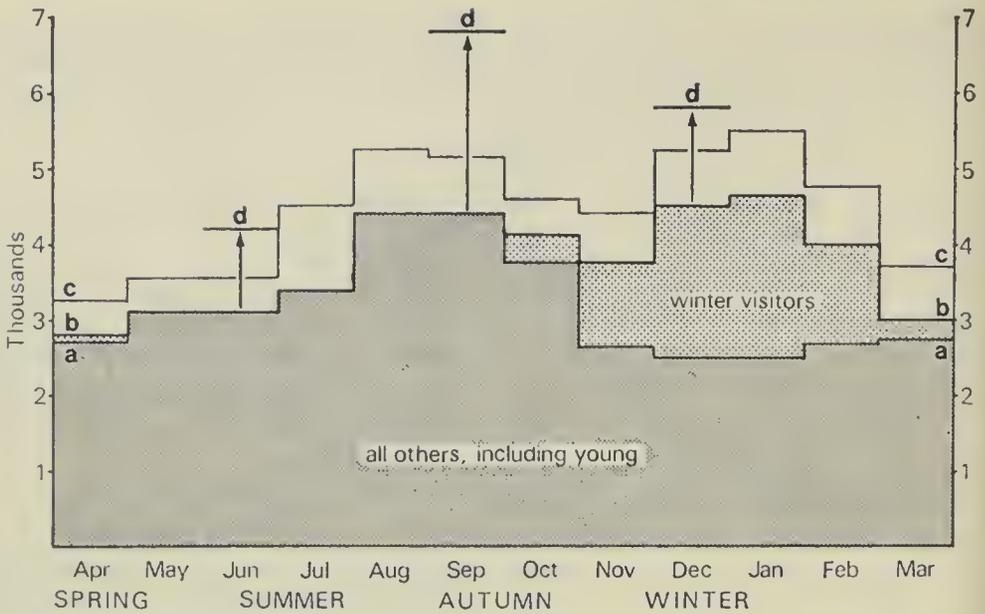


Fig. 1. Annual cycle of diurnal bird population, Regent's Park: **a** minimum population, excluding winter visitors, 1959-60 monthly averages; **b** as **a**, but including winter visitors; **c** as **b**, but estimated maximum population; **d** as **b**, but showing higher 1964 averages for June, September and December only. These figures exclude a variable pre-roost assembly of Starlings which has brought the total park population up to 9,500 birds in September

register allowed new benchmarks for June, September and December in 1964 and 1965. These are also shown in fig. 1.

TIMING OF SUCCESSFUL BREEDING

The appearances of fledged young were most carefully noted and yielded information on the timing of *successful* breeding, summarised in table 9. Why early breeding is so unsuccessful in Regent's Park is not known, though, as already demonstrated in table 3, the study area was judged to be relatively unsuitable to passerines in spring. Certainly both intraspecific and interspecific competition for territories was unusually pronounced in certain groups and species. A particular study of cock Chaffinches in 1959 showed that 17 failed to hold song-posts for more than a few days and that such insecurity was associated with the lack of mates. Thus both territory establishment and pairing were frustrated, and this situation dogged the Chaffinch in later years as well. As indicated in table 2, suitable breeding habitat, not mere *lebensraum*, was at such a premium in Regent's Park that it would not be surprising if its division took longer than in more natural and more uniform habitats. However, by early summer most species exhibited remarkable tolerance of neighbours, whether of their own species or another, thus allowing many marked overlaps and even overlays of territories, and communal feeding of both adults and young.

Table 9. Timing of successful fledging of 22 regular breeding species, Regent's Park
 Under each half-month are the percentages of broods then fledging over the main analysis periods (1961-65 for wildfowl, 1962-65 for other species); an asterisk indicates less than 1% and/or incidental records during 1966-68

	No. broods in main analysis	Mar		April		May		June		July		Aug		Sept		Oct	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Wallard	320	*	*	8	8	25	19	17	19	2	2						
Mallard Duck	50							30	40	30	*	*					
Witchard	50					*	30	40	20	10							
Moorhen	117		*	3	2	6	32	16	9	23	4	3	1	1			
Wot	16			*	6	31	20	12	31	*							
Woodpigeon	540			*		*	11	17	33	33	6	*	*	*	*		
Warrion Crow	31						35	39	16	10							
W/	10						*	10	10	30	50						
Wreat Tit	45					*	45	24	13	13	5						
Wre Tit	73					1	29	26	18	22	4						
Wren	11							9	18	36	27	10					
Wistle Thrush	37			*	8	27	19	19	8	11	8						
Wag Thrush	168		*	2	10	12	38	14	14	7	2	1					
Wackbird	360					*	8	43	24	14	8	2	*	*			
Wabin	66				2	6	18	14	20	23	14	3					
Wotted Flycatcher	36								11	47	36	6	*				
Wannock	66					3	23	15	18	17	17	6	1				
Warking	255					23	35	35	4	3							
Wreenfinch	43					*	12	21	23	28	12	4					
Wllfinch	11							9	27	36	10	18					
Wldfinch	22					4	4	4	27	27	32			4			
Wraffinch	25							4	4	40	44	8					

Table 10. Surviving young of six lakefowl, Regent's Park, 1959-68

	Minimum no. of pairs breeding or attempting	Total young fledged	Range of annual 'crop'	Comments on annual 'crop' and adverse human factors
Wallard	576	1,610	105-225	225 in 1960 and 1961; 105 in 1973, not above 175 in later years. Shooting and exportation of surplus drakes
Mallard Duck	113	240	8-45	40-45 in 1966 and 1967. Egg theft in at least two years
Witchard	90	190	4-26	Egg theft in at least two years
Wernada Goose	36	95	9-46	Product of only five years. Egg theft and/or removal to prevent excessive growth
Woorhen	148	241	11-35	Young of first brood often fed chicks of second
Wot	53	70	1-16	40 in total during 1966-68 when control relaxed. Nest destruction and/or egg theft to prevent establishment from 1959 to 1965

Table 11. Surviving young of 24 species out of nests, Regent's Park, 1959-68

	Minimum no. of pairs breeding or attempting	Total young fledged	Range of annual 'crop'	Comments
<i>Registered, accuracy 90% or over</i>				
Herring Gull	16	9	1-3	Success in four years from 1961
Stock Dove	5	3	0-3	Success in 1959 only
Great Spotted Woodpecker	3	2	0-1	Success in 1960 and 1961
Swallow	1	4		1968 only
Carrion Crow	81	123	9-16	'Crop' increased annually up to 1963
Jay	31	31	1-6	
Coal Tit	9	13	2-5	Success annual from 1965
Wren	89	63	2-13	'Crop' six or less from 1962 to 1967
Mistle Thrush	90	132	7-20	'Crop' 13 or more from 1962
Blackcap	8	12	up to 4	Success in 1965, 1967 and 1968
Spotted Flycatcher	76	151	5-30	
Pied Wagtail	8	6	up to 2	Juveniles still in care of adults lost in 1960 and 1962
Linnet	1	2		1968 only
Bullfinch	28	34	1-11	24 young fledged from 1965 to 1968
<i>Registered, accuracy untested</i>				
Tawny Owl	16	10	up to 3	At least five nest holes found
Great Tit	98	178	5-30	'Crop' ten or less until 1963, 115 in total from 1965 to 1968
Blue Tit	168	307	7-50	'Crop' 32 or more from 1962, 119 in total from 1965 to 1968
Song Thrush	518	556	30-90	Peak 'crops' of 65-90 in 1962, 1965 and 1968
Blackbird	1,500	1,063	50-150	Productivity certainly lower than that of Song Thrush
Robin	178	156	5-23	
Dunnock	512	212	11-26	Productivity undoubtedly lowest of all passerines
Greenfinch	169	182	8-35	Only 38 from 1959 to 1962, peak 'crop' in 1968
Goldfinch	51	106	5-17	Only five in 1959 and 1965, otherwise ten or more
Chaffinch	138	98	3-16	

BREEDING PRODUCTIVITY

Information on breeding productivity was amassed through the registers kept of both pairs and fledged broods. Families of scarce species and lakcowl were often watched over days and sometimes weeks; the results of such observations are given in table 10 and the first section of table 11. Breeding success was difficult to measure but, since the factors involved in observation were constant, table 11 also demonstrates the results for the ten years.

Productivity appeared to be highest in the case of species that other disciplines showed to be consistently gaining ground in the park. The highest success rate of any passerine was that of the Spotted Flycatcher, with each pair producing on average 1.39 broods of 1.9 young over the ten years. Second came the Goldfinch, third the Blue Tit and fourth the Great Tit. All were favoured by special factors, notably relative freedom from competition for nest sites and (probably) food, and I consider that their advance was truly a case of colonisation of previously underexploited habitats.

COMMENTS ON POPULATION DENSITY

The highest *registered* densities of 22-30 pairs per hectare (9-12 pairs per acre) were all in areas of undisturbed woodland with undergrowth, private gardens with thick hedges, and large shrubberies near flower beds. The Baptist College sanctuary of 0.6 ha (1.5 acres) attracted an astonishing concentration of breeding passerines, with no fewer than 13 pairs of nine species attempting to breed in every year. In 1964 at least 18 pairs of eleven species tried (though not simultaneously). Clearly increased conservation would advance the number of breeding birds, but not surprisingly the Department of the Environment is most reluctant to reduce public access.

In terms of an overall population density of breeding birds, the mapped register gave average *minima* for 1959-68 of 5.73 pairs per hectare (2.32 pairs per acre) where nesting was possible, and of 3.29 pairs per hectare (1.33 pairs per acre) for the entire study area. The summer 'census' results yielded overall summer presences from 1962 to 1964 of 12.8 to 17.0 birds per hectare (5.18 to 6.88 birds per acre). In the exceptional circumstances of 1965, the summer presence was 21.3 birds per hectare (8.63 birds per acre). (In comparing the two measures, the large non-breeding elements in certain specific populations must not be forgotten.)

Finally, it may be noted that the 1965 summer presence closely approached the highest density previously recorded in Inner London of 21.7 birds per hectare (8.8 birds per acre) in the garden of Buckingham Palace in 1962 (Cramp and Spencer 1964). This level of density may be the maximum that a diversified bird community

can achieve in restricted urban habitat, and there is evidence from both studies that it cannot be sustained.

ACKNOWLEDGEMENTS

Neither the development nor the completion of the study would have been possible without the enthusiastic and painstaking support of R. C. Green. I am most grateful to him. My thanks are also due to Professor E. H. Warmington and H. Fossey, who made the most frequent contributions of several occasional observers; W. G. Teagle, my first mentor in urban ornithology; and Stanley Cramp, who never failed to encourage me. I must thank the Ministry of Works (now within the Department of the Environment) for the privilege of being their Official Observer for Regent's Park, and gratefully acknowledge the help of various ministry officials, notably W. H. Cole and S. M. Gault. L. A. Batten and K. Williamson read one of several drafts and reminded me how difficult was the study of bird populations. P. F. Bonham coped manfully with reducing the paper to publishable length.

SUMMARY

The birds of Regent's Park and Primrose Hill were intensively studied from 1959 to 1968. During these ten years, about 100 species were recorded annually and 37 were successful in rearing young (23 annually). The breeding population increased markedly during the first seven years but then fell back to near the mean of about 800 pairs. Lasting growth was most obvious in insectivorous passerines. The Greenfinch (for scientific names, see appendix 2) overtook the Chaffinch as the dominant finch. Forty-one species occurred regularly or frequently in winter, in which season notable increases were recorded in diving ducks, gulls, Woodpigeon and several passerines. The increases in the wintering populations were not necessarily linked to the growth of the breeding populations, since the complexity of status in most species was much greater than general distributional data and an earlier park study had implied. The most obvious divergence from national population dynamics was the local population growth uninhibited by the exceptionally severe winter of 1962/63. The total diurnal population of the park varied by season from 2,800 to 6,800 birds and was highest in January and September. Despite the limited general suitability of the area as a breeding habitat, concentrations of as many as 30 pairs per hectare (12 pairs per acre) in especially favourable cover were registered. As expected, further additions to the park avifauna have occurred, but it is considered unlikely that the total population can permanently expand beyond the mean indicated by the study without direct human assistance in the future provision of safe habitat.

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Appendix 1. Study methods

The study was developed before the methodology of the Common Birds Census was standardised. In 1961 a change was considered but this would have involved the partial loss of three years' results. Furthermore, song-post mapping in 1959 showed that in Regent's Park the singing male was an untrustworthy indicator of the size of the Chaffinch population actually attempting to breed or breeding, and that such confusion also affected other passerines. It was also impractical to track down the stationary males of the large populations of some species, for example Woodpigeon and House Sparrow. Accordingly, the study continued with the aims and methods already in use. Notes on these follow.

AIM	DISCIPLINE	ACCURACY
Standard measurement of specific or total population, during winter and breeding season	Maximum sample (termed 'census') of all species seen or heard in various park sectors, sequentially over several days	Never a complete census but, except for skulking species, total accuracy improving from 70% to 90% (assessed by both independent counts and double-searching in 1964)
Standard measurement of size of or changes in specific or total breeding population(s)	<p><i>Lakefowl</i>: log of <i>pairs</i> clearly bonded or with nest or tending young</p> <p><i>Other species (except below)</i>: mapped register of <i>pairs</i> on territory—entire public cover searched at least three times, but private cover only once, in each season up to 1965</p> <p><i>Woodpigeon, Blackbird, Starling and House Sparrow</i>: some mapped registration but mainly localised counts of birds obviously paired or on nest or with young or collecting food</p>	<p>High at 95% (assessed by independent log)</p> <p>Variable, from 95% for rare or local species to 60% for commoner passerines ubiquitous in public and private cover (assessed by both independent searches and double-searching)</p> <p>Unknown but unlikely to be under 50%; some interpolation in 1959 and 1966-68 (not exceeding 20%)</p>

C Measurement of breeding productivity	Register (partly mapped) of fledged young, virtually simultaneous with B , containing A in June	Variable, as B ; never complete for all species in any one year
D Definition of status	Repeated searches (mapped) for all individuals at any season; control on A and B	High, reaching 100% for rare or local species (much data from migration studies)
E Establishment of annual lakefowl and gull cycle and total population trends	Counts in relevant habitats, complementing A , B and C , at least bimonthly up to 1964	High at 95-100% (assessed by comparison with independent series)

In 1962 R. C. Green joined me as a regular observer (and critic). Basic data were summarised regularly on a two- to three-month cycle. Our co-operation was closest on **B** and **C** and up to 1966 some part of the study area was visited on four days a week or more. During the same period, J. Newmark and members of the XYZ Club undertook the independent series of lakefowl counts and H. Fossey contributed many counts from private cover. In August 1965, when I left London, RCG took over the disciplines and was helped in turn by A. M. Forsyth and R. H. Kettle. In 1968 the last observer used the Common Birds Census methods in the south-east of the park and found there notably higher numbers of certain male passerines than those indicated by the pair figures given by RCG in his annual report and this paper. Inevitably this raises doubts on the validity of the methods described above, at least in 1968, but the study never pretended to total precision; I therefore accept the data for 1966-68 as sufficiently comparable with those for 1959-65 to allow the interpretation placed upon it in this paper. If the discipline of **B** did fall short of the Common Birds Census equivalent in accuracy, its practice was constant and its frequency unparalleled.

Appendix 2. Scientific names of bird species in the text and tables

Great Crested Grebe <i>Podiceps cristatus</i>	Jay <i>Garrulus glandarius</i>
Grey Heron <i>Ardea cinerea</i>	Great Tit <i>Parus major</i>
Mallard <i>Anas platyrhynchos</i>	Blue Tit <i>Parus caeruleus</i>
Tufted Duck <i>Aythya fuligula</i>	Coal Tit <i>Parus ater</i>
Pochard <i>Aythya ferina</i>	Wren <i>Troglodytes troglodytes</i>
Canada Goose <i>Branta canadensis</i>	Mistle Thrush <i>Turdus viscivorus</i>
Mute Swan <i>Cygnus olor</i>	Song Thrush <i>Turdus philomelos</i>
Moorhen <i>Gallinula chloropus</i>	Redwing <i>Turdus iliacus</i>
Coot <i>Fulca atra</i>	Blackbird <i>Turdus merula</i>
Lesser Black-backed Gull <i>Larus fuscus</i>	Robin <i>Erithacus rubecula</i>
Herring Gull <i>Larus argentatus</i>	Blackcap <i>Sylvia atricapilla</i>
Common Gull <i>Larus canus</i>	Willow Warbler <i>Phylloscopus trochilus</i>
Stock Dove <i>Columba oenas</i>	Spotted Flycatcher <i>Muscicapa striata</i>
Feral pigeon <i>Columba livia</i>	Dunnock <i>Prunella modularis</i>
Woodpigeon <i>Columba palumbus</i>	Pied Wagtail <i>Motacilla alba</i>
Tawny Owl <i>Strix aluco</i>	Starling <i>Sturnus vulgaris</i>
Swift <i>Apus apus</i>	Greenfinch <i>Carduelis chloris</i>
Great Spotted Woodpecker <i>Dendrocopos major</i>	Goldfinch <i>Carduelis carduelis</i>
Swallow <i>Hirundo rustica</i>	Linnet <i>Acanthis cannabina</i>
House Martin <i>Delichon urbica</i>	Bullfinch <i>Pyrrhula pyrrhula</i>
Carrion Crow <i>Corvus corone</i>	Chaffinch <i>Fringilla coelebs</i>
Magpie <i>Pica pica</i>	House Sparrow <i>Passer domesticus</i>

Obituaries

Matthew Fontaine Maury Meiklejohn, MA

(1913-1974)

Plate 67

Professor M. F. M. Meiklejohn died in a Glasgow hospital on 14th May 1974, after a short illness. Maury Meiklejohn was of Scottish parentage and ancestry, from a scholastic family noted for intellectual ability. His grandfather, J. M. D. Meiklejohn, was professor of education at St Andrew's University and author of a number of school textbooks; he founded the publishing firm of Meiklejohn & Son in order to have his textbooks published on more favourable terms than he could otherwise obtain. Professor J. M. D. Meiklejohn was a great friend of Matthew Fontaine Maury, the American Naval oceanographer: a son (Maury Meiklejohn's uncle) was called after him and from him Maury inherited his Christian names. (Incidentally, the family was not related to Colonel R. F. Meiklejohn, the noted ornithologist and collector, whose widow Maury knew.)

Arnold Hilary Meiklejohn, the 'Son' of Meiklejohn & Son, came to London in 1904 to run the family business, but moved to Harpenden in 1907 as it was in those days a very pleasant rural village with a good train service to London. Here the family was born. A. H. Meiklejohn was a good ornithologist and an egg-collector at a time when this was a reasonable pastime. He was an occasional contributor to *British Birds* and made excursions as far afield as Orkney, Caithness and Sutherland, where, according to Maury, he pinched the Red-throated Diver's eggs on Handa but failed to go down the cliffs to get Guillemots' eggs because the boatman who was supposed to hold the rope got drunk. From this home background Maury's interest in birds began.

In July 1927 a note on a Song Thrush breeding in an old Blackbird's nest was published in *British Birds* by M. F. M. Meiklejohn—'I beat James Fisher on this; he published his first note in *British Birds* at the age of 15, I was 13. I forget what it was, but you can look it up.'

Maury Meiklejohn was schooled at Gresham's School, Holt, Norfolk, the jumping-off place of many a good naturalist. Holt is only 6 km from Cley, and the inland heaths and the woods near the school were also good for birds. Maury became very fond of this part of Norfolk; his interests and associations there became life-long, for he visited Cley and Blakeney two or three times every year—for the last time in April 1974. But at the same time were laid the founda-

tions of his profound knowledge of literature and language, and one of his proudest possessions was a school prize for natural history—he chose *The Oxford Book of Italian Verse!*

An open scholarship in modern languages to Oriel College, Oxford, was followed by graduation with first-class honours in French and German in 1934 and a Harmsworth scholarship as a post-graduate student to Merton College in 1935. At this time Maury was greatly influenced as regards ornithology by the work of W. B. Alexander and B. W. Tucker, whom he considered to be the pioneer figures in bird identification in Britain. Oxford in the 1930's was a highly stimulating place ornithologically and among his fellow undergraduates were James Fisher, Dick Cornwallis, and two subsequent editors of *The Ibis*, James Monk and Hugh Elliott. At the same time, he walked about the country a great deal visiting places like Wytham Woods and Otmoor while continuing his association with Cley and a new-found one on the Isle of May.

In 1937 Maury was appointed lecturer in Italian and Old French at Cape Town University, where he remained until he joined the South African Army in 1941. At Cape Town he established contact with South African ornithologists, notably Dr G. J. Brockhuysen, with whom he published papers in *The Ibis* and *The Ostrich* on Palearctic migrants in the Cape Province. He visited what was then Tanganyika where his old friend Hugh Elliott (now Sir Hugh) was district commissioner, and became acquainted with some of the tropical African birds. He did not neglect other opportunities, however, and learned enough Afrikaans to stand him in good stead when he later began his military service in the Transvaal. His next posting was to Nairobi where he spent about a year with the intelligence unit at General Wavell's HQ for the Abyssinian campaign, thereafter moving first to Cairo, then to Palestine—'While I was in Palestine I got a day's leave to see my thousandth bird. It was *Passer moabiticus*'. After demobilisation he worked for the British Council in Tehran for a year, characteristically adding Persian and Romanian to his repertoire and writing a paper for *The Ibis* on the birds of Tehran and the Alborz (Elburz) Mountains.

In 1941 Maury returned to Britain as head of the Italian Department of Leeds University and began to revisit his old familiar haunts in Norfolk and the Isle of May, extending his birding ground elsewhere, especially to Islay and Holy Island 'where Dr Bannerman once saved my life. . . It was a bitter October day. . . waiting for the tide to go down, when Dr Bannerman came along and do you know what he produced from the boot of his car—a dram!' In 1949, much to Scotland's good fortune, Meiklejohn was elected Stevenson Professor of Italian at Glasgow University. The west of Scotland has the largest group of schools teaching Italian in the United Kingdom,



PLATE 64. Immature Ross's Gull *Rhodostethia rosea*. Hampshire, July 1974 (photos: J. B. and S. Bottomley): vigorous foot-paddling (above) was frequently observed as the bird moved about feeding in shallow muddy water (pages 477-478). This individual stayed in Christchurch Harbour for at least seven weeks



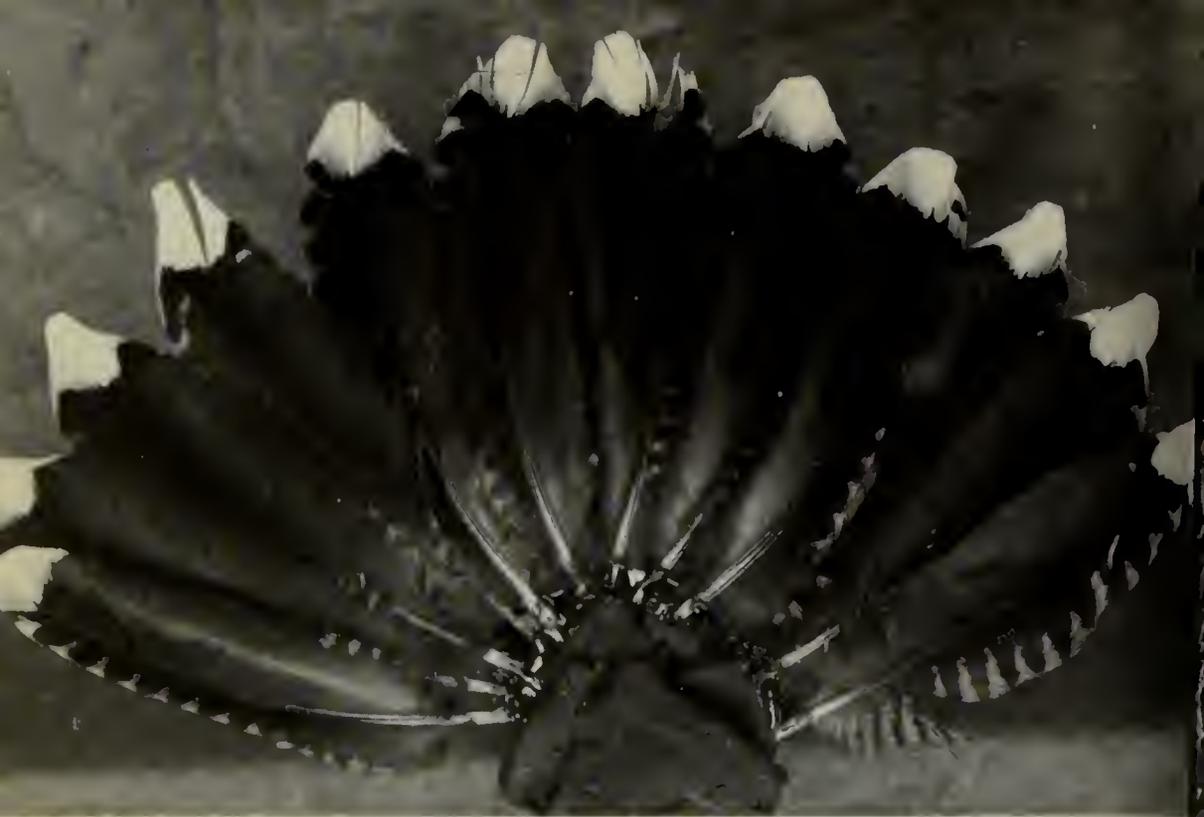


PLATE 65. Model of outspread rectrices of Woodcock *Scolopax rusticola* (photo: Collingwood Ingram), showing the gleaming white ventral surfaces of the feather tips (pages 475-476). Below, day-old Cuckoo *Cuculus canorus* in nest of Swallows *Hirundo rustica*, Somerset, June 1951 (photo: G. H. E. Young) (page 478)





PLATE 66. Regent's Park and (beyond) Primrose Hill, London, excluding the south-west and south-east corners and eastern edge (*photo: Aerofilms*). Note the predominance of greensward and the full leaf canopy of summer. Habitats important to the breeding population during the ten-year study (pages 449-468) were the lake islands (left of centre), the heavily wooded and little-disturbed area between the lake and Primrose Hill containing the passerine sanctuary, and the set-piece cover of Queen Mary's Garden (circle in centre). Commensal species exploited particularly the triangle of the zoo (below Primrose Hill), and winter visitors were often concentrated on the games pitches (between lake and zoo)



PLATE 67. Matthew Fontaine Maury Meiklejohn (1913-1974)
(photo: *Glasgow Herald*)

providing the foundations upon which in his 25 years Professor Meiklejohn built up the largest Department of Italian in any British University. He was universally acknowledged as an outstanding teacher and an unforgettable lecturer, well organised, amusing where necessary and with an astounding knowledge of literature and language—Latin, Greek, Italian, French, Provençal, Spanish, Portuguese, Romanian, German, Persian, Arabic and, of course, English.

In his particular academic field he was an authority on Dante, and as a side-line produced a scholarly treatise on the 'Birds of Dante' which was published in *Annals of Science*. Latterly he became interested in the language and people of Sardinia, which he visited frequently, and even taught Sardinian at evening classes in Glasgow. The climax of his academic career came in 1964 when he was awarded the Italian decoration 'CAVALIERE DELLA SOLIDARIETA ITALIANA' by the President of Italy for his services to Italian studies in the United Kingdom.

The Scottish Ornithologists' Club had been in abeyance during the war years: Maury joined the revived club when he came to Glasgow and the following year was elected to the Council. In 1960 he became President. The *Scottish Naturalist* too was revived after the war, but following a few successful years its light began to flicker and it became apparent to the SOC Council that there might soon be no local outlet for Scottish bird records and papers. *Scottish Birds* was launched with Maury Meiklejohn as the first editor, a post which he relinquished three years later when he began to realise that there were limits to the amount of work that even he could undertake, but not before he had established the journal firmly and successfully. He found time somehow to write a weekly article, identified by his initials, for the *Glasgow Herald*, usually on subjects related to nature and often amusing. He had actually contributed a thousand of these before he died.

On his complete disregard for personal appearance, his tremendous knowledge of birds, especially of fine points in identification, his humorous speeches and writings, it is unnecessary to comment. He was a shy, gentle and immeasurably generous character, but hated inaccuracy and would castigate in no uncertain terms anyone he regarded as bogus or suspected of fraudulent representation.

My own association with Maury was mainly on the SOC Council, where I succeeded him as President, and at the annual conferences. In the chair at Council meetings he conducted the business firmly but with quiet humour. I well remember on one occasion when, following a lengthy discussion of some matter on reorganisation—it may have been the proposed formation of the Council for Nature—the summing up from the chair was brief: 'This seems to me to be a

lot of pure bureaucratic guff'; and we moved to the next item on the agenda.

I last saw him at the 1973 Conference. He seemed rather poor physically but was in good humour and appeared to enjoy the dinner. Obviously he was just as much at home with Scots verse as with any other, for he said to me afterwards that his favourite early Scots poem was 'The Ballad of Kind Kittock', who found that 'The ale of Heaven was soor'. When we were breaking up next afternoon I said 'Cheerio' to Maury and with a chuckle he replied 'Remember, the ale of Heaven is soor'. I do hope that he was wrong that time.

British ornithology is going to miss Maury Meiklejohn greatly and the SOC will never be quite the same again. IAN D. PENNIE

Ludwig Koch, MBE (1881-1974)

Dr Ludwig Koch, MBE, died on 4th May 1974, at the age of 92. Ludwig, as he was affectionately called by most people, had no claims to scientific ornithology but was the European pioneer of the recording of wild birds in the field. He collaborated with a number of ornithologists to produce such works as *Der Schrei der Steppe* [*Sounds of Safari*] (about Africa) in 1933; *Der Wald Erschallt* [*The Wood Resounds*] in 1934, with Lutz Heck; and *Gefiederte Meistersänger* [*Feathered Mastersingers*] in 1935, with Oscar Heinroth (introduction by Hermann Goering). After his arrival in Britain he worked with E. M. Nicholson to produce *Songs of Wild Birds* in 1936 and *More Songs of Wild Birds* a year later; and with Julian Huxley to publish *Animal Language* in 1938. After the war he produced *Oiseaux Chanteurs de Laeken* [*The Song Birds of Laeken* (Belgium)] in 1952. All these works were books accompanied by gramophone records. His recordings were the first to be made of wild birds in Africa and on the European continent; in Britain his 1936 and 1937 recordings were preceded only by efforts on a much smaller scale than his own which were made in 1900 and 1926 or 1927. His autobiography *Memoirs of a Bird Man* was published in 1955.

His 1889 recording on a wax cylinder of the song of a caged Common or White-rumped Shama is believed to be the earliest extant recording of bird voice. He made 'a good number of open-air recordings in field, garden and woodland' (the autobiography, p. 16), not, apparently, specifically of birds, in 1906. These were, of course, non-electric, and were registered on wax disc. Despite a claim to the contrary that he once made verbally to me (see *Brit. Birds*, special supplement to vol. 57, p. 1), these recordings did not

appear on a commercial disc, as the autobiography in fact confirms. Interestingly, his first published bird voice recordings were of species recorded in what was then Tanganyika in 1929, though he appears to have started recording European wild birds in 1927.

A Jewish refugee from Nazi Germany, Ludwig arrived in Britain in 1936. He was on the radio the next year and on television in 1938! Following a career in Germany as a child violinist, concert singer and musical impresario, Ludwig became in Britain an impresario for the birds and carved for himself a remarkable career as a broadcaster. Ludwig Koch's name is on the roll of the truly great pioneers of British radio along with A. J. Allen, Walford Davies, Mr Middleton and the original disc-jockey Christopher Stone. He originated or took part in about 160 broadcasts between March 1945 and February 1958, a peak thirteen years in his career.

In his lifetime a whole new science and art grew up, and a thousand disciples throughout the world now mourn the passing of the 'master of nature's music'. With his recordings Ludwig invented a new kind of broadcast that today we take for granted. He was cartooned and burlesqued and imitated on the grand scale, and he loved every caricature. To have worked with Ludwig Koch is a claim many of us will long be proud to make. His sheer enthusiasm, to say nothing of his attractively fractured English, endeared him to millions, and no doubt helped to convert thousands to bird-watching.

Ludwig Koch was the most unforgettable character I ever met. A warm-hearted, friendly, lovable man with an inipish sense of humour. His capacity for overtime, his obsessive single-mindedness, and his formidable concentration were more than most of us could keep up with. Like the Ancient Mariner, he had an uncanny power of bending to his purpose all sorts of people who mistakenly thought that they were about to do something quite different.

Ludwig was not the simplest of men to work with, as E. M. Nicholson recalled in his address at the thanksgiving service: 'He preferred the challenge of the unknown and the almost unattainable to following along familiar paths. His Sancho Panzas in the heavy recording van had to put up with the artistic temperament in its most sublime form. At times the humble van would be transformed into something like a roving opera house, with the *Prima Donna* stalking up and down it exuding temperament and despair, while the technicians, first cowering in a corner, would gradually revolt and threaten to withdraw themselves and their labour. It was then that urgent telephone calls had to be made from the most unlikely spots to the highest quarters before sweet reason again prevailed and the harmony of the birds singing away outside was once more matched within the van'.

A photograph of Ludwig recording Swallows in Somerset in his 80th year appeared in the *British Birds* special supplement referred to above, as did full details of all his published Palearctic recordings. Much of his unpublished collection is held by the BBC and a great quantity of recorded material has been bequeathed to the British Library of Wildlife Sounds at the British Institute for Recorded Sound.

JEFFERY BOSWALL

Notes

Kestrel taking prey from Short-eared Owl On 20th January 1974, Mrs M. Perkins and I watched a Short-eared Owl *Asio flammeus* hunting in the usual manner over rough grass on Salisbury Plain, Wiltshire. It dropped into the grass, rose with a small mammal in its talons and flew to a passing bay beside a metalled road. Before I could reach the spot, a Kestrel *Falco tinnunculus* flew swiftly in the same direction and landed by the owl. There was a flurry and the Kestrel took off, carrying something in its claws. When we reached the owl it was still on the ground and appeared to be searching for its lost prey, taking quick running steps and peering round in a bewildered manner. It eventually hopped on to a lump of mud where it shook its plumage and took to the air. We followed in the car and watched it quartering a small plantation of very young conifers which was fenced in. The Kestrel was perched on one of the fence posts. When the owl alighted on another post the Kestrel flew over it and the owl immediately rose and pursued the falcon, both birds rising in the air together. The owl forced the Kestrel to the ground, striking at it with its talons; the Kestrel threw itself on its back and screamed several times before the owl flew away. The Kestrel remained lying on the ground for about half a minute before flying to a nearby tree. Later I was able to drive very close to the owl, which was perched on another post, and noticed that its ear-tufts were fully raised while it watched a Kestrel flying overhead.

On 10th March I again visited the area. At approximately 16.30 hours a Short-eared Owl appeared hunting over the same coarse grass. A Kestrel was once more in the vicinity. The owl soon killed a small passerine, which it carried off. Almost immediately a female Kestrel flew at the owl and attempted to snatch the prey from its claws; a second Kestrel arrived and the two birds harried the owl continuously while it jinked and side-slipped to avoid their attacks, gaining height all the time. I watched the three birds through

8.5 × 40 binoculars until they appeared no larger than Skylarks, having climbed so high as to be almost invisible to the naked eye. One Kestrel lost interest and flew away, but the other tried repeatedly to get above the owl and dive on it. The owl retained its prey, however, and eventually the other Kestrel broke off the encounter by going into a shallow dive. The owl continued to wheel round for some minutes, losing height, and could be seen bringing its feet forward, in the manner of a Hobby *F. subbuteo*, to peck at the prey. Whether this was to prevent the Kestrels from attacking again should it land one cannot say, but it is most unusual for an owl to feed on the wing. Gradually it lost more height and was lost to sight behind a belt of conifers. About a kilometre away two more Short-eared Owls were hunting and again another Kestrel chased one of them.

Piracy by Kestrels has been recorded in Scotland on several occasions (*Brit. Birds*, 64: 317-318, 543; 66: 227-228).

GEOFFREY L. BOYLE

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Possible functions of the tail spots in the Woodcock Those who have handled Woodcock *Scolopax rusticola* for most of their lives often remain unaware that the glossy white spots on the tips of the tail feathers are white on only one side. On the dorsal surface these spots are brownish-grey, a hue which harmonises perfectly with the rest of the bird's beautifully camouflaged plumage. On the ventral side they are pure white and of a glistening appearance (plate 65a). Under a strong magnifying glass the glistening effect is shown to be due to the smooth, enamel-like texture of the under-surface of the shafts of the closely crowded, forward-pointing barbs. On their upper surfaces these barbs are not white but brownish-grey and are furnished along their entire length with very short, straight barbules of the same colour. It is these barbules which impart a soft velvety feeling to that part of the feather's surface.

The glossiness and intense whiteness of the tail spots have obviously been evolved to reflect even the faintest glimmer of light. But that, of course, they can do only after the bird has rendered them visible by erecting its tail and spreading out its rectrices.

There must arise occasions in the life of such a beautifully camouflaged bird as the Woodcock (especially as it must derive further concealment from its nocturnal and crepuscular habits) when its virtual invisibility is neither necessary nor desirable: for example, during the male's courtship display on the ground. In *The Handbook* (4: 187) the findings of the few ornithologists who have observed this display are epitomised as follows: 'male struts round female with drooping wings, raised and spread tail and

feathers of head and neck puffed out'. The effulgence of the strikingly conspicuous tail spots, when they are deliberately flaunted in front of the female, must greatly enhance the effectiveness of the bird's nuptial display.

As the white spots occur also in the plumage of the female, it is evident that they must also serve the species in some other way. Since a female Woodcock, when she attempts by injury-feigning to lure a potential predator away from her nest or nestlings, raises her tail and spreads out her rectrices, we may safely assume that the conspicuousness of the white tail spots, thus fully exposed to view, affords her valuable assistance by immediately attracting the predator's attention.

Besides the relatively large spots on the tips of the Woodcock's rectrices, some of the bird's undertail-coverts also have smaller, terminal white spots. These, unlike those on the rectrices, are white on both sides of the feather, a distinction which no doubt renders them visible from a greater number of angles. They apparently do not play an important part in any ritual display but, since Woodcock have been observed walking about with 'their tail cocked up like a crane's' (which would, of course, automatically expose the undertail-coverts to view), we may safely conclude that one of their functions is to keep the birds visually in touch with one another. R. Wagstaff (*in litt.*), of the Liverpool Museums, was reliably informed of a Woodcock which, whenever it was seen leading its chicks, as for instance across an open ride, always carried its tail in an erect position.

COLLINGWOOD INGRAM

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We have found very few references to this subject and only one which appears to be directly relevant, by T. L. Borodulina and A. N. Formozov (1967, *Byull. Mosk. Obshch. Ispyt. Prir. Otd. biol.*, 72: 27-31). An English summary headed 'About signal spots of feathering of birds and peculiarity of woodcock tail feathers' reads as follows: 'Distinctive "lighting" in deep twilight of white band at the woodcock tail gives rise to the peculiar macro- and microstructures of its tail feathers. White band at the top represents the system of concave-convex mirrors, gathering and focusing light, i.e. the system of reflectors. Their walls reflect the light in similarity with the pearl screen. Systems of these reflectors, generated by all the tail feathers at its vertical position provides heightened visibility of white bands even in the twilight. Distinctive construction of the tail feathers playing special rôle in the courtship is peculiar to many of the Scolopacinae species (*Capella gallinago*, *C. stenura*, *C. megala*, *C. solitaria* and others). Thus the woodcock is not an exception, although belongs to the particular genus.' EDs

Feeding association between Marsh Sandpiper and dabbling ducks On 27th September 1972, at a water-hole in Nairobi National Park, Kenya, I saw a Marsh Sandpiper *Tringa stagnatilis* associating with two Hottentot Teal *Anas hottentata*. The ducks fed vigorously by typical dabbling for some 30 minutes and, during this time, the sandpiper kept close to them, even swimming at times, presumably finding aquatic organisms more easily as a result of the disturbance caused by the ducks' activities. When the ducks went to a small mud bar to preen and doze the sandpiper carried on feeding by itself, but, when they resumed feeding, it immediately flew over to rejoin them, thereby clearly showing the deliberate nature of its behaviour. On 21st July 1973, at a different water-hole in the Park, I saw another Marsh Sandpiper associating in a similar way with four Red-billed Ducks *A. erythrorhynchos*. These observations suggest that this may be fairly regular behaviour in the Marsh Sandpiper.

J. F. REYNOLDS

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Ross's Gull in Hampshire foot-paddling to disturb organisms In regard to my note concerning a Bonaparte's Gull *Larus philadelphia* foot-paddling to disturb organisms (*Brit. Birds*, 66: 447), it may also be of interest to record that on 11th July 1974, at Stanpit Marsh, Christchurch, Hampshire, I observed rather similar behaviour involving an immature Ross's Gull *Rhodostethia rosea* (plate 64). While under observation for over two hours, the bird was mainly feeding from very soft mud which, in patches, was sparsely covered by sea-lettuce *Ulva lactuca*. Alternate and very rapid foot movements in the soft mud apparently brought edible items to the surface, and these were immediately swallowed. Its foot movements were even more rapid than those of many Black-headed Gulls *L. ridibundus* nearby which were also obtaining food in this way. The Ross's Gull was frequently aggressive towards its larger companions, rushing at them with head lowered and bill partly open, its bright vermilion gape very conspicuous; occasionally its weak calls were faintly discernible over other continuous background noises. J. Kist also recorded aggressive behaviour of this nature in an adult Ross's Gull which remained for six weeks at Vlieland in the Netherlands during June and July 1958 (*Brit. Birds*, 52: 422-424, plates 66-69), but he did not mention foot-paddling.

BERNARD KING

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We are also grateful to J. Cantelo and P. A. Gregory, who have published an observation of foot-paddling in a Sabine's Gull *L. sabini* (*Brit. Birds*, 64: 76-77), for a similar note on foot-paddling

by the Hampshire Ross's Gull, which also mentions that, since swimming seems to have been rarely recorded in this species, it is of interest that they saw the bird once alight on shallow water and swim with apparent ease.

Mr King has drawn our attention to a paper by Dr P. A. Buckley on foot-paddling in American Gulls (1966, *Z. Tierpsychol.*, 23: 395-402), namely Laughing *L. atricilla*, California *L. californicus*, Ring-billed *L. delawarensis* and Bonaparte's, which discussed its possible function and stimulation and also reviewed records of this behaviour in European gulls. EDS

Cuckoo parasitising Swallow The editorial comment on the note by R. H. Heath (*Brit. Birds*, 66: 279-280) mentions the paucity of records during the 20th century concerning the parasitisation of the Swallow *Hirundo rustica* by the Cuckoo *Cuculus canorus*. In early June 1951 I called on a farmer at Muchelney, Somerset, who reported that he had seen a Cuckoo fly out of a brick shed on several afternoons during the previous few days. I visited the farm again on 18th June and saw a Swallow's nest on one of the beams supporting the roof. The farmer and I climbed the roof and removed some tiles in order to obtain a clear view, for there was little light inside the shed and only about 15 cm between the nest and the under-surface of the tiles. The beam sloped gently upwards. The nest contained three Swallow eggs and a very active, recently hatched chick (plate 65b). I watched for about ten minutes while the chick struggled to get an egg upon its back in order to eject it over the side of the nest. It was unsuccessful and we replaced the tiles and withdrew. Three days later there was evidence of broken eggshells on the floor below the nest, which then contained only the one chick. About three weeks later the fledged Cuckoo was sitting on the outside of the roof being fed by the Swallows. I twice saw a pair of Dunnocks *Prunella modularis* attempt to appease its incessant hunger cries by giving it food intended for its own young in a nest 45 metres away. Pied Wagtails *Motacilla alba* were nesting in the farm buildings; while Reed Warblers *Acrocephalus scirpaceus* and Sedge Warblers *A. schoenobaenus* are parasitised by Cuckoos on the adjoining levels.

G. H. E. YOUNG

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Great Tit commencing clutch before lining nest The note by R. H. Kettle on a Blue Tit *Parus caeruleus* laying an egg on the bare floor of a nestbox (*Brit. Birds*, 67: 78-79) prompts me to record the following. In April 1948, at Hall Green, Birmingham, a pair of Great Tits *P. major* were visiting a nestbox in a tree very near to the nest of a Blackbird *Turdus merula* which contained eggs. The female

Blackbird was very aggressive and drove away the Great Tits repeatedly. On 15th April a few pieces of grass were lying on the floor of the box. When it was next examined, on 18th, a single egg lay in one corner of the box and a pile of moss in another. By 19th a rough cup had been formed in which lay two eggs. Nest-building was more or less complete by 24th April. Nine eggs were eventually laid, two disappearing during incubation. The female sat from 28th April until 14th May, thereafter visiting the nest only occasionally. The eggs were all infertile. At the time the failure to accumulate nest materials before laying was attributed to interference from the Blackbirds.

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Reviews

The Cairngorms. Their Natural History and Scenery. By Desmond Nethersole-Thompson and Adam Watson. Collins, London, 1974. 286 pages; 7 colour and 36 black-and-white photographs; 17 maps and text-figures. £3.50.

Everything about the Cairngorms is massive—the greatest extent of ground over 900 metres in Britain, the biggest tourist developments in the Highlands and a huge land-management problem for the future. Hundreds of thousands of people come every year to enjoy them and most must be attracted by their wildlife even if they have come for the scenery, the skiing, fishing or shooting, or the luxury hotels with their bowling alleys and skating rinks. Here one comes face to face with the dilemma of people in danger of destroying what they enjoy. I believe that this dilemma can be resolved only if as many people as possible come to understand something about the natural environment and thus to care about its future. This book can play an important part in increasing this understanding and awareness. The authors' first words are 'We love the Cairngorms', and their enthusiasm and great personal knowledge of the area make the book exhilarating and enjoyable to read; there can be few books of this kind that contain so much original observation by the authors, some of which is published here for the first time. This applies particularly to four long chapters on the birds of the main Cairngorm habitats which readers of *British Birds* will find especially interesting for the descriptions of the breeding biology of the more important species. There are also chapters on The Human History, Fish Amphibia and Reptiles, Sport, Conservation, and The Future.

The chapter on Conservation seems wrongly titled as it is concerned solely with present and future pressures on the area, the authors' proposals for the way in which the Cairngorms should be managed being put in the short chapter on The Future. Too often

those pleading the cause of conservation are branded as being against everything and a casual reader of this book could have this impression confirmed. Their proposals for the future, however, seem realistic and positive, stressing the urgent need for an overall plan for the management of the whole area from Drumochter to Glen Tanar and for an efficient and effective body to administer such a plan with powers 'to conserve and develop, strictly in that order'. A substantial part of the Cairngorms should be left inviolate as one of the few real wilderness areas in Britain with a unique scientific importance, and everyone, including naturalists, would have to accept some control over his activities. The authors have not tried to write on subjects about which they are not experts. There is an excellent chapter by Derek Ratcliffe on The Vegetation and appendices include contributions by specialists on Geology, Landforms, Soils, Climate, and Invertebrates. In this it differs from most other regional books, with advantage, and might be described as a handbook to the Cairngorms. I recommend it as essential reading for any naturalist visiting the area, desirable reading for all visitors and fascinating to anyone interested in the natural history and future of our native uplands.

DAVID LEA

Cranes of the World. By Lawrence Walkinshaw. Winchester Press, New York, 1973. vii + 370 pages, including 128 black-and-white and 10 colour photographs. Obtainable from George Prior Associated Publishers Ltd, Rugby Chambers, 2 Rugby Street, London WC1N 3QU. £12.75.

Owls of the World. Edited by John A. Burton. Peter Lowe, London, 1973. 216 pages, including 101 colour photographs, many original paintings and maps. £5.95.

There seems to be a growing demand for books covering distinctive groups of birds on a world basis. These latest two, despite their similar titles, differ widely in approach. Both give the same basic information—on classification, fossils and, for each species, plumages and moult, breeding behaviour, voice, distribution and movements. But here the resemblance ends. Lawrence Walkinshaw is an enthusiastic amateur who has travelled widely for many years in search of cranes, and has managed to see all but one of the 15 species of this fascinating and seriously threatened group in the wild. The style is discursive, with long accounts of his field experiences and extensive verbatim extracts from other authorities. His species accounts range from twelve pages for the lesser-known species to 60 for his lifelong favourite, the Sandhill Crane. He eschews any standard order of presentation, and although he gives a wealth of material it is not always readily accessible. He has made a survey of the literature, giving full references, and has met or corresponded

with many fellow enthusiasts throughout the world. Nevertheless, in some instances, such as the Demoiselle Crane in Europe and North Africa, his account fails to reflect adequately the present parlous position. The book is fully illustrated with many photographs whose quality often merits much better reproduction but, rather strangely, with no distribution maps. A treasure-house for the crane enthusiast, though the general reader may find both the price and the 370 large pages rather daunting.

A team of 14 professional zoologists, under the editorship of John A. Burton, offers, in contrast, a concise and superbly produced survey of the much larger number of owls of the world, another group which has long fascinated and awed mankind. The species accounts are limited to some 140 pages in all, to cover some 130 species in six main groups. The basic data are given, but without detailed references, and it is made clear that for a large number of species information on many aspects (indeed, in some cases almost all) is simply not available. Every species is illustrated either by coloured photographs or by original, rather stylised paintings by John Rignall, and there are admirably clear distribution maps. There are also a number of interesting general chapters on owls and men, origins, anatomy, conservation, pellets, and voice. The specialist will want more, but for most readers this is a well-planned and visually attractive survey.

STANLEY CRAMP

Scarce Migrant Birds in Britain and Ireland. By J. T. R. Sharrock. T. and A. D. Poyser, Berkhamsted, 1974. 191 pages; 12 black-and-white plates; 24 vignettes; 130 maps and histograms. £3.80.

Between the common and the rare migrants are the scarce ones. This book discusses and illustrates the geographical and temporal distribution and the probable origins of 24 species and two groups of such birds from 1958 to 1967. Essentially it reproduces the outstanding series of papers published by Dr Sharrock in this journal from 1969 to 1973. Since they deserve fuller and wider study, their simultaneous publication in a handsome slim volume is welcomed in these sad days of so few statements on migration.

In terms of content little is added to that already published. An introduction assisting the general reader to understand the specific treatment and the general context of the study would have had much more merit if some of the fundamental theories of migration had been briefly explained. However, the new chapter prefaces, containing descriptive notes on species that follow, will be helpful, particularly as they are backed up by some well-chosen photographs. These include some notable Fair Isle captures from Roy Dennis; and, incidentally, those featuring Sabine's Gull, Aquatic,

Greenish and Arctic Warblers, Richard's Pipit and Scarlet Rosefinch are worth pages of field guide text. A marvellously dainty series of vignettes by Peter Grant competes well with the photographs. Sadly, in the review copy the printed result suggests over-reduction from the original drawings. Most birds appear to be in deep shadow. Even so, the illustrations combine to refresh the whole essay.

One thing disappoints. Dr Sharrock has not taken his rare second chance to write a fuller and updated summary. It is nearly seven years since the end of his study period and it is a shame that at the very least he did not critically review the comments in the annual reports of the Rarities Committee on the more recent status of his subject species. This, however, is only a fault of omission. His industry is still something to marvel at, and his book is a necessary addition to all working ornithological libraries in Europe.

D. I. M. WALLACE

Urvögel. By Stephan Burkhard. Die Neue Brehm-Bücherei, A. Ziemsen Verlag, Wittenberg Lutherstadt, East Germany, 1974. 167 pages; 88 photographs, reconstructions, line-drawings, diagrams and maps. 13.90 M.

In this slim volume Dr Burkhard has brought together all the available information on Archaeopteryx and its importance as a link between birds and reptiles. The text is profusely illustrated, mostly with plates and line-drawings from earlier works on the subject, but some of the line-drawings have reproduced rather poorly. The author lists and illustrates all but the last of the specimens, of which there are now five skeletal remains in varying degrees of completeness, together with the original feather. In reviewing the taxonomy he favours recognising two species in different genera. This may be correct, but in view of the additional material and the presence of errors in earlier works the characters used for separation are due for reappraisal.

The first half is taken up with a bone-by-bone consideration of the anatomy. It is apparent that the author has relied almost entirely on published descriptions and that this is a summary of published knowledge and not an original re-examination. The latter half of the book is concerned with an examination of the Archaeopterygidae in relation to the evolution of birds from reptiles, together with such information as is available on the climate and habitat at the period in which these forms lived. What is very apparent is the way in which the overall structure of Archaeopteryx is astonishingly similar to that of the small, bipedal and cursorial dinosaurs. There is every reason to assume that it ran swiftly before it could fly, but no evidence that it climbed trees. Pre-

sumably a running and leaping creature could have run up and launched itself from rocks, shrubs or similar low eminences. The author is in favour of a cursorial origin; but it is interesting to look at the illustrated array of earlier reconstructions, obsessed, in spite of the lack of morphological evidence, with the creation of a mythical, long-bodied, gliding pro-avian ancestor and with the need for Archaeopteryx to clamber in trees using its forelimbs.

This book forms a valuable summary of our knowledge of the first birds, and those with a poor grasp of the language but interested in the structure and evolution of birds might find the many illustrations and other data of interest. C. J. O. HARRISON

Letters

Oiled seabirds successfully cleaning their plumage I was interested to read the note by T. R. Birkhead, Clare Lloyd and P. Corkhill concerning the successful cleaning of oiled plumage by seabirds (*Brit. Birds*, 66: 535-537). Instances of this behaviour are of necessity difficult to confirm in the field, since individual birds, unless colour-ringed as in the cases quoted in the note, are virtually impossible to distinguish. However, I have one record concerning removal of oil which I feel may be of interest.

On 9th March 1970, at St Ives, Cornwall, an adult Bonaparte's Gull *Larus philadelphia* which had been present since 1st February (*Brit. Birds*, 64: 354) was seen to have become oiled on the lower belly and vent region. The bird was feeding normally, and five days later it was completely clean. It remained in the area until 26th April and appeared to suffer no ill-effects.

It would seem that the smaller gulls, although their diet is less varied than that of the larger (scavenging) species, can nevertheless tolerate at least moderate levels of oil in the digestive system.

It is likely that this cleaning of oil by preening may be more common than might be expected but, unless individuals can be recognised, instances of it will not be apparent to field-workers.

JOHN PHILLIPS

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The note on oiled seabirds successfully cleaning their plumage fails to consider moult as a possible explanation for the fairly rapid and complete disappearance of the oil. The observations quoted were mainly in April when gulls and auks are nearing the end of a complete moult of the body plumage, and it seems likely that the quick change to clean feathers could at least be aided by the shedding of the oiled ones.

I have no details of the capabilities of the salivary enzymes and their effect on such toxic substances as oil but, in my opinion, preening alone would not leave the feathers in their original white condition: some staining would surely remain.

It seems that more observations are necessary, and certainly more details need to be presented, before it can be accepted as proven that complete removal of oil by preening alone is possible.

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Feral parrakeets and control of introductions M. D. England's concern (*Brit. Birds*, 67: 393-394) over feral populations of the Ringneck Parrakeet *Psittacula krameri* may be heightened by my experience of this species. I first saw one at liberty in Wallington, Surrey, on 18th September 1962 and thereafter saw it almost daily throughout the abnormally prolonged hard weather of the winter that followed, my last sighting being on 16th March 1963. I understand it was then 'recaptured' by its alleged owner. Thus, with access to food especially put out, it demonstrated its ability to survive until some ten days after the last traces of snow had vanished. During the most severe weather it roosted nightly in a group of trees, predominantly elm, in a nearby recreation ground.

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In a recent letter in which he advocated the elimination of feral populations of parrakeets now living in southern England, M. D. England referred to the situation in parts of the USA where several introduced bird species have become pests. There are, of course, notable examples in Britain of introductions producing serious pests. One such species is the Grey Squirrel *Sciurus carolinensis*, introduced in the 1890's and already a major pest in broadleaved woodland in England, Wales and parts of southern Scotland. The Forestry Commission rates this species as a greater threat, through its bark-stripping activities, to our broadleaved trees than that facing our elms from the aggressive strain of Dutch Elm Disease. It is also a predator on the nestlings of some of our native birds. All that can be done now is to undertake such control measures as limit the damage to broadleaved trees to an acceptable level.

The lesson from this and other examples—such as the Coypu *Myocastor coypus* and Mink *Mustela vison*—is quite clear. Introductions should be made, or captive species liberated, only after a thorough examination of the probable consequences, and subsequent developments properly monitored. Uncontrolled populations should be eliminated before they become so widespread that such action is no

longer possible. In the present instance, the added risk to human health from ornithosis makes this a clear case for immediate action.

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Effects of agricultural change on birds We are sorry that Derek Barber (*Brit. Birds*, 67: 395-396) should misunderstand our thesis. It is a pity, too, that he should choose to comment about our supposed travels rather than offer any ecological evidence or scholarship to rebuke our case. Incidentally, we were employed as ecologists for sixteen years by the Ministry of Agriculture, and did see something of the farming scene in Britain, as well as abroad. Our paper concerned birds and agriculture and our results need not be applicable to non-avian taxa. There are three broad concepts which we should like to distinguish to clarify the discussion about hedges and the farmland avifauna.

First, it has never been denied that hedgerows attract certain bird species and that these must be lost from an area if the hedges and woodlands are removed. In this context the Monks Wood pamphlets on hedges were intended to advise the interested farmer how to attract a few woodland edge animals on to his property. Obviously, hedges vary in quality and it is not really fair to include all of them in one category. A rather high and wide mixed bramble and hawthorn hedge, preferably with some mature trees such as ash, seems necessary to attract Lesser Whitethroats *Sylvia curruca*; such hedges, especially if they support an understorey of nettles and other herbs, are very space-demanding. Cirl Buntings *Emberiza cirrus* in southern England favour the well-developed elm hedges. A stunted, low and narrow hawthorn hedge may be accepted by Yellowhammers *E. citrinella* or Corn Buntings *E. calandra* but be unsuitable for most warbler species; nevertheless, given the presence of a sufficient headland of nettles, willowherb or other tall herbs, Whitethroats *S. communis* might be present. Clearly, if hedgerows exist close to footpaths and other places of public access, they may harbour a variably interesting avifauna that can bring pleasure to many people. It is worth commenting that many of the hedges that are removed by farmers separate small fields and are isolated from all but the owner or determined trespassers. Very few people ever wander round the fields at Carlton and our study area is not atypical in this respect.

Many naturalists believe that the collective network of hedges provides a valuable reservoir of wildlife such that, as each segment is removed, the total populations of different animal species become more at risk, especially since woodland has also been so depleted. If true, this would put a premium on hedgerow preservation and

inevitably a degree of conflict would arise between agricultural and conservation interests. This brings us to our second concept, which in no way contradicts the first. This is that hedgerows are sub-optimal habitats for the majority of bird species and can support individuals for only a variable proportion of the year. At critical seasons these birds must become dependent on more favourable habitats. The literature already quoted which referred to the Wren *Troglodytes troglodytes*, Great Tit *Parus major* and Woodpigeon *Columba palumbus* seems adequate to justify this conclusion in some detail. But the principle is emphasised by two rather more extreme examples. Thus, whether or not Whitethroats will settle to breed on English farmland depends primarily on the factors governing their survival in Africa: it appears that recent droughts explain the paucity of survivors which are currently returning from their contranuptial grounds to summer in Britain (see D. Winstanley, R. Spencer and K. Williamson, *Bird Study*, 21: 1-14). No matter how many suitable sites were provided, farmers could not affect the current status of this species. Of course, farmer A might attract the only pair from farmer B but this is basically a matter of distribution and is embraced by our first concept. Nor, again, could the provision of old rambling hedges affect the present status of the Red-backed Shrike *Lanius collurio*, which is on the edge of its range in Britain and sensitive to cold, cloudy summers (see *Man and Birds* by R. K. Murton, 1971). Our second concept, therefore, emphasises the need to define the optimum ecological requirements of individual species and not to assume that the blanket preservation of hedges will solve the real problems.

Our third concept concerns the capacity of hedges to increase the ecological diversity by supporting species that would not otherwise be present. We contrasted hedgeless farms in Iceland and Westmorland (diversity in these areas is partly depressed because of climatic factors) with areas in Cambridgeshire, Suffolk and Dorset (a fairly wide geographical choice for such insular folk) and it was immediately evident that there were more bird species per 100 acres on farms supporting hedges. But ecological diversity did not differ appreciably between sites. This is primarily because many of the species inhabiting farmland live at extremely low densities and their populations are dependent on reservoirs in more optimum sites, as already mentioned. In most cases farmland is an unsaturated habitat, in which intraspecific competition is reduced, and this is a generalisation applicable to man-altered ecosystems. It is in such circumstances that House Sparrows *Passer domesticus* and Starlings *Sturnus vulgaris* have learned to 'hawk' for flies because they are not in competition with such species as the Spotted Flycatcher *Muscicapa striata*. The Sedge Warbler *Acrocephalus schoeno-*

baenus may continue to do well on the farm until it is forced to compete with a high Whitethroat population.

Crucial to this diversity concept, and a point overlooked by Mr Barber, is that there is a well-established logarithmic relationship between the number of species and the number of individuals in any sample. For a farm to support many bird species there must be a high total population in terms of individual numbers, and the late G. B. G. Benson's Suffolk site was quoted as an example. Now in order to support a high bird population, a relatively big proportion of the primary production must be channelled into the feeding chains on which the various species depend. A lot of energy can be channelled out of the ecosystem in situations where the farming is inefficient. Inefficiency may result because the farming is on marginal land so that many 'waste' areas of, for example, untilled scrub or nettle patch occur. For instance, in East Suffolk much farmland is only just profitable because it is practised on land that was once gorse-covered heathland. Should the wheat and barley 'barons' of mid-Anglia be persuaded to divert their primary production from corn to make their standards of farming comparable with those practised on less favourable soils? This is the real conservation issue under discussion and in this context hedgerows remain a 'red herring'.

Finally, for Mr Barber to claim that the 'conservation camp' is in contact with only a minute proportion of the 200,000 farm holdings in England and Wales and so must adopt 'a blunt instrument' on 'as wide a front as possible' is no justification for advocating woolly and nebulous generalisations about the value of hedges. We are thankful that the 'agricultural camp' adopts a positive approach, does manage to reach the individual farmer and does select policies which are geared to specific and defined objectives—even if we may disagree with some of the aims. We do not apologise for trying to take a scientific attitude. But we do assure Mr Barber that we too have an aesthetic appreciation for some hedgerows and we deplore the acts of vandalism whereby they are unnecessarily destroyed by the hatchet or uncontrolled fire.

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News and comment *Robert Hudson*

Rookery census The last national survey of the British Rook population was undertaken by the British Trust for Ornithology in 1945; much data was gathered (and is still on file), though rather little was published. Various local surveys carried out during the past 20 years or so have indicated that the Rook has

declined dramatically in many areas; and it is obviously important that the extent of these population changes should be known accurately, so that there is a baseline against which future changes can be measured. Therefore the BTO has initiated a National Survey of Rookeries, to be carried out in the United Kingdom in 1975. Recording will be on the basis of county boundaries as they were before April 1974. Observers are requested to give the location and six-figure map reference, dates of counts, number of nests present, and altitude; breakdowns of nests by tree species will be valuable, but are optional. For the purposes of this National Survey, any groups of nests 100 metres or more apart will count as separate rookeries. The national organisers are Bryan Sage (13 Dugdale Hill Lane, Potters Bar, Hertfordshire EN6 2DP) and J. D. R. Vernon (55 Wolfridge Ride, Alveston, Bristol BS12 2PR), who are arranging regional coverage through contact with BTO representatives and local ornithological societies. They would be glad to hear from any volunteers who have not yet been approached locally.

Future of Foulness Soon after the Government announcement that the Maplin Airport project had been cancelled, a consortium of 13 naturalists' bodies, including the Royal Society for the Protection of Birds, the Wildfowl Trust and the Essex Naturalists' Trust, issued a booklet (*Foulness: a window on the wilderness*) containing proposals for the future of Foulness Island. Suggesting that Foulness should become 'a window on the wilderness' for 3½ million people living in north London and south Essex, the consortium's proposals include a 'drive-round' reserve of the American type, an amusement beach, a visitor centre with catering facilities, an ornamental waterfowl collection, the inevitable sea-wall hides and, perhaps, landing points for yachting enthusiasts and facilities for anglers, all of this to be fitted in with traditional farming. These proposals have been widely acclaimed, though I have doubts whether it would really be wise to open the door quite so wide. A major attraction of Foulness lies in its remoteness and relative inaccessibility; the 'wilderness' would inevitably be lost if 3½ million people were given right of vehicular access to what would become a safari park for indigenous fauna. Unrestricted access for birdwatchers is surely not needed; the island's avifauna is notable for its quantities rather than for local rarities, and the waders and waterfowl concerned are all species which can be seen readily elsewhere on the coasts of Essex and neighbouring counties. Foulness would be best kept as a refuge area, as it has been hitherto, though some additional protection for terns nesting on the outer shellbank is needed. But I believe all such discussion to be theoretical. My own guess is that the Government will allow the Ministry of Defence units to remain on the island in order to save the £25 millions it would cost to relocate them. I, for one, will not be disappointed if this turns out to be the case.

Bristol Channel reserve The island of Steep Holm in the Bristol Channel is to be established as a wildlife conservation and study area in memory of the late Kenneth Allsop, writer and broadcaster. Steep Holm is a long and narrow island with 60-metre cliffs, and holds one of the largest gulleries in southern England. A 1969 census taken during Operation Seafarer revealed that the Herring Gull had increased there during the previous 13 years from 3,600 pairs to nearly 5,100 pairs, while the Lesser Black-backed Gull had been static at 600 pairs; there are also small colonies (under 100 pairs) of Cormorants and Great Black-backed Gulls.

New BTO Guide The latest addition to the *BTO Guide* series is no. 16, written by Chris Mead and entitled 'Bird Ringing'. This 64-page booklet contains a wealth of information, including over 30 maps of recoveries, and is written not only for ringers but also for ordinary birdwatchers and schoolteachers requiring

background information of a non-technical nature. Though migration, especially long-distance recoveries, occupies a major part of the text, there are also sections dealing with the historical background, ring specifications, trapping methods, biometrics, and population dynamics, and a table of longevity records. *BTO Guide* no. 16 is available from the British Trust for Ornithology, Beech Grove, Tring, Hertfordshire HP23 5NR, price 50p post free.

Another blot on Shell's escutcheon On 9th August, the 210,000-ton Royal Dutch Shell supertanker *Metula*, carrying 194,000 tons of Persian Gulf crude oil, grounded at the entrance to the Straits of Magellan just before some tens of thousands of penguins were due to return to breeding colonies on three islands in the centre of the straits. By the time she was refloated on 25th September, it was calculated that some 54,000 tons of oil had been spilt, polluting 65 km of coast, while another 50,000 tons has been offloaded, leaving 90,000 tons aboard a potentially leaky single hull for the remainder of her journey, which (it was thought) might now be extended to her place of construction, Japan. There has been comparatively little information on the harm caused to birdlife. However, according to a report circulated by the Smithsonian Institution Center for Short-lived Phenomena, a survey team, including an ornithologist from the Instituto de la Patagonia (Chile), walked 40 km of the affected shore on 4th-5th September and found about 250 dead birds, including over 100 cormorants and 40 penguins. Others were found along unaffected shores, at the top of a 15-metre cliff, and up to nearly a kilometre inland; thus it was thought that the total mortality could have been at least four or five times greater than that indicated by the main count. Since it was considered that much of the oil would have been carried out to sea, there may of course have been even more mortality there. It may be recalled that, in a better-watched area, a leakage of similar size from the *Torrey Canyon* caused a known mortality of at least 10,000 birds. (Contributed by Dr W. R. P. Bourne.)

Captive breeding Those who shared my interest in Derrick England's most useful paper on the escape problem (*Brit. Birds*, 67: 177-197) may like to know that a recent issue of the *Avicultural Magazine* contains (80: 153-159) a 'Register of birds bred in Britain during 1973', compiled by Peter Brown. This first attempt at such a register may be incomplete (for example, Goldfinch is not mentioned), but it is instructive in showing the variety of non-domestic species currently being bred in captivity, and also useful for giving the names and addresses of the aviculturists concerned. The list is much too long to repeat here, but it includes such (to me) surprising birds as Black Kite, American Kestrel, Spur-winged Plover, Snowy Owl, Lazuli Bunting and Spanish Sparrow. It is also interesting to note the absence of entries for certain species known to be difficult to propagate, but which are nevertheless exhibited periodically in the British classes at cagebird shows: the European thrushes and wagtails, Waxwing, Hawfinch and Crossbill come readily to mind. One hopes that this register will be published annually, and will be properly supported by conscientious aviculturists.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

August reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

August was dominated by weather from the Atlantic, a series of depressions crossing Britain and producing generally cool and unsettled conditions with

temperatures below average and rainfall above normal. There were short periods of northerly winds, sometimes strong, especially in the second week, and occasional anticyclonic situations to the east of Britain produced some interesting records on the east coast, particularly in the last few days of the month.

SHEARWATERS TO SWANS

Single **Balearic Shearwaters** *Puffinus puffinus mauretanicus* were noted at Dungeness (Kent) on 9th and 18th, at Hengistbury Head (Hampshire) on 16th, and at Bempton cliffs (Yorkshire) flying south-east on 31st. A **Cory's Shearwater** *Calonectris diomedea* was at Spurn (Yorkshire) on 20th, while what was either this species or a **Great Shearwater** *P. gravis* was seen at Girdle Ness (Aberdeenshire) on 31st. **Sooty Shearwaters** *P. griseus* were reported from nine places, the largest flocks being over 300 at Cape Clear Island (Co. Cork) on 24th and 41 on 10th at Scaton Sluice/St Mary's (Northumberland), where a total of 103 flew north and one south on nine dates during the month.

A **Purple Heron** *Ardea purpurea* was seen on four dates at Minsmere (Suffolk), one was at Hickling Broad (Norfolk) from 17th into September, and another on the River Dee (Cheshire) on 27th may have been the one seen at Pennington Flash on the same day. The only **Little Egrets** *Egretta garzetta* were singles at Tumble (Carmarthenshire) on 2nd and at Stanpit (Hampshire) on 8th. A **Black Stork** *Ciconia nigra* was reported from the Outer Hebrides during the latter part of the month, though the details are not known to us. **Spoonbills** *Platalea leucorodia*, rather numerous in Britain in 1974, were present in at least five places during August with up to three at both Stodmarsh (Kent) and Minsmere; at Blithfield Reservoir (Staffordshire) one which arrived in the middle of July (*Brit. Birds*, 67: 447) was joined by a second at the end of that month, both staying until 16th August, and at Hengistbury Head one was seen coming in off the sea on 3rd.

A **Blue-winged Teal** *Anas discors* was at Hornsca Mere (Yorkshire) from 10th to 26th. The **Long-tailed Duck** *Clangula hyemalis* seen at Whittle Dene (Northumberland) in July (*Brit. Birds*, 67: 447) reappeared on 3rd August, and what was almost certainly the same bird was seen in the same county at Hallington on 10th. Other early winter wildfowl included single **Goldeneyes** *Bucephala clangula* at Netherfield (Nottinghamshire) on 20th and at Staines Reservoir (Middlesex) on 27th; up to ten **Velvet Scoters** *Melanitta fusca* off Minsmere during August, as well as nine flying north at Scaton Sluice on 9th; **Brent Geese** *Branta bernicla* in Kent at Yantlet on 4th (four) and at Chetney on 18th (14); and a **Whooper Swan** *Cygnus cygnus* at Loch Insh (Inverness-shire) on 22nd, plus two at Berwick-upon-Tweed (Northumberland) on 28th which may have been injured.

RAPTORS, CRAKES AND CHARADRIIFORMES

Single **Honey Buzzards** *Pernis apivorus* were noted at Beachy Head (Sussex) on 29th and on the Calf of Man on 30th, and an immature female **Montagu's Harrier** *Circus pygargus* appeared at Sandwich Bay (Kent) on 11th and 16th. **Ospreys** *Pandion haliaetus* were recorded at Chew Valley Lake (Somerset) on 5th and 6th, at Barton Broad (Norfolk) on 9th, at Sevenoaks (Kent) on 12th and 28th (two), on the Calf of Man on 13th, and near Lyng (Norfolk) at the very end of the month. A **Red Kite** *Milvus milvus* appeared at Bough Beech Reservoir (Kent) on 15th. Only a single **Red-footed Falcon** *Falco vespertinus* was reported, a male at Sutton Bingham Reservoir (Dorset/Somerset) on 5th. There were two **Spotted Crakes** *Porzana porzana* at Leighton Moss (Lancashire) on 28th, and a migrant **Corncrake** *Crex crex* was at Beachy Head on 31st.

A very early **Jack Snipe** *Lymnocyptes minimus* was reported at Peggwell Bay (Kent) on 28th, but scarce migrant waders were few. **Kentish Plovers** *Charadrius alexandrinus*, apart from four on Herm (Channel Islands) on 21st, were noted at only four places: singles at Cley (Norfolk) on 10th, at Titchwell (also Norfolk)

from 17th to 26th and at Aberthaw (Glamorgan) on 25th, while at Sandwich Bay there were three from 3rd to 6th and one on 9th and 12th. **Dotterels** *Eudromias morinellus* were found at seven localities: five at Wittersham (Kent) on 16th, two at Beachy Head on 18th, and single birds at Wisbech sewage farm (Lincolnshire/Norfolk) on 24th and 25th, on Fair Isle (Shetland) on 26th, at Seasalter (Kent) on 28th, at Bempton cliffs on 31st (flying south), and on St Mary's (Seilly) from the end of the month until 10th September. **Temminck's Stints** *Calidris temminckii* turned up at eight places, excluding one at Bittell (Worcestershire) from 30th July to 1st August which was omitted from the July reports: two at Rainham (Essex) from 10th, two at Pennington Marshes (Hampshire) on 27th, and singles at two sites in Northumberland, and in Yorkshire, Nottinghamshire, Northamptonshire and Lincolnshire/Norfolk. An extremely early **Grey Phalarope** *Phalaropus fulicarius* was at Washington (Co. Durham) on 2nd, and more typically **Red-necked** *P. lobatus* occurred at Wisbech sewage farm and Minsmere on 10th, at Covenham Reservoir (Lincolnshire) on 18th and 19th and at Walberswick (Suffolk) from 20th to 25th. A formidable array of vagrant waders comprised a **dowitcher** *Limnodromus* sp heard at Steart (Somerset) on 4th and 11th; a possible **Hudsonian Curlew** *Numenius (phaeopus) hudsonicus* on Out Skerries (Shetland) from 24th July to 8th August; **Spotted Sandpipers** *Tringa macularia* at Weir Wood Reservoir (Sussex) from 11th to 17th, at Aberthaw on 25th and on St Mary's from 27th until 11th September; a **Lesser Yellowlegs** *T. flavipes* at Sandbaeh (Cheshire) from 26th to about 20th September; a **Terek Sandpiper** *Xenus cinereus* at Sutton Bingham Reservoir on 18th (a **Western Sandpiper** *C. mauri* was reported from the same place from 20th to 22nd); **White-rumped Sandpipers** *C. fuscicollis* at Pennington marshes on 10th and at Sidlesham Ferry (Sussex) from 24th to 28th; **Pectoral Sandpipers** *C. melanotos* in Hampshire at Farlington marshes on 10th and 11th, at Warsash on 17th and at Calshot from 24th to 26th; a **Black-winged Stilt** *Himantopus himantopus* reported near Cannington (Somerset) on 18th; **Wilson's Phalaropes** *P. tricolor* on the River Parrett, Steart, on 5th, at Dibden Bay (Hampshire) from 14th to 18th, and at Cape Clear Island on 24th; and finally a **Black-winged Pratincole** *Glareola nordmanni* in the Cley area from 24th.

Three **Arctic Skuas** *Stercorarius parasiticus* appeared well inland at Barbrook Reservoir (Derbyshire) on 18th, and **Long-tailed Skuas** *S. longicaudus* were seen at Spurn on 14th, 18th and 27th, and at Minsmere on 24th. Also at Spurn, four different **Sabine's Gulls** *Larus sabini* were identified between 14th and 26th; another Sabine's was at Formby Point (Lancashire) on 17th and 26th. **White-winged Black Terns** *Chlidonias leucopterus* appeared at Swalecliffe (Kent) on 22nd, at Dungeness from 25th until mid-September, at Sandwich Bay on 28th and 31st, and at Covenham Reservoir from 30th until 10th September. Two **Whiskered Terns** *C. hybrida* were seen, at Chew Valley Lake on 10th and at Warsash on 17th; a **Gull-billed Gelocheidon** *nilotica* at Slapton Ley (Devon) from 8th to about 15th; and two **Caspian Hydroprogne** *caspia*, at Spurn on 3rd and at Loeh of Strathbeg (Aberdeenshire) on 13th.

NEAR-PASSERINES AND PASSERINES

From southern Europe came an **Alpine Swift** *Apus melba* to Beachy Head on 25th and **Bee-eaters** *Merops apiaster* to Dungeness on 7th and to Helledon, Norwich (Norfolk), on 26th. Single **Hoopoes** *Upupa epops* were seen at Dungeness on 30th and at Sandwich Bay from 30th to 13th September, as well as at three places on Guernsey during the last week.

Migrant **Great Spotted Woodpeckers** *Dendrocopos major* were on Fair Isle from 9th to 11th (two) and at Spurn on 30th and 31st. The first **Redwing** *Turdus iliacus* reported was at Bamburgh (Northumberland) on 30th, and **Fieldfares** *T. pilaris* arrived at six places, the first on Fair Isle on 9th, with a flock of 25 at

Spurn on 31st. A **nightingale** *Luscinia sp* was on the Farne Islands (Northumberland) in the last week, and the only **Bluethroat** *L. svecica* was at Gibraltar Point (Lincolnshire) on 30th, when a large fall occurred which will be summarised later. On Fair Isle there were vagrant **Reed Warblers** *Acrocephalus scirpaceus* on 23rd and 30th-31st (both trapped); and a **Sedge Warbler** *A. schoenobaenus* was seen on 20th and 23rd. A **Marsh Warbler** *A. palustris* trapped on the Calf of Man on 13th was the first Manx record.

Melodious Warblers *Hippolais polyglotta* were found at Beachy Head on 17th and 28th, at Portland Bill (Dorset) on 17th (three) and from 27th to 31st (two), on Skokholm (Pembrokeshire) on 20th, 21st (two) and 22nd, and on Bardsey (Caernarvonshire) from 30th to 4th September. Reports of 21 **Icterine Warblers** *H. icterina* were received, all from the east coast; only four were outside the two days 30th-31st when an obvious influx took place, with four together at Teesmouth (Co. Durham) on 30th. **Barred Warblers** *Sylvia nisoria* followed a similar pattern, again all from the east coast apart from one at Radipole Lake (Dorset) at the very end of the month; on Fair Isle they appeared from 19th and maxima were four on 29th and six on 31st, while elsewhere ten birds were found, six during the last two days. Tied up with the fall from the north-east were two **Greenish Warblers** *Phylloscopus trochiloides*, one trapped at Tynemouth (Northumberland) on 30th and the other at Kilnsea, near Spurn, from 31st to 5th September. **Wood Warblers** *P. sibilatrix* appeared on the coast at Portland Bill on 4th, at Brean Down (Somerset) on 15th and on Fair Isle on 31st, while a **Bonelli's Warbler** *P. bonelli* stayed at Great Yarmouth (Norfolk) from 30th until 2nd September. An **Arctic Warbler** *P. borealis* was identified on the Out Skerries on 18th. A very unusual record concerned a **Dartford Warbler** *S. undata* discovered on 11th at Steart, well away from the nearest breeding grounds; the bird was still present in October. Two **Red-breasted Flycatchers** *Ficedula parva* were reported, at Old Winchester Hill (Hampshire) on 28th and at Holy Island (Northumberland) on 31st.

A **Tawny Pipit** *Anthus campestris* arrived at Portland about 24th and another at Dungeness on 29th, and at Beachy Head there was one on 29th and two from 30th to 1st September. Also at Portland, there was a **Woodchat Shrike** *Lanius senator* on 23rd and 24th, and on Fair Isle an immature appeared on 30th. A **Serim** *Serinus serinus* was reported from Old Winchester Hill at the end of the month.

A **Scarlet Rosefinch** *Carpodacus erythrinus* on Fair Isle on 29th and another on the Farne Islands on 31st were the only two during August. **Bramblings** *Fringilla montifringilla* were heard passing Bempton on 30th, the day the first **Lapland Bunting** *Calcarius lapponicus* arrived at Spurn. A female or immature **Yellow-breasted Bunting** *Emberiza aureola* remained on Fair Isle from 29th to 3rd September, but the only **Ortolans** *E. hortulana* were on the south coast, one at Beachy Head on 25th and another at Portland on 31st, continuing the steady decline of this species as an east coast autumn migrant.

STOP PRESS Two more Pallas's Warblers at Beachy Head on 17th November made four for that locality, and about ten for Britain, during this autumn. (Earlier, on 18th October, both Dusky and Radde's Warblers were trapped at Beachy Head.) Lesser Yellowlegs were at Truro (Cornwall) and Freckleton (Lancashire) at the beginning of November. A male Steller's Eider was at Westray (Orkney) from 25th October. The biggest news has been of influxes from Scandinavia and huge numbers of Little Auks on the east coast. Passages of up to 319 Little Auks in a day were recorded at Spurn and elsewhere on 29th-30th October. Large flocks of Waxwings arrived at the same time and Rough-legged Buzzards a little earlier, the latter including an unprecedented 45 coasting south at Minsmere on 22nd and 40 at Walberswick (Suffolk) on 24th. Both species appear to be still coming in in mid-November.

SCARCE MIGRANT BIRDS IN BRITAIN AND IRELAND

J. T. R. Sharrock



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Volume 67 Number 11 November 1974

- 449 The birds of Regent's Park, London, 1959-68 *D. I. M. Wallace*
Plate 66

Obituaries

- 469 Matthew Fontaine Maury Meiklejohn, MA (1913-1974) Plate 67
472 Ludwig Koch, MBE (1881-1974)

Notes

- 474 Kestrel taking prey from Short-eared Owl *Geoffrey L. Boyle*
475 Possible functions of the tail spots in the Woodcock *Captain Collingwood Ingram* Plate 65a
477 Feeding association between Marsh Sandpiper and dabbling ducks
J. F. Reynolds
477 Ross's Gull in Hampshire foot-paddling to disturb organisms *Bernard King* Plate 64
478 Cuckoo parasitising Swallow *G. H. E. Young* Plate 65b
478 Great Tit commencing clutch before lining nest *D. Warden*

Reviews

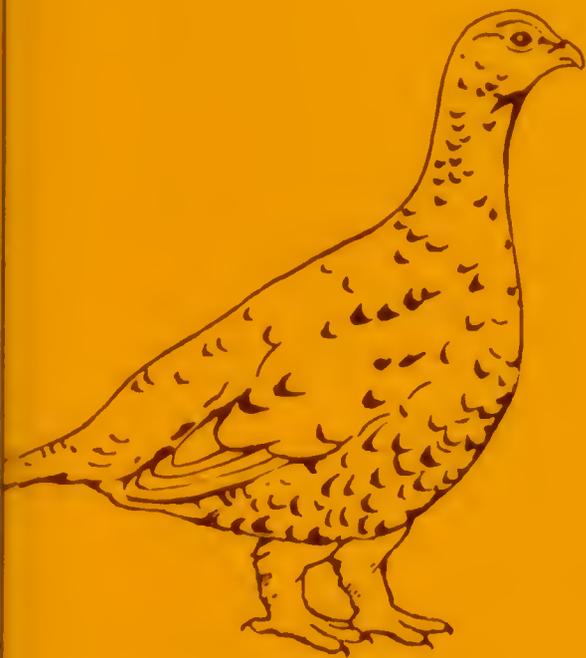
- 479 *The Cairngorms. Their Natural History and Scenery* by Desmond Nether-
sole-Thompson and Adam Watson *David Lea*
480 *Cranes of the World* by Lawrence Walkinshaw; *Owls of the World* edited
by John A. Burton *Stanley Cramp*
481 *Scarce Migrant Birds in Britain and Ireland* by J. T. R. Sharrock *D. I. M. Wallace*
482 *Urvögel* by Stephan Burkhard *Dr C. J. O. Harrison*

Letters

- 483 Oiled seabirds successfully cleaning their plumage *John Phillips, and John R. Mather*
484 Feral parrakeets and control of introductions *K. D. G. Mitchell, and R. B. Tozer*
485 Effects of agricultural change on birds *Dr R. K. Murton and N. J. Westwood*

487 News and comment *Robert Hudson*
489 August reports *D. A. Christie* 

Volume 67 Number 12 December 1974



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VOICE OF BARN OWL

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BRITISH BIRDS

The voice of the Barn Owl

D. S. Bunn

In their descriptions of the voice of the Barn Owl *Tyto alba*, the majority of books make no more than vague mention of eerie screams, hisses and snores, with perhaps some reference to the twittering sounds that can be heard at closer quarters. Apart from a general acceptance that 'snoring' (see pages 496-498) is a food-call, no real attempt seems to have been made to classify and interpret the various notes.

RECORDING METHODS

In order to remedy this, early in 1966 I purchased a portable tape-recorder with an unattended running time of just over two hours. This machine was left before dusk in various buildings known to be frequented by Barn Owls and was collected just before the tape ran out. At first there was a problem created by the noise of the motor being picked up on the recordings, but this was overcome by the acquisition of a long extension lead for the microphone which enabled it to be positioned well away from the machine. This also allowed some attempt at monitoring, and sometimes earphones were used so that the barn was effectively 'bugged'. However, monitoring always proved difficult because it was impossible to forecast the intensity of a sudden call or the distance and direction of the bird uttering it. For the latter reason, especially, a parabolic reflector was not considered a worthwhile investment, and in practice it was safest in most circumstances to use an ordinary

non-directional microphone and to leave the record level at maximum so that nothing would be missed; it was only when calling was fairly continuous, such as when recording the persistent snores of the hen or young, that monitoring could do much to improve the quality of the results. Nevertheless, a fair collection of calls was soon preserved on tape and by listening to them repeatedly I was able to implant them on my memory.

During the following six years, close observation of the species enabled me to interpret these taped calls and also to hear and identify the meanings of others. In this paper seventeen separate 'sound signals', vocal and non-vocal, are defined and discussed.

VOCAL SOUNDS

In this section the calls have been grouped descriptively so far as is possible, beginning with those most aptly termed screams, following these with the more hissing notes and then passing on to the chirruping, twittering and squeaking sounds. The succeeding section deals with two non-vocal sounds.

Screeching

At its best always produced in flight, this is a loud, drawn-out, hissing scream with a marked gargling or tremulous effect (perhaps renderable as 'shrrreeeee'), of about two seconds' duration. The effort of the wing-beats is reflected in the call, as in the speech of a person trying to talk while running. The full screech of the female usually has a different tone from that of the male and is not so perfectly delivered, tending to break off into a less tremulous scream.

This is the *song* of the Barn Owl in the recognised ornithological sense of the term: a declaration of territorial possession, an invitation to hen birds by unmated cocks, a sexual stimulant between cock and hen, and sometimes a contact call to the mate or young when some distance separates them. There are many variations. As dusk falls, cock Barn Owls in particular frequently give series of subdued screeches prior to emergence from the roost. If a hen is present she often joins in with similar screeches. Not all screeches are clear and tremulous: sometimes perched birds give hoarse, non-tremulous versions and there is every gradation between the two. All forms of screech may vary from little more than a chirrup to a very loud scream. Occasionally two loud screeches are run together to produce a most bizarre sound, and during sexual chases the most strange-sounding screeches are heard. During and after encounters with intruding birds, not necessarily of the same species, the screech takes on a harsh tone, apparently expressing anger, but apart from this no differences in the functions of any of the variations have

been detected. The female's screech is generally more husky, this being increasingly evident the louder she calls.

Purring

In the cock this is a continuous series of unusually mellow, subdued, tremulous screeches; the hen's purring is distinctly higher pitched, held on a sustained note and not mellow. This call functions as an attracting or 'come over here' call to the mate. It is used by the cock in courtship to invite the hen to join him at some possible nest-site, and by the hen to call the cock to her at the nest or to some possible future nest-site when he arrives with prey. Subdued screeches can grade imperceptibly into purring.

Wailing

This call has been heard only a few times. It was noted as 'a lower-pitched [than the screech] non-tremulous wail'. On all occasions it was uttered, together with much screeching, during aerial chases in which the two birds dashed to and fro for some time, and this behaviour corresponded closely with records by other workers of what I believe to have been wailing in sexual chases. It was suspected that the hen uttered the wails while the pursuing cock did the screeching. Indeed, this call may simply be a development of the hen's less tremulous screech. I have come to the conclusion that wailing is probably the so-called hoot of the Barn Owl.

Screaming

1. As an alarm call. This is a loud, drawn-out, high-pitched scream or squeal, without a tremulous effect or hissing tone; it is almost always uttered in flight. It may vary in volume, length and tone, but is always easily recognisable. I believe that this alarm call is sometimes thought to be the screech, as it is much more commonly heard in the daytime. It is frequently uttered at the sight of a human being during diurnal hunting activities and rarely when flushed from the roost. Like most birds, Barn Owls are particularly inclined to give the alarm when there are young present.

2. In mobbing. Screaming in this form is an explosive yell, normally quite distinct from the alarm call. It seems to denote a combination of fear and anger, directed at mammalian predators and, according to which emotion is chiefly expressed, differing from the alarm call to a lesser or greater extent. It is usually heard from a perched bird that is screaming abuse at some ground predator. Newly fledged owlets are particularly inclined to use this call because they are not so easily frightened as adults, and they frequently direct it at humans.

3. Expressing anxiety or mild alarm. This is a plaintive but piercing whistle or scream, a subdued version of the alarm call given by a perched bird. It is occasionally given by a hen when the nest is endangered, but it has been heard very rarely, the alarm call being more often uttered in this situation.

4. In distress. A volley of loud screams is uttered, often a progression of the sustained defensive hiss (see below): if a hissing bird is approached closely or handled, by degrees the hiss will develop into this call. It is used also in fighting.

Hissing

1. In defence. This is an incredibly loud and prolonged hiss, repeated again and again, and often ending in a little squeaking whistle as the breath runs out. The bill appears closed but is probably slightly parted. This sound serves to intimidate and frighten off enemies, including aggressive members of its own species. It varies considerably according to how hard the bird is being pressed: the closer it is approached the louder and more screaming the hiss becomes, and A. B. Warburton (*in litt.*) and I have independently heard this call, uttered by brooding hens, to develop into what could only be described as a shrill hoot. There is often a whistling or squeaking quality to the call, most evident at the end, as mentioned above. It is typically uttered by cornered or captive birds but once was directed at a motionless observer by a hen with young who suspected but was not sure of his identity. It has been heard more than once from well-fledged owlets that were suffering aggression from their parents.

2. Also in defence as part of an intimidatory display. A very short, quiet hiss is delivered with the bill open, and is often accompanied by tongue-clicking (see page 499).

3. In courtship. A single hiss, sometimes with a whistling tendency, of greatly varying length and intensity, is uttered now and again when two paired birds are engaged in bouts of squeaking, chirruping and twittering (see page 498), without any separate function that is readily apparent. The more drawn-out hisses seem characteristic of the cock but occur mainly outside the breeding season. It presumably serves to cement the pair-bond.

Snoring

This term is used to describe a greatly varying hiss. It may be short, long or very long, simply a hiss or with a marked rasping or wheezing quality, sometimes with a whistling tendency and at times with affinities to the screech or to the sustained defensive hiss. The stable characteristic which clearly identifies it is that it is repeated usually in a most persistent manner.

Regular snoring is heard only from March to September and is essentially a female and juvenile characteristic. Nevertheless, the cock also snores at times, but it is perhaps significant that in the case of the one pair closely observed throughout a twelve-month period, the cock snored regularly only during the interval between the termination of breeding (when copulation ceased) and the end of September (when snoring stops anyway)—a period when his 'masculinity' was probably at a minimum. Snoring is stimulated by hunger, and not only do the hen and young snore more loudly and persistently when short of food, but I have witnessed both a captive and a wild cock expressing their hunger in this way. In ordinary snoring by the hen, if the cock is close by, her snores are quiet and rapid; if very close and the two are engaging in courtship, the snores are muffled and uttered in quick succession with each breath; when some distance separates them a loud snore is uttered every few seconds. Copulation is accompanied by frenzied snores on the part of the hen which should perhaps be interpreted as a combination of snoring and purring. Much of the variation in tone is only incidental to the movements of the bird's head, for snoring continues while the owl is preening and moving about.

The voice of the hen can usually be distinguished from that of the young by its throaty tone and shorter duration, but certainly not invariably. The snores of newly hatched young are weak and infrequent, though if short of food they can be uttered quite persistently even at this stage. As the appetite develops the snore is heard more often and after a fortnight it becomes very persistent during their accustomed feeding periods. At about this stage it starts to become more wheezy, rasping and drawn out during excitement, and from about three weeks it takes on these characteristics most of the time. It is then an extremely far-carrying sound and for a period of six or seven weeks the owlets scatter discretion to the wind and become anything but secretive. Screech-like, very long, drawn-out hissing calls are occasionally delivered by owlets, on the verge of independence, that almost seem to be exercising their voices. At this stage any activity among themselves, and even more the arrival of an adult with food, causes volleys of frenzied shrieks.

Snoring is not simply a food-call as is so often implied, but is basically a non-aggressive, self-advertisement call. As with screeching, the response depends on the circumstances: when uttered by the adults it strengthens the pair-bond and presumably serves to induce the sexual behaviour necessary for reproduction; when uttered by the young it acts as a constant reminder to the parents of their presence and therefore ensures that they are fed; later it probably serves to suppress for a time the latent aggression of the adults. Snoring also functions incidentally—but nevertheless

importantly—as a contact call, enabling the returning cock to locate the hen, enabling newly fledged owlets to find their way back to the nest by ‘homing in’ on the calls of the owlets still present, and, at a later stage, as a means whereby the young can keep in touch with one another as they explore around the nest site.

Chirruping, twittering and squeaking

This varicid mixture of notes is difficult to describe in detail. Most characteristic is the cock’s self-advertisement call to the hen—a combined little squeak and chirrup when he looks in her direction or approaches her; he also utters a more prolonged, twittering version when he delivers food to the nest. Paired birds in close proximity frequently utter squeaking chirrups and twitters to one another. Outside the breeding season, when the hen is no longer using the snore, she often greets the cock with tremulous squeaking notes. A more twittering version of the chirrup is heard characteristically from a bird being preened by its mate.

These notes are less easy to define than the foregoing. Basically they probably express excitement, but more specifically they usually function as friendly recognition and attention-seeking calls which serve to preserve the pair-bond. Sudden louder twitters from the passive bird in mutual preening seem to indicate discomfort and perhaps serve to warn the active bird to be more gentle: they probably represent the adult form of chittering (see below). The hen sometimes gives a ‘rich’ squeak which appears to be mid-way between a snore and a normal squeak. All these notes are used by both sexes, but some are more characteristic of one particular sex, as already indicated. I can attribute chirrups heard from a captive Barn Owl defending food from a Snowy Owl *Nyctea scandiaca*, from a cock pursued by an over-enthusiastic owlet, and from a captive struggling to escape from a cage, only to excitement.

Chittering

There is a series of chittering (or twittering) notes peculiar to the young, very characteristic during the first month of life. Chicks call loudly with this note when the hen leaves them and also when exploring in the nest area. One newly hatched chick left by the hen gave a whistle with each intake of breath while uttering this call loudly. After the first week the call changes somewhat and becomes faster. It seems to express discomfort and to be attention-seeking; the owlets use it when quarrelling and when touched. Once the hen finally ceases to remain with them the call is used much less frequently, and when they begin to fly it is heard even more rarely, being replaced by the chirruping, twittering and squeaking of the adults from which it can no longer be positively distinguished.

Staccato squeaking or clucking

A repeated staccato squeaking, plaintive in tone and quite different from the ordinary squeaking notes, is uttered by the male during copulation and can be heard quite commonly in the first half of the breeding season owing to the extreme frequency of copulation.

Chattering

A highly distinctive, fast, chattering twitter stimulates the owlets to beg for food and, when used by the cock in food presentation, indicates his intentions. It is, however, seldom given by him except when passing food to his mate in the early nesting period. The hen uses it on the nest from the day prior to the hatching of the first egg (probably she can hear the chick inside the shell) until the young can feed themselves without assistance. At first she utters the call a great deal, not only when feeding the young but also when toying with prey items strewn around the nest.

NON-VOCAL SOUNDS

Tongue-clicking

A clicking sound often accompanies defensive hissing. This expresses excitement and often, more specifically, is used to intimidate. It is also used in courtship. Well-grown owlets tongue-click a great deal in excitement and aggression.

There has been controversy as to whether this sound, which is common to at least all the British owls, is produced by snapping the beak, clicking the tongue, or vocal means. In the case of the Barn Owl each click is preceded by a protrusion of the tongue, the click being heard as the tongue is withdrawn and the bill closed. Observations on owlets in the nest, which are easier to watch closely, suggest that the closing of the bill is too gentle to create the sound and that it is actually produced by the movement of the back of the tongue in the muscular pharynx as the organ is withdrawn. Strangely, the tongue is usually protruded alternately, first from one side of the bill and then from the other.

Wing-clapping

A single smacking sound, usually not at all loud and often followed by a quieter smack—D. Scott (*in litt.*) has recorded a much louder version on rare occasions—forms part of an apparently rather uncommon display by the cock as he hovers momentarily in front of the hen. In its quieter form it may be incidental to the strenuous type of wing-beating involved in hovering. In these cases the wings appear to touch either above or below the body, but Mr Scott believes that the loud wing-claps he witnessed were made on the upstroke. As owls in general clap the wings beneath the body, this is quite at variance with what one would expect.

OTHER INCIDENTAL CALLS

The owlets can use some of the adults' calls while still in the nest. The two defensive hisses and the screams used as an alarm call and in mobbing have all been recorded, and on one occasion I strongly suspected that a juvenile attempt at purring was being made by two-week-old owlets to call the hen back to the nest.

In addition to the vocalisations listed above, there are other incidental sounds not to be confused with calls that have a definite function. While swallowing prey an owl often gives an odd chirp or two, and a male was once heard to make 'a very quiet vocal noise like a contented hen' while preening. Younger owlets frequently utter a drawn-out, high-pitched, whistling sound, and very characteristic is the cheeping sneeze of well-grown owlets (adults sneeze without vocal accompaniment).

DISCUSSION

It is hoped that the above classification represents the complete vocabulary of the Barn Owl but, despite the vast number of hours spent observing the species, it would be rash for me to assume that this is necessarily the case, for there may be calls used only in circumstances so rare that the chances of an observer being in the right place at the right time are very remote. The literature has been searched for help on this aspect and I have, indeed, frequently found descriptions of calls which could not easily be related to any in my own list (e.g., in Witherby *et al.* 1938, Moffatt 1940, Trollope 1971). It would, however, be most undesirable to add these seemingly unrecorded notes to my list, as in all probability they are included already: one of the problems in studying the Barn Owl's voice is the difficulty of describing the calls satisfactorily, none of them being easily rendered verbally on paper, and it is quite likely that I have simply failed to interpret correctly the descriptions of these writers.

Another factor which has hampered classification is the way in which many of the sounds vary and tend to grade into one another. It was at first hard to know which sounds were merely variations of one call and which were to be considered separate with different functions. Sometimes these variations may be significant—for example, the harshness of the screech when a cock bird is attacking or has just driven off an intruder clearly indicates its anger—while in other instances, such as in the numerous variations of the hen's snore as she turns her head, moves about, stretches and preens, they have no importance.

Besides these not altogether unexpected variations, there is a further complication. While I was maintaining almost daily observations on a pair throughout the breeding season, I noticed that

the hen's snore changed in character from day to day; it varied in tone, volume and frequency. Similarly, the vocalisations of the fledged young differed at each vigil. On some evenings an owlet would do little more than snore, while on others it would continually utter a variety of chirruping and squeaking notes for no apparent reason.

ACKNOWLEDGEMENTS

I should like to thank D. Scott, H. Shorrocks and A. B. Warburton for their help in communicating to me their own experiences relating to the calls of the Barn Owl. My thanks are also due to the Forestry Commission and to Miss R. Edmundson and Mr and Mrs D. Lord on whose land my research was conducted.

SUMMARY

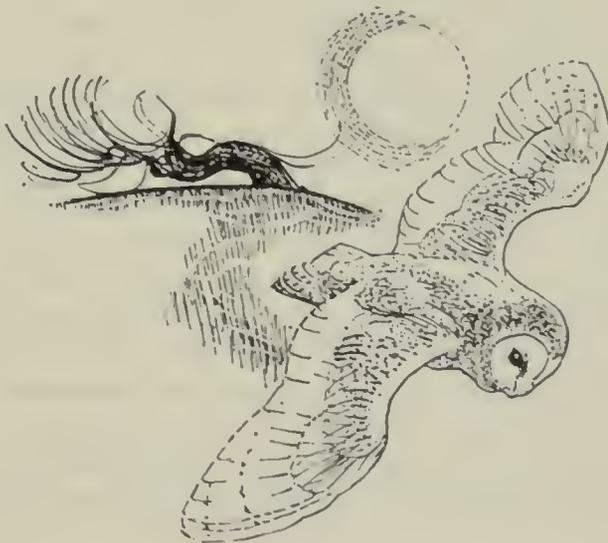
Very little seems to have been published regarding the vocabulary of the Barn Owl *Tyto alba*. This paper sets out the findings of a long-term study of its voice, made with the aid of a portable tape-recorder, and describes and interprets in detail seventeen separate 'sound signals', including two non-vocal sounds. The difficulties of interpreting the calls correctly are discussed.

The young have been noted to use some of the adults' calls while still in the nest. Four other sounds appear to have no function, being incidental to other activities.

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Studies of less familiar birds

174 Shore Lark and Temminck's Horned Lark

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Photographs by J. B. and S. Bottomley, Eric Soothill, Eric Hosking and Allen D. Cruickshank

Plates 68-71

Photographs of Shore Larks *Eremophila alpestris* last appeared in this journal as long ago as 1952 (Wood 1952). Circumstantial evidence of probable breeding in the Scottish Highlands in 1972 and 1973 (Watson 1973) makes this an appropriate moment to publish a new series of photographs of both the Shore Lark and its sole congener, the Temminck's (or Desert) Horned Lark *E. bilopha*.

The Shore Lark, with a circumpolar, mainly Holarctic, distribution, breeds from the highlands of southern Norway, through Fenno-Scandia and across northern Eurasia, north of the Arctic Circle, as far as the Kolyma River. It is absent from a large area of the central Palearctic, but to the south breeds discontinuously from the Balkan mountains through Asia Minor, the Caucasus and Iran, reaching Afghanistan, the Himalayas and Tibet, thence fanning out eastwards through Mongolia to reach the Stanovoi and Tukuringra Mountains. A species originating in a paleomontane fauna, it colonised the New World in a relatively recent geological period; it is the only true native lark of North America, where it is known as the Horned Lark, and is the only species common to the steppe zone in both continents. Ranging from Alaska and the arctic coast of Canada to Lower California and Mexico, it enters the Neotropical zone with an isolated population breeding in grassy savannah at over 2,000 metres on the Bogotá plateau in the Colombian Andes. Similarly, there is another southern, outlying population in Africa, breeding in the High and Middle Atlas Mountains. (Data from Dementiev and Gladkov 1954, Vaurie 1959, Voous 1960, British Ornithologists' Union 1971.)

In Britain the Shore Lark's status hitherto has been that of a spring and autumn passage migrant with a variable number wintering, principally on the east coast. In the light of the report of probable breeding in Scotland it is significant that a southward extension of the Scandinavian breeding range in the last few decades has been described by Bannerman (1953), drawing on the experience of Dr H. M. S. Blair. On the 1,300-metre plateau of Hardangervidda in southern Norway, at the same latitude as Shetland, the species is now a common breeder.

Despite wide fluctuations in the numbers wintering in Britain, there is evidence of an overall increase in the last decade or two and occurrences away from the east coast are increasingly frequent and dispersed more widely. For 30 years after the first specimen was collected at Sheringham, Norfolk, in 1830, few were noted, but by 1870 notable increases in both numbers and range had occurred (Bannerman 1953). Towards the end of the 19th century, Shore Larks were being taken in Kent on the Dover cliffs (Balston *et al.* 1907) and H. N. Pashley, a taxidermist at Cley, Norfolk, was handling dozens of specimens each year (Pashley 1925). Bannerman (1953) cited H. Gätke's reports of great increases in passage birds on Heligoland from mid-century, which by 1890 had grown to hundreds of thousands every autumn, with thousands returning each spring. In Britain the Shore Lark's predilection for the east coast between Teesmouth and Kent was becoming evident. In the last 20 years, at places such as Teesmouth, Spurn (Yorkshire), Donna Nook and Gibraltar Point (Lincolnshire) and Cley, flocks of 150 or more have been regularly reported in years of abundance. Numbers up to 50 are more usual, but most reports, particularly away from the main wintering areas, speak of two or three birds, widely dispersed.

Occurrences at Minsmere, Suffolk, are interesting. In the 1960's Shore Larks were present mostly in twos and threes, with never more than 14 at any one time, though a flock of 50 wintered regularly nearby at Slaughden, Aldeburgh. During this period the 'Scrape' was being created on the bird reserve; by 1972 this was a shallow lagoon of some 20 hectares of brackish water and exposed mud, with large colonies of *Aster*, *Salicornia* and *Spergularia* developing when it dried out in the autumn. In winter 1972/73 numbers on the 'Scrape' reached 60-80 from December until March; in the following winter the pattern was similar, but numbers were halved. Waste seed, mainly poppy *Papaver sp* and fat hen *Chenopodium album*, was put out in both winters, and Shore Larks joined the Skylarks *Alauda arvensis*, Twites *Acanthis flavirostris* and Linnets *A. cannabina* attracted by this bounty, but never lost their preference for naturally occurring *Salicornia* seed (H. E. Axell *in litt.*).

Hindle (1974) summarised the situation in Kent, at the southern end of the main British wintering area, for the years 1952-72. Totals did not exceed 14 in any year before 1969, and during 1964-66 only a single bird was recorded in the whole of the county, but from 1969 a dramatic increase occurred, with over 300 birds reported in the next four years. In autumn 1969 Sussex, too, shared in the influx; the Isle of Wight had its first four birds; there were two as far west as Somerset, and five inland in Huntingdonshire. Four at Portland, Dorset, in October 1972 were exceptional and two

on St Agnes, Isles of Scilly, even more so, likewise the first occurrence on Guernsey in November 1973. In April 1973 there were seven in Anglesey and in May two on the Isle of Man. Most Scottish reports have been from Orkney and Shetland, where a few autumn migrants usually occur, and more recently from the Firth of Forth area; there are only four Irish records, all from the south-east. Inland records, mostly from reservoirs and gravel pits, have become less rare in recent years.

Shore Larks depart late from their northern breeding grounds, so that their main arrival in Britain is usually not until the third week of October. The earliest arrive in the second half of September, sometimes in summer plumage, though there are very occasional August records. Numbers increase to a peak in early winter, but decrease again as many birds appear to move on. Reports mount again as the time approaches for the general departure north, in early April. In some years there are sizeable totals well into April and a few remain even in May. At Cley a straggler stayed until mid-June 1973 and a disabled bird until July. During 1959-72 51 were ringed but, unfortunately, as yet without yielding any foreign recovery.

In Britain, Shore Larks typically winter on the coast, often on the seaward side of dunes, where they are to be seen busily feeding, moving with a slightly crouching, mouse-like action, or sheltering in the lee of small clumps of vegetation. They feed out on the mud and sand exposed at low water, retreating before the rising tide to shingle banks and shell beaches, often in the shelter of sea walls, where they forage with such species as Greenfinches *Carduelis chloris*, Linnets and Snow Buntings *Plectrophenax nivalis*. Disturbance frequently drives them inshore on to saltings and arable land where they mingle with Skylarks and Meadow Pipits *Anthus pratensis*. Newly arrived birds are often very approachable, but Hindle (1974) reported that they become very wild by January. Incidentally, there is an inland record from north Kent in January 1956 of several Shore Larks seen by artificial light on a railway track, one dazzled bird being caught and identified (*Kent Bird Rep.* 1956); roosting on American railroads was recorded in the 19th century (*Auk*, 12).

Shore Larks are medium-sized larks, about 17 cm long, the males especially being characterised by a striking head and neck pattern. The forehead, supercilium and throat are a pale yellow contrasting with the broad black band across the crown, at the sides of which the elongated feathers give rise to the distinctive black 'horns'. A further black band from the bill across the cheeks and curving down the sides of the throat, with a separate black gorget, completes the pattern. The car-coverts are dusky brown, the sides of the breast pinkish and the underparts mainly white. Indistinct darker brown

streaking on the brown upperparts is more marked in the female (plate 69a). From the back of the crown to the hind neck, and on the uppertail-coverts, there is a pinkish tinge, most marked in summer when the yellow on the head tends to fade to whitish. The tail has a central pair of brown feathers with dark centres, the remainder being brownish-black with slight white fringes more prominent in the outer pair where the outer webs also are white. White fringes relieve the dark brown of the primaries and secondaries. The female is duller, the black markings of the head and neck more restricted, particularly at the base of the upper mandible, and the pinkish tinge less marked. The 'horns', much reduced in the female, are absent from young birds which have a drabber pattern relieved by buffish tips to the feathers, giving the upperparts a very spotted appearance. In winter (plate 68b) the unabraded plumage, acquired by a complete moult in early autumn, is not so well marked, since dark feather tips obscure the yellow areas, yellow tips to the black crown feathers modify their appearance and the back looks less pinkish (Witherby *et al.* 1938). Hindle (1974) describes a plumage character visible both in the field and in the hand: a double pale wing-bar, caused by cream tips to the greater and median coverts, is present during October-December, when the head pattern is obscured; but later it fades. In flight the Shore Lark completely folds the wings after each beat, but without any undulation resulting. The contrast between the white underparts and the dark tail is distinctive.

Some 40 subspecies have been described over the Shore Lark's wide range, differing mainly in the distribution of black on the head and neck, the shade of the yellow areas and the colour of the upperparts. That occurring in Britain is *E. a. flava*, the race breeding in northern Eurasia. There is a solitary record, in September 1953, from the Outer Hebrides of a North American race of the Horned Lark *E. a. alpestris* (British Ornithologists' Union 1958), and so there is a possibility that some of the early autumn west coast records are of this race.

Some southern races of the Shore Lark which have white replacing the yellow areas approach the plumage pattern of Temminck's Horned Lark (plates 69b-70). The latter, at 14 cm, is smaller, but the bill (as in many desert-inhabiting larks) appears heavier. The facial pattern is black and white, yellow being entirely absent; the white frontal band is broader; the back is a rather uniform cinnamon-sandy with the dark primaries and tail strongly contrasted. The white of the outer tail-feathers is clearer and more sharply contrasted than in the Shore Lark. Stanford (1954) described two males running like pink mice on a pinkish-buff desert: in such circumstances the bold facial pattern is surprisingly inconspicuous,

but when the bird pauses and stands erect, often on some slight eminence, this and its erect 'horns' make it conspicuous from afar (Bannerman and Priestley 1952). In flight a white trailing edge to the wings is visible, a feature not present in the Shore Lark.

Voous (1960) denied specific status to Temminck's Horned Lark and included it with the Shore Lark in a monotypic genus. It is true that no geographical overlap of the breeding ranges has been demonstrated, but Temminck's is a manifestly different bird in the field and, in particular, its choice of a desert habitat separates it from the Shore Lark. Although it avoids bare sand *ergs*, it is found in a variety of arid terrain, ranging from flinty *hammada* to semi-steppe with a thin cover of *Artemisia* shrublets, *Anabasis articulata*, or sparse perennial grasses. Dry, silty *wadi* beds are favourite sites. It breeds in Rio de Oro and southern Morocco, and from the west Algerian border through Libya, Tunisia and Egypt into the Sinai Desert, thence north-eastwards through northern Arabia, Jordan and the Syrian deserts to western Iraq (Hüe and Etchécopar 1970). Nelson (1973) placed it as the third commonest breeding lark, after Lesser Short-toed *Calandrella rufescens* and Bar-tailed Desert *Ammomanes cincturus*, at Azraq, in east Jordan, where the photographs on plates 69b-70 were taken.

Shore Larks, on the other hand, prefer mountainous regions above or beyond the tree-line, seldom below 1,500 metres in south-east Europe and occurring above 5,000 metres in the Himalayas (Sálim Ali and Ripley 1972). Smith (1965) found them on barren slopes with unmelted snow at 1,800 metres in the Middle Atlas, but elsewhere in Morocco down to 1,400 metres in halfa grass *Stipa*. In Turkey, Gaston (1968) reported flocks and breeding birds in the pasture zone of the Taurus Mountains with smaller parties on rocky slopes and screes up to 3,200 metres. To the north, barren open ground is preferred, whether on the more southerly steppes or on the arctic tundra of northern Eurasia; in the extreme north they breed on treeless plateaux, descending to sandy areas near the coast. Throughout Fenno-Scandia they favour rather barren areas with low, straggling cover of creeping birch *Betula nana*, crowberry *Empetrum* and reindeer moss *Cladonia rangerinifera* and other lichens, often by lake shores and arctic coastal settlements (Bannerman 1953).

In North America the situation differs. The absence of native larks has permitted the Horned Lark to colonise widely differing habitats, from barren arctic shores and gravel ridges, mountain pastures and sparsely vegetated slopes to prairies with short grass, farmland, golf courses and the vicinity of dwellings, as well as sandy and rocky deserts from California southwards (Bent 1963).

In general only the tundra populations migrate, local movements being usual elsewhere. The picture of migration presented by

Bannerman (1953) raises many unanswered questions. Autumn passage at Heligoland is reported to be from east to west, yet no large flocks are recorded in Continental western Europe to the south and west of Heligoland. On the other hand, Denmark, Germany and eastern Europe seem to hold a considerable winter population. One can only speculate about the final destination of the birds leaving Britain in late March, and the origin of the considerable numbers leaving Heligoland in the latter half of April is also unclear. A straggler recovered in Spain had been ringed in Sweden (Saéz-Royuela 1952).

As the winter population of southern Sweden moves north in April, large flocks arrive from the south. The birds arriving in Finnmark in late April and early May are thought to travel by a more easterly route in both spring and autumn. Russian breeding grounds as far north as Novaya Zemlya are not occupied until late May. Males arrive first, followed shortly by the females, and they remain frequently until after the first snows before the return migration gets under way, from the end of September to mid-October. The main concentration of south-going, Scandinavian and Finnmark birds leaves on an easterly heading. Winter flocking, often at considerable altitudes, is widely reported in southern Asia and the Middle East, but movements to lower ground seem general in snowy conditions. Similarly in North America immense flocks are seen at the approach of winter, with birds from the inhospitable north moving south towards the more sedentary populations of the southern states. In spring the former are among the first migrants to return north.

Temminck's Horned Lark indulges in local movements only, doubtless influenced by the ephemeral nature of much of the desert vegetation. Smith (1965) reported loose flocks of over 100 birds in south-east Morocco in November.

Shore Larks and Horned Larks forage in more open areas, but often take food from under or inside plants. A broad spectrum of vegetable and animal matter is eaten. Fruits of bilberry *Vaccinium* are important in northern areas, and weed and grass seeds in autumn and winter, particularly in snowy conditions. In many areas of North America immense flocks are reported to invade farmyards, ranches and even towns in search of grain and other seeds. Temminck's Horned Lark is similarly omnivorous. Fleshy tips of desert xerophytes are favoured, and although Meinertzhagen (1954) stated that grasshoppers (Acrididae) are ignored many other insects and their larvae are taken. Tightly packed feeding flocks observed in Morocco were turning over large stones (Smith 1965).

Bent (1963) and Beason and Franks (1974) have given full descriptions of the calls and songs of Horned Larks which agree

substantially with those of Shore Larks. The commonest call is variously rendered as a clear 'tseep', 'tsee-ree' or 'su-weet', reminiscent of Yellow Wagtail *Motacilla flava* or Rock Pipit *Anthus spinoletta*. A clear ringing call is heard on the breeding grounds. The song, bearing a family resemblance to the Skylark's, is of poorer quality, less well developed, and typically delivered from a stone or other low eminence. There is also a song-flight in which the bird rises silently to 100 metres or more, and, while gliding in wide circles, sings snatches of low warbling song. A recitative type of song is associated with slow, fluttering wing-beats. Gliding song-flights are interspersed with short, rapid, vertical fluttering to regain height, and a silent plummet to earth on closed wings ends the song-flight, which averages about 2½ minutes. This aerial song is associated with courtship, but that delivered on the ground is a manifestation of territorial behaviour and often follows chases and fiercely contested fights a few metres above ground. Temminck's Horned Larks have similar calls; the song is described as more disyllabic and less vigorous, but the aerial component is more marked, and most observers agree that there is no final dive to earth.

In courtship display, the male Shore Lark struts with body horizontal, wings drooped and tail spread; the 'horns' are raised and the black gorget displayed while a chittering call is being uttered with the bill open. Sexual chasing from ground to air is marked. The female's invitatory display is somewhat similar, but with the tail moved from side to side. Courtship feeding has been reported.

Much of the information concerning the breeding cycle derives from extensive American studies (Bent 1963, Verbeek 1967, Beason and Franks 1974). Whereas the Shore Lark breeds in rather open, thinly vegetated ground, often beside a grassy tussock or, more rarely, on a slightly raised hummock, the Horned Lark additionally nests in sites which in the Old World would attract Skylarks and Crested Larks *Galerida cristata* in farmland, stubbles, fallow, winter-sown corn and even near houses. The female selects the site and, although a natural depression is sometimes utilised, it is more usual for her to excavate, using mainly her bill, a fairly deep nest cavity some 8-9 cm in diameter. Within the cavity she constructs the nest, rather loosely built of grasses, small twigs, lichens and fine roots, with a lining of finer grasses and down of arctic willows *Salix*, cotton-grass *Eriophorum*, pappi of various Compositae and sometimes a few feathers or hairs. A great variety of both natural and artificial materials is incorporated by Horned Larks outside the tundra regions. The finished nest is about 4 cm deep and averages 6.5 cm in diameter.

Nests of Temminck's Horned Lark are basically similar, with

modifications imposed by the lack of protection in the open desert. They tend to be more deeply buried and tucked under the shade of a small shrub as in plate 69b. A nest in silty desert in northern Jordan had only minimal shade from a small stone on otherwise completely bare ground. Soft grass seed-heads figure largely in the nest linings. An unusual feature of the nests of most desert-dwelling larks is the presence of a paving or rampart of small stone chips or flakes of dried mud. This is found almost invariably in nests of Temminck's Horned Lark, that in plate 69b being a good example; the Shore Lark's nest in plate 69a has a less well developed surround which includes fragments of peat as well as stones. Other locally available material is frequently incorporated, particularly by Horned Larks. The purpose of these structures is variously explained as giving protection from blown sand and dust and providing shade in open desert conditions; covering the loose soil dug from the nest cavity; or merely providing a ramp access to the nest. Beason and Franks noted that pieces of paving were dropped into the cavity, apparently to prevent material being blown away, during nest-building. As nests are frequently sunk deep in the ground, it may be that the paving helps to shed water and protect against possible flooding in rainy conditions.

Some Scandinavian and Siberian birds are double-brooded, laying in the last week of May and at the end of June (but up to three weeks later in the extreme north of the Siberian range). Eggs of single-brooded individuals are laid about a fortnight later than the first of the double-brooded clutches. Clutch size varies from two to five, commonly three or four, very exceptionally six, and eggs are laid on consecutive days. Incubation begins on the completion of the clutch, but sometimes a little sooner in early nests of Horned Larks. The female alone incubates and, although the male occasionally feeds her on the nest, more usually she slips off to feed herself.

The eggs, which vary widely in colour, are generally greenish-white, marked with yellowish-brown spots and not uncommonly a few hair-streaks. Those of Temminck's Horned Lark have violet and brick-brown spottings and are often almost impossible to separate from the eggs of other 'desert' larks; they average slightly smaller than those of Shore Larks. Temminck's lays two or three eggs, sometimes four, generally in April, but as early as March in the south. Hatching in northern Jordan was observed in the last few days of April.

Incubating females closely observed in Illinois (Beason and Franks 1974) left the nest quietly when an observer approached to within 100 metres, but repeated disturbance tended to produce injury feigning which is also observed when there are small young out of the nest. Studies of American races indicate an average incubation

period of eleven days. Both parents feed the young, which leave the nest, often before they can fly, on about the tenth day but, reportedly, as early as the seventh day in later broods. Similar data for Temminck's Horned Lark are lacking. At the very exposed nest in northern Jordan one parent remained constantly with the young to provide shade from the sun and permitted very close approach. The incubating bird in plate 70, during a sudden dust storm, became very agitated, repeatedly leaving the nest or restlessly moving about on the eggs with fluffed-up feathers and open bill. Another pair in the same area was watched sharing in the feeding of large chicks about to fledge from the nest of a Lesser Short-toed Lark, to the extent of occasionally attempting to drive off the parents.

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Notes

Hen Harriers' hunting behaviour in south-west Scotland

Hen Harriers *Circus cyaneus* are generally regarded as solitary hunters. For example, J. J. and F. C. Craighead (1956, *Hawks, Owls and Wildlife*) found that in winter Marsh Hawks *C. c. hudsonius* had individual hunting ranges from 30-40 acres (12-16 hectares) to one square mile (259 hectares) or more. In the winter of 1973/74 I noticed that Hen Harriers were hunting at times in loose groups in two areas (A and B) in south-west Scotland, and I subsequently made over 35 hours' of observations there between 18th November 1973 and 17th February 1974.

Area A (85 hectares) consisted of two kale fields bordering a wide expanse of common rushes and rough pasture with scattered whin bushes growing on the drier ground. A small burn intersects the rushes, flowing into and out of a freshwater marsh. Area B (27 hectares) consisted of two kale fields separated by a pasture field; all three had been rough marginal land before they were drained in 1972-73. They were bordered to the south by a wide expanse of low-lying moorland and to the north and east by two minor roads. In winter grain was spread for feeding Pheasants *Phasianus colchicus*, and the fields in both areas were systematically grazed by domestic animals.

Each area lay about 1.6 km from the harriers' communal roost. Only those observations made between one hour after sunrise and one hour before sunset are considered here, because some harriers frequently hunted over these areas on their way from and to their roost.

On seven dates I saw two to five harriers hunting together in areas A and B (table 1). On other occasions only one was present. They were seen to attack Pheasants, Curlews *Numenius arquata* and Woodpigeons *Columba palumbus* without success. As they approached these birds, the harriers put on a burst of speed and attempted to take them on the ground or just as they flew up ahead. A harrier beating near ducks usually caused them to fly up, circle and land

Table 1. Sightings of two or more Hen Harriers *Circus cyaneus* hunting together in areas A and B, south-west Scotland, winter 1973/74

Date	Area	Males	'Ringtails'	TOTAL
18 Nov 1973	B	1	2	3
24 Nov 1973	B	1	1	2
1 Jan 1974	A	1	2	3
5 Jan 1974	A	3	2	5
6 Jan 1974	A	1	2	3
19 Jan 1974	A	3	0	3
20 Jan 1974	A	1	1	2

again. When the harriers flew near flocks of waders, gulls or passerines, these would fly up in apparent panic to settle again quickly once the predator had passed; once a Lapwing *Vanellus vanellus* swooped on a 'ringtail'. Pounces by the harriers into the kale fields were frequent and sometimes sustained, the raptor hovering intently, with talons dangling. Sometimes harriers landed in or on top of the kale. On one occasion a 'ringtail' dropped six times in the same spot until a Blackbird *Turdus merula* flew away from below it; the harrier did not give chase. Only once was a Hen Harrier (a male) seen to be successful in capturing a Blackbird, and this was after four pounces into the kale. Carrion Crows *Corvus corone* sometimes pestered the harriers and on three occasions forced one to abandon its hunting, making it fly out of the area (twice) or land on the ground (once).

Sometimes the harriers hunted in close association, leading to occasional interactions between them when they swooped on each other; once two males came together and touched talons. On 1st January 1974, in area A, a male and a 'ringtail' had a particularly close association, as follows:

11.15 hours Male hunting kale field. Put up about 50 Woodpigeons, twisting and turning after one but without success. Some feral pigeons *C. livia* also flew up; male chased one with white wings, without success.

11.17 hours Male joined by 'ringtail'; both hunted rushes together, 'ringtail' following male. 'Ringtail' hovered over cock Pheasant which stretched neck and jabbed with beak; 'ringtail' flew away and male landed in rough grass near Pheasant.

11.19 hours 'Ringtail' pounced into rough grass at burn side near male. Flew up half a metre or so with fairly large black object (rat?) in talons and dropped it, hovering above it. Prey animal jumped up at harrier which continued to drop on it, holding it in talons, flying up and dropping it again. Animal continued to jump up at harrier when free. Male flew over and landed near 'ringtail', which flew closer to male with prey in talons and landed, dropping prey. This must have escaped, for male rose quickly, dived into rushes once and then flew away; 'ringtail' remained a few moments, then hunted kale field, landing in rushes in heavy rain at 11.30.



PLATE 68. Winter-plumage Shore Lark *Eremophila alpestris* nibbling seeds of glasswort *Salicornia*, and typical habitat of 'strip' saltings between areas of sea-buckthorn *Hippophaë rhamnoides*, Gibraltar Point, Lincolnshire, December 1972 (photos: J. B. and S. Bottomley) (pages 502-511). Up to 100 have occurred here





PLATE 69. Above, female Shore Lark *Eremophila alpestris* incubating, Varanger Fjord, Norway, June 1972 (photo: Eric Soothill): note collection of small stones and pieces of dry peat in front of nest. Below, the smaller Temminck's Horned Lark *E. bilopha*, Jordan, April 1965 (photo: Eric Hosking) (pages 506, 508-509)





PLATE 70. Temminck's Horned Larks with two young at a very exposed nest, also Jordan, April 1965 (photos: *Eric Hosking*); nests are usually tucked under the shade of a stone or desert shrub, as in plate 69b, which also shows a good example of the typical 'paving' of small stone chips round the cavity (page 509)





PLATE 71. North American Horned Larks *Eremophila alpestris* at different nests with young, Utah (photos: Allan D. Cruickshank). This is the only lark to have colonised America, where it has become adapted to a great variety of habitats, from arctic tundra south to Mexico and in the Colombian Andes (pages 502, 506)



11.38 hours 'Ringtail' up hunting kale field again; flew across rushes and put male off fence post. Male landed in rushes and 'ringtail' landed on fence post at 11.40, later flying to land in rushes near male.

11.49 hours Male up hunting rushes joined by second 'ringtail'. Male flew across and swooped on first 'ringtail' in rushes. All three harriers circled each other, both 'ringtails' fluttering together, and at 11.51 landed in rushes in heavy rain quite near each other.

Rev Edward A. Armstrong (1943, *The Way Birds Live*) cited a record of a Marsh Hawk having a 'cat and mouse game', similar to that above, with a 'lark' (presumably a Horned Lark *Eremophila alpestris*) which it flew up with and dropped seven or eight times, each time seizing the lark as it tried to flutter away.

The harriers apparently rested between periods of hunting by dropping into the rushes, landing on fence posts or landing on or in the kale. These pauses lasted from less than one minute up to 25 minutes (mean, ten minutes). Weather conditions may have affected hunting periods: for example, once in heavy rain and squally conditions a male landed three times in 60 minutes and was inactive for 38 of those minutes, while on another occasion a male landed in cloudy, dry weather twice in 60 minutes, during which it was inactive for 35 minutes. J. J. and F. C. Craighead (*op. cit.*) found that 57% of the harriers' time was spent on the ground in bad weather.

Most of the kale at area B had been eaten by sheep by the end of December 1973, and most at area A by cattle by the beginning of February. The harriers' visits then became increasingly infrequent, only one being present or none at all.

R. C. DICKSON

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Large spring roost of Whimbrels in Bridgwater Bay In late April and early May each year since 1972, marked evening movements of Whimbrels *Numenius phaeopus* have been seen by myself and many other observers in the Bridgwater Bay National Nature Reserve, Somerset. Small and large flocks, sometimes totalling many hundreds, have been watched flying out to Stert Island to roost. This small island, though no more than a kilometre west of Burnham-on-Sea, is difficult to reach, being separated from the mainland by a very strong tide race with a rise and fall of about twelve metres. At low tide it is surrounded by precariously soft mud banks.

The main evening movements (all times BST) during the three years are set out in the table overleaf; on 6th and 7th May 1974 birds were still arriving at the close of observations. The peak numbers are believed to be unprecedented anywhere in Britain.

The island is used solely as a roosting place for a relatively short period in spring, with no comparable autumn gatherings noted. It is thought that during the daytime the Whimbrels disperse widely over the inland levels to feed, returning to the roost each evening.

Date	Period of observation	Main movement	Total numbers
6 May 1972	19.20-20.50	19.45-20.45	1,415
25 April 1973	19.25-20.10		149
1 May 1973	19.23-21.00	From 20.10	1,978
5 May 1973	19.10-21.20	From 20.45	1,972
23 April 1974	20.05-20.40		24
30 April 1974	20.00-20.40		236
3 May 1974	19.50-20.00		979
6 May 1974	20.04-21.10		315+
7 May 1974	20.19-21.25	From 20.45	467+

For example, J. A. McGeoch noted 155 flying along the Brue valley towards Stert Island during 19.00-21.00 hours BST on 6th May 1972 (*Somerset Birds* 1972: 36).

Incidentally, these large roosting flocks seldom give the well-known tittering calls in flight but sometimes utter bubbling cries like the song of Curlews *N. arquata*. Bernard King (*in litt.*) also noted these bubbling calls from about 100 Whimbrels which settled briefly at Cheddar Reservoir, Somerset, in the evening of 3rd May 1953 before dispersing in the direction of the coast (*Brit. Birds*, 46: 411).

BRIAN E. SLADE

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Abnormal numbers of Little Gulls in Ireland in summer

Unprecedented numbers of Little Gulls *Larus minutus* were recorded in Co. Wicklow in January and February 1974 (*Brit. Birds*, 67: 166-167). Another influx followed southerly gales on 10th May, and from 19th May until 15th June between 44 and 52 were regularly present on the same stretch of coast, with the highest count on 12th June. Numbers gradually declined until the last three on 4th August. Apart from one or two adults at first, all were in their first year. The birds invariably frequented a broad saltmarsh channel at both high and low tides, whereas those in January and February were always found along the tideline.

R. F. RUTTLEDGE

Doon, Newcastle, Greystones, Co. Wicklow

A paper on the recent increase of the Little Gull in both Britain and Ireland is in preparation. EDS

Male Cuckoo using plant material in display On 19th May, at Rostherne Mere National Nature Reserve, Cheshire, I saw two Cuckoos *Cuculus canorus* flying across a pasture field. One bird, which seemed by its subsequent behaviour to be the male, was carrying a flowering head of common reed *Phragmites communis*. Both alighted some five metres apart on the top of a thorn hedge. The male began

shaking the reed head vigorously, causing it to break into smaller pieces; at the same time he assumed a 'begging' posture in which the body was lowered, the wings partly opened and the tail raised to a nearly vertical position and fanned out. He then flew to a nearby post where, with the reed head now much smaller, the same ritual was repeated. The female then flew a little further along the hedge, and the male dropped the reed head and followed her, alighting on a farm gate. At first he squatted parallel with the top rail, but then he turned across it and began to repeat the previous display without the reed head. The female flew past him towards the reed-beds on the edge of the mere, and he followed her until lost from sight. Neither bird was heard to call during the display, though calling had been heard for long periods prior to the observation.

This display has obvious parallels in the courtship rituals of some non-parasitic species in which nest material is offered by the male to the female, but its use by a parasitic species appears incongruous.

RONALD HARRISON

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During the afternoon of 27th May 1974, at Nanquidno, St Just, Cornwall, I witnessed some interesting behaviour by a male Cuckoo. It was perched on barbed wire, close to but facing in the opposite direction from a hepatic female, and, with rather slow and purposeful movements, it bowed a little to and fro. Then three times it flew to an adjacent field where it gathered bents and dead grasses in its bill; each time it returned and 'presented' these to its mate while again performing the bowing. On each occasion, after a minute or so, it slightly opened its bill, thus allowing the material gradually to fall away from its mouth. Soon afterwards both birds departed to the nearby fields and were not seen again.

Maurice Tibbles, who is conducting researches on Cuckoo behaviour, has informed me (*in litt.*) that he has not seen this type of display, nor does he know of it in the extensive literature at his disposal.

BERNARD KING

Gull Cry, 9 Park Road, Newlyn, Cornwall

Treecreepers apparently feeding on fat In early January 1974, in my garden at Jordanhill, Glasgow, I daubed some beef dripping fat (after melting it) on the trunk of a sycamore tree in the hope of attracting a Great Spotted Woodpecker *Dendrocopos major* which had been present for a few days. The fat was spread from about shoulder to waist height, on one side of the tree only. By mid-January two Treecreepers *Certhia familiaris* were visiting the garden daily, mostly at dusk. They invariably gravitated to the fat-daubed area

on the sycamore, and I concluded that they were consuming the fat. They did this surreptitiously when the regular Blue Tits *Parus caeruleus* and Great Tits *P. major* were not feeding there. Their visits ceased in mid-March, after which they apparently vacated the area. The woodpecker was not seen to take the fat at all.

RICHARD S. GREENWOOD

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Leaf-shaking by Dunnock On 25th November 1973, in a rose bed in my garden at Paisley, Renfrewshire, I saw a Dunnock *Prunella modularis* with a withered leaf of Virginia creeper *Parthenocissus* in its bill. The Dunnock was hopping about, vigorously shaking the leaf all around just as though, having impaled it, the bird was desperately trying to throw it off. A view through binoculars showed, however, that the leaf was gripped by the bill and not impaled on it. This leaf-shaking continued for fully a minute before the Dunnock threw the leaf down. It was hopping forward, apparently to seize it again, when a male Blackbird *Turdus merula* swooped down and snatched it, but immediately lost interest. The Dunnock, meanwhile, hopped about in an agitated way, but shortly subsided into its normal, undemonstrative search for food, flicking the covering of dead leaves aside to get at the soil underneath. Some distance away the Blackbird searched for food in exactly the same way.

On examination, the original leaf was found to be split all over. Of 15 other Virginia creeper leaves picked up from around the site, ten had no breaks at all, three had one or two obvious holes and two had splits, but not at all so many as the Dunnock's leaf. Attempts to reproduce the split appearance, simulating the shaking treatment with a pair of tweezers, were inconclusive. Certainly, if the leaf splits were attributable to the flailing by the Dunnock, then the performance must have been going on for some minutes before my discovery of it.

It would have been interesting to witness the onset of this piece of apparently aggressive behaviour on the part of a bird normally unobtrusive in habits. No other Dunnock was in the vicinity at the time and there appeared to be no obvious explanation for the behaviour. Perhaps some aggressive release had simply been triggered by the leaf-flicking action while the Dunnock searched for food. In his book *A Study of Blackbirds* (1958) Dr D. W. Snow referred to leaf-brandishing by Blackbirds, and it may not be without relevance that it was a Blackbird which pounced at the Dunnock's leaf and that both birds had the habit of flicking leaves aside while feeding.

R. G. CALDOW

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Both sexes of the Serin in song In late April and early May 1973, I watched several pairs of Serins *Serinus serinus* in different parts of Provence, France. In the case of one pair watched almost daily in Arles, and of two pairs (probably with adjacent territories) near the Pont du Gard, I saw and heard both sexes in full song. The breeding area in Arles was a small ornamental garden close to the city centre, with many tall trees (some over 30 metres high) over lawns and flower beds. At the Pont du Gard, the birds were in dense scrub three to five metres high bordering the River Gard, with occasional tall trees reaching 10-15 metres serving as song-posts. Judging from the birds' behaviour, it is doubtful if nest-building had started.

The sexes were easily separable, allowing a watch to be kept on both individuals, often for several minutes at a time. Both male and female of each pair were seen and heard producing the full jangling run of song while perched on song-posts in the treetops, and both sexes were seen in song-flights similar to those of Greenfinches *Carduelis chloris*, with exaggerated and slow wing-beats. Song-flights were performed much more often by males. When the male was song-flying, or some distance away, the females sang more readily, but in one of the Pont du Gard pairs the birds sang simultaneously on several occasions while perched on the same dead twig.

Professor W. H. Thorpe, writing in *A New Dictionary of Birds* (1964), considers song from female birds to be exceptional, though it has been recorded from, among others, the Song Sparrow *Melospiza melodia* early in the season, female Robins *Erithacus rubecula* holding winter territories, and the Orange-billed Sparrow *Arremon auranti-rostris* while incubating. In general, Professor Thorpe considers that female song is less likely the more striking the sexual dimorphism (save in those cases where the female has the dominant rôle in courtship display). Several records of singing female Chaffinches *Fringilla coelebs* noted in Rev E. A. Armstrong's book *Bird Display* (1942) were attributed to hormonally aberrant birds. Despite the fact that female domestic Canaries *S. canarius* can be made to develop typical male song by male sex hormone injections, it seems unlikely that any hormone imbalance was the major factor involved in any of the three cases reported above.

J. J. M. FLEGG

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Letters

Eye colour of the Hen Harrier D. I. M. Wallace's remarks (*Brit. Birds*, 65: 358-359) on the eye colour of an immature of the American subspecies of the Hen Harrier *Circus cyaneus hudsonius* at Cley,

Norfolk (see *Brit. Birds*, 64: 537-542), were confusing and to a certain extent incorrect. I quote: '... R. A. Richardson wrote to point out that such a bird could not have had yellow irides since these are marks of adulthood in harriers. Subsequent correspondence with E. Balfour through R.A.R. confirmed that, in the closely related Hen Harrier *C. c. cyaneus*, only adult males have bright yellow irides' (my italics). With regard to the European form, however, Mr Balfour had already stated elsewhere (*Bird Study*, 17: 47) that 'All males, whether in full adult plumage or in one-year-old sub-adult plumage, had bright yellow irides'; in females the iris colour becomes bright yellow when six to seven years old. He also mentioned that F. Hamerstrom had published similar observations on eye colour in the American race (*Inland Bird Banding Association News*, 40: 43-44). In my opinion, at least some males may already have developed yellow or yellowish irides by their first winter.

G. J. OREEL

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I accept Mr Oreel's correction. I have, however, already pointed to the lack of certainty over the eye colour of the Cley individual. Furthermore, at the time when this was noted (by one observer) as yellow, the bird was only five to six months old—assuming that it had hatched in June or July—and in the early part of its first winter. It is not clear from Mr Balfour's note to what extent his observations apply to birds at that age, and I feel that further research is needed on this point. I should also mention that the identification of the Cley harrier is now hotly disputed. Since, apparently, Hen Harriers can produce young with rufous underparts, the original record and two later claims are under review.

D. I. M. WALLACE

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House Martins roosting in reed-beds I was interested in the note by N. E. G. Elms (*Brit. Birds*, 65: 126) on House Martins *Delichon urbica* roosting in reed-beds. The accompanying editorial comment mentioned the doubts raised by F. Tischler and H. Ringleben (*Orn. Monatsber.*, 44: 117, 159-160) of the validity of the statement by F. Tantow (1936, *Das Vogelleben der Niederelbe*, page 152) that House Martins regularly roost overnight in reeds. Recent evidence also suggests that Tantow was mistaken. During 1968-72, in July, August and September, four ringers, including myself, trapped nearly 6,500 Swallows *Hirundo rustica* and 500 Sand Martins *Riparia riparia*, but not a single House Martin, in the reed-beds of the Elbe around Hamburg and also at Stöckte, the place mentioned by Tantow. It is true that towards dusk at Stöckte House Martins

may join in the great communal flights of Swallows and Sand Martins over the reed-beds and nearby houses, and this might have led to the conclusion that the House Martins then dropped into the reeds with the other hirundines.

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Reviews

The Seabirds of Britain and Ireland. By S. Cramp, W. R. P. Bourne and D. Saunders. Collins, London, 1974. 287 pages; four colour and eight black-and-white plates; 32 maps, line-drawings. £3.50.

This long-awaited book gives an excellent survey of British seabirds, in both a national and an international setting. Most of the well-written text is taken up with accounts of individual species, but there are also good short surveys of the biology of seabirds and the threats to their well-being. The book is tastefully illustrated by a good selection of black-and-white photographs and line-drawings; also four mediocre colour plates by Robert Gillmor. Twenty-seven of the 32 maps (drawn by Crispin Fisher) depict the ranges and colonies of the British seabirds. It is a pity that size differences of colonies could not have been more clearly brought out, as in some maps with overlapping red dots it is difficult to decide what order of magnitude is meant. I checked details about the species I know best, the Puffin, and noted the fallacy that the young Puffin is deserted for eight days prior to fledging; this was disproved by Richard Perry as long ago as 1948. There are also some discrepancies between the table of colonies and those plotted on the map: for example, the Rathlin and Caernarvonshire colonies are omitted from the map. However, this is a generally well-produced book which deserves a place in every ornithologist's library.

Nonetheless, a book of this sort deserves a deeper analysis, as it will be taken as the authoritative account of British seabirds. We needed a far more detailed report on Operation Seafarer. The original data, which were mostly collected in 1969, have been closeted away while we awaited this report, and it is disappointing to find that these analyses cannot be used for any serious comparisons with future counts. Workers will have to go back to the original data; nothing would have been lost if detailed summaries (even if cyclostyled), species-by-species, had been published years ago, even if only as an incentive for people to prove them wrong. During 'Seafarer' no attempts were made to check counts—either within or between seasons—so we have no idea of their accuracy. A repeat survey, which admittedly suffers from some of the same drawbacks,

of some Shetland colonies in 1974 has produced counts very different from the 'Seafarer' ones. Do these differences indicate changes in the populations or merely differences due to observer or season? We shall probably never know. The 'Seafarer' distribution data will be invaluable for the future but I have my doubts concerning the actual counts. It might have been better just to have given the actual totals of birds counted and not made any adjustments, such as changing Guillemot bird totals to pairs. Also, why rank species from common to rare, especially when in some gulls the largest colonies were inland and so were omitted? I would have thought it better to have excluded Common and Black-headed Gulls from the species covered and to have enlarged some other sections.

The presentation of the results in such an obviously popular and well-produced form might be justified, as the proceeds from the sale of this book are to be used for further research on seabirds. The present text illustrates the difficulties involved in an overall census. The next effort might more profitably concentrate on properly replicating counts at the 20 or so largest colonies. The errors in the Operation Seafarer 'guestimates' for the difficult species at some of these are possibly so great and, what is far worse, entirely unknown, that they swamp the accurate counts at the far more numerous small colonies. Indeed, one could well forget about much of the coastline of Britain and Ireland and still get totals as accurate as we now have. The authors are rightly proud of the achievements but may be optimistic in thinking that a repeat 'Seafarer' would probably enable changes of the order of 10 per cent to be detected for most of the 17 species where a fairly high degree of accuracy was obtained, and almost certainly of 20 per cent for all of these. Despite these criticisms of the numerical data, the distribution maps are the best available for Britain and Ireland, and the book can be used with confidence by ornithologists wanting to know the principal sites for British seabirds.

M. P. HARRIS

Flight Identification of European Raptors. By R. F. Porter, Ian Willis, Steen Christensen and Bent Pors Nielsen. T. & A. D. Poyser, Berkhamsted, 1974. 184 pages; 176 black-and-white photographs; 78 detailed line-drawings, 41 vignettes. £4.80.

Few ornithological endeavours have attracted as much discussion as raptor identification. The subject species are not only splendid creatures but are also increasingly precious. In the battle to turn the evil eye still so often put upon them, the basis of each conservation success is the precise observation of certainly identified birds. For all raptors, however, their mobility and the variability of plumage and silhouette never make this easy. Happily, in 1968

a chance meeting between Danish and English enthusiasts watching the mass migrations of raptors at the Bosphorus prompted the most intensive research on their flight identification ever attempted. From many notes, sketches and photographs came first a series of notable papers in this journal (*Brit. Birds*, vols 64-66) and now their final combined publication in this remarkable book.

For the more experienced observer, here is a pleasing, slim volume that contains the most expert comment on and most accurate illustrations of flying raptors ever assembled. Furthermore, it is already evident that the majority of the field-characters will stand the test of time. In producing the book, the authors have taken the opportunity to adopt a more convenient order of species and to include revisions, most notably in the case of Spotted and Lesser Spotted Eagles. They have also added to both the line and photographic illustrations. I am particularly taken with the new series of vignettes by Ian Willis. These figure every species in action and do much to breathe life into the necessarily more disciplined drawings that show structure and plumage pattern. Another new feature is a summary of the legal status of all raptors (including owls) in Europe. This will be useful to any enthusiast discussing the protection of birds of prey while abroad.

The authors and their helpers deserve to see a very wide sale for their book in the several communities where birds of prey are an issue of interest or emotion. Its translation and export to other European countries is also merited

D. I. M. WALLACE

The Bird-watchers' Book. Edited by John Gooders. David & Charles, Newton Abbot, 1974. 173 pages, including 32 photographs. £2.95.

This is intended as the first of a series of annuals which will publish, in a form attractive and accessible to the average birdwatcher, items by selected contributors on recent events or discoveries in birdwatching, research and conservation. The idea is good. There is an enormous amount going on: studies of individual species or bird communities; expeditions to remote or inaccessible places with interesting and often important bird populations; conservation work through the law courts, the oil conference or the planner's office; and, by no means least, the unsophisticated business of looking at and enjoying birds for its own sake. Involved in all this activity, there are a small but rapidly growing number of professionals and perhaps 10,000 amateurs who are adding in various ways to ornithological knowledge. At least 200,000 more people also like watching birds and all of us enjoy reading about them.

The 14 contributors are all well-known ornithologists and the

range of material covered is fairly good, examining the habits of such different animals as Bullfinches, bowerbirds and birdwatchers, taking us to Spitzbergen and to Selborne and ranging from Jurassic fossils to modern farming. None of the pieces contains any new information but, as most of it is unlikely to have percolated through to the great majority of birdwatchers, that does not matter.

Unfortunately, only about half of the contributors write with the sort of economic and attractive style that would do justice to this type of presentation. More vigorous editing or rewriting by authors would have raised the standard. The photographs are particularly disappointing. Often without merit either on artistic grounds or as an aid to identification, they are also poorly printed.

These criticisms apart, the basic idea is good and the outcome is not unsuccessful. With this year's experience to go on, next year's edition ought to be a wholly entertaining contribution to birdwatchers' wet-weather reading.

J. H. ANDREWS

Avifaune de Bretagne. By Yves Brien. Société pour l'Etude de la Nature en Bretagne, Brest, 1973. 187 pages; 18 plates; 66 maps. No price given.

This work is based on the results of a study, mainly in 1970 and 1971, of the numbers and status of birds in Brittany. An introduction explains the aims and methods used. This is followed by five sections dealing with the Baie d'Audierne, censuses of coastal sites, of wintering areas, and of inland breeding sites, and general conclusions. Audierne Bay, one of the most important habitats in Brittany, is fully described and its breeding and wintering species listed with numbers. Man's influence on the area, including increased hunting, is discussed and protection measures are suggested.

The largest section of the book deals with coastal sites and covers 83 pages of text and 22 maps. Brittany holds, notably, all of France's Atlantic Manx Shearwaters, Fulmars, Gannets, Eiders, Ringed Plovers, Kittiwakes, Arctic and Roseate Terns, Razorbills, Guillemots and Puffins. The census of wintering zones includes a map of the main areas, both coastal and inland, and the figures for December/January 1968/69-1970/71 are tabulated for each of the most numerous species of wildfowl and waders. Again the relative importance of each major site is stated and conservation measures are proposed.

The ecology and the most interesting bird species of eight typical inland breeding sites are discussed: all are threatened with development and urgent protection measures are recommended. The author gives extra space to rare species or those restricted to particular habitats. (There is one striking omission: the Fan-tailed Warbler, listed as very rare on page 156, is, unlike other species of

similar status, mentioned nowhere else in the book.) His conclusion that Brittany's avifauna depends largely on the safeguarding of coastal environments and wetlands, though perhaps inevitable, seems a slight oversimplification.

The work is written in simple, non-technical language, the tables are clearly set out, and the maps, each occupying a complete page, are easy to refer to. A large separate map of Brittany (scale 1:250,000), which comes with the book, effectively summarises the study results. For the ornithologist interested in distribution, populations or conservation it will naturally hold some attraction, while for those visiting Brittany it will be of considerable value, even though bulky and not easy to carry about. The photographs are good but are poorly printed and, apart from the habitat shots, add little to the book.

Although not comprehensive and rather limited by the short time-span of the study, which may have led to inaccuracies, this is nevertheless an admirable publication.

D. A. CHRISTIE

Catalogus Faunae Jugoslaviae. IV/3. Aves. By S. D. Matvejev and V. F. Vasić, Council of Academic Sciences of the Federal Socialist Republic of Yugoslavia. Slovenian Academy of Sciences and Arts, Ljubljana, 1973. 120 pages; 2 maps. Obtainable from Slovenska Akademija znanosti in umetnosti Biblioteka, Ljubljana, Novi trg 3, Yugoslavia. 15 dinars.

This list of the birds of Yugoslavia is designed to be (and is) readily understandable to the English reader. In all, 376 species are listed, plus 15 of doubtful authenticity. It is possible to determine the month-by-month occurrence of each bird, where it occurs within the Federal Republic, and whether or not it breeds. About 256 species are believed to breed regularly in Yugoslavia at the present time. Known former breeders believed now to be extinct, with their probable dates of last breeding, are White Pelican (1907), Mute Swan (1965), Crane (1965), Great Bustard (1949), Snipe (1947), Curlew (1916) and Black-winged Stilt (1964). The Bearded Tit is described as 'In the process of extinction in Yugoslavia'. The Dalmation Pelican is extinct in Dalmatia but hangs on farther south in Yugoslavia, about 25 pairs still attempting to nest on Lake Skadar in Montenegro.

Subspecies are dealt with in the same detail as full species: thus the seven races of the Reed Bunting known to have occurred in Yugoslavia take up most of one page! The tendency to 'split' also means that the really keen lister can see one more woodpecker in Yugoslavia than is listed in the *Field Guide*. Dr Matvejev regards Lilford's Woodpecker *Dendrocopos lilfordi* as a full species, and not merely as a race of the White-backed Woodpecker *D. leucotos*. His

distributions for the two forms appear to indicate that they breed sympatrically in the Posav area of Bosnia.

Like much else in Yugoslavia, the avifauna is a curious mixture. At higher altitudes in the south of the country nest such 'northern' species as the Goosander, Ural Owl and Three-toed Woodpecker. And yet only a few kilometres away, down by the Dalmatian coast, are found 'southerners' like Red-rumped Swallows, Olive-tree Warblers and Spanish Sparrows. I found this excellent check-list most helpful during a fortnight in southern Montenegro.

JEFFERY BOSWALL

ALSO RECEIVED

- Animals and their Colours*. By Michael and Patricia Fogden. Peter Lowe, London, 1974. £3.50.
- Aviary Birds in Colour*. By Frank Woolham, illustrated by Dennis Avon and Tony Tilford. Blandford, London, 1974. £2.25.
- Beginner's Guide to Bird Watching*. By Reg Harrison. Pelham Books, London, 1974. £3.00.
- Best in Show: Breeding and Exhibiting Budgerigars*. By Gerald S. Binks. Ebury Press and Pelham Books, London, 1974. £3.25.
- Biological Mechanisms of Attachment*. By W. Nachtigall. Springer-Verlag, Berlin, Heidelberg and New York, 1974. DM 75.00.
- Birds of Australia*. By J. D. Macdonald. Witherby, London, 1974. £11.00.
- Birds of the Tropics*. By John A. Burton. Orbis, London, 1973. £2.50.
- Birds of the West Indies*. By James Bond. Fourth (revised and enlarged) edition. Collins, London, 1974. £2.95.
- Birds of the Yorkshire Coast*. By Richard Vaughan. Hendon Publishing Co., Nelson, Lancashire, 1974. Hardback £1.70, paperback £1.20.
- Der Haubentaucher*. By Manfred Melde. Die Neue Brehm-Bücherei, A. Ziemsen Verlag, Wittenberg Lutherstadt, 1973. 9.60 M.
- Die Grauwammer*. By Lutz Gliemann. Die Neue Brehm-Bücherei, 1973. 8.60 M.
- Eulen*. By Siegfried Eck and Horst Busse. Die Neue Brehm-Bücherei, 1974. 18.20 M.
- Guide des Arbres et Arbustes d'Europe*. By A. Quartier and P. Bauer-Bovet. Delachaux et Niestlé, Neuchâtel, 1973. Fr 28.00.
- How to Attract, House and Feed Birds*. By Walter E. Schutz. Collier Macmillan, London, 1974. £1.25.
- Life on the Sea Shore*. By John Barrett. Collins, London, 1974. £1.95.
- New Zealand Water Birds*. By Elaine Power. Collins, Auckland and London, 1974. £4.25.
- Population Ecology of Migratory Birds*. Wildlife Research Report no. 2, Bureau of Sport, Fisheries and Wildlife, Washington, DC, 1972. No price given.
- The Concise Encyclopedia of Birds*. By Bertel Bruun, illustrated by Paul Singer. Octopus Books, London, 1974. £2.25.
- The Life of the Hummingbird*. By Alexander F. Skutch, illustrated by Arthur B. Singer. Octopus Books, London, 1974. £3.95.
- The Mitchell Beazley Atlas of World Wildlife*. Mitchell Beazley, London, 1974. £9.50.
- The Sea and the Ice*. By Louis J. Halle. Michael Joseph, London, 1974. £4.50.
- Woodlands*. By William Condry. Collins, London, 1974. £1.95.

News and comment *Robert Hudson*

The Great Oystercatcher Robbery For the second successive winter the Ministry of Agriculture and the South Wales Sea Fisheries Committee are organising a major cull among Oystercatchers wintering in the Burry Inlet, south Wales. This is being done under the authorities of the Minister for Agriculture and the Secretary of State for Wales, and the excuse, of course, is that local consumption of cockles by the birds is damaging the cockle fishing industry. Needless to say, this action has caused a rift between the Ministry and conservationists, the latter denying that the decline in cockle stocks has been due to predation by Oystercatchers, which have wintered there in very large numbers for well over half a century. Moreover, there are serious disagreements concerning the proportions of local birds versus long-distance immigrants in the Burry winter flocks, and also over the total numbers of Oystercatchers in the Burry Inlet, with conservationists stating that before culling began in 1973 there were about 17,000 but the Ministry claiming that 22,000 would be nearer the truth. The fact that much of the culling is being done in or adjacent to a nature reserve has further soured relations. As the Royal Society for the Protection of Birds has pointed out (*Birds*, November-December 1974), other factors are more likely to have caused the decline of the cockle fishery; *Spartina* has spread over hundreds of acres of sand, the river channel has changed so that established cockle beds are being scoured, the estuary is polluted and huge numbers of cockles have died, while there has been a high level of illegal cockle gathering. The Ministry's attitude seems to be that since cockle landings have declined, for whatever reason, then none can be spared for the Oystercatchers, and the birds must go. It seems astonishing that they should regard culling as a solution, when what it really needed is research and action to reverse the decline in cockle stocks. Naturally, it would be more expensive to clean the River Loughor than to pay bounties on Oystercatcher heads; and present policies seem to be designed to appease local fishermen rather than to correct the situation. In other birds, Cormorant and Woodpigeon for example, it has been amply demonstrated that culling in winter is futile; it merely leads to improved survival rates among those that escaped the cull, so that breeding numbers (the important parameter) remain roughly stable. I note also that the verbal and printed exchanges between the protagonists have not included a single comment from Dr P. J. Dare, the Ministry biologist who did the lion's share of definitive research into Oystercatcher distribution and numbers when these were priority subjects in the 1960's. Am I being unduly suspicious in wondering whether Dr Dare has been officially gagged?

A survey of sewage farms Sewage farms are often ornithological meccas, and one automatically connects names such as Nottingham, Bedford, Rye Meads and Beddington with species such as Black-winged Stilt, Wilson's Phalarope, Spotted Crake and Water Pipit. Already, a number of sewage farms have been studied in some detail, including Aylesbury, Rye Meads, Weylands and Wisbech, but we are still far from assessing accurately their comparative value to breeding, passage and roosting birds. During 1975 it is planned to survey as wide a range of sewage disposal systems as possible (including modern establishments limited to sprinklers and settlement tanks), to add to the existing bank of information. Additional help will be welcomed. Many observers will have visited their local sewage works, and be in a position to fill in an Ornithological Site Register card based on past records extracted from their diaries. Others may feel able to undertake a mapping census of the breeding birds employing the Common Birds Census technique. For further details, please contact either Robert Fuller or David Glue, Populations Section, British Trust for Ornithology, Beech Grove, Tring, Hertfordshire HP23 5NR.

Egg transplants for raptors The region of Long Island Sound used to have one of the densest breeding populations of Ospreys in North America, but a major decline followed contamination by pesticides, and many birds are still infertile or lay thin-shelled eggs which do not survive the incubation period. As part of a field experiment to study these reproduction problems, a graduate of the Cornell Laboratory of Ornithology, in the years 1968-70, transferred 45 Osprey eggs or nestlings from a healthy population in Chesapeake Bay to failing pairs in eastern Long Island and Connecticut; hatching and fledging rates from these transportations proved normal. In 1972 and 1973, seven of the fostered Ospreys were seen within 50 km of where they fledged; by 1974 at least five of these had reared young of their own, and the rate of population decline slowed from 11% per year to 3%. Now that DDT and dieldrin have been banned, the long-term prospects for the Long Island Sound Ospreys have improved, and it is believed that limited transportations will advance the hoped-for recovery. In the 1974 breeding season, too, the technique was extended to the Bald Eagle by the Fish and Wildlife Service. Three eggs were collected in Minnesota, where the species is holding its own, and used to replace infertile eggs in two eyries in Maine, where the species is endangered; two eaglets resulted.

Meanwhile Cornell's own project of breeding falcons in captivity ('News and comment', January 1974) continues successfully. In 1974, five pairs of Peregrines produced 23 young, and five pairs of Prairie Falcons produced 29 young. Two Peregrine chicks were transported to a Colorado nest, where a wild pair had infertile eggs; the transfer was successful and both fledged safely, so Cornell's plans for augmenting wild stocks have begun.

Air strike hazard in Estonia The following is quoted from the *Novosti Information Service Bulletin*, no. 15401, dated 15th October: 'Civil aviation pilots in Estonia consult, before flights, not only meteorologists but also ornithologists. Hundreds of bird migration routes cross Estonia, and during seasonal migrations these constitute a certain hazard to modern airliners. Scientists of the Estonian Institute of Zoology and Botany have observed that the time, routes and altitude of the migration flights are almost unchanged with the majority of bird species. This has enabled experts to draw maps which help pilots to avoid hazards.'

One could wish that this press release had dealt with a few specifics, and revealed more about the liaison channels between ornithological and aviation bodies in Estonia; however, it is not without interest to have this confirmation from an official source that there is real concern about bird strike risks in a Soviet Socialist Republic.

Reprieve for the Dollard In 'News and comment' for December 1973 I referred to Dutch plans involving reclamation on their side of the Dollard, which would have had serious consequences for the Avocet populations of north-west Europe. It is now reported (*IUCN Bulletin*, October) that the Netherlands Government has decided to route the proposed Dollard Canal to the Waddensec *behind* the sea-dike, not through the Dollard itself. This is welcome news, since the Dollard is a waterfowl habitat of international importance, an undisturbed tidal area nevertheless dominated by brackish water, resulting in a plant and animal community found nowhere else.

Some regional publications Clearing my desk for the end of the year, I find five 1974 regional publications not yet reviewed in 'News and comment' though meriting mention which, unfortunately, must be brief, since space is limited:

Atlas of Breeding Birds in Devon, by Humphrey Sitters. 64 pages (A4 size). Price £1.50, from Devon BWPS, c/o P. W. Ellicott, Clitters, Trusham, Newton Abbot, Devon TQ13 0LX. Following the national fieldwork for the BTO *Atlas*, it is likely

that a number of counties will produce special publications using their own data, as in fact the West Midland Bird Club did four years ago (see *Brit. Birds*, 63: 217-218). This Devon *Atlas* will be useful to those knowing or visiting the county, and is an example that other counties could follow.

Lakeland Birdlife 1920-1970, by R. H. Brown. 150 pages. Price £1.51, post paid, from Carlisle NHS, The Museum, Castle Street, Carlisle, Cumberland. This is a personal record by one naturalist of the changes he has noticed in the birdlife of the area over 50 years, based entirely on the author's field-work. Copious space is given to commoner species, and it can be recommended on this account. The author has long been a keen ringer, and numerous recoveries are quoted in context.

The Sevenoaks Gravel Pit Reserve, by Jeffery Harrison. 116 pages. Price 50p, from WAGBI, Grosvenor House, 104 Watergate Street, Chester CH1 2LF. A comprehensive account of this reserve's natural history, with special emphasis on birds. It is a successor to *A Wildfowl Gravel Pit Reserve*, by the same author, published in 1972 and reviewed in *Brit. Birds*, 65: 181.

Check List of the Birds of Dorset, by J. V. Boys. 68 pages. Obtainable from Dorset NHS, County Museum, Dorchester, Dorset (price not stated). A useful booklet from an ornithologically important south coast county. The distributional information is presented in the systematic list format; individual species accounts are often brief, but made more meaningful by frequent use of *Atlas* data, the 10 × 10 km squares occupied being given by grid numbers which appear on an endpaper map.

Birds of Sark, by F. R. G. Rountree. 82 pages. Price £1.91, post paid, from Sark Ornithological Committee, c/o Le Perronerie, Sark, via Guernsey, Channel Islands. This is an instructive account of the birdlife of this small island, 492 hectares in extent. There are 17 introductory pages (including an ecological sketch), the remainder being devoted to a detailed systematic list. This is the first work of its kind to be devoted to Sark birdlife, and it is a useful addition to the ornithological literature of the Channel Islands.

Opinions expressed in this feature are not necessarily those of the editors of British Birds

September reports *D. A. Christie*

These are largely unchecked reports, not authenticated records

September was, like August, dominated by weather from the North Atlantic, as a seemingly unending series of deep depressions crossed Ireland and Britain. Severe gales occurred early in the month, particularly during 7th-8th, with storm-force winds in places, and these no doubt accounted for the appearance inland of several seabirds and the arrival of a number of Nearctic waders. The only calm period came in the middle of the month, when passerine movement was more evident. As well as being a stormy month, September was also one of the coldest and wettest on record: in the Bristol area rainfall was more than double the average and in Nottinghamshire rain fell on 25 out of the 30 days of the month.

SEABIRDS

The storms brought a number of seabirds inland, especially during 5th-9th. Prominent among these were **Shags** *Phalacrocorax aristotelis*: we heard of six in Derbyshire, seven in Warwickshire, singles in Hertfordshire and Buckinghamshire, eight in Kent and five in Somerset. A **Red-throated Diver** *Gavia stellata* at Ogston Reservoir (Derbyshire) from 13th to 15th was very early inland, and in

full summer plumage. Single **Manx Shearwaters** *Puffinus puffinus* were found at at least eight inland localities, in Lancashire (three), Staffordshire, Warwickshire (two), Lincolnshire and Somerset. A **petrel** at Staines Reservoir (Middlesex) on 14th was not identified specifically, though singles at Eye Brook Reservoir (Leicestershire) on 21st and at Blithfield Reservoir (Staffordshire) on 26th were both shown to be **Leach's** *Oceanodroma leucorhoa*. A **Gannet** *Sula bassana* appeared at Kineton (Warwickshire) on 5th and another was found dead at Cheddar Reservoir (Somerset) on 6th, while one found alive near Scarrington, Bingham (Nottinghamshire), on 9th was released at Gibraltar Point (Lincolnshire) on 11th. **Great Skuas** *Stercorarius skua* were storm-driven to Egginton gravel pits (Derbyshire) on 2nd, and to Belvide Reservoir (Staffordshire) and Cheddar Reservoir both on 7th; **Arctic Skuas** *S. parasiticus* occurred at four places in the Midlands from 6th, and at Chew Valley Lake (Somerset) on 11th (two); and there was an adult **Long-tailed Skua** *S. longicaudus* at Tealham Moor (Somerset) on 28th. Most unusually, a **Sabine's Gull** *Larus sabini* appeared at Upton Warren (Worcestershire) on 8th.

Apart from the larger movements, which will be treated in a later summary, the more normal seabird records (all singles) included **Balearic Shearwaters** *P. p. mauretanicus* at Portstewart (Co. Londonderry) on 22nd and at Bardsey (Caernarvonshire) on 28th; **Great Shearwaters** *P. gravis* off Lundy (Devon) during 6th-7th, at Gibraltar Point on 15th and at Fair Isle (Shetland) on 21st; and **Cory's Shearwaters** *Calonectris dionedea* at Tarbat Ness (Ross-shire) on 1st, off Lundy on 7th and off Ness Point, Lowestoft (Suffolk), on 19th. **Sooty Shearwaters** *P. griseus* were reported from twelve sites, all but three on the east coast. By far the highest numbers were at Seaton Sluice (Northumberland) where a total of 136 passed north and one south on four dates; peaks came on 3rd (36) and 24th (78). **Leach's Petrels** were noted in extremely high numbers during the gales in the fourth week: at St Ives (Cornwall) about 500 were estimated on 23rd, some 40 were counted off the south-west Lancashire coast and 41 off the Calf of Man on 22nd, and about 50 were off the Wirral peninsula (Cheshire) on 26th; smaller numbers were noted elsewhere. A seabird accounted for the most unexpected report of the month, from Cape Clear Island (Co. Cork) on 5th—a **Soft-plumaged Petrel** *Pterodroma mollis*, the North Atlantic race of which breeds at Madeira and in the Cape Verde Islands; this population is very small and sightings far from the two breeding sites are few indeed. Needless to say, this would be the first British and Irish record if accepted.

Eight coastal and offshore reports of **Long-tailed Skuas** came from Scilly, Devon, Kent and four places in north-east England; and 19 further **Sabine's Gulls** were widely scattered from Somerset round to Yorkshire.

HERONS TO SWANS

Another rather poor autumn for the rarer herons produced only three new **Purple Herons** *Ardea purpurea*, at Lightshaw Hall Flash (Lancashire) on 7th, at Sandwich Bay (Kent) on 8th and on the south-west Lancashire mosses on 13th; and one **Little Egret** *Egretta garzetta*, at Kidwelly saltings (Carmarthenshire) for the last week of the month. An adult and an immature **White Stork** *Ciconia ciconia* appeared near Gisburne (Lancashire) on 15th, and **Spoonbills** *Platalea leucorodia* were found at Blakeney Point (Norfolk) on 1st, at Porthgwarra (Cornwall) on 14th and in the Dee estuary (Cheshire/Flintshire) for most of the month.

A **Long-tailed Duck** *Clangula hyemalis* was in the Ythan estuary (Aberdeenshire) on 8th, the first Fair Isle sighting was on 16th, and one flew north at Seaton Sluice on 24th. **Velvet Scoters** *Melanitta fusca* were reported from Hengistbury Head (Hampshire) (two west on 7th) and six east coast localities. Fair Isle's second **King Eider** *Somateria spectabilis* of the year occurred on 18th, staying to at least the end of October.

There were several sightings of **grey geese** *Anser spp.*, the earliest being a flock of 21 flying south at Cresswell (Northumberland) on 4th. At Loch of Strathbeg (Aberdeenshire) the first **Greylags** *A. anser* were identified on 19th. Six **Pinkfeet** *A. brachyrhynchus* were at Sandwich Bay from 14th but the general arrival took place from 18th-19th: a major influx was noted on the south-west Lancashire moorlands on 18th and by the end of the month over 2,000 were back, having brought the first **Whitefront** *A. albifrons* with them. **Whooper Swans** *Cygnus cygnus* were recorded at at least ten places in Shetland, Aberdeenshire, Northumberland, Lancashire and Northern Ireland; the first five arrived early at Fair Isle on 20th, a day after the first at Loch of Strathbeg, while at Holy Island (Northumberland) the first 38 arrived on 26th and 50 had returned by 29th.

RAPTORS AND CRAKES

Up to three **Buzzards** *Buteo buteo* were seen on four dates at Beachy Head (Sussex). At Marazion (Cornwall) an early **Rough-legged Buzzard** *B. lagopus* came in high from the west on 16th and flew on eastwards. Single **Honey Buzzards** *Pernis apivorus* were noted at Gibraltar Point on 8th and at Spurn (Yorkshire) on 15th, while at Tynemouth (Northumberland), also on 15th, a **kite** *Milvus sp.* flew south. A **Montagu's Harrier** *Circus pygargus* was reported at Stodmarsh (Kent) on 14th, one was at Portland (Dorset) in mid-month and another at Arne (also Dorset) on 18th. We heard of twelve or so **Ospreys** *Pandion haliaetus* in nine English and Welsh counties, while of many reports of **Hobbies** *Falco subbuteo* the most interesting was of four together at Draycote (Warwickshire) on 15th, the last being seen there on 1st October. Two male **Red-footed Falcons** *F. vespertinus* were seen, at Severn Vale (Gloucestershire) on 16th and at Wick Hams (Hampshire) on 18th. In Lancashire there were **Spotted Crakes** *Porzana porzana* at Rumworth Reservoir, Bolton, on 3rd and at Leighton Moss from 9th to 28th; one on Fair Isle on 30th may have been the bird present on 18th and 19th (trapped); and on the Exe marshes (Devon) singles were noted throughout the month. A **Corn-crake** *Crex crex* at Dungeness (Kent) on 17th was an unusual migrant, and another was discovered dead about the same time at Portland.

WADERS AND TERNS

A **Purple Sandpiper** *Calidris maritima* well inland at Staunton Harold on 21st and 22nd provided only the fifth Derbyshire record, while another appeared at Shrewsbury sewage farm (Shropshire) on 29th. **Kentish Plovers** *Charadrius alexandrinus* were reported from only four places: Rainham (Essex) from 1st to 5th, Sandwich Bay on 8th, Rye Harbour (Sussex) on 17th and Yantlet (Kent) on 17th (two). Fourteen **Dotterels** *Eudromias morinellus* passed through Lundy between 27th August and 26th September, making this one of the best passage sites for the species; other Dotterels were seen at Portland on 7th, Rye Harbour on 8th and 9th, Brean Down (Somerset) on 10th, Allhallows (Kent) on 14th and 22nd (two), Severn Beach (Gloucestershire) from 14th to 17th, St Mary's (Scilly) from 14th to at least 16th and Beachy Head on 15th (two), while in Cornwall they were present on several days in mid-month at St Just airfield and Porthgwarra (four on 17th); one was on Alderney from 15th to 19th. Further **Temminck's Stints** *Calidris temminckii* turned up at Sidlesham (Sussex) on 1st, at Sandbach (Cheshire) until 5th, and at three places in Kent (four birds), while at Netherfield (Nottinghamshire) one from 4th to 24th was joined by a second from 15th to 18th, making three records for this locality this autumn. Seven **Red-necked Phalaropes** *Phalaropus lobatus* were reported, but more significantly, as a result of the stormy weather, there were several dozen **Grey Phalaropes** *P. fulicarius*. The majority of the latter occurred in the first nine days, particularly during 7th-9th when probably 40 to 45 were reported in Sussex, Hampshire,

Dorset, Scilly, Glamorgan, Merioneth and Lancashire, and inland in Somerset, Middlesex, Northamptonshire, Leicestershire and Yorkshire. Eleven were found in Glamorgan during 7th-12th, about eight in Scilly, up to seven at Stcart (Somerset) and six at Ferrybridge/Langton Herring (Dorset); there was a further inland record at Staines Reservoir from 14th to 16th. Single **Avocets** *Recurvirostra avosetta* turned up at Oglet Bay in the Mersey estuary on 8th, at Slimbridge (Gloucestershire) on 16th and 17th and at Martin Mere (Lancashire) on 25th. After the early August record of **Jack Snipe** *Lymnocyptes minimus* (*Brit. Birds*, 67: 490), further arrivals were noted at eight localities in September, the first being three on Fair Isle on 1st; most unusual was one standing in a road at night at Frieth (Buckinghamshire) on 16th.

Vagrant waders provided a good variety. Two **dowitchers** *Limnodromus* sp were at Shellness (Kent) on 8th and one or two on 15th, and another at Fairburn Ings (Yorkshire) on 25th, while a **Long-billed Dowitcher** *L. scolopaceus* stayed at Rodbourne sewage farm, Swindon (Wiltshire), from 13th to 23rd. In Scotland a **Great Snipe** *Gallinago media* found on Out Skerries (Shetland) on 10th stayed almost two weeks until 22nd. The second and third **Solitary Sandpipers** *Tringa solitaria* of the autumn were recorded at Rainham from 1st to 6th and on Tresco (Scilly) from 8th to 11th (the second there in two months). Further Nearctic birds included **Lesser Yellowlegs** *T. flavipes* at Carse of Ardersier (Nairnshire) on 15th, at Altcar Moss (Lancashire) on 28th, and (possibly the same one) at Martin Mere on 29th and 30th. Also at Martin Mere from 14th to 16th was a Palearctic vagrant, a **Marsh Sandpiper** *T. stagnatilis*, the second in 1974. Among smaller waders were four **Baird's Sandpipers** *C. bairdii* at Carnforth marsh/Silverdale (Lancashire) on 5th and 6th, on Lundy from 6th to 13th, at Gladhouse Reservoir (Midlothian) from 14th to 16th, and at Steart on 15th and 16th; a **White-rumped Sandpiper** *C. fuscicollis* at Ferrybridge from 4th to 9th; a probable **Western** *C. mauri* at Arne on 11th; and a **Semipalmated** *C. pusilla* at Duncrue Street, Belfast, from 15th to at least 18th. **Pectoral Sandpipers** *C. melanotos* were reported from twelve places, in Aberdeenshire, Lincolnshire/Norfolk, Suffolk, Hampshire, Somerset, Devon, Scilly and Antrim/Londonderry, up to three on St Mary's being accompanied by a much rarer **Sharp-tailed Sandpiper** *C. acuminata* from 20th to 29th, providing good opportunities for comparison of these closely related species. **Buff-breasted Sandpipers** *Tryngites subruficollis* were rather plentiful: one on Fair Isle on 8th, one on St Mary's from 8th to 10th, with two on 14th and three on 15th, one on Lundy on 6th, another on 7th and a third from 14th to 16th, one at Sidlesham from 9th to 11th, up to four (possibly seven) at Portland from 9th to 12th, and one at Lough Beg (Cos. Antrim/Londonderry) from 15th to at least 22nd; one was on Guernsey on 12th, two on 13th, and two ringed on 16th, one of which stayed until 24th when of two seen only one wore a ring, showing that at least three birds were involved. A **Broad-billed Sandpiper** *Limicola falcinellus*, the third in 1974, was on Lundy from 1st to 9th. Lastly, there were **Wilson's Phalaropes** *P. tricolor* at Duncrue Street on 1st and at Loch of Hillwell (Shetland) on 27th, and from a different direction two **Black-winged Pratincoles** *Glareola nordmanni* at Rumworth Reservoir on 15th.

Ten **White-winged Black Terns** *Chlidonias leucopterus* were seen up to 18th in seven counties north to Yorkshire and west to Glamorgan and Somerset. There were three **Whiskered Terns** *C. hybrida*, one at Belvide Reservoir on 1st and 2nd, one at Eglwys Nunydd Reservoir (Glamorgan) on 7th, and in Cheshire one at Reedsmerc on 9th and 10th which moved to Sandbach on 11th. A **Gull-billed Gelocheidon nilotica** was at Botany Bay, Margate (Kent), on 9th and two were at Cley (Norfolk) on 28th, and a **Caspian** *Hydroprogne caspia* appeared at Hilbre Island (Cheshire) on 7th.

BEE-EATER TO FLYCATCHERS

On 14th a **Bee-eater** *Merops apiaster* was seen at Porthgwarra (Cornwall); an **Alpine Swift** *Apus melba* appeared at Forness Point (Kent) on 13th and another at Stiffkey (Norfolk) twelve days later. **Hoopoes** *Upupa epops* were noted at eleven places; at least six reports, involving eight birds, were during the calm weather of 14-15th, which seems to have been a good weekend for southern vagrants.

Migrant **Great Spotted Woodpeckers** *Dendrocopos major* were on Fair Isle from 9th to 14th and on 25th, and on the south coast **Woodlarks** *Lullula arborea* arrived at Dungeness on 22nd and at Beachy Head on 29th. Reports of **Fieldfares** *Turdus pilaris* came from 18 places and of **Redwings** *T. iliacus* from 15; most were from northern areas and in neither case were large numbers involved. Single **Bluethroats** *Luscinia svecica* arrived on Fair Isle on 14th and 29th and there was a very unusual inland record of one at Rodbourne sewage farm on 20th.

The increasing incidence of **Cetti's Warbler** *Cettia cetti* was reflected by two September records, singles at Beachy Head on 15th and at Marazion on 16th. A **Savi's Warbler** *Locustella luscinioides* was singing at Minsmere (Suffolk) up to 11th, the latest date ever recorded there. A warbler present on St Mary's from 30th was trapped on 15th October and identified as a **Paddyfield** *Acrocephalus agricola*, only the fourth British record. **Aquatic Warblers** *A. paludicola* appear to have been far fewer than in 1973: other than at Radipole Lake (Dorset), where eight had been trapped by 15th September, no August reports were received, and in September there were just singles on St Agnes (Scilly) on 14th and at South Milton Ley (Devon) on 19th, and one unusually far north on Fair Isle on 15th which was found dead on 23rd. There were more **Melodious Warblers** *Hippolais polyglotta*: in Scilly they were present from 6th to 15th, with a maximum of three on St Agnes on 11th; four were at Portland on 7th; singles were trapped on the Calf of Man on 11th, on Bardsey on 12th and 16th-24th, and at Beachy Head on 15th, on which date there were three at Porthgwarra; and three or four arrived on Skokholm (Pembrokeshire) between 13th and 18th. Reports of **Icterine Warblers** *H. icterina* came from Aberdeenshire, Northumberland, Co. Durham, Yorkshire, Kent, Dorset, Cornwall, Scilly and Caernarvonshire; about 23 were involved, including six at Spurn; 15 occurred between 11th and 16th.

Barred Warblers *Sylvia nisoria* showed no particular pattern: 26 or so in Shetland, Northumberland, Co. Durham, Yorkshire, Devon, Cornwall and Scilly; on Fair Isle there were peaks of seven on 13th and 16th. A **Subalpine Warbler** *S. cantillans* was trapped near Slapton (Devon) about 17th. Three more **Greenish Warblers** *Phylloscopus trochiloides* brought the autumn's total to five: one was trapped at Lower Hauxley (Northumberland) on 1st, one was at Wells (Norfolk) on 3rd, and the third trapped on Fair Isle on 14th. A **Bonelli's Warbler** *P. bonelli* was discovered at Sumburgh (Shetland) on 5th, and six days later another on St Agnes made three for the autumn. The earliest **Yellow-browed Warbler** *P. inornatus*, on 21st, was most unusually inland at Stapleford (Nottinghamshire), and this was followed by singles at Folkestone Warren (Kent) on 22nd, on Fair Isle on 23rd and at Sumburgh on 27th. **Red-breasted Flycatchers** *Ficedula parva* were few—single birds at Great Yarmouth (Norfolk) on 1st, at Marsden Hall (Co. Durham) on the next day, on Fair Isle from 14th to 16th, and at Dungeness on 17th.

PIPITS TO BUNTINGS

As many as 18 **Tawny Pipits** *Anthus campestris* are known to have reached Britain during September; records came from Norfolk, Suffolk, Kent, Sussex, Hampshire, Dorset, Cornwall, Scilly, Glamorgan and Pembrokeshire and there was an indication of a small influx about the middle of the month. These were followed by the first **Richard's Pipits** *A. novaeseelandiae* of the autumn, three at Porth-

gwarra on 19th and another there on 30th, and singles on Fair Isle from 28th to 30th; two more were on Lundy during the month. Much rarer was a **Citrine Wagtail** *Motacilla citreola* on Fair Isle from 2nd to 4th.

A **Lesser Grey Shrike** *Lanius minor* stayed on Mull (Argyll) from 5th to 9th and another appeared on Skomer (Pembrokeshire) on 18th, while five **Woodchats** *L. senator* comprised one trapped at Vale Pond (Guernsey) on 3rd and single birds on St Mary's from 6th to 13th, on St Agnes during this same period, on Skokholm on 14th and on Lundy from 21st to 23rd. The first **Great Grey Shrikes** *L. excubitor* of the autumn arrived at Dungeness on 13th (staying until 17th), on Holy Island on 29th and at Benachie (Aberdeenshire) on 30th. The strong westerly weather during September brought many American vagrants to our shores, not the least surprising of which was a **Baltimore Oriole** *Icterus galbula* which stayed on Fair Isle on 19th and 20th.

The winter finches and buntings began to arrive in September. Four **Twites** *Acanthis flavirostris* at Cottam (Nottinghamshire) on 10th were presumably from the Pennine breeding stock, but others on the east coast from 17th were more probably immigrants. Unprecedented numbers were noted at Spurn: 130 arrived on 28th and 220 were counted on 29th; the peak came in early October, 265 on 6th. The first **Bramblings** *Fringilla montifringilla* at Spurn were five on 12th; one was at Graveney (Kent) on 19th, and 13 on 28th were the first to arrive on Fair Isle, A total of four **Lapland Buntings** *Calcarius lapponicus* was sent at Spurn from 2nd, two were near Tobermory, Mull, on 5th, and single birds at Teesmouth (Co. Durham) and on Fair Isle on 15th, on St Agnes from 29th to 1st October, and on Lundy; the most southerly report was of one on Lihou (Guernsey) on 19th and 29th. Three **Snow Buntings** *Plectrophenax nivalis* on Lundy on 1st were extremely early; on the east coast these were followed by four on Fair Isle on 7th and six others, widely scattered, from 17th; elsewhere there were single birds at Aberthaw on 21st (the first in Glamorgan since 1968), on the Calf of Man on 28th and on St Agnes on 29th, the last followed by three the next day.

The rarer finches and buntings were three **Serins** *Serinus serinus* on St Mary's on 15th; one to two **Scarlet Rosefinches** *Carpodacus erythrinus* on Fair Isle from 10th to 17th, with up to six there from 21st to 27th, up to two on Gugh (Scilly) between 28th and 3rd October, and singles at Spurn on 11th, on Skokholm on 17th, on Bardsey from 17th to 19th, on St Mary's on 22nd and on St Agnes on 27th, the latter moving across to Gugh; a **Little Bunting** *Emberiza pusilla* at Washington (Co. Durham) from 18th to at least the end of the month; at least four different **Yellow-breasted Buntings** *E. aureola* on Fair Isle up to 25th, up to two on Out Skerries from 12th to 14th and one on St Mary's from 25th to 27th; and finally a total of 18 or more **Ortolan Buntings** *E. hortulana*, more than in recent Septembers, on Fair Isle (at least seven individuals between 2nd and 11th), on Lundy on unspecified dates, and during 11th-15th at Spurn, Dungeness, Beachy Head and Portland (four together), and on Bardsey and St Agnes.

As a postscript, it may be of interest that a male **Lazuli Bunting** *Passerina amoena*, a North American species imported in small numbers, appeared at Sumburgh on 5th just before the early September westerly gales reached their height.

STOP PRESS Reports of rare vagrants have now, understandably, declined. The most recent are the first wild Blue Snow Geese: two arrived at Wexford Slobbs with Greenland Whitefronts at the end of October and one came in with Greenland Barnacles at Islay (Argyll) in early November; all are thought to be still present. A Desert Wheatear first seen at Fraisthorpe, south of Bridlington (Yorkshire), on 29th November was still present on 1st December.



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BRITISH BIRDS

Volume 67 Number 12 December 1974

- 493 The voice of the Barn Owl *D. S. Bunn*
- 502 Studies of less familiar birds 174 Shore Lark and Temminck's Horned Lark *G. R. Shannon, J. B. and S. Bottomley, Eric Soothill, Eric Hosking and Allan D. Cruickshank* Plates 68-71

Notes

- 511 Hen Harriers' hunting behaviour in south-west Scotland *R. C. Dickson*
- 513 Large spring roost of Whimbrels in Bridgwater Bay *Brian E. Slade*
- 514 Abnormal numbers of Little Gulls in Ireland in summer *Major R. F. Rutledge*
- 514 Male Cuckoo using plant material in display *Ronald Harrison, and Bernard King*
- 515 Treecreepers apparently feeding on fat *Richard S. Greenwood*
- 516 Leaf-shaking by Dunnock *R. G. Caldow*
- 517 Both sexes of the Serin in song *Dr J. J. M. Flegg*

Letters

- 517 Eye colour of the Hen Harrier *G. J. Oree, and D. I. M. Wallace*
- 518 House Martins roosting in reed-beds *Dr Wolfgang Harms*

Reviews

- 519 *The Seabirds of Britain and Ireland* by S. Cramp, W. R. P. Bourne and D. Saunders *Dr M. P. Harris*
- 520 *Flight Identification of European Raptors* by R. F. Porter, Ian Willis, Steen Christensen and Bent Pors Nielsen *D. I. M. Wallace*
- 521 *The Bird-watchers' Book* edited by John Gooders *J. H. Andrews*
- 522 *Avifaune de Bretagne* by Yves Brien *D. A. Christie*
- 523 *Catalogus Faunae Jugoslaviae. IV/3. Aves* by S. D. Matvejev and V. F. Vasić *Jeffery Boswall*
- 525 News and comment *Robert Hudson*
- 527 September reports *D. A. Christie*

Robert R. Greenhalf drew the Barn Owl on page 501



BRITISH BIRDS

INDEX TO VOLUME 67 1974

INDEX TO PHOTOGRAPHS IN VOLUMES 1-67

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Index to volume 67

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Entries are in a single list with references to:

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(2) scientific nomenclature under generic names only and following *A Species List of British and Irish Birds* (BTO Guide 13, 1971);

(3) authors of all papers, notes, reviews and letters, and photographers; papers are referred to by their titles, other contributions as 'note on', 'review of', etc.;

(4) a few subject headings, i.e. 'Breeding', 'Display', 'Editorial', 'Field characters', 'Food', 'Migration', 'News and comment', 'Obituaries', 'Rarities Committee', 'Recorders', 'Reports', 'Requests for information' and 'Voice';

(5) 'Reviews', which are listed together under this heading in alphabetical order of authors reviewed.

Acanthis cannabina, see Linnet

— *flammea*, see Redpoll

Accipiter gentilis, see Goshawk

— *nisus*, see Sparrowhawk

Acrocephalus arundinaceus, see Warbler, Great Reed

— *paludicola*, see Warbler, Aquatic

— *palustris*, see Warbler, Marsh

— *schoenobaenus*, see Warbler, Sedge

— *scirpaceus*, see Warbler, Reed

Adkin, G. V., photographs of Great Northern and White-billed Divers, plates 41b, 42a-c, 43d

Aegithalos caudatus, see Tit, Long-tailed

Agelaius icterocephalus, see Blackbird, Yellow-headed Marsh

— *phoeniceus*, see Blackbird, Red-winged

Aix sponsa, see Duck, Wood

Alauda arvensis, see Skylark

Albatross, accepted record 1973, 313

—, Black-browed, accepted record 1972, 342

—, Steller's, advertisement for research post on, 85

Alca torda, see Razorbill

Alcedo atthis, see Kingfisher

Alectoris rufa, see Partridge, Red-legged

Anas americana, see Wigeon, American

— *clypeata*, see Shoveler

— *crecca*, see Teal

— — *carolinensis*, see Teal, Green-winged

— *discors*, see Teal, Blue-winged

Anas erythrorhynchos, see Duck, Red-billed

— *hottentata*, see Teal, Hottentot

— *platyrhynchos*, see Mallard

— *rubripes*, see Duck, Black

Anderson, Alastair, letter on scope of *British Birds*, 31

Andrews, J. H., review of Gooders: *The Bird-watchers' Book*, 521-2

Anser erythropus, see Goose, Lesser White-fronted

Anthropoides virgo, see Crane, Demoiselle

Anthus campestris, see Pipit, Tawny

— *cervinus*, see Pipit, Red-throated

— *hodgsoni*, see Pipit, Olive-backed

— *pratensis*, see Pipit, Meadow

— *trivialis*, see Pipit, Tree

Apus affinis, see Swift, Little

— *apus*, see Swift

— *melba*, see Swift, Alpine

Aquila chrysaetos, see Eagle, Golden

— *clanga*, see Eagle, Spotted

— *pomarina*, see Eagle, Lesser Spotted

— *rapax orientalis*, see Eagle, Steppe

Ardea cinerea, see Heron, Grey

— *purpurea*, see Heron, Purple

Ardeola grayii, see Heron, Indian Pond

— *ralloides*, see Heron, Squacco

Ardeotis kori, see Bustard, Kori

Arremon aurantirostris, see Sparrow, Orange-billed

Asio flammeus, see Owl, Short-eared

— *otus*, see Owl, Long-eared

- Athene noctua*, see Owl, Little
- Atkin, Keith, photograph of Night Heron, plate 45a; of Red-throated Diver, plate 28b; of Swift, plate 34a
- Avocet, direct head-scratching in flight, 243; photograph of Common Tern alighting at nest of, plate 22
- Aythya collaris*, see Duck, Ring-necked
- *ferina*, see Pochard
- *fuligula*, see Duck, Tufted
- *marila*, see Scaup
- Barber, Derek, letter on scope of *British Birds* and seasonal analyses of records, 30-31; on effects of agricultural change on birds, 395-6; review of Campbell: *The Countryman Bird Book*, 244-5
- Bartramia longicauda*, see Sandpiper, Upland
- Batten, L. A., the colonisation of England by the Firecrest: correction, 256
- Bee-eater, food in southern Spain, 158-64; importation of, 191; feeding on wasps, 222, 227, 229; accepted records 1973, 329-30
- , Blue-cheeked, wintering in East Africa, 73, plate 11a
- , Red-throated, eating wasps, 226
- Belman, P. J., note on iris colour of juvenile Night Herons, 120; on Purple Heron chick regurgitating young Little Grebe, 439
- Bevan, Geoffrey, studies of less familiar birds: 173—Icterine Warbler, 370-6, plates 52-4; review of Hosking and Gooders: *Wildlife Photography*, 80-1
- Birkhead, T. R., predation by birds on social wasps, 221-9
- Bittern, Little, accepted records 1973, 315; accepted records 1972, 342
- Blackbird, status on farmland, 57, 62-3, 69; frequency of plumage abnormalities, 123-4; eating wasps, 229; prey of Long-eared Owl, 367; eating apple blossom, 441; numbers in Regent's Park 1959-68, 453-8, 460-1; breeding success in Regent's Park, 463-4; taken by Hen Harrier, 512
- , Red-winged, importation of, 192
- , Yellow-headed, importation of, 192
- , Yellow-headed Marsh, importation of, 192
- Blackburn, Frank V., photograph of Crossbill, plate 34b
- Blackcap, status on farmland, 62, 69; eating wasps, 229; numbers in Regent's Park 1959-68, 453; breeding success in Regent's Park, 464
- Blewitt, R. J. C., photograph of Sparrowhawks, plate 35a
- Bluetail, Red-flanked, importation of, 191
- Bluethroat, Red-spotted, importation of, 191
- Bobolink, importation of, 192
- Bombycilla garrulus*, see Waxwing
- Bonham, P. F., and Sharrock, J. T. R., note on Sedge Warblers singing in fields of rape, 389-90
- Booby, Brown, breeding adaptations, 414, 427
- Boswall, Jeffrey, obituary of Ludwig Koch, 472-4; review of Matvejev and Vasić: *Catalogus Faunae Jugoslaviae. IV/3. Aves*, 523-4
- Bottomley, J. B. and S., photograph of Common Terns, plate 23a; of juvenile Common Sandpiper, plate 31a; of Great Northern Diver, plate 41a; of Great Spotted Cuckoo, plate 45b; of Long-billed Dowitcher, plate 46; of Pectoral Sandpipers, plate 51; of Ross's Gull, plate 64; of Shore Lark and habitat, plate 68
- Bourne, W. R. P., letter on Cyprus cranes and English bird names, 170-1; on melanism in shearwaters and auks, 392-3
- Boyle, Geoffrey L., note on Grey Phalarope feeding on earthworms, 352; on Kestrel taking prey from Short-eared Owl, 474-5
- Brambling, status on farmland, 69; prey of Long-eared Owl, 369
- Branta canadensis*, see Goose, Canada
- *leucopsis*, see Goose, Barnacle
- Breeding: Great Crested Grebe, 413-37, plates 56-63; Purple Gallinule, 230-6, plates 37-40; Moorhen, 105-15, 137-58, plate 25. Nests: Blue Tit, 78-9; Chaffinch, 27. Fledging: Cuckoo, 26-7, plate 4b
- Broad, Roger A., contamination of birds with Fulmar oil, 297-301
- Brooke, R. K., note on Steppe Eagle in Africa, 393
- Bubo bubo*, see Owl, Eagle

- Bubulcus ibis*, see Egret, Cattle
- Budgerigar, breeding in England in wild, 191
- Bullfinch, status on farmland, 69; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453-4, 458, 460; breeding success in Regent's Park, 463-4
- Bundy, Graham, letter on identification of juvenile Arctic Terns, 246-7
- Bunn, D. S., the voice of the Barn Owl, 493-501
- Bunting, (African) Rock, importation of, 192
- , Black-headed, importation of, 192; accepted records 1973, 339
- , Gull, type of hedge preferred, 485
- , Corn, status on farmland, 57, 62, 69; type of hedge preferred, 485
- , Indigo, importation of, 192; accepted record 1973, 346
- , Lazuli, importation of, 192
- , Little, accepted records 1973, 339
- , Painted, importation of, 192
- , Rainbow, importation of, 192
- , Red-headed, importation of, 192
- , Reed, status on farmland, 62, 69; oiled by Fulmar, 298, 300; prey of Long-eared Owl, 369
- , Rustie, accepted record 1973, 339
- , Snow, on farmland, 69
- , Yellow-breasted, escape notified, 185; importation of, 192; accepted records 1973, 339
- Burhinus oedicnemus*, see Curlew, Stone
- Burn, David M., photographs of White-billed and Great Northern Divers, plates 43a-c, e, 44
- , —, and Mather, John R., the White-billed Diver in Britain, 257-96, plates 41-44
- Bustard, Great, importation of, 191
- , Kori, importation of, 191
- Buteo buteo*, see Buzzard
- , *jamaicensis*, see Hawk, Red-tailed
- Buzzard, breeding biology in Speyside, 199-210; eating wasps, 229; aggressive behaviour at nest, 238-9
- , Honey, feeding on wasps, 223, 225, 227, 229; oiled by Fulmar, 298, 300; mobbed by Crag Martins, 379
- Calandrella cinerea*, see Lark, Short-toed
- Caldow, R. G., note on leaf-shaking by Dunnock, 516
- Calidris acuminata*, see Sandpiper, Sharp-tailed
- , *alpina*, see Dunlin
- , *bairdii*, see Sandpiper, Baird's
- , *fuscicollis*, see Sandpiper, White-rumped
- , *mauri*, see Sandpiper, Western
- , *melanotos*, see Sandpiper, Pectoral
- , *minuta*, see Stint, Little
- , *minutilla*, see Sandpiper, Least
- , *pusilla*, see Sandpiper, Semi-palmated
- , *ruficollis*, see Stint, Red-necked
- , *subminuta*, see Stint, Long-toed
- , *temminckii*, see Stint, Temminck's
- Calonectris diomedea*, see Shearwater, Cory's
- Campbell, Bruce, letter on wader nesting associations, 82; note on Robin killing Robin, 121-2; letter on proof of breeding of Shore Larks, 127
- Canary, Domestic, wide colour range, 192-3; female song developed by hormone injection, 517
- Caprimulgus europaeus*, see Nightjar
- Cardinal, importation of, 192
- Carduelis carduelis*, see Goldfinch
- , *chloris*, see Greenfinch
- Carlson, Kevin J. V., photograph of Purple Heron, plate 32
- Carlson, R. G., photograph of Azure-winged Magpie, plate 35b
- Carpodacus erythrinus*, see Rosefinch, Scarlet
- Certhia brachydactyla*, see Treecreeper, Short-toed
- , *familiaris*, see Treecreeper
- Cettia cetti*, see Warbler, Cetti's
- Chaffinch, domed nest, 27; status on farmland, 56-7, 69; removing material from Long-tailed Tits' nests, 79; numbers in Regent's Park 1959-68, 453-4, 457-8, 460-2; breeding success in Regent's Park, 463-4
- Charadrius dubius*, see Plover, Little Ringed
- , *hiaticula*, see Plover, Ringed
- , *tricoloris*, see Plover, Three-banded
- Charles, W. N., photographs of breeding activities of Great Crested Grebes, plates 56-62

- Chiffchaff, status on farmland, 62, 69
Chlidonias hybrida, see Tern, Whiskered
 — *leucopterus*, see Tern, White-winged Black
 — *niger*, see Tern, Black
 Christie, D. A., review of Brien: *Avifaune de Bretagne*, 522-3; monthly reports, see Reports
Cichladusa guttata, see Warbler, Spotted Morning
Ciconia ciconia, see Stork, White
 — *nigra*, see Stork, Black
Circus aeruginosus, see Harrier, Marsh
 — *cyaneus*, see Harrier, Hen
 — *macrourus*, see Harrier, Pallid
 — *pygargus*, see Harrier, Montagu's
 City of Liverpool Museums, photograph of White-billed Diver, plate 42d
Clamator glandarius, see Cuckoo, Great Spotted
Coccothraustes coccothraustes, see Hawfinch
Coccyzus americanus, see Cuckoo, Yellow-billed
Colinus virginianus, see Quail, Bobwhite
Columba livia, see Pigeon, Feral
 — *oenas*, see Dove, Stock
 — *palumbus*, see Woodpigeon
 Conder, Peter, review of Batten *et al.*: *Birdwatchers' Year*, 80
 Cooke, D. A. P., photograph of Arctic Terns, plate 33b
 Coot, display postures compared with Moorhen's, 111-2; juveniles feeding younger siblings, 151; nest-like structures, 153; taking wasp, 226; attacking Herring Gull, 242; oiled by Fulmar, 298; mobbed by Swallow, 355; numbers in Regent's Park 1959-68, 453, 459; breeding success in Regent's Park, 463
 —, American, display postures compared with Moorhen's, 111-2; nest-like structures, 153
Coracias bengalensis, see Roller, Indian
 — *garrulus*, see Roller
Corvus corax, see Raven
 — *corone cornix*, see Crow, Hooded
 — *corone*, see Crow, Carrion
 — *frugilegus*, see Rook
 — *monedula*, see Jackdaw
Coturnix coturnix, see Quail
 Crack, Little, accepted records 1973, 320
 Cramp, Stanley, review of Parrack: *The Naturalist in Majorca*, 243-4; of Walkinshaw: *Cranes of the World*, and Burton: *Owls of the World*, 480-1
 Crane, confusion over Cyprus records, 170-1; importation of, 190; accepted record 1973, 320
 —, Demoiselle, Cyprus records, 170; importation of, 190
 —, Sandhill, imported under licence, 180
 —, Sarus, importation of, 190
 —, Siberian White, importation of, 189
 Crossbill, photograph, plate 34b
 —, Two-barred, confusion over vernacular names, 171; accepted records 1973, 338-9; accepted record 1972, 343
 Crow, Carrion, young Cuckoo's reaction to, 27; status on farmland, 69; food-burying, 215; eating oily fish paper, 355; numbers in Regent's Park 1959-68, 453, 457, 460-1; breeding success in Regent's Park, 463-4; harassing Hen Harriers, 512
 —, Hooded, eating wasps, 229; oiled by Fulmar, 298; large flock in Suffolk, 355-6
 Cruickshank, Allan D., photographs of North American Horned Larks, plate 71
 Cuckoo, young reared by Wren, 26-7, plate 4b; reacting to predators, 27; parasitisation of Reed Warblers, 442-3; parasitising Swallow, 478, plate 65b; using plant material in display, 514-5
 —, Great Spotted, accepted record 1973, 328, plate 45b
 —, Yellow-billed, accepted record 1973, 328
Cuculus canorus, see Cuckoo
 Curlew, status on farmland, 69; gapeworm infestation, 442; attacked by Hen Harrier, 511
 —, Stone, two females laying in one nest, 165-6, plate 28a
Cyanopica cyanus, see Magpie, Azure-winged
Cygnus cygnus, see Swan, Whooper
 — *olor*, see Swan, Mute
 Dawson, Rodney, photograph of Little Egret, plate 31b
Delichon urbica, see Martin, House

- Dendrocopos major*, see Woodpecker, Great Spotted
- Dendroica coronata*, see Warbler, Myrtle
- Dickson, R. C., note on Hen Harriers' hunting behaviour in South-west Scotland, 511-3
- Diomedea albatrus*, see Albatross, Steller's
— *melanophris*, see Albatross, Black-browed
- Display: Sparrowhawk, 239-42; Black Grouse, 116-20, plates 13-20; Moorhen, 105-12; Cuckoo, 514-5
- Diver, Great Northern, problems of separation from White-billed, 262-76, plates 41-44
—, Red-throated, photograph, plate 28b
—, White-billed, breeding distribution and range, 259-61; field-characters, 261-76, plates 41-44; summary of British records, 276-93; accepted records 1973, 313; accepted record 1967: amendment, 340; accepted records 1962, 1964, 1965, 340; accepted records 1966, 1969, 1970, 1971, 341; accepted record 1972, 342
- Dolichonyx oryzivorus*, see Bobolink
- Dove, Barbary, 'escape' found at lighthouse, 184
—, Namaqua, importation of, 191
—, Rufous Turtle, importation of, 191; in Cornwall October 1973, 328, 352-4
—, Stock, status on farmland, 62, 69; numbers in Regent's Park 1959-68, 453, 458; breeding success in Regent's Park, 464
—, Turtle, status on farmland, 57, 62, 69
- Dowitcher, accepted records 1973, 321
—, Long-billed, accepted records 1973, 321, plates 46, 47
- Dryocopus javensis*, see Woodpecker, White-bellied Black
- Duck, Black, problem of escapes, 186
—, Red-billed, Marsh Sandpiper feeding in association with, 477
—, Ring-necked, problem of escapes, 186; accepted records 1973, 316-7
—, Ruddy, feral birds confused with White-headed Ducks, 190
—, Tufted, numbers in Regent's Park, 1959-68, 453; breeding success in Regent's Park, 463
- Duck, Wood, confusion over vernacular names, 171
- Dunlin, gapeworm infestation, 442
- Dunnock, status on farmland, 57, 69; approaching fighting Robins, 122; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453, 456-8, 460-1; breeding success in Regent's Park, 463-4; feeding Cuckoo reared in Swallow's nest, 478; leaf-shaking, 516
- Eagle, Golden, building on Buzzard's nest with chicks, 202-3
—, Lesser Spotted, importation of, 193
—, Spotted, importation of, 193
—, Sieppe, wintering in East Africa, 71, plate 7b; worn tail-feathers, 188; wintering ranges in Africa, 393
—, Tawny, importation of, 193
—, White-tailed, oiled by Fulmar, 298-300; accepted record 1973, 318
- Editorial: advances in field identification, 309-10
- Egret, Cattle, importation of, 190
—, Great White, importation of, 190
—, Little, importation of, 190; accepted records 1973, 314; accepted record 1972, 342; photograph, plate 31b
- Egretta alba*, see Egret, Great White
— *garzetta*, see Egret, Little
- Eider, photograph, plate 48
—, King, accepted records 1973, 317
—, Steller's, accepted record 1973, 317, plate 48
- Elanus caeruleus*, see Kite, Black-winged
- Elkins, N., and Etheridge, B., the Crag Martin in winter quarters at Gibraltar, 376-87, plate 55
- Emberiza aureola*, see Bunting, Yellow-breasted
— *bruniceps*, see Bunting, Red-headed
— *calandra*, see Bunting, Corn
— *cirlus*, see Bunting, Cirl
— *citrinella*, see Yellowhammer
— *melanocephala*, see Bunting, Black-headed
— *pusilla*, see Bunting, Little
— *rustica*, see Bunting, Rustic
— *schoeniclus*, see Bunting, Reed
— *tahapisi*, see Bunting, (African) Rock

- England, M. D., a further review of the problem of 'escapes', 177-97; letter on Redpolls feeding from floating vegetation, 218; note on Black Storks wing-spreading while feeding, 236-7; on grebes eating bread, 302; letter on feral populations of parakeets, 393-4
- Eremophila alpestris*, see Lark, Shore
— *bilopha*, see Lark, Temminck's Horned
- Erithacus rubecula*, see Robin
- Etheridge, B., see Elkins, N.
- Falco biarmicus*, see Lanner
— *eleonora*, see Falcon, Eleonora's
— *naumanni*, see Kestrel, Lesser
— *peregrinus*, see Peregrine
— *rusticolus*, see Gyrfalcon
— *subbuteo*, see Hobby
— *tinnunculus*, see Kestrel
— *vespertinus*, see Falcon, Red-footed
- Falcon, Eleonora's, eating wasps, 229
—, Gyr, see Gyrfalcon
—, Red-footed, eating wasps, 229; accepted records 1973, 318-9; accepted record 1967, 341
- Ficedula hypoleuca*, see Flycatcher, Pied
— *parva*, see Flycatcher, Red-breasted
- Field-characters: Great Northern Diver, 262-76, plates 41-44; White-billed Diver, 261-76, plates 41-44; Scaup, 302-3; Hen Harrier, 517-8; Greenshank, 210-1; Little Stint, 4-5, 10-15, plate 2; Red-necked Stint, 6, 10-15, plate 2; Least Sandpiper, 8-15, plates 2-3; Long-toed Stint, 9-15, plates 2-3; Temminck's Stint, 9-15, plates 2-3; Sharp-tailed Sandpiper, 351-2, plate 50; Semipalmated Sandpiper, 6-7, 10-15, plate 2; Western Sandpiper, 7-8, 10-15, plates 2-3; Mediterranean Gull, 19-24; Common Tern, 133-6, 246-7, plates 22, 23a, 24b; Arctic Tern, 133-6, 246-7, plates 21, 23b, 24a; Roseate Tern, 136, 167-8
- Fieldfare, status on farmland, 69; release of imported birds, 183
- Finch, Green Singing, importation of, 192
—, Trumpeter, accepted records 1971, 342
- Firecrest, colonisation of England: correction, 256
- Fish-owl, Brown, importation of, 193
- Flamingo, importation of, 190
- Flegg, J. J. M., note on both sexes of the Serin in song, 517
- Flycatcher, Brown, importation of, 192
—, Pied, eating wasps, 225-6, 229; prey of Long-eared Owl, 369
—, Red-breasted, importation of, 192
—, Spotted, status on farmland, 69; eating wasps, 229; numbers in Regent's Park 1959-68, 453-4, 457; breeding success in Regent's Park, 463-5
—, Tickell's Blue, importation of, 192
- Food: Great Crested Grebe, 302; Little Grebe, 439; Black-throated Little Grebe, 302; Grey Heron, 225, 229; White Stork, 229; Buzzard, 229; Honey Buzzard, 223, 225, 227, 229; Hobby, 229; Eleonora's Falcon, 229; Red-footed Falcon, 229; Lesser Kestrel, 229; Partridge, 229; Moorhen, 151; Common Sandpiper, 440; Grey Phalarope, 352; Black-winged Pratincole, 229; Little Owl, 229; Long-eared Owl, 361-9; Alpine Swift, 229; Needle-tailed Swift, 229; Bee-eater, 158-64, 222, 227, 229; Red-throated Bee-eater, 226; Roller, 229; Green Woodpecker, 225, 229; Great Spotted Woodpecker, 229; Carrion Crow, 355; Hooded Crow, 229; Rook, 213-5, 224, 229; Jackdaw, 229; Magpie, 224-5, 229; Nutcracker, 229; Jay, 224-5, 229; Great Tit, 223-4, 229; Blue Tit, 224; Treecreeper, 515-6; Blackbird, 229, 441; Rock Thrush, 229; Black Wheatear, 229; Redstart, 225-6, 229; Blackcap, 229; Garden Warbler, 229; Whitethroat, 229; Spotted Flycatcher, 229; Great Grey Shrike, 223, 227, 229; Lesser Grey Shrike, 223, 227, 229; Red-backed Shrike, 223, 227, 229; Starling, 229, 440-1; Redpoll, 218
- Fregata* sp, see Frigatebird
- Frigatebird, accepted record 1973, 313
- Fringilla coelebs*, see Chaffinch
— *montifringilla*, see Brambling
- Fryer, G., note on aggressive behaviour by Buzzards at nest, 238-9

- Fulica atra*, see Coot
 Fulmar, contaminating other species with oil, 297-301
Fulmarus glacialis, see Fulmar
 Furrer, Robert K., letter on English bird names, 171-2
- Gallinago gallinago*, see Snipe
 — *media*, see Snipe, Great
Gallinula chloropus, see Moorhen
 Gallinule, Allen's, importation of, 190; accepted for British and Irish list, 405-6; summary of Palearctic records, 406-10
 —, Purple, display postures compared with Moorhen's, 112; juveniles feeding younger siblings, 151; importation of, 190; breeding biology in *marismas* of Guadalquivir, 230-6, plates 37-40
 Gannet, nest with two chicks, 25, plate 1; migration, 89-103
 —, Australian, migration, 101-2
 —, Cape, migration, 101
Garrulus glandarius, see Jay
Gavia adamsii, see Diver, White-billed
 — *immer*, see Diver, Great Northern
 — *stellata*, see Diver, Red-throated
Gelochelidon nilotica, see Tern, Gull-billed
Glareola nordmanni, see Pratincole, Black-winged
 — *pratincola*, see Pratincole, Collared
 Glue, David E., and Hammond, Geoffrey J., feeding ecology of the Long-eared Owl in Britain and Ireland, 361-9
 Godwit, Bar-tailed, feeding on open heath, 303
 Goldencrest, status on farmland, 62, 69; prey of Long-eared Owl, 368-9
 Goldfinch, status on farmland, 56, 62, 69; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453, 458; breeding success in Regent's Park, 463-5
 Goose, Barnacle, photograph of flock, plate 30a
 —, Canada, numbers in Regent's Park 1959-68, 453; breeding success in Regent's Park, 463; photograph, plate 30b
 —, Lesser White-fronted, accepted record 1973, 317-8
 Goshawk, oiled by Fulmar, 298
- Gowans, David A., photograph of flock of Barnacle Geese, plate 30a
 Grant, P. J., comment on letter on identification of juvenile Arctic Terns, 247; note on head plumage of female Scaup, 302-3
 —, —, see Hume, R. A.
 —, —, see Wallace, D. I. M.
 Grebe, Black-throated Little, eating bread, 302
 —, Great Crested, eating bread, 302; breeding adaptations, 413-37, plates 56-62; egg-laying, 438, plate 63; breeding in Regent's Park, 453
 —, Little, function of wing-beating, 438; eaten by Purple Heron chick, 439
 —, Pied-billed, foot-paddling, 439
 Green, Dennis, photograph of herd of Whooper Swans, plate 36a; of Buff-breasted Sandpiper, plate 49c; of Sharp-tailed Sandpiper, plate 50
 Greenfinch, status on farmland, 62, 69; settling on sea, 79-80; prey of Long-eared Owl, 367; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-4
 Greenshank, leg colour, 210-1
 Greenwood, Richard S., note on Tree-creepers apparently feeding on fat, 515-6
 Grenfell, H. E., photograph of Arctic Tern, plate 24a
 Grosbeak, Blue, importation of, 192
 —, Evening, importation of, 192
 —, Rose-breasted, importation of, 192
 Grouse, Black, at lek, 116-120, plates 13-20
Grus antigone, see Crane, Sarus
 — *canadensis*, see Crane, Sandhill
 — *grus*, see Crane
 — *leucogeranus*, see Crane, Siberian
 White
 Guillemot, oiled by Fulmar, 298; melanism in, 392
Guiraca caerulea, see Grosbeak, Blue
 Gull, Black-headed, attacked by Mediterranean Gull, 24; status on farmland, 69; greater nesting success of duck near colony, 82; predation and breeding adaptations, 414; photograph of immature, plate 24b
 —, Bonaparte's, accepted records

- 1973, 326; foot-paddling, 478; possible removal of oil by preening, 483
- Gull, California, foot-paddling, 478
- , Common, attacked by Mediterranean Gull, 24; status on farmland, 69; attacked by Great Black-backed Gull, 242-3; numbers in Regent's Park 1959-68, 459
- , Great Black-backed, attacking Common Gull, 242-3; oiled by Fulmar, 298-300
- , Herring, status on farmland, 69; attacked by Coot, 242; oiled by Fulmar, 298-9; numbers in Regent's Park 1959-68, 453, 459; breeding success in Regent's Park, 464
- , Ivory, accepted record 1973, 326
- , Laughing, foot-paddling, 478
- , Lesser Black-backed, status on farmland, 69; numbers in Regent's Park, 453, 459
- , Little, large numbers off Co. Wicklow, 166-7; large numbers in Ireland in summer, 514
- , Mediterranean, records at Blackpill, Glamorgan, 1972-73, 17-24; aggressive behaviour, 24
- , Ring-billed, accepted records 1973, 326; foot-paddling, 478
- , Ross's, foot-paddling, 477-8, plate 64
- Gyps fulvus*, see Vulture, Griffon
- Gyrfalcon, accepted records 1973, 318; accepted records 1972, 343
- Haematopus ostralegus*, see Oystercatcher
- Haliaeetus albicilla*, see Eagle, White-tailed
- Hammond, Geoffrey J., see Glue, David E.
- Harding, B. D., letter on scope of *British Birds* and seasonal analyses of records, 28
- Hardy, Eric, note on leg colour of Greenshank, 211
- Harms, Wolfgang, letter on House Martins roosting in reed-beds, 518-9
- Harrier, Hen, wintering in East Africa, 71-2; hunting behaviour, 511-3; eye colour, 517-8
- , Marsh, wintering in East Africa, 71-2
- , Montagu's, wintering in East Africa, 71-2
- Harrier, Pallid, wintering in East Africa, 71-2, plate 8
- Harris, M. P., review of Cramp, Bourne and Saunders: *The Seabirds of Britain and Ireland*, 519-20
- Harrison, C. J. O., review of Burkhard: *Urvögel*, 482-3
- Harrison, Pamela, photograph of Steller's Eider with Eiders, plate 48
- Harrison, Ronald, note on male Cuckoo using plant material in display, 514-5
- Hawfinch, prey of Long-eared Owl, 369
- Hawk, Marsh, see Harrier, Hen
- , Red-tailed, increase in clutch-size with latitude, 208
- Hen, Tasmanian Native, display, 112; nest-like structures, 153
- Heron, Grey, status on farmland, 69; wintering in East Africa, 70, plate 5; feeding on wasp larvae, 225, 229; oiled by Fulmar, 298, 300; restricted laying season, 431; breeding in Regent's Park, 453
- , Indian Pond, importation of, 190
- , Night, iris colour in juvenile, 120; importation of, 190; accepted records 1973, 313, plate 45a
- , Purple, wintering in East Africa, 70, plate 6; importation of, 190; accepted records 1973, 314; accepted record 1972, 342; chick regurgitating Little Grebe, 439; photograph, plate 32
- , Squacco, importation of, 190; accepted record 1973, 314-5
- Herrera, Carlos M., and Ramirez, Adoración, food of Bee-eaters in southern Spain, 158-64
- Hesperiphona vespertina*, see Grosbeak, Evening
- Hibbert, F. W., note on Coot attacking Herring Gull, 242
- Himantopus himantopus*, see Stilt, Black-winged
- Hippolais icterina*, see Warbler, Icterine
- Hirundapus caudacutus*, see Swift, Needle-tailed
- Hirundo daurica*, see Swallow, Red-rumped
- *rupestris*, see Martin, Crag
- *rustica*, see Swallow
- Hjorth, Ingemar, the lek of the Black Grouse, 116-20, plates 13-20

- Hobby, eating wasps, 229
- Hogg, Raymond H., note on Great Black-backed Gull attacking Common Gull, 242-3
- Holland, T. R., note on behaviour of Long-eared Owls in presence of dog, 212-3
- Holyoak, D. T., note on high incidence of plumage abnormalities in London birds, 122-4
- Hosking, Eric, more examples of the best recent work by British bird-photographers, 197-9, plates 29-36; photograph of Common Tern alighting at Avocet's nest, plate 22; of Temminck's Horned Lark, plates 69b-70
- Hudson, Robert, review of Zink: *Der Zug Europäischer Singvögel*, part 1, 217-8; Allen's Gallinule in Britain and the Palearctic, 405-13; see also News and comment
- Hughes, S. W. M., note on Tree Pipit breeding habitats in Sussex, 390-1
- Hume, R. A., and Grant, P. J., the upperwing pattern of adult Common and Arctic Terns, 133-6, plates 21-24
- , —, and Lansdown, P. G., Mediterranean Gulls at Blackpill, Glamorgan, 17-24
- Hydroprogne caspia*, see Tern, Caspian
- Ibis, Glossy, importation of, 190; accepted record 1973, 315-6
- , Sacred, untidy plumage, 187
- Icterus galbula*, see Oriole, Baltimore
- Ingram, Collingwood, note on possible functions of the tail spots in the Woodcock, 475-6, plate 65a
- Ixobrychus minutus*, see Bittern, Little
- Jackdaw, status on farmland, 62, 69; food-hiding, 215; eating wasps, 229; prey of Long-eared Owl, 369
- Jay, young Cuckoo's reaction to, 27; status on farmland, 69; food-burying, 215; eating wasps, 224-5, 229; prey of Long-eared Owl, 367; numbers in Regent's Park 1959-68, 453, 460; breeding success in Regent's Park, 463-4
- Johnson, C. D. N., Venables, J. D., and Williams, G. A., field notes on the Sharp-tailed Sandpiper, 351-2, plate 50
- Jones, W. E., note on territorial display by Sparrowhawks, 239-42
- Jynx torquilla*, see Wryneck
- Kestrel, status on farmland, 69; wintering in East Africa, 72; oiled by Fulmar, 298; taking prey from Short-eared Owl, 474-5
- , Lesser, wintering in East Africa, 72, plate 9; eating wasps, 229; accepted records 1973, 319-20
- Kettle, R. H., note on Blue Tit laying and hatching egg in substitute site with no nest material, 78-9
- Ketupa zeylonensis*, see Fish-owl, Brown
- Keymer, I. F., letter on gapeworms in waders, 441-2
- King, Bernard, note on aerial plunging by Shags and Manx Shearwaters, 77; on anting-like behaviour and food of Wryneck, 388; on foot-paddling behaviour of Pied-billed Grebes, 439; on Ross's Gull in Hampshire foot-paddling to disturb organisms, 477-8; on male Cuckoo using plant material in display, 515
- , — and Marjorie, note on nocturnal feeding by Pied Wagtails in winter, 303
- Kingfisher, mobbed by Swallow, 355
- Kington, B. L., note on Little Ringed Plover with red legs, 210
- Kirtland, C. A. E., note on Bearded Tit with abnormal leg coloration, 356
- Kite, Black, importation of, 185; worn tail-feathers, 188
- , Black-winged, prey removed by Lanner, 25
- Kittiwake, attacked by Mediterranean Gull, 24; possibly oiled by Fulmar, 298; predation and breeding adaptations, 414
- Koch, Ludwig, obituary, 472-4
- Lanius collurio*, see Shrike, Red-backed
- *excubitor*, see Shrike, Great Grey
- *minor*, see Shrike, Lesser Grey
- *schach*, see Shrike, Rufous-backed
- *senator*, see Shrike, Woodchat
- *vittatus*, see Shrike, Bay-backed
- Lanner, feeding by piracy, 25-6, plate 4a
- Lansdown, P. G., see Hume, R. A.

- Lapwing, egg-weights on farmland, 45, 62, 69; nesting associations with Redshank and Snipe, 82; prey of Long-eared Owl, 369; gapeworm infestation, 442
- Lark, Horned, see Lark, Shore
- , Shore, letters on possible breeding in Scotland, 127; photographic study, 502-11, plates 68, 69a, 71
- , Short-toed, accepted records 1973, 330
- , Temminck's Horned, photographic study, 505-11, plates 69b-70
- Larus argentatus*, see Gull, Herring
- *atricilla*, see Gull, Laughing
- *californicus*, see Gull, California
- *canus*, see Gull, Common
- *delawarensis*, see Gull, Ring-billed
- *fuscus*, see Gull, Lesser Black-backed
- *marinus*, see Gull, Great Black-backed
- *melanocephalus*, see Gull, Mediterranean
- *minutus*, see Gull, little
- *philadelphia*, see Gull, Bonaparte's
- *ridibundus*, see Gull, Black-headed
- Laterallus leucopyrrhus*, see Rail, Southern White-breasted
- Lea, David, review of Nethersole-Thompson and Watson: *The Cairngorms*, 479-80
- Limicola falcinellus*, see Sandpiper, Broad-billed
- Limnodromus scolopaceus*, see Dowitcher, Long-billed
- Limosa lapponica*, see Godwit, Bar-tailed
- Linnet, status on farmland, 56, 62, 69; loss of plumage colour in captivity, 188; prey of Long-eared Owl, 367; numbers in Regent's Park, 453, 459; breeding success in Regent's Park, 464
- Locustella lanceolata*, see Warbler, Lanceolated
- *luscinioides*, see Warbler, Savi's
- *naevia*, see Warbler, Grasshopper
- Lord, John, letter on scope of *British Birds*, 30
- Loxia curvirostra*, see Crossbill
- *leucoptera*, see Crossbill, Two-barred
- Luscinia calliope*, see Rubythroat, Siberian
- *luscinia*, see Nightingale, Thrush
- Luscinia megarhynchos*, see Nightingale
- *svecica svecica*, see Bluethroat, Red-spotted
- Lyrurus tetrix*, see Grouse, Black
- McGinn, D. B., photograph of White-billed Diver, plate 41c
- Magpie, status on farmland, 62, 69; eating wasps, 224-5, 229
- , Azure-winged, importation of, 191; photograph, plate 35b
- Mallard, status on farmland, 69; polymorphism in urban areas, 124; egg found in Buzzard's nest, 203; taking wasp, 226; numbers in Regent's Park 1959-68, 453-5, 459; breeding success in Regent's Park, 463
- Martin, Crag, wintering behaviour in Gibraltar, 376-87, plate 55; measurements, 386-7
- , House, status on farmland, 62, 69; with Crag Martins at Gibraltar, 379; roosting in reed-beds questioned, 518-9
- , Sand, mobbed by Swallow, 355; with Crag Martins at Gibraltar, 379
- Mather, John R., letter on oiled seabirds successfully cleaning their plumage, 483-4
- , —, see Burn, David M.
- Mayo, A. L. W., letter on wader nesting associations, 82
- Meiklejohn, Matthew Fontaine Maury, obituary, 469-72, plate 67
- Melanitta perspicillata*, see Scoter, Surf
- Melopsittacus undulatus*, see Budgerigar
- Melospiza melodia*, see Sparrow, Song
- Merganser, Red-breasted, aerial plunge-diving, 78
- Mergus serrator*, see Merganser, Red-breasted
- Merops apiaster*, see Bee-eater
- *bullocki*, see Bee-eater, Red-throated
- *superciliosus*, see Bee-eater, Blue-cheeked
- Micropalama himantopus*, see Sandpiper, Stilt
- Migration: Palearctic birds in East Africa, 70-6, plates 5-12; Gannet, 89-103; Cape Gannet, 101; Australian Gannet, 101-2
- Milne-Redhead, E., letter on county boundary changes, 218-9

- Milvus migrans*, see Kite, Black
- Mitchell, K. D. G., letter on feral parrakeets and control of introductions, 484
- Monticola cinclorhynchus*, see Thrush, Blue-headed Rock
- *rufiventris*, see Thrush, Chestnut-bellied Rock
- *saxatilis*, see Thrush, Rock
- *solitarius*, see Thrush, Blue Rock
- Moorhen, status on farmland, 69; breeding behaviour and biology, 105-15; 137-58, plate 25; prey of Long-eared Owl, 368-9; numbers in Regent's Park 1959-68, 453, 457, 459; breeding success in Regent's Park, 463
- Morgan, Robert, note on survival of young Long-tailed Tits in exposed nest, 79
- Motacilla alba*, see Wagtail, Pied
- *citreola*, see Wagtail, Citrine
- *flava*, see Wagtail, Yellow
- — *beema*, see Wagtail, Sykes's
- — *feldegg*, see Wagtail, Black-headed
- — *flava*, see Wagtail, Blue-headed
- — *flavissima*, see Wagtail, Yellow
- — *lutea*, see Wagtail, Eastern Yellow
- — *thunbergi*, see Wagtail, Grey-headed
- Murton, R. K., and Westwood, N. J., some effects of agricultural change on the English avifauna, 41-69; letter on effects of agricultural change on birds, 485-7
- Muscicapa latirostris*, see Flycatcher, Brown
- *striata*, see Flycatcher, Spotted
- Myophonus caeruleus*, see Thrush, Whistling
- Naunton, C. R., photograph of White-rumped Sandpiper, plate 49b
- News and comment: Belgian open season for bird trapping, breeding of Peregrines in captivity, feral parrakeets near London, county natural history societies and boundary changes, 32-4; tern protection, NCC appointments, MBE for H. G. Hurrell, rare pheasants returned to wild, power plant fuelled by peat, obituary of Dr M. C. Radford, new BTO publication, 83-4; Eiders and oil pollution, North-east Greenland National Park, Shetland Bird Club, RSPB staff moves, birds of Persian Gulf, Houbara Bustard research cancelled, reprieve for Foulness? 128-30; Tawny Owls and Pheasants, Norwich bird strike, Foulness respite, obituaries of R. J. Partridge and R. P. Bagnall-Oakeley, parrakeets in London area, pesticides in Peregrine eggs from 1948, 173-5; WWF expenditure, RSPB Film Unit awards, Whitethroats and arboviruses, *Salmonella* in wild birds, some continental conservation news, 248-9; attempts of Wood Sandpiper to recolonise Aleutian Islands, CBE for David Attenborough and MBE for Mrs Grace Hickling, projected book on birdwatching for disabled, international collaboration among egg-collectors, 304-5; new RSPB dockland reserve, release of defence lands, National cagebird exhibition, IUCN/WWF sponsored coins, NCC survey of Channel Tunnel sites, *The Birds of Morecambe Bay and Lakeland Birds*, 397-8; growth of British and Irish list, bird species new to science, British Library of Wildlife Sounds, Brent Goose research, recent appointments, 444-7; rookery census, future of Foulness, Steep Holm to be reserve, new BTO ringing guide, Magellan oil spillage, register of birds bred in captivity (*Avic. Mag.*), 487-9; Welsh Oystercatcher cull, sewage farm survey, egg transplants for threatened raptors in USA, air strike hazard in Estonia, Dollard reprieve, some regional publications, 525-7
- Nicholson, E. M., review of Potter and Sargent: *Pedigree: Words from Nature*, 126-7
- Nightingale, present on Suffolk farmland, 60
- , Thrush, accepted records 1973, 331
- Nightjar, prey of Long-eared Owl, 369
- Niltava tickelliae*, see Flycatcher, Tickell's Blue

- Notornis mantelli*, see Takahe
Nucifraga caryocatactes, see Nutcracker
Numenius arquata, see Curlew
 — *phaeopus*, see Whimbrel
 Nutcracker, eating wasps, 229
 Nuthatch, release of imported birds, 183
Nyctea scandiaca, see Owl, Snowy
Nycticorax nycticorax, see Heron, Night
- Obituaries: R. P. Bagnall-Oakeley, 174; Ludwig Koch, MBE (1881-1974), 472-4; Matthew Fontaine Maury Meiklejohn, MA (1913-1974), 469-72, plate 67; R. J. Partridge, 174
Oena capensis, see Dove, Namaqua
Oenanthe hispanica, see Wheatear, Black-eared
 — *isabellina*, see Wheatear, Isabelline
 — *leucura*, see Wheatear, Black
 — *oenanthe*, see Wheatear
 — *pleschanka*, see Wheatear, Pied
- Oreel, G. J., note on identification of Roseate Terns, 167-8; on Sharp-tailed Sandpiper with flesh-coloured legs and feet, 211; letter on eye colour of the Hen Harrier, 517-8
 Oriole, Baltimore, importation of, 192
 Osprey, possibly oiled by Fulmar, 298
Otis tarda, see Bustard, Great
Otus bakkamoena, see Owl, Collared Scops
 — — *glabripes*, see Owl, Bare-toed Scops
 — — *leucotis*, see Owl, White-faced Scops
 — — *scops*, see Owl, Scops
- Ovenbird, accepted record 1973, 337
 Owl, Bare-toed Scops, importation of, 193
 —, Barn, voice, 493-501
 —, Collared Scops, importation of, 193
 —, Eagle, importation of, 193
 —, Little, status on farmland, 69; eating wasps, 229; prey of Long-eared Owl, 368-9
 —, Long-eared, behaviour in presence of dog, 212-3; oiled by Fulmar, 298-9; food in Britain and Ireland, 361-9
 —, Scops, importation of, 193; accepted record 1973, 328
 —, Short-eared, oiled by Fulmar, 298; prey taken by Kestrel, 474-5
 Owl, Snowy, accepted records 1973, 328
 —, Tawny, status on farmland, 69; numbers in Regent's Park 1959-68, 453; breeding success in Regent's Park, 464
 —, White-faced Scops, importation of, 193
Oxyura jamaicensis, see Duck, Ruddy
 Oystercatcher, rearing success on farmland, 45, 60
- Pagophila eburnea*, see Gull, Ivory
 Palmar, C. E., photograph of Black Grouse at lek, plate 14b
Pandion haliaetus, see Osprey
Panurus biarmicus, see Tit, Bearded Parrakeet, Ringneck, breeding in wild in England, 191; danger of feral populations in Britain, 393-4, 484-5
 Partridge, status on farmland, 47, 62, 69; eating wasps, 229; young as prey of Long-eared Owl, 368-9
 —, Red-legged, status on farmland, 47, 69; photograph, plate 36b
Parus ater, see Tit, Coal
 — *caeruleus*, see Tit, Blue
 — *cristatus*, see Tit, Crested
 — *major*, see Tit, Great
 — *montanus*, see Tit, Willow
 — *palustris*, see Tit, Marsh
 — *xanthogenys*, see Tit, Yellow-checked
- Passer domesticus*, see Sparrow, House
 — *montanus*, see Sparrow, Tree
Passerina amoena, see Bunting, Lazuli
 — *ciris*, see Bunting, Painted
 — *lechlancheri*, see Bunting, Rainbow
 Paton, William S., photograph of Canada Goose, plate 30b
Pelecanus crispus, see Pelican, Dalmatian
 — *onocrotalus*, see Pelican, White
 Pelican, Dalmatian, importation of, 190
 —, White, importation of, 190
 Pennie, Ian D., obituary of Matthew Fontaine Maury Meiklejohn, 469-72, plate 67
Perdix perdix, see Partridge
 Peregrine, oiled by Fulmar, 298-9; preying on Crag Martins, 378
Pernis apivorus, see Buzzard, Honey
Petronia xanthocollis, see Sparrow, Yellow-throated
Phalacrocorax carbo, see Shag

- Phalarope, Grey, feeding on earth-worms, 352
 —, Wilson's, accepted records 1973, 325
Phalaropus fulicarius, see Phalarope, Grey
 — *tricolor*, see Phalarope, Wilson's
Phasianus colchicus, see Pheasant
 Pheasant, status on farmland, 69; young as prey of Long-eared Owl, 368-9; attacked by Hen Harrier, 511
Pheucticus ludovicianus, see Grosbeak, Rose-breasted
 Phillips, John, letter on oiled seabirds successfully cleaning their plumage, 483-4
Philomachus pugnax, see Ruff
Phoenixopterus spp., see Flamingo
Phoenicurus ochruros, see Redstart, Black
 — *phoenicurus*, see Redstart
Phylloscopus bonelli, see Warbler, Bonelli's
 — *borealis*, see Warbler, Arctic
 — *collybita*, see Chiffchaff
 — *proregulus*, see Warbler, Pallas's
 — *schwarzi*, see Warbler, Radde's
 — *trochiloides*, see Warbler, Greenish
 — *trochilus*, see Warbler, Willow
Pica pica, see Magpie
 Picozzi, N., and Weir, D., breeding biology of the Buzzard in Speyside, 199-210
 —, —, see Watson, A.
Picus viridis, see Woodpecker, Green
 Pigeon, feral, polymorphism in urban area, 124; deformed toes, 188; numbers in Regent's Park 1959-68, 451-2, 455, 460-1
 Pipit, Meadow, status on farmland, 69
 —, Olive-backed, accepted record 1973, 335
 —, Red-throated, wintering in East Africa, 73-4, plate 11b; accepted record 1973, 335
 —, Tawny, accepted records 1973, 334-5; accepted record 1971, 342; mobbed by Swallow, 355
 —, Tree, status on farmland, 62, 69; breeding habitats in Sussex, 390-1
Piranga spp., See Tanager
 — *olivacea*, see Tanager, Scarlet
 — *rubra*, see Tanager, Summer
Platalea alba, see Spoonbill, African
 — *leucorodia*, see Spoonbill
Plectrophenax nivalis, see Bunting, Snow
Plegadis falcinellus, see Ibis, Glossy
 Plover, Golden, status on farmland, 69
 —, Lesser Golden, accepted records 1973, 320
 —, Little Ringed, with red legs, 210
 —, Ringed, unusual nest defence behaviour, 78; nesting association with Little Tern, 82
 —, Sociable, accepted record 1973, 320
 —, Spur-winged, importation of, 191
 —, Three-banded, importation of, 191
Pluvialis apricaria, see Plover, Golden
 — *dominica*, see Plover, Lesser Golden
 Pochard, numbers in Regent's Park 1959-68, 453, 459; breeding success in Regent's Park, 463
Podiceps cristatus, see Grebe, Great Crested
Podilymbus podiceps, see Grebe, Pied-billed
Polysticta stelleri, see Eider, Steller's
Porphyrio porphyrio, see Gallinule, Purple
Porphyryla alleni, see Gallinule, Allen's
 Porter, S. C., photograph of Red-legged Partridge, plate 36b
Porzana carolina, see Rail, Sora
 — *parva*, see Crane, Little
 Pratincole, accepted record 1973, 325
 —, Black-winged, eating wasps, 229
 —, Collared, accepted records 1973, 325
 Pratincoles, importation of, 191
Prunella modularis, see Dunnock
Psittacula krameri, see Parrakeet, Ring-neck
Puffinus assimilis, see Shearwater, Little
 — *herminieri*, see Shearwater, Audubon's
 — *puffinus*, see Shearwater, Manx
Pyrrhula pyrrhula, see Bullfinch
 Quail, importation of, 181
 —, Bobwhite, hatching period, 146
Quelea quelea, see Quelea, Red-billed
 Quelea, Red-billed, prey of Steppe Eagle, 393
 Rabbits, Brian, note on leg colour of Greenshank, 210-1

- Radford, A. P., note on Carrion Crows eating oily fish paper, 355; on Starling feeding lavender leaves to juvenile, 440
- Rail, Clapper, only egg nests built, 153
- , King, display postures compared with Moorhen's, 112; only egg nests built, 153
- , Sora, importation of, 190; only egg nests built, 153; accepted record 1973, 320
- , Southern White-breasted, juveniles feeding younger siblings, 151
- , Virginia, only egg nests built, 153
- , Water, status on farmland, 69; courtship-feeding, 112
- Rallus aquaticus*, see Rail, Water
- *elegans*, see Rail, King
- *limicola*, see Rail, Virginia
- Ramírez, Adoración, see Herrera, Carlos M.
- Rarities Committee: Report on rare birds in Great Britain in 1973 (with additions for ten previous years), 310-48, plates 45-50; the reasons for record rejection, 349-50
- Raven, food-burying, 215; oiled by Fulmar, 298-300
- Razorbill, oiled by Fulmar, 298; melanism in, 392
- Recorders, List of county and regional, 253-6
- Recurvirostra avosetta*, see Avocet
- Redpoll, feeding from floating vegetation, 21; status on farmland, 56, 62, 69; prey of Long-eared Owl, 369
- Redshank, nesting associations with Lapwing, 82
- Redstart, eating wasps, 225-6, 229
- , Black, breeding in new town centres, 394-5
- Redwing, status on farmland, 69; release of imported birds, 183; numbers in Regent's Park 1959-68, 459
- Regulus ignicapillus*, see Firecrest
- *regulus*, see Goldcrest
- Reports: October, 34-40; November, 85-8; December, 130-2; January, 175-6; February, 219-20; March and winter summary, 250-2; April, 305-8; May, 357-60; June and spring summary, 398-404; July, 447-8; August, 489-92; September, 527-32
- Requests for information: influx of Rough-legged Buzzards, 84; colour-ringed and dye-marked waders from Greenland, 219; colour-ringed Great Black-backed Gulls, checklist of the birds of Gibraltar, 396
- Reviews:
- Alexander: *Seventy Years of Bird-watching*, 245-6
- Batten *et al.*: *Birdwatchers' Year*, 80-1
- Brien: *Avifaune de Bretagne*, 522-3
- Burkhard: *Urvögel*, 482-3
- Burton: *Owls of the World*, 480-1
- Campbell: *The Countryman Bird Book*, 244-5
- Cramp, Bourne and Saunders: *The Seabirds of Britain and Ireland*, 519-20
- Glutz von Blotzheim: *Handbuch der Vögel Mitteleuropas*, vol. 5: *Galliformes and Gruiformes*, 172-3
- Gooders: *The Bird-watchers' Book*, 521-2
- Hosking and Gooders: *Wildlife Photography*, 80-1
- Matvejev and Vasić: *Catalogus Faunae Jugoslaviae. IV/3. Aves*, 523-4
- Nethersole-Thompson and Watson: *The Cairngorms*, 479-80
- Parrack: *The Naturalist in Majorca*, 243-4
- Parslow: *Breeding Birds of Britain and Ireland*, 216-7
- Porter *et al.*: *Flight Identification of European Raptors*, 520-1
- Potter and Sargent: *Pedigree: Words from Nature*, 126-7
- Sharrock: *Scarce Migrant Birds in Britain and Ireland*, 481-2
- Tinbergen: *The Animal in its World*, 125-6
- Walkinshaw: *Cranes of the World*, 480-1
- Zink: *Der Zug Europäischer Singvögel*, part 1, 217-8
- Reynolds, J. F., note on piracy by Lanner, 25-6, plate 4a; Palearctic birds in East Africa, 70-6, plates 5-12; note on feeding association between Marsh Sandpiper and dabbling ducks, 477
- Rhodopechys githaginea*, see Finch, Trumpeter
- Rhodostethia rosea*, see Gull, Ross's
- Richmondia cardinalis*, see Cardinal

- Riparia riparia*, see Martin, Sand
Rissa tridactyla, see Kittiwake
 Robbins, C. Stephen, note on probable interbreeding of Common and Roseate Terns, 168-70, plates 26-7
 Robin, status on farmland, 69; killed by another, 121-2; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-4; female singing in winter, 517
 —, American, importation of, 191
 Robson, R. W., note on food-burying and recovery by Rook, 214-5
 Rogers, M., photograph of Alpine Swift, plate 49a
 Roller, numbers imported, 180, 191; eating wasps, 229; accepted records 1973, 330
 —, Indian, importation of, 191
 Rolls, Julian C., note on domed nest of Chaffinch, 27; on Common Terns roosting on water, 120-1
 —, — and Margaret, note on Red-breasted Mergansers diving from the air, 78
 Rook, status on farmland, 50-2, 57, 68-9; feeding methods on suspended fat, 213-4; food-burying and recovery, 214-5; eating wasps, 224, 229; direct head-scratching in flight, 243
 Rosefinch, Scarlet, importation of, 192; accepted records 1973, 337-8
 Rowe, Peter, note on Gannet nest with two chicks, 25, plate 1
 Rubythroat, Himalayan, importation of, 192
 —, Siberian, importation of, 192
 Ruff, wintering in East Africa, 72-3, plate 10b
 Rutledge, R. F., note on unprecedented numbers of Little Gulls in Ireland, 166-7; on Woodpigeons cooing while on the ground, 440; on abnormal numbers of Little Gulls in Ireland in summer, 514
 Sage, Bryan L., note on large flock of Hooded Crows in Suffolk, 355-6; photograph of Long-tailed Skuas, plate 33a
 Sandford, John E., note on Greenfinch settling on the sea, 79-80
 Sandpiper, Baird's, accepted records 1973, 322; accepted record 1965, 340
 —, Broad-billed, accepted records 1973, 324-5; accepted record 1972, 343
 —, Buff-breasted, accepted records 1973, 324, plate 49c
 —, Common, mobbed by Swallow, 355; eating butterflies, 440; photograph of juvenile, plate 31a
 —, Green, wintering in East Africa, 72, plate 10a
 —, Least, field-characters, 8-15, plates 2-3
 —, Marsh, feeding association with dabbling ducks, 477
 —, Pectoral, photographs, plate 51
 —, Semipalmated, field-characters, 6-7, 10-15, plate 2; accepted record 1970, 341
 —, Sharp-tailed, with flesh-coloured legs and feet, 211; accepted records 1973, 323, 351-2, plate 50
 —, Spotted, accepted records 1973, 322
 —, Stilt, accepted record 1973, 321
 —, Terek, accepted records 1973, 322
 —, Upland, accepted record 1973, 321
 —, Western, field-characters, 7-8, 10-15, plates 2-3; accepted records 1973, 323
 —, White-rumped, accepted records 1973, 322-3, plate 49b
 Scaup, head plumage of female, 302-3
 Schmitz, Arne, photographs of Black Grouse at lek, 15a, b, 17d, 20b, c
 Schouten, Hans, photograph of Common Tern, plate 24b
Scolopax rusticola, see Woodcock
 Scoter, Surf, accepted record 1973, 317
 Scott, R. E., note on two female Stone Curlews laying in one nest, 165-6, plate 28a
Seiurus aurocapillus, see Ovenbird
 Serin, importation of, 192; accepted records 1973, 337; both sexes singing, 517
Serinus canaria, see Canary, Domestic
 — *mozambicus*, see Finch, Green Singing
 — *serinus*, see Serin
 Shag, aerial plunge-diving, 77
 Shannon, G. R., studies of less familiar

- birds: 174—Shore Lark and Temminck's Horned Lark, 502-11, plates 68-71
- Sharrock, J. T. R., note on House Sparrows acquiring a feeding technique, 356; letter on the origin of British Aquatic Warblers, 443-4
- , —, see Bonham, P. F.
- Shearwater, Audubon's, melanism in, 392
- , Cory's, accepted records 1973, 313
- , Little, accepted records 1973, 313
- , Manx, aerial plunge-diving, 77; melanic specimen of Californian race, 392
- Shelduck, present on Suffolk farmland, 60
- Shoveler, present on Suffolk farmland, 60
- Shrike, Bay-backed, importation of, 192
- , Great Grey, importation of, 192; feeding on wasps, 223, 227, 229
- , Lesser Grey, feeding on wasps, 223, 227, 229; accepted records 1973, 335-6
- , Red-backed, feeding on wasps, 223, 227, 229; factors affecting status on farmland, 486
- , Rufous-backed, importation of, 192
- , Woodchat, accepted records 1973, 336
- Simmons, K. E. L., adaptations in the reproductive biology of the Great Crested Grebe, 413-37, plates 56-62; review of Tinbergen: *The Animal in its World*, 125-6; note on direct head-scratching by Rook in flight, 243; on Starling learning to use its feet while feeding, 391-2; letter on Cuckoos and Reed Warblers, 442-3
- Sitta europaea*, see Nuthatch
- Skua, Long-tailed, photograph, plate 33a
- Skylark, status on farmland, 62, 69; prey of Long-eared Owl, 367
- Slade, Brian E., note on large spring roost of Whimbrels in Bridgwater Bay, 513-4
- Smith, F. R., report on rare birds in Great Britain in 1973 (with additions for ten previous years), 310-48, plates 45-50
- Smith, John and Margaret, note on behaviour of Ringed Plover in defence of nest, 78
- Smith, Peter, note on Great Spotted Woodpecker tapping on window pane, 388
- Smith, Robert T., photographs of Black Grouse at lek, plates 14a, c, 15c, 17a, b, 18-20a
- Snipe, present on Suffolk farmland, 60; nesting associations with Lapwing, 82
- , Great, accepted records 1973, 321
- Somateria mollissima*, see Eider
- *spectabilis*, see Eider, King
- Soothill, Eric, photograph of female Shore Lark, plate 69a
- Sparrow, House, status on farmland, 62, 69; approaching fighting Robins, 122; frequency of plumage abnormalities, 123; acquired nut-feeding technique, 356; prey of Long-eared Owl, 366-8; numbers in Regent's Park 1959-68, 453, 455; 'hawking' for flies, 486
- , Orange-billed, female singing during incubation, 517
- , Song, female singing, 517
- , Tree, status on farmland, 69; frequency of plumage abnormalities, 123
- , White-throated, accepted record 1973, 340
- , Yellow-throated, importation of, 192
- Sparrowhawk, territorial display, 239-42; possibly oiled by Fulmar, 298; photograph, plate 35a
- Speckmann, Michael, letter on scope of *British Birds* and seasonal analyses of records, 28-30
- Speight, M. C. D., ants in Wryneck faeces identified, 388-9
- Spencer, Robert, review of Parslow: *Breeding Birds of Britain and Ireland*, 216-7
- Spoonbill, importation of, 190
- , African, importation of, 190
- Starling, status on farmland, 62, 69; frequency of plumage abnormalities, 123-4; eating wasps, 229; prey of Long-eared Owl, 367; using feet in feeding, 391-2; feeding lavender leaves to juvenile, 440; feeding dandelion flower to juvenile, 440; taking fern and sage to nest, 441; numbers in Regent's Park 1959-68,

- 452-3, 455; breeding success in Regent's Park, 463; 'hawking' for flies, 486
- Starling, Rose-coloured, loss of plumage colour in captivity, 188; accepted records 1973, 336
- Stercorarius longicaudus*, see Skua, Long-tailed
- Sterna albifrons*, see Tern, Little
- *dougallii*, see Tern, Roseate
- *hirundo*, see Tern, Common
- *paradisaea*, see Tern, Arctic
- Stilt, Black-winged, importation of, 191; accepted record 1973, 325
- Stint, Little, field-characters, 4-5, 10-15, plate 2
- , Long-toed, field-characters, 9-15, plates 2-3
- , Red-necked, field-characters, 6, 10-15, plate 2
- , Temminck's, field-characters, 9-15, plate 2
- Stork, Black, importation of, 190; wing-spreading while feeding, 236-7
- , White, wintering in East Africa, 70-1, plate 7a; importation of, 190; eating wasps, 229; accepted records 1973, 315; accepted record 1972, 343
- Streptopelia orientalis*, see Dove, Rufous Turtle
- *roseogrisea*, see Dove, Barbary
- *turtur*, see Dove, Turtle
- Strix aluco*, see Owl, Tawny
- Sturnus roseus*, see Starling, Rose-coloured
- *vulgaris*, see Starling
- Sula bassana*, see Gannet
- *capensis*, see Gannet, Cape
- *leucogaster*, see Booby, Brown
- *serrator*, see Gannet, Australian
- Summers, G., note on Bar-tailed Godwit feeding on open heath, 303; on Swallow persistently mobbing Tawny Pipit, 355
- Swallow, status on farmland, 62, 69; mobbing Tawny Pipit and other birds, 355; prey of Long-eared Owl, 369; with Crag Martins at Gibraltar, 379; heavy mortality during cold weather in winter quarters, 385; breeding in Regent's Park, 453, 464; parasitised by Cuckoo, 478, plate 65b
- , Red-rumped, accepted records 1973, 330; with Crag Martins at Gibraltar, 379
- Swan, Mute, numbers breeding in Regent's Park 1959-68, 453
- , Whooper, photograph of herd, plate 36a
- Swift, status on farmland, 69; numbers breeding in Regent's Park 1959-68, 453; photograph, plate 34a
- , Alpine, eating wasps, 229; accepted records 1973, 329, plate 49a
- , Little, accepted record 1973, 328-9
- , Needle-tailed, eating wasps, 229
- Sylvia atricapilla*, see Blackcap
- *borin*, see Warbler, Garden
- *cantillans*, see Warbler, Subalpine
- *communis*, see Whitethroat
- *curruca*, see Whitethroat, Lesser
- *melanocephala*, see Warbler, Sardinian
- *nisoria*, see Warbler, Barred
- Tachybaptus novaehollandiae*, see Grebe, Black-throated Little
- *ruficollis*, see Grebe, Little
- Tadorna tadorna*, see Shelduck
- Takalic, nest-like structures, 153
- Tanager, attacking wasps' nests, 227
- , Scarlet, importation of, 192
- , Summer, importation of, 192
- Tarsiger cyanurus*, see Bluetail, Red-flanked
- Teal, present on Suffolk farmland, 60
- , Blue-winged, accepted records 1973, 316
- , Green-winged, accepted records 1973, 316
- , Hottentot, Marsh Sandpiper feeding in association with, 477
- Tern, Arctic, upperwing pattern, 133-6, plates 21, 23b, 24a; photograph, plate 33b; field-characters of juvenile, 246-7
- , Black, mobbed by Swallow, 355
- , Caspian, accepted records 1973, 327
- , Common, roosting on water, 120-1; upperwing pattern, 133-6, plates 22, 23a, 24b; probable interbreeding with Roseate, 168-70, plates 26-7; field-characters of juvenile, 246-7
- , Gull-billed, accepted records 1973, 327
- , Little, nesting association with Ringed Plover, 82

- Tern, Roseate, upperwing pattern, 136; field-characters, 167-8; probable interbreeding with Common, 168-70, plates 26-7
- , Whiskered, accepted records 1973, 327
- , White-winged Black, accepted records 1973, 326-7
- Thomas, B. W., photographs of Long-billed Dowitcher, plate 47
- Thomson, A. Landsborough, the migration of the Gannet: a reassessment of British and Irish ringing data, 89-103
- Threskiornis aethiopicus*, see Ibis, Sacred
- Thrush, Blue Rock, importation of, 191
- , Blue-headed Rock, importation of, 191
- , Chestnut-bellied Rock, importation of, 191
- , Mistle, status on farmland, 69; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-4
- , Rock, importation of, 191; eating wasps, 229
- , Song, status on farmland, 57, 69; prey of Long-eared Owl, 367; numbers in Regent's Park 1959-68, 453-4, 456-8, 460-1; breeding success in Regent's Park, 463-4
- , Whistling, importation of, 191
- , White's, accepted record 1973, 331
- Tit, Bearded, abnormal leg coloration, 356
- , Blue, status on farmland, 62, 69; young reared in substitute site without nest material, 78-9; approaching fighting Robins, 122; avoiding wasps, 224; eating bees, 224; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-5
- , Coal, status on farmland, 62, 69; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453-4, 458; breeding success in Regent's Park, 464
- , Crested, importation of, 191
- , Great, status on farmland, 42-3, 69; feeding on wasps and bees, 223-4, 229; prey of Long-eared Owl, 367; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-6; commencing clutch before lining nest, 478-9
- Tit, Long-tailed, status on farmland, 69; survival of young in exposed nest, 79
- , Marsh, status on farmland, 69
- , Willow, status on farmland, 62, 69; prey of Long-eared Owl, 369
- , Yellow-cheeked, importation of, 191
- Tozer, R. B., letter on feral parrakeets and control of introductions, 484-5
- Trap-Lind, Ib, photographs of Icterine Warbler, plates 52-4
- Treecreeper, prey of Long-eared Owl, 369; feeding on fat, 515-6
- , Short-toed, difficulties of identification, 330-1
- Tribonyx mortierii*, see Hen, Tasmanian Native
- Tringa flavipes*, see Yellowlegs, Lesser
- *hypoleucos*, see Sandpiper, Common
- *macularia*, see Sandpiper, Spotted
- *nebularia*, see Greenshank
- *ochropus*, see Sandpiper, Green
- *stagnatilis*, see Sandpiper, Marsh
- *totanus*, see Redshank
- Troglodytes troglodytes*, see Wren
- Tryngites subruficollis*, see Sandpiper, Buff-breasted
- Turdus iliacus*, see Redwing
- *merula*, see Blackbird
- *migratorius*, see Robin, American
- *philomelos*, see Thrush, Song
- *pilaris*, see Fieldfare
- *viscivorus*, see Thrush, Mistle
- Tysk, Gösta, photographs of Black Grouse at lek, plates 13, 16
- Tysk, Tony, photograph of Black Grouse at lek, plate 17c
- Tyto alba*, see Owl, Barn
- Uria aalge*, see Guillemot
- Urry, David and Katie, photographs of Arctic Terns, plates 21, 23b
- Vanellus spinosus*, see Plover, Spur-winged
- *vanellus*, see Lapwing
- Venables, J. D., see Johnson, C. D. N.
- Vielliard, Jacques, the Purple Gallinule in the *marismas* of the Guadalquivir, 230-6, plates 37-40

- Voice: Woodpigeon, 440; Barn Owl, 493-501; Scrin, 517
- Voous, K. H., review of Glutz von Blotzheim: *Handbuch der Vögel Mitteleuropas*, vol. 5: *Galliformes and Gruiformes*, 172-3
- Vulture, Griffon, mobbed by Crag Martins, 379
- Wagtail, Black-headed, wintering in East Africa, 74-5, plate 12a
- , Blue-headed, wintering in East Africa, 74
- , Citrine, importation of, 192; accepted record 1973, 335
- , Eastern Yellow, wintering in East Africa, 74-5
- , Grey-headed, wintering in East Africa, 74-5
- , Pied, status on farmland, 69; nocturnal feeding, 303; prey of Long-eared Owl, 369; numbers in Regent's Park 1959-68, 453; breeding success in Regent's Park, 464
- , Sykes's, wintering in East Africa, 74-5
- , Yellow, races wintering in East Africa, and doubts on British race, 74-5
- Wallace, D. I. M., field identification of small species in the genus *Calidris*, 1-16, plates 2-3; review of Alexander: *Seventy Years of Bird-watching*, 245-6; the reasons for record rejection, 349-50; note on Rufous Turtle Dove in Cornwall, 352-4; the birds of Regent's Park, London, 1959-68, 449-68, plate 66; review of Sharrock: *Scarce Migrant Birds in Britain and Ireland*, 481-2; letter on eye colour of the Hen Harrier, 518
- Warbler, Aquatic, accepted records 1973, 332-3; accepted record 1972: amendment, 340; accepted record 1972, 343; origin of British migrants, 443-4
- , Arctic, accepted records 1973, 334; accepted records 1972, 343
- , Barred, escape notified, 185
- , Bonelli's, accepted records 1973, 333-4
- , Cetti's, accepted records 1973, 331-2; accepted record 1971, 342; accepted records 1972, 343
- Warbler, Garden, status on farmland, 62, 69; eating wasps, 229
- , Grasshopper, oiled by Fulmar, 298-300
- , Great Reed, accepted records 1973, 332
- , Greenish, accepted records 1973, 333
- , Icterine, photographic study, 370-6, plates 52-4
- , Lanceolated, accepted record 1973, 332
- , Marsh, photograph, plate 29
- , Myrtle, accepted record 1973, 336-7
- , Pallas's, accepted record 1972, 343
- , Radde's, accepted records 1973, 334
- , Reed, present on farmland, 60; parasitisation by Cuckoo, 442-3
- , Sardinian, accepted records 1973, 333
- , Savi's, accepted records 1973, 332
- , Sedge, status on farmland, 62, 69; singing in rape fields, 389-90; factors affecting status on farms, 486-7
- , Spotted Morning, importation of, 191
- , Subalpine, numbers imported, 180
- , Willow, status on farmland, 69; breeding in Regent's Park, 453, 458
- Warden, D., note on Great Tit commencing clutch before lining nest, 478-9
- Warren, D. R., note on Starling feeding dandelion flower to juvenile, 440
- Washington, D., note on Rooks feeding on suspended fat, 213-4
- Waters, R. J., note on Common Sandpiper eating butterflies, 440
- Watson, A., Watson, Adam, and Picozzi, N., letter on proof of breeding of Shore Larks, 127
- Waxwing, confusion over vernacular names, 171
- Weir, D., see Picozzi, N.
- Westwood, N. J., see Murton, R. K.
- Wheatear, status on farmland, 69; wintering in East Africa, 75-6; prey of Long-eared Owl, 369
- , Black, eating wasps, 229

- Wheatear, Black-eared, accepted record 1973, 331
 —, Isabelline, wintering in East Africa, 75-6, plate 12b
 —, Pied, wintering in East Africa, 75-6
 Whimbrel, large spring roost in Bridgwater Bay, 513-4
 Whitethroat, status on farmland, 57, 62, 69; eating wasps, 229; type of hedge preferred, 485; factors affecting status on farmland, 486
 —, Lesser, status on farmland, 62, 69; type of hedge preferred, 485
 Wiechmann, M., note on egg-laying by the Great Crested Grebe, 438-9, plate 63
 Wigeon, American, accepted records 1973, 316
 Wilde, N. A. J., observations on Wren rearing young Cuckoo (note), 26-7, plate 4b
 Williams, G. A., see Johnson, C. D. N.
 Wood, N. A., the breeding behaviour and biology of the Moorhen, 104-15, 137-58, plate 25
 Woodcock, status on farmland, 69; function of tail spots, 475-6, plate 65a
 Woodpecker, Great Spotted, status on farmland, 62, 69; eating wasps, 229; tapping on window pane, 388; numbers in Regent's Park, 453, 458; breeding success in Regent's Park, 464
 —, Green, status on farmland, 62, 69; feeding on wasp larvae, 225, 229; ant species identified from faeces and pellets, 388-9
 —, White-bellied Black, importation of, 191
 Woodpigeon, status on farmland, 43-4, 47-9, 53-6, 62, 69; frequency of plumage abnormalities, 123-4; prey of Long-eared Owl, 369; cooing on ground, 440; numbers in Regent's Park 1959-68, 452, 455-6, 460-1; breeding success in Regent's Park, 463; attacked by Hen Harrier, 511
 Wren, rearing young Cuckoo, 26-7, plate 4b; status on farmland, 43, 69; numbers in Regent's Park 1959-68, 453-4, 457, 460-1; breeding success in Regent's Park, 463-4
 Wryneck, eating ants, 388

Xanthocephalus xanthocephalus, see Black-bird, Yellow-headed
Xenus cinereus, see Sandpiper, Terek

 Yeates, George, letter on scope of *British Birds*, 31-2
 Yellowhammer, status on farmland, 57, 69; prey of Long-eared Owl, 369; type of hedge preferred, 485
 Yellowlegs, Lesser, accepted records 1973, 322
 Young, G. H. E., note on Cuckoo parasitising Swallow, 478, plate 65b; photograph of Marsh Warbler, plate 29
 Youngman, R. E., letter on Black Redstarts breeding in newly developed town centres, 394-5

Zonotrichia albicollis, see Sparrow, White-throated
Zoothera dauma, see Thrush, White's

Index to photographs in volumes 1-67

Compiled by D. A. Christie

In general, this index covers only *photographs of live birds*. Entries are in a single list in systematic order. Numbers in **bold type** refer to volumes, those in ordinary type to plates, and those in *italics* to pages; roman numerals indicate colour plates.

For species included in *A Species List of British and Irish Birds* (BTO Guide 13, 1971), both vernacular and scientific names and the sequence follow that publication. For species in the third edition of the *Field Guide* (1974) but not on the British and Irish list, the vernacular and scientific names follow that edition, but the sequence is generally that of the check-list in the first edition (1954). The names of other species follow conservative current usage.

We should be grateful if any errors in this index are brought to our notice.

- Black-throated Diver *Gavia arctica* 5 3, 182, 184; **48** 40; **57** 5b, 47b; **60** 49
Great Northern Diver *G. immer* 9 144-6; **43** 1-9; **58** 53a; **61** 73c; **63** 71b; **64** IIIb, 77b; **65** 33b; **67** 41a
White-billed Diver *G. adamsii* **45** 83-4a; **48** 61-4; **64** IIIa, 81-4; **67** 41b
Red-throated Diver *G. stellata* 7 12-15, 154-5; **16** 36-41, 44-5; **28** 293; **31** 2, 71, 78, 81; **58** 27b; **62** 34b; **64** 25a; **67** 28b
Great Crested Grebe *Podiceps cristatus* 1 104; **50** 48; **54** 28b; **58** 27a; **67** 56-63
Red-necked Grebe *P. grisegena* **50** 1-7; **55** 42a, 51b; **57** 73a; **66** 2-5
Slavonian Grebe *P. auritus* **14** 1, 3, 5, 7; **22** 1, 3-4; **33** 4-5, 171; **57** 47a; **64** 47a
Black-necked Grebe *P. nigricollis* **13** 3-10, 148; **18** 277; **50** 8; **51** 17; **53** 9-11
Little Grebe *Tachybaptus ruficollis* **13** 6; **27** 1-2, 35-7; **57** 73b; **62** 6b
Pied-billed Grebe *Podilymbus podiceps* **60** 35-6
Black-browed Albatross *Diomedea melanophris* **46** 13; **59** 58-60a; **61** 1-4; **65** 76b
other albatrosses and Giant Petrel *Macronectes giganteus* **59** 60b-5
Fulmar *Fulmarus glacialis* 8 230, 232, 234-6; **27** 3; **43** 32a; **44** 61-3; **52** 57-62; **54** 29b; **58** 28a; **65** 74a; **66** 73a
Cory's Shearwater *Calonectris diomedea* **61** 20-2; **65** 71b
Manx Shearwater *Puffinus puffinus* **13** 184; **38** 5; **58** 64; **64** 77a
Little Shearwater *P. assimilis* **51** 64-7
Great Shearwater *P. gravis* **41** 55-9; **44** 63
Wedge-tailed Shearwater *P. pacificus* **50** 55b
Wilson's Petrel *Oceanites oceanicus* **65** 75a
Frigate Petrel *Pelagodroma marina* **51** 41-4; **65** 71a
Storm Petrel *Hydrobates pelagicus* **13** 233; **25** 4, 209; **50** 49-51; **57** 26b; **62** 63b
Leach's Petrel *Oceanodroma leucorhoa* **30** 5
Gannet *Sula bassana* 4 153, 164-8, 198-9, 201, 351-5; **18** 179-83; **27** 6, 147-8; **31** 11; **33** 106; **36** 2-3; **39** 40; **41** 45-6; **58** 33-4, 41-7; **59** 52b, 66-9; **60** 21b, 52; **61** 2b; **65** 56a, 76c; **66** 76-7; **67** 1
Brown Booby *S. leucogaster* **65** 76c
Cormorant *Phalacrocorax carbo* 8 131-2, 135-40; **36** 2; **48** 68; **51** 34-5; **61** 67a
Shag *P. aristotelis* **21** 159; **36** 3; **56** 13-20; **61** 10, 51-2; **65** 72c
Magnificent Frigatebird *Fregata magnificens* **47** 12-13
Great Frigatebird *F. minor* **47** 14; **65** 72a
Red-billed Tropicbird *Phaethon aethereus* **65** 72b
White Pelican *Pelecanus onocrotalus* **56** 50a, 51; **65** 35b, 70a
Brown Pelican *P. occidentalis* **65** 70b
Grey Heron *Ardea cinerea* 9 286-9; **20** 60; **47** 65; **54** 29a; **61** 5, 24b; **67** 5
Purple Heron *A. purpurea* **40** 26-31; **51** 59; **58** 58; **67** 6, 32

- Little Egret *Egretta garzetta* 30 4; 46 36-41; 50 73-4; 51 6b, 53a; 63 67a; 67 31b
 Great White Egret *E. alba* 45 61; 55 72-9; 56 53
 Squacco Heron *Ardeola ralloides* 45 64; 50 75; 52 33-6; 65 50c
 Cattle Egret *Bubulcus ibis* 30 4; 45 65-70; 50 73-4, 78c; 58 57; 59 33b
 Night Heron *Nycticorax nycticorax* 47 53-9; 50 73, 76a; 64 59a; 67 45a
 Little Bittern *Ixobrychus minutus* 10 249; 46 17-24; 47 6; 64 53
 Bittern *Botaurus stellaris* 1 6; 5 2, 92, 94; 13 1, 10-11; 34 99; 35 221
 Yellow-billed Stork *Mycteria ibis* 67 7a
 White Stork *Ciconia ciconia* 51 6b; 59 26; 65 1-3, 46-7
 Black Stork *C. nigra* 55 50b; 59 23-5
 Spoonbill *Platalea leucorodia* 48 68; 56 35-8, 50b; 61 71b; 63 68a
 Glossy Ibis *Plegadis falcinellus* 14 137; 45 62-3; 56 47; 60 37
 Greater Flamingo *Phoenicopterus ruber* 41 61-9; 50 79a, b; 51 51; 58 53b, 54
 Lesser Flamingo *P. minor* 65 35b
 Mallard *Anas platyrhynchos* 4 2, 68-9; 9 279; 66 17a
 Black Duck *A. rubripes* 48 45-6
 Pintail *A. acuta* 43 31; 55 39a; 66 78a
 Red-crested Pochard *Netta rufina* 18 93, 95
 Scaup *Aythya marila* 14 268; 64 12a
 Tufted Duck *A. fuligula* 9 279; 14 267
 Ring-necked Duck *A. collaris* 64 59d
 Ferruginous Duck *A. nyroca* 55 51a
 Barrow's Goldeneye *Bucephala islandica* 63 18b, 69a
 Long-tailed Duck *Clangula hyemalis* 33 139; 61 73b; 63 69b
 Harlequin Duck *Histrionicus histrionicus* 49 4b; 61 30b; 63 71a
 Steller's Eider *Polysticta stelleri* 65 50a; 67 48
 Eider *Somateria mollissima* 7 3, 102-3; 9 308; 23 27; 43 17; 60 39a; 61 67b; 65 56b;
 67 48
 King Eider *S. spectabilis* 60 39; 63 51a
 Red-breasted Merganser *Mergus serrator* 55 39b
 Goosander *M. merganser* 23 246; 66 27a
 Smew *M. albellus* 63 6a
 Shelduck *Tadorna tadorna* 9 311; 27 109; 44 9-11; 53 27b; 54 18-21; 57 26a; 61 70a;
 63 34-5; 66 29b
 Greylag Goose *Anser anser* 5 179; 7 1, 34-6; 55 54b; 58 32; 63 70, 71c
 White-fronted Goose *A. albifrons* 39 13; 49 25-8
 Lesser White-fronted Goose *A. erythropus* 39 11-12, 14; 49 21-4
 Pink-footed Goose *A. brachyrhynchus* 12 253; 49 9-16; 58 52; 65 35a; 66 78b
 Brent Goose *Branta bernicla* 45 85-8; 63 8-10, 20b
 Barnacle Goose *B. leucopsis* 46 32-5; 62 34a; 63 70; 67 30a
 Canada Goose *B. canadensis* 62 13; 67 30b
 Mute Swan *Cygnus olor* 44 55; 57 45a
 Whooper Swan *C. cygnus* 6 6; 15 171; 44 53-8; 56 34; 57 6a; 61 72a; 63 68b;
 65 30a; 67 36a
 Bewick's Swan *C. bewickii* 18 276; 44 59-60; 61 72b
 Egyptian Vulture *Neophron percnopterus* 51 7b; 56 22b; 58 38b; 65 61, 66b-7
 Griffon Vulture *Cyps fulvus* 39 31-5; 51 7b; 56 22b; 58 37, 38b; 65 61, 63-5, 66a
 Black Vulture *Aegyptius monachus* 58 35-8; 65 62
 Lammergeier *Gypaetus barbatus* 53 1-8; 65 61, 68
 Golden Eagle *Aquila chrysaetos* 3 206; 18 238-9; 19 220-2; 24 1; 44 65-76; 56 24a;
 57 1-4, 51, 66a; 58 17; 61 8a, 27; 62 61; 65 10-11
 Imperial Eagle *A. heliaca* 65 15a, b
 Spanish Imperial Eagle *A. h. adalberti* 51 7a
 Steppe Eagle *A. rapax orientalis* 65 15c-e; 67 7b
 Spotted Eagle *A. clanga* 65 12a

- Lesser Spotted Eagle *A. pomarina* 55 55a; 56 24b; 65 12b-14; 66 61-4
 Bonelli's Eagle *Hieraetus fasciatus* 54 66-73; 64 69; 65 63b
 Booted Eagle *H. pennatus* 63 52-8; 64 68
 Buzzard *Buteo buteo* 13 140; 56 33a; 57 27a; 59 9-10; 60 24a; 64 37-8, 41a; 66 51b
 Steppe Buzzard *B. b. vulpinus* 64 39a, b
 Rough-legged Buzzard *B. lagopus* 39 7-8; 61 55-7; 64 40
 Long-legged Buzzard *B. rufinus* 64 39c, d
 Sparrowhawk *Accipiter nisus* 8 157-8; 10 3-8, 27, 29-31, 33, 35-6, 52-3, 55, 58, 76-7, 79, 82-3, 85, 107, 109, 112-4; 12 62, 64, 76, 78, 80; 13 119, 121-3; 15 75, 257, 259, 261; 20 116-7; 26 35, 38; 56 23a; 58 16, 26a; 59 16a; 61 9, 28b; 62 10a; 66 1, 37-44, 71; 67 35a
 Levant Sparrowhawk *A. brevipes* 66 70
 Goshawk *A. gentilis* 51 37-40; 57 46; 66 69
 Red Kite *Milvus milvus* 50 25-32; 64 65-6a
 Black Kite *M. migrans* 49 5-7; 51 7b; 56 22b; 60 38; 64 66b-7
 Black-winged Kite *Elanus caeruleus* 56 65-72; 66 67d-8
 White-tailed Eagle *Haliaeetus albicilla* 34 1, 5, 7, 9; 47 66; 57 62-8; 65 16
 Honey Buzzard *Pernis apivorus* 55 3-5; 64 41-2
 Marsh Harrier *Circus aeruginosus* 17 103; 37 1-4; 39 27-30; 56 25b; 65 41a, b
 Hen Harrier *C. cyaneus* 1 240; 56 25a, 33b; 60 24b; 62 10b; 65 38b, 41c, 42a, 43a, 44a, b, 58b
 Pallid Harrier *C. macrourus* 56 26b; 65 42b, 43b; 67 8
 Montagu's Harrier *C. pygargus* 25 1; 39 23-6; 58 13; 64 78b; 65 42c, 43c, 44c
 Short-toed Eagle *Circaetus gallicus* 51 3; 56 22a; 64 70-1
 Osprey *Pandion haliaetus* 1 1, 19, 41, 43; 19 248; 49 65-72; 59 21a; 61 32-7; 64 72
 Hobby *Falco subbuteo* 56 23b; 60 22; 61 28a; 66 46
 Peregrine *F. peregrinus* 21 27; 22 2, 198, 200-1; 46 5-12; 56 21; 59 14; 61 8b; 64 26a; 65 53; 66 20c-e
 Lanner *F. biarmicus* 66 20a, b; 67 4a
 Saker *F. cherrug* 66 18b, 19
 Gyrfalcon *F. rusticolus* 49 37-43; 66 17, 18a
 Eleonora's Falcon *F. eleonorae* 54 35-9; 66 45
 Merlin *F. columbarius* 11 120; 15 125, 196-201, 225, 227, 229, 249, 251-2, 276; 17 95-6; 35 218; 53 26a; 59 12-13; 60 51b; 62 65a; 63 16; 66 48b-c
 Red-footed Falcon *F. vespertinus* 63 49a; 66 47-8a, 56b
 Lesser Kestrel *F. naumanni* 47 17-19; 66 66c-7c; 67 9
 Kestrel *F. tinnunculus* 4 299-301; 47 20; 55 38; 56 26a; 57 27b; 59 50; 60 21a, 23; 64 26b; 65 IVa; 66 65a-6b
 Red Grouse *Lagopus lagopus* 57 17; 64 28b
 Ptarmigan *L. mutus* 50 17-24; 57 5a, 28; 61 6; 65 4-8
 Black Grouse *Lyrurus tetrix* 30 2-3, 34, 36; 67 13-20
 Capercaillie *Tetrao urogallus* 51 29-32; 56 1-5; 61 7b; 63 67b; 65 27b
 Hazel Grouse *Tetrastes bonasia* 65 27a
 Red-legged Partridge *Alectoris rufa* 67 36b
 Partridge *Perdix perdix* 29 3; 58 14b; 61 7a; 66 32
 Crane *Grus grus* 49 57-64; 55 50a; 56 55-9; 63 51b; 66 56a
 Water Rail *Rallus aquaticus* 3 3-10
 Spotted Crane *Porzana porzana* 64 43-4; 66 6a
 Little Crane *P. parva* 53 60-3
 Cornerake *Crex crex* 38 11-12; 44 17-24; 55 43a; 58 55a; 59 56
 Purple Gallinule *Porphyrio porphyrio* 67 37-40
 Moorhen *Gallinula chloropus* 9 260-2; 47 67
 Coot *Fulica atra* 9 263; 14 267-8; 60 1; 65 57b
 Great Bustard *Otis tarda* 59 frontispiece (colour), 1-8, 70-3
 Little Bustard *O. tetrax* 60 9-11

- Houbara Bustard *Chlamydotis undulata* 56 61
- Oystercatcher *Haematopus ostralegus* 9 107; 39 45; 41 31-40; 42 14a; 44 32b; 54 31b; 55 46b; 57 9-12; 62 66b; 63 21a; 65 57a; 66 27b, 79b
- Spur-winged Plover *Vanellus spinosus* 58 9-12
- Lapwing *V. vanellus* 9 259; 35 247; 55 46a, 81a; 57 24a; 59 54a
- Ringed Plover *Charadrius hiaticula* 9 307; 15 27-31; 21 79; 25 2-3, 35-6; 40 1-8; 55 37, 81b; 58 21
- Little Ringed Plover *C. dubius* 32 3-4; 38 1-4; 62 35b
- Kentish Plover *C. alexandrinus* 39 9; 50 79c; 57 50b; 60 55a; 66 28a
- Killdeer *C. vociferus* 20 8
- Caspian Plover *C. asiaticus* 65 23-4
- Grey Plover *Pluvialis squatarola* 48 65-7; 55 80; 64 24b
- Golden Plover *P. apricaria* 42 73-84; 62 42
- Lesser Golden Plover *P. dominica* 9 84-7; 65 IIIa, 49b
- Dotterel *Eudromias morinellus* 11 7, 9; 35 193; 53 12; 54 26; 57 7b; 60 5a, 55b; 61 74a
- Turnstone *Arenaria interpres* 15 174-7; 19 1, 3, 5, 7; 42 56; 45 37-44; 55 49, 88a; 60 28b; 66 26b
- Short-billed Dowitcher *Limnodromus griseus* 54 56a, 57; 61 47
- Long-billed Dowitcher *L. scolopaceus* 54 56b, 58; 61 43-6, 66b; 65 49a; 67 46-7
- Dowitcher *Limnodromus* sp 20 219; 42 32
- Stilt Sandpiper *Micropalama himantopus* 48 4-5
- Snipe *Gallinago gallinago* 2 252-3, 255-8; 42 36-7; 44 13; 50 16; 53 27a; 55 82a; 57 71; 59 31a; 65 49a
- Great Snipe *G. media* 42 33-5; 58 72-9
- Jack Snipe *Lymnocyptes minimus* 9 283-5; 21 1, 3
- Woodcock *Scolopax rusticola* 60 4a; 65 40a
- Upland Sandpiper *Bartramia longicauda* 43 47-8; 62 68; 66 53
- Curlew *Numenius arquata* 53 25; 54 31b; 55 43b; 57 70b; 63 73a; 64 22a, 80a; 66 72, 73b
- Whimbrel *N. phaeopus* 17 71-4, 151-3; 59 53; 60 56b
- Hudsonian Whimbrel *N. (p.) hudsonicus* 48 53
- Black-tailed Godwit *Limosa limosa* 14 100-1; 35 110-1; 40 9; 55 82b; 57 24b, 49, 70a; 62 45-7, 51; 63 73b; 65 45
- Bar-tailed Godwit *L. lapponica* 41 23-30
- Green Sandpiper *Tringa ochropus* 42 19-21; 55 84b; 67 10a
- Wood Sandpiper *T. glareola* 40 19-21; 54 22, 24-5; 62 12b; 64 13-17
- Solitary Sandpiper *T. solitaria* 57 44a, b; 60 41b
- Common Sandpiper *T. hypoleucos* 9 105; 54 32a; 55 84a; 64 19b, 49; 67 31a
- Spotted Sandpiper *T. macularia* 63 31; 64 18-19a
- Common or Spotted Sandpiper 65 48a
- Redshank *T. totanus* 9 108; 55 36b, 85a
- Spotted Redshank *T. erythropus* 41 17-21; 55 85b; 65 28b-9
- Greater Yellowlegs *T. melanoleuca* 42 26-8
- Lesser Yellowlegs *T. flavipes* 20 144; 23 3-4; 42 29-31; 45 72; 48 11-12, 52a, b; 66 54
- Greenshank *T. nebularia* 35 167, 243; 40 10; 55 84c; 57 6b; 58 56; 62 35a; 64 22b
- Marsh Sandpiper *T. stagnatilis* 60 28a
- Grey-rumped Sandpiper *T. brevipes* 54 5-8
- Terek Sandpiper *Xenus cinereus* 45 12; 52 13-20
- Knot *Calidris canutus* 13 279; 42 51-61a; 55 36b, 88b; 58 28b; 60 28b; 61 64b; 66 79a
- Purple Sandpiper *C. maritima* 43 18-25; 61 64a; 63 72c
- Little Stint *C. minuta* 8 4, 204-6; 43 58-9; 55 87a; 61 65b; 62 57-60; 65 79
- Temminck's Stint *C. temminckii* 10 157, 159, 161, 163; 28 149; 31 12; 43 50-6; 66 49
- Baird's Sandpiper *C. bairdii* 46 44-6; 65 IIIb
- White-rumped Sandpiper *C. fuscicollis* 49 8; 57 44c; 60 40a; 64 54; 66 55b; 67 49b

- Pectoral Sandpiper *C. melanotos* 42 23-5; 61 66a; 63 72a; 64 20, 24a, 60b; 67 51
 Sharp-tailed Sandpiper *C. acuminata* 67 50
 Dunlin *C. alpina* 55 86b, c; 56 28a; 60 28b; 61 30a; 64 77c
 Curlew Sandpiper *C. ferruginea* 55 86a; 63 23a, 72b
 Semipalmated Sandpiper *C. pusilla* 20 144; 43 57; 47 27-8; 59 79; 63 72a
 Sanderling *C. alba* 55 87b; 60 28b; 61 65a
 Buff-breasted Sandpiper *Tryngites subruficollis* 20 188, 191; 64 1a, 55c-7; 67 49c
 Broad-billed Sandpiper *Limicola falcinellus* 40 16-18; 54 51-4; 64 55a, b; 65 26
 Ruff *Philomachus pugnax* 1 3; 14 147-52; 44 41-4; 52 49-56; 55 83a; 59 29a; 62 52a, 66a; 63 23b; 65 28a; 66 50-1a; 67 10b
 Avocet *Recurvirostra avosetta* 8 2, 58-61; 14 195, 197, 199, 201; 19 2, 85-7; 41 1-3; 51 50b; 55 83b; 56 28b; 57 50a; 59 31b; 63 32-9
 Black-winged Stilt *Himantopus himantopus* 35 43-5; 38 7-9; 43 42-6; 50 78b; 51 1b, 57c; 58 14a; 62 65b
 Grey Phalarope *Phalaropus fulicarius* 9 12, 15-16; 27 208; 44 33-6, 38-40; 61 63
 Red-necked Phalarope *P. lobatus* 1 207; 8 1, 9, 11, 293; 44 37; 48 3; 54 23, 31a; 65 30b
 Wilson's Phalarope *P. tricolor* 48 1-2; 60 61-4; 64 1b; 65 50b, 78
 Stone Curlew *Burhinus oedicephalus* 1 303-4, 306-7; 6 7; 27 4-5, 114-5; 60 4b; 66 28b
 Collared Pratincole *Glareola pratincola* 41 47-51; 50 80a; 51 57b; 56 32a
 Cream-coloured Courser *Cursorius cursor* 63 49b; 65 17-22
 Great Skua *Stercorarius skua* 16 176-8, 180; 59 29b; 61 17a; 62 23b; 65 74b
 Pomarine Skua *S. pomarinus* 28 118; 48 52c, d
 Arctic Skua *S. parasiticus* 16 199-201; 42 12a; 58 23, 24a, 26b; 65 38a, 74c
 Long-tailed Skua *S. longicaudus* 8 79; 13 143; 45 1-8; 58 21-2, 24b, c; 65 31; 67 33a
 Ivory Gull *Pagophila eburnea* 26 1, 3-4, 6; 44 50-1; 52 21-4; 55 68
 Great Black-backed Gull *Larus marinus* 25 312
 Lesser Black-backed Gull *L. fuscus* 1 116; 7 309-11; 22 53; 25 311; 41 54b; 59 28; 62 7; 65 69a
 Herring Gull *L. argentatus* 13 49, 192; 25 313; 43 81; 47 26b; 54 28a; 59 51a; 64 73a, 85-7; 65 1; 66 74a
 Albino Lesser Black-backed or Herring Gull 57 41
 Common Gull *L. canus* 7 17, 279; 13 304-5; 59 30b
 Ring-billed Gull *L. delawarensis* 66 22c-3
 Glaucous Gull *L. hyperboreus* 16 7; 40 40-9; 54 47a; 56 39-42; 65 80
 Iceland Gull *L. glaucoides* 40 40, 50-3; 43 74-81
 Audouin's Gull *L. audouinii* 62 37-41
 Slender-billed Gull *L. genei* 57 34-8
 Great Black-headed Gull *L. ichthyæetus* 61 48
 Mediterranean Gull *L. melanocephalus* 50 9-11; 57 39-40; 61 71a; 63 11-14; 65 11a
 Laughing Gull *L. atricilla* 60 17-19; 63 50
 Franklin's Gull *L. pipixcan* 64 50-1
 Bonaparte's Gull *L. philadelphia* 43 33; 61 49, 73a
 Little Gull *L. minutus* 39 1-6; 42 22b; 52 9-12; 55 40b; 63 22a
 Black-headed Gull *L. ridibundus* 9 72, 289; 24 284; 25 105; 45 9-11; 51 17; 52 12b; 55 19-21; 56 32b; 57 12, 39a; 61 49a; 64 51b; 65 73c; 67 24b
 Mediterranean × Black-headed Gull 63 65
 Sabine's Gull *L. sabini* 48 9-10; 64 60a, c; 65 11b
 Ross's Gull *Rhodostethia rosea* 52 66-9; 67 64
 Kittiwake *Rissa tridactyla* 4 193, 200, 202-3; 46 27b; 55 68b; 58 25; 60 26b; 61 52; 62 62a; 64 73b-5; 66 74b
 Black Tern *Chlidonias niger* 14 122-5; 48 54a, 55a; 62 52b; 65 73b
 White-winged Black Tern *C. leucopterus* 48 54b, 55b, 56; 61 53-4; 64 59b, c
 Whiskered Tern *C. hybrida* 41 41-4; 51 58a

- Gull-billed Tern *Gelochelidon nilotica* 18 202-5, 207; 45 73-80; 50 80b; 51 50a; 54 32b; 62 62b; 66 55a
- Caspian Tern *Hydroprogne caspia* 47 61-4; 64 45-8
- Common Tern *Sterna hirundo* 8 255, 260, 265-6; 9 309-10; 42 10a; 44 16; 61 70b; 62 36; 65 75b; 67 22, 23a, 24b, 26-7
- Arctic Tern *S. paradisaea* 2 81; 42 12; 65 73a; 66 75; 67 21, 23b, 24a, 33b
- Roseate Tern *S. dougallii* 26 168; 44 14-15; 53 30b; 61 70b; 67 26-7
- Sooty Tern *S. fuscata* 50 52-5
- Bridled Tern *S. anaethetus* 28 93; 51 45-8
- Little Tern *S. albifrons* 2 3, 7, 319-21; 14 75-7, 80-1; 15 52-3; 63 22b
- Royal Tern *S. maxima* 48 13-18
- Sandwich Tern *S. sandvicensis* 32 277-8; 34 92; 65 59
- Black Noddy *Anous tenuirostris* 65 70c
- African Skimmer *Rynchops flavirostris* 65 75c
- Razorbill *Alca torda* 57 7a; 65 69b
- Little Auk *Plautus alle* 54 43-8
- Guillemot *Uria aalge* 22 52; 36 2-3; 65 39; 66 80b
- Black Guillemot *Cepphus grylle* 59 30a; 63 21b
- Puffin *Fratercula arctica* 27 8, 215; 57 7a; 66 25, 80a
- Pin-tailed Sandgrouse *Pterocles alchata* 62 72-4
- Stock Dove *Columba oenas* 61 12b; 62 33b; 65 39a
- Rock Dove *C. livia* 54 37
- Feral pigeon *C. livia* 63 7a
- Woodpigeon *C. palumbus* 53 45-9; 54 34; 60 54, 64 25b
- Turtle Dove *Streptopelia turtur* 18 3-4, 6, 8-9; 36 1; 54 27; 63 18a; 66 31b
- Collared Dove *S. decaocto* 50 41a, b, 42; 57 18-21
- Cuckoo *Cuculus canorus* 1 365-6; 3 412-3; 23 186; 45 28; 52 43-4; 62 22; 67 4b
- Great Spotted Cuckoo *Clamator glandarius* 67 45b
- Yellow-billed Cuckoo *Coccyzus americanus* 47 33-6; 65 50d
- Black-billed Cuckoo *C. erythrophthalmus* 47 29-32
- Barn Owl *Tyto alba* 4 261; 25 5; 42 64-9; 55 40a; 58 19a; 59 27; 62 33a, 64; 65 IVb, 36-7
- Scops Owl *Otus scops* 45 81; 51 25-8; 62 71
- Eagle Owl *Bubo bubo* 50 65-8
- Snowy Owl *Nyctea scandiaca* 44 8; 47 69-72; 59 17; 61 13-19; 62 4-5
- Hawk Owl *Surnia ulula* 46 60-3a; 65 25
- Pygmy Owl *Glaucidium passerinum* 51 13-16
- Little Owl *Athene noctua* 31 5; 59 55a; 60 3; 63 19; 66 26a
- Tawny Owl *Strix aluco* 57 25; 58 50; 61 29a; 62 32; 65 40b
- Great Grey Owl *S. nebulosa* 49 1-3; 55 60-4; 63 1
- Ural Owl *S. uralensis* 46 63b-7
- Long-eared Owl *Asio otus* 9 61, 63-5; 35 1, 4, 6-7; 39 46
- Short-eared Owl *A. flammeus* 18 227-9; 28 290; 57 52b; 58 19b; 59 34, 55b; 60 51a; 63 74
- Tengmalm's Owl *Aegolius funereus* 6 9; 46 1-2; 52 1-4; 60 25
- Nighthawk *Chordeiles minor* 65 51a
- Nightjar *Caprimulgus europaeus* 27 340; 42 38; 54 10-17; 59 51b; 64 79b
- Red-necked Nightjar *C. ruficollis* 66 57-9
- Little Swift *Apus affinis* 60 33-4
- White-rumped Swift *A. cafer* 62 24
- Swift *A. apus* 55 10-18; 64 76; 67 34a
- Alpine Swift *A. melba* 52 37-42; 67 49a
- Needle-tailed Swift *Hirundapus caudacutus* 53 55-8; 59 18a
- Kingfisher *Alcedo atthis* 11 221; 26 2, 264, 307; 28 298; 58 18; 62 29
- Bee-eater *Merops apiaster* 41 4-8; 50 43-5; 55 33

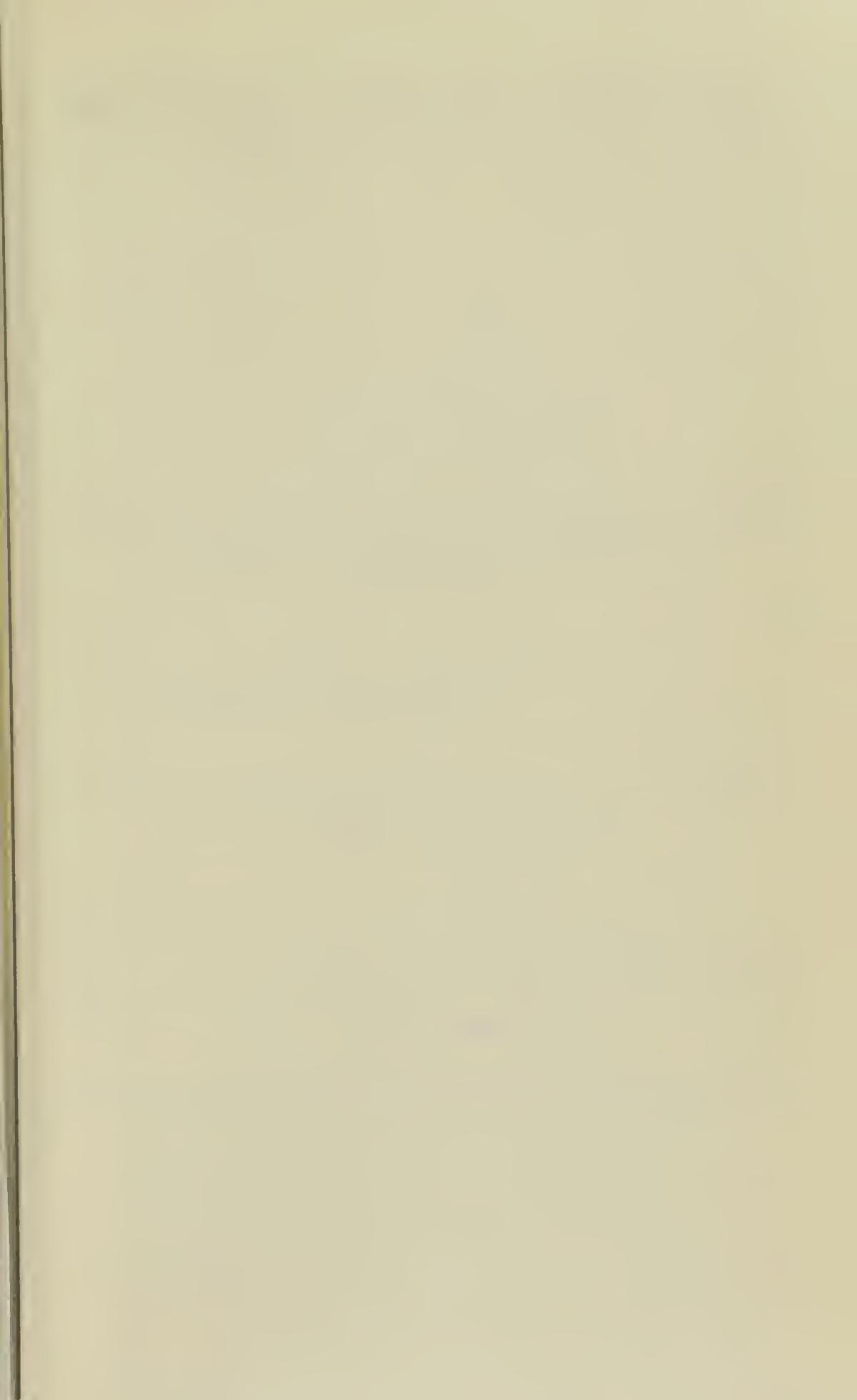
- Blue-cheeked Bee-eater *M. superciliosus* 67 11a
 Roller *Coracias garrulus* 42 18; 56 9-11
 Hoopoe *Upupa epops* 35 108; 42 15-17; 48 47-51
 Green Woodpecker *Picus viridis* 2 4, 144; 35 147; 49 4a; 64 28a; 66 1
 Great Spotted Woodpecker *Dendrocopos major* 5 137; 20 59; 43 10a; 47 15; 53 43a;
 55 34; 57 76
 White-backed Woodpecker *D. leucotos* 45 57-9
 Three-toed Woodpecker *Picoides tridactylus* 39 21-2
 Black Woodpecker *Dryocopus martius* 45 53-6; 59 35-8
 Wryneck *Jynx torquilla* 62 15a; 66 9-16
 Calandra Lark *Melanocorypha calandra* 43 62-4
 Short-toed Lark *Calandrella cinerea* 43 65-8; 48 6; 51 11b
 Crested Lark *Galerida cristata* 55 6-7
 Thekla Lark *G. theklae* 58 48
 Woodlark *Lullula arborea* 3 1, 9; 42 7; 60 5b
 Skylark *Alauda arvensis* 18 293-4; 28 1; 35 123; 61 69a
 Shore Lark *Eremophila alpestris* 45 21-3; 67 68, 69a, 71
 Temminck's Horned Lark *E. bilopha* 67 69b, 70
 Swallow *Hirundo rustica* 62 63a; 63 7b; 66 60b
 Red-rumped Swallow *H. daurica* 56 62-3
 Crag Martin *H. rupestris* 63 40-3
 House Martin *Delichon urbica* 41 54a; 42 48a, 49; 43 39-41; 60 26a; 65 58a; 66 60b
 Swallow × House Martin 66 60a
 Sand Martin *Riparia riparia* 42 46-7, 48b; 58 15; 64 23
 Golden Oriole *Oriolus oriolus* 62 14; 64 11, 61-3
 Raven *Corvus corax* 3 235-6; 56 22b; 58 29; 59 15
 Carrion Crow *C. corone corone* 58 31b; 59 11a
 Hooded Crow *C. c. cornix* 3 239-41; 9 103; 53 26b
 Carrion × Hooded Crow 18 53
 Rook *C. frugilegus* 15 11-14; 26 32; 65 2b
 Jackdaw *C. monedula* 41 52b, 53b; 45 84b
 Magpie *Pica pica* 55 35; 57 72a
 Azure-winged Magpie *Cyanopica cyanus* 51 11a; 67 35b
 Nutcracker *Nucifraga caryocatactes* 45 13-20; 63 59-64
 Jay *Garrulus glandarius* 43 49; 46 14-15; 50 62; 53 43a; 56 27; 59 52a; 61 29b;
 66 29a
 Siberian Jay *Perisoreus infaustus* 64 1-8
 Blue Jay *Cyanocitta cristata* 50 58-9
 Chough *Pyrrhocorax pyrrhocorax* 51 23; 63 2-4; 64 64
 Alpine Chough *P. graculus* 51 21-2, 24; 63 5
 Great Tit *Parus major* 42 39b, 71b, 72a; 43 10b; 53 37, 40a; 55 47
 Blue Tit *P. caeruleus* 42 39a, 71, 72; 43 10b, 37-8; 46 16; 51 75; 52 72; 53 39, 40b;
 54 49; 65 60
 Coal Tit *P. ater* 34 59; 42 40b; 49 19-20; 51 76; 57 31a
 Crested Tit *P. cristatus* 34 167-8, 170; 61 11a
 Marsh Tit *P. palustris* 43 10b
 Willow Tit *P. montanus* 28 166; 60 8; 64 27
 Long-tailed Tit *Aegithalos caudatus* 4 78; 45 60; 55 32; 61 11b
 Northern Long-tailed Tit *A. c. caudatus* 42 11
 Penduline Tit *Remiz pendulinus* 51 54; 55 54a; 58 59
 Nuthatch *Sitta europaea* 32 2, 137; 53 29; 57 69; 61 31a; 62 16
 Wallcreeper *Tichodroma muraria* 63 24-30
 Treecreeper *Certhia familiaris* 30 1, 6, 9; 34 57; 35 141; 52 72; 57 29
 Wren *Troglodytes troglodytes* 35 146; 40 14; 59 32; 62 22; 67 4b
 St Kilda Wren *T. t. hirtensis* 40 12-13, 15; 57 8

- Dipper *Cinclus cinclus* 5 5, 294-5; 50 46-7; 57 48, 72b
 Black-bellied Dipper *C. c. cinclus* 47 8
 Bearded Tit *Panurus biarmicus* 6 4, 139-41; 35 72; 54 30; 59 74-8
 Mistle Thrush *Turdus viscivorus* 16 163; 25 56; 43 13a, 14, 16; 60 56a
 Fieldfare *T. pilaris* 5 131; 45 34b-6; 57 60b; 62 6a, 12a
 Song Thrush *T. philomelos* 53 43b; 57 58, 61b; 60 42
 Redwing *T. iliacus* 45 29-34a; 57 60a, 61a; 62 31b
 Siberian Thrush *T. sibiricus* 48 7
 Dusky Thrush *T. naumanni* 53 35
 Black-throated Thrush *T. ruficollis* 51 33
 Ring Ouzel *T. torquatus* 24 31; 27 7; 32 6; 57 52a; 58 30a; 59 19-20
 Blackbird *T. merula* 4 44; 43 15a, 37-8; 53 42; 55 23c, 36a, 41, 42b; 60 27b, 43, 44a; 62 31a
 American Robin *T. migratorius* 46 56-9; 50 60
 Wood Thrush *Catharus mustelinus* 50 57
 Grey-cheeked Thrush *Hylocichla minima* 47 45-7a; 62 69
 Veery *H. fuscescens* 65 9
 Rock Thrush *Monticola saxatilis* 49 29-36; 62 1-3; 65 34b
 Blue Rock Thrush *M. solitarius* 61 39-42
 Wheatear *Oenanthe oenanthe* 42 44-5; 49 17; 57 75b; 62 67
 Greenland Wheatear *O. o. leucorrhoa* 64 78a
 Desert Wheatear *O. deserti* 43 34-6; 50 12-13
 Black-eared Wheatear *O. hispanica* 43 69-73; 51 60b; 63 17a; 65 51b
 Isabelline Wheatear *O. isabellina* 67 12b
 Black Wheatear *O. leucura* 29 4; 53 64-7
 Stonechat *Saxicola torquata* 26 225; 60 53; 62 30a
 Whinchat *S. rubetra* 42 5b, 6a, 42b-3; 56 30; 57 30; 65 34a
 Redstart *Phoenicurus phoenicurus* 42 40a, 41, 42a; 43 15b; 60 60
 Black Redstart *P. ochruros* 31 13; 38 6; 45 27
 Nightingale *Luscinia megarhynchos* 6 5, 172-3, 175; 42 2-3
 Red-spotted Bluethroat *L. svecica svecica* 40 23-5; 61 59-62; 65 1a
 Robin *Erithacus rubecula* 10 42; 47 60; 52 63; 53 38b, 41; 54 49; 60 44b; 64 21; 65 55a
 Rufous Bush Robin *Cercotrichas galactotes* 40 32-4; 53 19-20; 63 44-8
 Cetti's Warbler *Cettia cetti* 57 54-7
 Grasshopper Warbler *Locustella naevia* 3 225; 20 152; 56 31; 58 55b; 61 12a; 63 17b; 64 52
 River Warbler *L. fluviatilis* 55 23a
 Savi's Warbler *L. luscinoides* 55 55b; 60 41
 Moustached Warbler *Acrocephalus melanopogon* 47 1-4
 Thick-billed Warbler *A. aedon* 60 29-32
 Great Reed Warbler *A. arundinaceus* 44 25b-9; 51 56a
 Reed Warbler *A. scirpaceus* 24 261; 44 25a
 Marsh Warbler *A. palustris* 45 28; 67 29
 Sedge Warbler *A. schoenobaenus* 31 121; 42 66
 Aquatic Warbler *A. paludicola* 65 52c
 Melodious Warbler *Hippolais polyglotta* 49 18b; 57 43a; 58 1-5
 Icterine Warbler *H. icterina* 47 21-6a; 57 43b; 67 52-4
 Olivaceous Warbler *H. pallida* 40 37-9; 46 27a
 Barred Warbler *Sylvia nisoria* 49 45-52
 Orphean Warbler *S. hortensis* 64 9-11
 Garden Warbler *S. borin* 42 9b
 Whitethroat *S. communis* 54 33
 Lesser Whitethroat *S. curruca* 35 91
 Sardinian Warbler *S. melanocephala* 29 109; 40 35-6; 60 58-9, 484

- Subalpine Warbler *S. cantillans* 24 2; 60 13-16
 Spectacled Warbler *S. conspicillata* 51 56b
 Dartford Warbler *S. undata* 28 2; 57 53a; 66 30a
 Marmora's Warbler *S. sarda* 48 41-4
 Fan-tailed Warbler *Cisticola juncidis* 51 2; 65 77a
 Willow Warbler *Phylloscopus trochilus* 35 121; 42 1; 43 27b-9, 30b; 61 25a
 Greenish Warbler *P. trochiloides* 48 58-60
 Wood Warbler *P. sibilatrix* 55 44-5; 57 53b; 60 6b; 61 25b; 66 31a
 Bonelli's Warbler *P. bonelli* 54 62-4; 65 52b
 Arctic Warbler *P. borealis* 46 48-55; 61 50a
 Pallas's Warbler *P. proregulus* 51 36; 64 59c
 Dusky Warbler *P. fuscatus* 61 50b; 64 58
 Radde's Warbler *P. schwarzi* 53 13-18; 55 23b; 56 64
 Goldcrest *Regulus regulus* 62 30b
 Spotted Flycatcher *Muscicapa striata* 8 115; 42 50, 63; 57 75a; 62 9
 Pied Flycatcher *Ficedula hypoleuca* 47 42-3, 51; 57 74
 Collared Flycatcher *F. albicollis* 47 49-50, 52
 Red-breasted Flycatcher *F. parva* 58 66-7
 Dunnock *Prunella modularis* 53 40b; 60 27a, 45
 Alpine Accentor *P. collaris* 48 34-9
 Richard's Pipit *Anthus novaeseelandiae* 56 44a, 45
 Tawny Pipit *A. campestris* 46 68-71; 56 43, 44b
 Meadow Pipit *A. pratensis* 36 5; 58 30b
 Tree Pipit *A. trivialis* 42 4b, 5a
 Olive-backed Pipit *A. hodgsoni* 60 20
 Red-throated Pipit *A. cervinus* 62 17-20; 67 11b
 Rock Pipit *A. spinoletta* 31 1; 61 69b
 Water Pipit *A. s. spinoletta* 59 81
 Pied Wagtail *Motacilla alba yarrellii* 1 366; 9 104; 24 364; 61 26a
 White Wagtail *M. a. alba* 62 15b
 Grey Wagtail *M. cinerea* 4 19; 57 32a; 65 33a
 Citrine Wagtail *M. citreola* 48 8; 58 49
 Yellow Wagtail *M. flava flavissima* 35 188
 Blue-headed Wagtail *M. f. flava* 1 141
 Grey-headed Wagtail *M. f. thunbergi* 31 101
 Black-headed Wagtail *M. f. feldegg* 67 12a
 Waxwing *Bombycilla garrulus* 7 320; 37 8; 54 1-4; 58 39; 66 30b
 Great Grey Shrike *Lanius excubitor* 50 37-40; 51 9a; 62 11
 Steppe Grey Shrike *L. e. pallidirostris* 50 41c
 Lesser Grey Shrike *L. minor* 46 31a; 53 50-4
 Woodchat Shrike *L. senator* 46 47; 58 68-71
 Red-backed Shrike *L. collurio* 10 177, 179; 42 8, 9a; 59 16b, 33a; 61 68a; 64 79a
 Starling *Sturnus vulgaris* 44 52; 46 43; 50 61; 53 43b; 55 36a; 57 60a; 60 46-7;
 61 26b; 62 31a; 63 20a
 Myrtle Warbler *Dendroica coronata* 48 25-30
 Blackpoll Warbler *D. striata* 62 70
 Northern Waterthrush *Seiurus noveboracensis* 53 59
 Yellowthroat *Geothlypis trichas* 48 21-4
 Bobolink *Dolichonyx oryzivorus* 58 40
 Hawfinch *Coccothraustes coccothraustes* 29 1-2; 35 70; 43 11-15a; 61 24a
 Greenfinch *Carduelis chloris* 56 8; 61 31b
 Goldfinch *C. carduelis* 35 67
 Siskin *C. spinus* 66 21-2b
 Linnet *Acanthis cannabina* 53 31; 60 7
 Twite *A. flavirostris* 21 118; 56 29a; 60 50

- Redpoll *A. flammea* 54 40-1; 57 32b
 Mealy Redpoll *A. f. flammea* 40 22
 Citril Finch *Serinus citrinella* 31 3-4; 49 53-6
 Serin *S. serinus* 64 29-34
 Bullfinch *Pyrrhula pyrrhula* 12 123, 126, 129; 60 6a; 65 54
 Scarlet Rosefinch *Carpodacus erythrinus* 55 22
 Pine Grosbeak *Pinicola enucleator* 44 48-9; 48 19-20
 Crossbill *Loxia curvirostra* 21 259; 29 285; 41 9-15; 47 47b; 67 34b
 Parrot Crossbill *L. pytyopsittacus* 57 13-16
 Chaffinch *Fringilla coelebs* 41 52a, 53a; 42 4a; 53 38a, 39b, 40a, 41, 44; 60 2
 Brambling *F. montifringilla* 44 1-7
 Summer Tanager *Piranga rubra* 56 12
 Corn Bunting *Emberiza calandra* 59 54b; 64 79c
 Yellow-breasted Bunting *E. aureola* 52 25-32
 Cirl Bunting *E. cirlus* 39 15-16; 53 32
 Cretzschmar's Bunting *E. caesia* 62 26
 Ortolan Bunting *E. hortulana* 50 33-5, 36a; 53 21-3
 Rock Bunting *E. cia* 55 24-8
 Rustic Bunting *E. rustica* 44 45-7
 Reed Bunting *E. schoeniclus* 24 158; 53 30a; 56 29b; 65 55b
 Lapland Bunting *Calcarius lapponicus* 9 231, 235; 47 37-40; 58 31a; 65 1b
 Snow Bunting *Plectrophenax nivalis* 45 45-51; 61 68b
 Song Sparrow *Melospiza melodia* 52 70; 65 52a
 House Sparrow *Passer domesticus* 53 42; 57 31b
 Tree Sparrow *P. montanus* 7 39; 53 28
 House × Tree Sparrow 50 14-15
 Snow Finch *Montifringilla nivalis* 63 5
 Rock Sparrow *Petronia petronia* 55 29-31







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