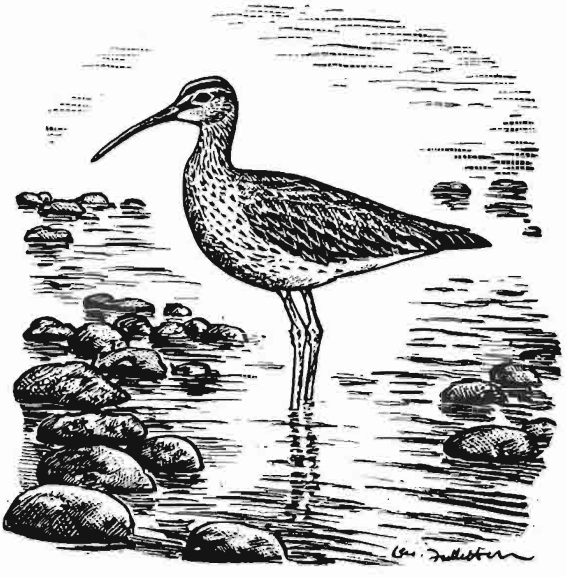
Scottish Birds

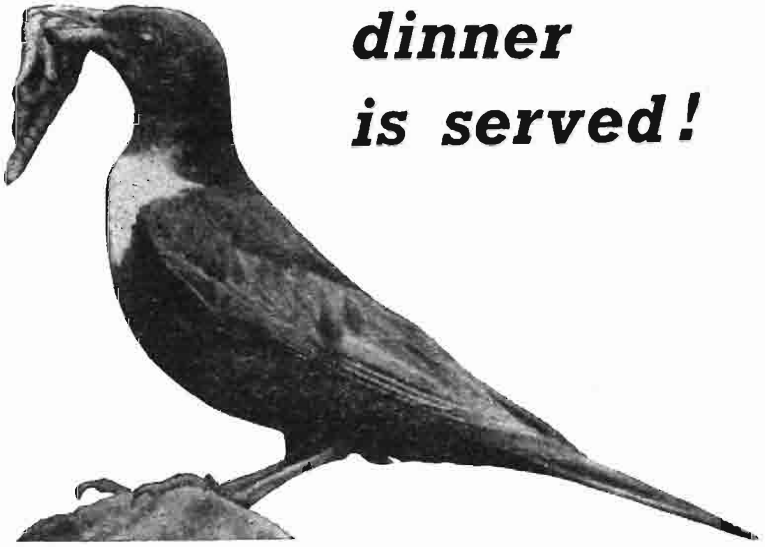


The Journal of
The Scottish Ornithologists' Club

Vol. 4 No. 2 *Summer 1966*

Scottish Bird-Islands Study Cruise Issue

FIVE SHILLINGS



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Scottish Birds

THE JOURNAL OF THE SCOTTISH ORNITHOLOGISTS' CLUB

Contents of Volume 4, Number 2, Summer 1966

Edited by Andrew T. Macmillan, 12 Abinger Gardens, Edinburgh 12.
Assisted by D. G. Andrew, T. C. Smout and P. J. B. Slater.
Business Editor T. C. Smout, 93 Warrender Park Road, Edinburgh 9.

Scottish Birds

THE JOURNAL OF THE SCOTTISH ORNITHOLOGISTS' CLUB

Volume 4 No. 2 **Summer 1966**

Edited by A. T. MACMILLAN with the assistance of D. G. ANDREW, T. C. SMOUT and P. J. B. SLATER. Business Editor, T. C. SMOUT.
Cover Design (Whimbrel) by LEN FULLERTON.

Editorial

Scottish Bird-Islands Study Cruise Issue

Scottish Bird-Islands Study Cruise. It is our hope that everyone will enjoy this unique tour of Scotland's spectacular bird-islands; and especially that those who have come from abroad for the International Ornithological Congress and the International Conference on Bird Preservation will take home pleasant memories of their visit to Scotland. The S.O.C. is honoured to be their host.

Five distinguished Scottish ornithologists have prepared a series of papers for this issue of *Scottish Birds*. We hope it will paint an interesting picture of the Scottish ornithological scene for native and visitor alike. The usual shorter features—Short Notes, Current Notes, Obituary, Reviews, and Letters—have been held over to allow us to publish these papers in full so that anyone who does not at once take out a subscription may still read them to the end.

Scottish Ornithologists' Club Endowment Fund. As recorded on another page, the club already holds funds in trust from which the income may be used for the advancement of ornithology in Scotland or elsewhere. An endowment fund is now being created so that those who want to make gifts or legacies for such purposes may be quite certain that their money will be used in the way they intend. Full details of this important venture may be had from the Scottish Centre for Ornithology and Bird Protection, 21 Regent Terrace, Edinburgh 7. The fund will welcome support and will seek to use its resources for projects that are likely to produce worthwhile results—for example, to give help to the Scottish bird observatories and others with the purchase of equipment needed for their studies, to assist with the costs of printing and illustrating valuable papers, to finance substantial enquiries and useful expeditions, and generally to provide the necessary money wherever it may be most usefully employed for the advancement of ornithology, particularly in Scotland.

Ornithology in Scotland

A historical review

IAN D. PENNIE

The ornithological history of Scotland may be said to begin with the Gannet, for in the *Codex* of the Cistercian Abbey of Cupar, written about the year 1447 by Walter Bower, Abbot of Inchcolm, there is a brief reference to "Insula de Bass, ubi solendae nidificant in magna copia." John Major or Mair (1470-1550) has a detailed description of the Bass Rock and its Gannets in his *Historiae Majoris Brittanniae* (1521), but his interest is only in the Gannet as an article of food, a source of fat and a means of providing fish, which were taken from the nests by the inhabitants of the island. Major was a native of North Berwick and was educated at Haddington, Cambridge and Paris before returning to Glasgow University as Principal Regent, so it may well be that his description of the Bass derives from his own observation.

Hector Boece (*c.*1465-*c.*1536), a native of Angus, was a contemporary of Major in Paris, where he was studying philosophy when he received a call from Bishop Elphinstone to return to Scotland and become the first Principal of the University and King's College of Aberdeen. Boece's *magnum opus* was his *Scoticorum Historiae* (1527) in which he gives a description of the Bass Rock, evidently taken from Major, but mentioning also the Gannets of Ailsa Craig, and in addition appends a list of Scottish birds—Falcon, Goshawk, Sparrowhawk, Merlin, "Waterfoulls," Capercaillie, Red Grouse, Black Grouse and Great Bustard. The last he describes in some detail, and this is the sole authority for the much quoted record of breeding in Berwickshire.

With Major and Boece it can be fairly said that Scottish history began, but the true dawn of the study of natural history was not discernible before the lapse of many more years, and no mere bird was worthy of notice unless it could be of use in falconry or for human food or medicine: even in the colleges Aristotle remained the prime authority, without reference to the living subject or dead specimen. This persisted throughout the sixteenth century: Dean Monro's celebrated catalogue of the Scottish islands (1549)—which includes Man and Rathlin—contains practically no reference to birds other than falcons and Gannets, as if emphasising their economic importance, but perhaps also reflecting the comparative ease of sea travel at this period compared with the utter impossibility of communication by

land in a wild and sparsely populated country. The accuracy of his records of Gannets on Rhum and Eigg has never been confirmed, but he gives the oldest known account of the harvesting of Gannets on Sula Sgeir, a practice which endures to this day:

> "This ile is full of wylde foulis, and quhen foulis hes ther birdes, men out of the parochin of Nesse in Lewis use to sail ther, and to stay ther seven or aught dayes, and to fetch hame with them their boitt full of dray wild foulis, with wyld foulis fedders."

On Sula Sgeir also he excels himself with his lovely description of the colk (Eider), to the regret of all his readers that he did not pay similar attention to other species:

> "In this ile ther haunts ane kynd of foule callit the colk, little less nor a guise, quha comes in the *ver* to the land to lay her eggis, and to clecke her birds quhill she bring them to perfytness, and at that time her fleiche of fedderis falleth of her all hailly, and she sayles to the mayne sea againe, and comes never to land quhyll the zeir end againe, and then she comes with her new fleiche of fedderis. This fleiche that she leaves zeirly upon her nest hes nae pens in the fedderis, nor nae kynd of hard thinge in them that may be felt or graipit, bot utter fyne downes."

William Harvey, the physiologist, visited the Bass Rock in 1633 and, though seeming more interested in the encrustation of bird excreta than in the birds themselves, made the interesting observation that the disused Gannets' nests were sold for firing. He was followed in 1661 by the great naturalist John Ray, who not only described the Gannets but tasted them, quoted the current price of one shilling and eightpence plucked, which he thought very dear, and reckoned that the proprietor made a profit of £130 sterling per annum from the birds. Ray listed other birds nesting on the Bass—"... the scout, which is double ribbed; the cattiwake, in English cormorant; the scart, and a bird called the turtledove, whole-footed, and the feet red." Scout is either Guillemot or Razorbill; scart is of course the Cormorant in English, evidently transposed here in error, and the last is the Black Guillemot.

Several other seventeenth century accounts of the gannetries of the Bass Rock and Ailsa Craig are quoted by Gurney (1913, 1921) and one is hard put to it to find as many contemporary accounts of the birds of the whole of the rest of Scotland. One of the few is Sir Robert Gordon's list of the birds of Sutherland, compiled about 1630 but not published until 1812. This list, already quoted in *Scottish Birds* (Pennie 1962), although not in itself of great value does give some idea of Sutherland as it was, and is at least an attempt to break away from the traditional hawks and game birds only.

Not until 1684 is to be seen the first glimmer of scientific zoology in Scotland, for in that year was published in Edin-

burgh the first book on Scottish natural history, Sir Robert Sibbald's *Scotia Illustrata sive Prodromus Historiae Naturalis*, a folio volume of which 113 pages are devoted to botany, 12 to mammals and 9 to birds. Altogether about two dozen species of birds are described and 11 figured in the plates. A description of Sibbald's *Prodromus* and a full assessment of his contribution to Scottish ornithology have already been made (Pennie 1964). Sibbald appears to have been encouraged to pursue his study of natural history by Andrew Balfour, who in turn had been a student of William Harvey's. In his methods Sibbald antedated by a century Sir John Sinclair by circulating a questionnaire to prominent persons throughout the country, principally the bishops and clergymen. Several of his correspondents were thereby induced to publish comprehensive accounts of the history and topography of the localities in which they lived. Notable among these was the Rev. James Wallace, who graduated at King's College, Aberdeen, in 1659 and became parish minister of Kirkwall. Fired by Sibbald's enthusiasm he wrote *A Description of the Isles of Orkney* which contains many bird records and is dedicated to Sibbald. Wallace died in 1688 but his book was not published until 1693 and was reissued by his son in 1700. Thus began the documentation of the natural history of the North Isles, and a tradition which has persisted ever since.

The intrinsic value of Sibbald's ornithological work may not be great. Nevertheless, the stimulus created both by his published work and by personal contact was far-reaching, and his influence on the study of Scottish natural history in its broadest sense was profound. As an instance of this, there is every reason to believe that it was as a result of personal association with Sibbald that Martin Martin was encouraged to make his journeys to the Western Isles and to publish his observations in what have become the two most valued and widely read books ever written on any part of Scotland. These were of course *A Late Voyage to St Kilda* (1698) and *A Description of the Western Islands of Scotland* (1703). Little is known of Martin beyond the fact that he was a Skyeman who graduated M.A. at Edinburgh University in 1681 and subsequently studied medicine at Leyden. It is quite safe to say that no subsequent writer has stimulated more interest in the islands of Scotland; his notes are carefully and accurately made, yet he was no ornithologist in the accepted sense of the word and one detects in almost all his bird records the inference that it is still only the fact that the birds are either useful or detrimental to the interests of man that makes them worthy of inclusion. Indeed, more was written on the natural history of Orkney, Shetland and St Kilda, up to almost the close of the eighteenth century, than

on all Scotland, until during the last decade Sir John Sinclair produced *The Statistical Account of Scotland,* an elaboration on a vast scale of what Sibbald had attempted a century earlier.

Sir John Sinclair of Ulbster (1745-1835), Member of Parliament for Caithness and President of the Board of Agriculture, conceived the idea in May 1790, when he was a lay member of the General Assembly of the Church of Scotland, of gathering together a uniform description of the whole of Scotland from material supplied by the local ministers, about 900 in all. The fulfillment of this enterprise took nine years and resulted in 21 volumes. The parochial descriptions necessarily vary greatly in quality and content but the whole gives the most complete picture available of natural and social conditions in Scotland at the time, much of which is of great value to the ecological historian. The questionnaire had 166 items; 43 of these pertained to geography and natural history, and one asked specifically about the birds: "What quadrupeds and birds are there in the Parish? What migratory birds? and at what times do they appear and disappear?" The accounts of the various parishes were published in the order in which they were received from the ministers and are consequently completely haphazard, but Mullens and Swann (1917) give a very useful index to the ornithological content of the whole series, a set of which is available for reference in the S.O.C. Library.

In 1761 there appeared on the Scottish academic scene a personality whose ultimate influence on the study of ornithology in Scotland was far greater than is generally realised and yet one whose name, even in his own university, is almost forgotten. This was William Ogilvie, appointed Assistant Professor of Philosophy to King's College, Aberdeen, that year. He was later promoted to Regent, and finally in 1765 became Humanist, or professor, of Latin, with the suggestion that as such he should also give a course of lectures upon antiquities and history, both political and natural. Commencing about 1772 Professor Ogilvie began, according to Douglas (1782),

> ". . . of his own accord to put together a collection of specimens for a museum of natural history in King's College . . . and in the various branches of zoology as might serve to excite the liberal curiosity of youth, and to make them, in some measure, aquainted with the immense variety of the works of nature . . . One is astonished to find so large a collection of birds, fishes, marbles, spars etc., etc. accumualted in so short a space."

Professor Ogilvie had a printed *Synopsis of Zoology* which he used in teaching his natural history class. This was a small pamphlet containing summaries of classification, structure and function, but whether it was actually published for sale or

merely printed for his own personal use is not clear. Ogilvie retired in 1817 and continued to live in Old Aberdeen, where he died at the age of 83.

It can be safely assumed that one whose liberal curiosity was thus excited was the young William MacGillivray, who had come from Harris to be educated in Aberdeen, his birthplace. He had lived in Harris from the age of three, his father being on active service as an army surgeon. MacGillivray graduated in Arts at King's College in 1815. Although he subsequently studied medicine, his first love was obviously natural history, and he soon became a proficient botanist and a field worker of immense energy, walking prodigous distances on his excursions. He made a practice of walking from Aberdeen to Poolewe on his way home to Harris at the end of the college term, and leaving on 7th September 1819 he actually walked to London, where he arrived on 21st October still in sufficiently good condition to commence visiting the British Museum and other institutions.

The following year he left Aberdeen and, having attended the lectures of Professor Jameson, who then occupied the chair of Natural History in Edinburgh, was subsequently appointed Professor Jameson's assistant and secretary, but resigned from this post after a few years to give himself more time for study and travel, maintaining himself meantime by free-lance journalism. In 1831 MacGillivray succeeded Dr Robert Knox, the comparative anatomist whose name survives in another, less fortunate, connection, as Conservator of the Museum of the Edinburgh College of Surgeons, and entered upon the busiest and most productive period of his life. In the previous year he had formed a friendship with John James Audubon, to whom he had been introduced by James Wilson, friend of Sir William Jardine, and *inter alia* natural history editor of the *Encyclopaedia Britannica*, and in addition to carrying out his museum duties collaborated with Audubon in the *Ornithological Biographies*.

In MacGillivray's first book, *Descriptions of the Rapacious Birds of Great Britain* (1836), dedicated to his friend Audubon, we can see that he had begun as he intended to continue. Not only are there the fullest descriptions yet to be found in any British bird book, and notes on the author's field observations on bird behaviour, but also examples of MacGillivray as an artist, in the woodcuts of his meticulous drawings of the alimentary tract; for, as he says in the preface, "It must be obvious that a bird is not merely a skin stuck over with feathers, as some persons seem to think it... [the student] will however... agree with me in thinking that if the bill be an organ of much importance,

the parts of which it is merely the commencement must be so too." The next year saw the first volume of *A History of British Birds*, a great scientific work moulded in the same pattern as the *Rapacious Birds* and illustrated with the same exquisite anatomical drawings. Yet MacGillivray's *British Birds* never achieved real popularity; his strict adherence to purely scientific and technical illustrations made the reading public—and the reviewers—shy of it as a work of reference, an attitude encouraged by the contemporaneous appearance of the first part of Yarrell's *History of British Birds*, written by an Englishman and illustrated in a manner calculated to attract the non-scientific ornithologist right at the opening of the era of the great Victorian naturalists.

MacGillivray as a scientist is well known, less so as an artist; his paintings in colour of British birds are as good as any others of the period and were highly praised by Audubon, but he did not see them published. Indeed, it was not until a selection appeared in the *Scottish Field* in 1958 that any were ever reproduced in colour. The climax of MacGillivray's career came in 1841 with his appointment to the chair of Civil and Natural History in Marischal College, Aberdeen, where he remained until his death in 1852. The two colleges were still ununited, for only in 1860 came the union which created the University of Aberdeen. Marischal College then stood alone among Scottish universities in the inclusion of Natural History as a necessary part of the Arts curriculum: even in King's College the subject was taught only in "occasional lectures" and although the chair of Natural Philosophy at King's was held by an eminent naturalist and author, the Rev. James Fleming (1785-1857), he did not teach natural history and worked purely as an amateur in that field until his appointment in 1845 as Professor of Natural Science in the New College, Edinburgh. Fleming is best known for his *History of British Animals* but Scottish ornithologists will recognise him as author of the chapter on zoology in M'Crie's *The Bass Rock* (1848).

As a lecturer MacGillivray became so popular that it is said that Professor John Stuart Blackie enrolled as one of his students. To quote Professor Traill (1906):

> "He taught zoology and geology in winter and botany in summer, and into it all he brought the same spirit of enquiry. There was no provision within the university, until many years after, for work in the laboratory; but MacGillivray delighted in excursions, to which he welcomed those who would come."

The open air was MacGillivray's laboratory, and he utilised it as none has done since. Formalised practical instruction in zoology came only in 1879 when Professor Cossar Ewart created a laboratory by clearing out a former storeroom.

Thomas Pennant, Gilbert White's correspondent, renowned as a zoologist and traveller, contributed little directly to Scottish ornithology, other than a few notes and pictures of the Ptarmigan and the Scottish Capercaillie, but probably performed a greater service by attracting attention to the Highlands and Islands, and also by commissioning the Rev. George Low to compile his *Fauna Orcadensis*, which however was not published until 1813, after the deaths of both Low and Pennant. Meanwhile in Shetland the Edmonstons were helping to keep the North Isles to the forefront of Scottish natural history with a long family tradition which culminated in the posthumous publication of *The Birds of Shetland* (1874) written by Dr Laurence Edmonston's son-in-law Henry Saxby.

In the early years of the nineteenth century ornithology became firmly established as an amateur study, though mainly at first among the landed gentry. Foremost amongst the earliest of these came Sir William Jardine (1800-74), a sportsman and landed proprietor, but nevertheless backed by a scientific training, for he had, along with MacGillivray, attended Professor Jameson's lectures, and also studied botany and comparative anatomy. Jardine became one of the most distinguished Scottish naturalists of his century, best known probably for his editorship of the 40 volume *Naturalist's Library;* he was also one of the editors of the *Magazine of Zoology and Botany* and, surprisingly, a severe critic in his review of MacGillivray's *British Birds*. Jardine set the fashion in ornithological exploration of the Scottish Highlands by travelling in 1834 as far as the north of Sutherland, then virtually unexplored, along with Prideaux John Selby, author of *Illustrations of British Ornithology* and Jardine's collaborator in other ornithological works. The third member of the party was James Wilson, the man who introduced Audubon to MacGillivray. The results of this expedition were published by Selby (1836) in a paper which forms the basis for all ornithological work in the north Highlands.

These early ornithologists were essentially skin and egg collectors and the ensuing twenty years saw a great rush to this El Dorado of rare species, which was soon to be as well known—to the detriment of the birds—as the North Isles. The Milner brothers were followed by Charles St John, whose name has outlived them all, although he was a poor ornithologist—all shooting and collecting everything. John Wolley, who at that time was studying medicine at Edinburgh University, was next in the field, primarily as an egg collector, but also, to the benefit of posterity, as an accurate and painstaking diarist (Newton 1864-1907). Wolley collected extensively in Caithness, Sutherland, Orkney and Shetland before

transferring his interests farther north, but it is only fair to say that he seemed genuinely anxious about the constant threat from all quarters to the larger birds of prey.

Colonel Henry Drummond (1814-96), grandson of the Duke of Athole, and who married the heiress of Seggieden and thereafter adopted the name of Drummond-Hay of Seggieden, was an outstanding example of the Victorian country gentleman naturalist, and became a distinguished botanist and ornithologist, at first overseas during his military career and later in his native Perthshire. Here he devoted much time and enthusiasm to the Perth Museum and to the Perthshire Society of Natural Science, under whose auspices the *Scottish Naturalist* began publication in 1871. Lt.-Col. Henry Drummond, as he then was, became the first president of the British Ornithologists' Union on its formation in 1858 and was, most appropriately, the last man known to have seen a Great Auk alive. Roughly contemporaneously, Robert Gray (1825-87) was becoming well known in the west, for although a native of Dunbar he spent much of his life in Glasgow, where he was employed on the staff of the City of Glasgow Bank. Gray was one of the founders of the Natural History Society of Glasgow, but is probpably best remembered as author of *The Birds of the West of Scotland* (1871), one of the early Scottish regional faunal works which is still useful for reference.

The scene was now set for a full regional cover of Scottish ornithological studies; the interest was sufficiently widespread, local natural history societies were flourishing as collectors of specimens and data, and there was one man who had the time, money and energy to take the lead. This was John A. Harvie-Brown of Dunipace (1844-1916), to the present generation undoubtedly the best known of the nineteenth century sportsman naturalists. Harvie-Brown was an indefatigable correspondent, his sheets of grey notepaper, headed with a motif of Swallows on telegraph wires beside a map of Larbert, finding their way to every country house in Scotland. He was also a voluminous writer of notes and papers over a period of half a century, but he is best remembered for the Scottish *Vertebrate Fauna* series of books which he compiled in collaboration with T. E. Buckley, the Rev. H. A. Macpherson and A. H. Evans.

The original plan had been for a series of books covering the whole country, but although volumes relating to nine of the Scottish Faunal Areas were published during Harvie-Brown's lifetime the set has never been completed. The first, *A Vertebrate Fauna of Sutherland, Caithness and West Cromarty,* was published in 1887 in collaboration with T. E. Buckley (1846-1902) who, although an Englishman, had

settled in Sutherland. But after the appearance of *A Vertebrate Fauna of the Tay Basin and Strathmore* (1906), with Harvie-Brown as sole author, his health began to deteriorate and a previously faultless memory to become impaired. Evans added *A Vertebrate Fauna of the Tweed Area* (1911) to the main series published in Edinburgh by David Douglas, while George Sim (1835-1908), an Aberdeenshire tailor who became well known as a naturalist and taxidermist in Aberdeen, filled the gap in the northeast with *The Vertebrate Fauna of Dee* (1903), published and printed in Aberdeen. Berwickshire had already been covered by George Muirhead (1845-1928) in his fine work *The Birds of Berwickshire* (1889) and Sir Hugh Gladstone (1878-1949) had done the same for Dumfries in *The Birds of Dumfriesshire* (1910) but the only subsequent volume in the direct Harvie-Brown tradition did not arrive until 1935 with *A Vertebrate Fauna of Forth* by the Misses Rintoul and Baxter. This book had originally been planned by William Evans (1851-1922), one of the most competent naturalists of his day and acknowledged authority on the fauna of the Forth area, but he died with the book unwritten and it was on the suggestion of Dr Eagle Clarke that the authors undertook it jointly.

Curiously, the nineteenth century did not produce a *Birds of Scotland,* but this was the golden age of the local naturalist and of the local natural history societies; throughout Scotland men like Thomas Edward (1814-86) the Banff shoemaker, one of the most energetic self-educated field naturalists the country has known, and Robert Service (1854-1911) the Solway naturalist, to mention only two, were examining and recording the fauna. Broadly speaking the nineteenth century ornithologists were regional recorders: in collecting records they necessarily collected birds. "The double-barrelled shotgun is your main reliance" is the opening sentence of a standard textbook on field ornithology (Coues 1890), advice which was to remain sound for several decades, but species studies were now beginning to appear, though at first distributional and historical only. Again Harvie-Brown led the way, with *The Capercaillie in Scotland* (1879) and a paper on "The Great Spotted Woodpecker in Scotland" (*Ann. Scot. Nat. Hist.* 1892: 4-17). Mention should also be made here of Symington Grieve's *The Great Auk* (1885) published when he was President of the Edinburgh Naturalists' Field Club.

The closing years of the century were to see a completely new development which began, as described elsewhere in this issue by Dr Eggeling, with the appointment of a special committee of the British Association to study bird migration at British lighthouses—yet once more at Harvie-Brown's

instigation—succeeded most opportunely by the appointment in 1888 of William Eagle Clarke (1853-1938) as Assistant in the Natural History Department of the Royal Scottish Museum. Previously Eagle Clarke had been Curator of Leeds Museum and had been one of the members of the British Association migration committee. His great influence as pioneer in the study of bird migration in Scotland cannot be over-estimated, and in recognition of these services he received the honorary degree of LL.D. from St Andrews University (not Aberdeen as stated by Lack—*Ibis* 101: 73).

Closely associated with Eagle Clarke were two outstanding and adventurous characters whose work on Fair Isle has been referred to by Dr Eggeling. These were Mary, Duchess of Bedford, and Surgeon Rear-Admiral John H. Stenhouse (1865-1931). The former made full use of her unusual ability as a field naturalist combined with more than usual opportunity for indulging in birdwatching in out-of-the-way places (Bedford 1938), and in recognition Eagle Clarke dedicated to her his *magnum opus Studies in Bird Migration* (1912). In the years preceding the first world war the Duchess of Bedford cruised extensively in northern waters in her steam yacht *Sapphire,* reaching as far as Jan Mayen. She visited Fair Isle nine times between 1909 and 1914, besides taking Dr Clarke there on other occasions, and also made extensive migration records on Barra and North Rona—the first ornithologist ashore there since Harvie-Brown's visit in 1887. Like many others she failed to land on Sule Stack, but published (Bedford 1914) a fine series of photographs of it. Later she became one of the pioneers of aviation and had flown in most parts of the world before her tragic disappearance in March 1937 while on a solo flight over the flooded fenlands.

Stenhouse was a doctor who graduated at Aberdeen University in 1886. He studied zoology under Professor Cossar Ewart and while in his third year joined one of the vessels of the Scottish sealing fleet on a spring trip to Newfoundland. Little wonder he joined the Navy immediately after graduation, and he lost no opportunity of observing and collecting birds wherever his service took him. On his retirement he settled in Edinburgh and spent the rest of his days actively engaged in ornithology at the Royal Scottish Museum and on his Fair Isle expeditions.

The logical corollary to the study of visible migration, by this time firmly established as ornithological practice, was some form of marking individual birds for subsequent identification. The simultaneous but independent origins of the two marking schemes in 1909 are described elsewhere in this issue by Sir Landsborough Thomson, originator of one of the schemes, and happily still very much alive, though

furth of his native Scotland. Landsborough Thomson's father, Sir John Arthur Thomson, was Professor of Natural History in Aberdeen and did much to popularise the study of his subject. He was an early exponent of the ecological concept of zoology, the seeds thus sown being well nurtured by his successor James Ritchie, author in 1920 of one of the finest books on Scotland ever written; and bearing fruit in the ecological studies for which Aberdeen University now has an established reputation.

Scotland lost several ornithologists of great promise in the 1914-18 war, among whom were Lewis N. G. Ramsay of Aberdeen, and a forerunner in bird ecology, Sydney E. Brock of Kirkliston, author in 1914 of an important though possibly not well known paper, "The ecological relations of bird-distribution" and of a second, published posthumously in 1921, on "Bird-associations in Scotland." Lewis Ramsay and Landsborough Thomson were university contemporaries and both became assistants in the Natural History Department at Aberdeen. It seems appropriate to place on record here—as has not been done previously except for incidental mention in a letter to *British Birds* (Thomson 1958)—the former existence of "The MacGillivray Society" and of its magazine *The Halcyon* (published in unique typewritten copy). The society was a private club of young Scottish field naturalists, especially ornithologists, in the period 1908-11. The total number of members was 16, of whom ten were ornithologists, with a nucleus in Aberdeen and a rather older group in and around Edinburgh. The main object of the society was the compilation and circulation among members of *The Halcyon,* edited by Landsborough Thomson assisted by Lewis Ramsay. This was the form of communication which kept members in touch with one another. It was to the ornithological members that Landsborough Thomson first turned for ringers for the Aberdeen University Bird Migration Enquiry. The function of the society and magazine appeared to have been fufilled when most of the members had reached the stage of belonging to recognised societies and of contributing to scientific journals, but the group did not lose its coherence and might have made a greater impact on Scottish ornithology if so many of its members had not lost their lives in the war.

When Eagle Clarke made his first trio to Fair Isle in 1905 he had with him a young assistant from the Royal Scottish Museum, Norman B. Kinnear (1882-1957), a great grandson of Sir William Jardine, and who became an internationally known ornithologist and in 1930 was knighted for his services to the British Museum. Frequent visitors to the R.S.M. were two young ladies from Fife who had been birdwatchers from

childhood and were so carried away by Eagle Clarke's enthusiasm for Fair Isle that they began in 1907 to visit the Isle of May with the idea of studying bird migration there. These were Leonora Jeffrey Rintoul (1878-1953) and Evelyn Vida Baxter (1879-1959), a working partnership affectionately known to everyone as 'the good ladies' which was to lead Scottish ornithology for the succeeding half-century and particularly in the period between the two world wars. From 1910 onwards they edited the "Report on Scottish Ornithology" in the *Annals of Scottish Natural History* (which in 1912 reverted to the original title of *Scottish Naturalist*), and in 1918 published their classic paper on bird migration in the *Ibis*, where attention was first drawn to the importance of migrational drift. In 1928 they completed *The Geographical Distribution and Status of Birds in Scotland*, a checklist to which subsequent amendments were regularly published, and in 1935 *A Vertebrate Fauna of Forth*. Their final work has been described as a landmark in Scottish ornithology, as indeed it was—*The Birds of Scotland*, a two-volume work and the first ever on the avifauna of the whole country, published in 1953, but alas just after the death of Miss Rintoul. In 1955 Miss Baxter had the honorary degree of LL.D. conferred upon her by Glasgow University.

Much of the early ornithological work in Scotland was carried out by individuals working on their own, though a measure of coordination was achieved through the influence of Harvie-Brown, Eagle Clarke and the group in Aberdeen, but in the 1930s, influenced possibly by the work of E. M. Nicholson in Oxford, came a marked trend towards closer cooperation in fieldwork in Scotland. In the formation of the Midlothian Ornithological Club in 1933 with George Waterston as the central figure can be traced a similarity to the MacGillivray Society, even to the publication of an important ecological paper by one of its members, Vernon van Someren (1936). The M.O.C. was however a private club, and has remained so, but it was by now felt that "a common meeting ground for all those interested in ornithology in Scotland would be of great value," so that early in 1936 a meeting was held in Edinburgh, attended by Miss Baxter, Miss Rintoul, H. F. D. Elder and George Waterston, where it was resolved that steps should be taken to found a national club. George undertook to be Honorary Secretary, and the first meeting of the newly formed Scottish Ornithologists' Club was held in Edinburgh on 14th January 1937, at which 64 out of a total of 80 members were present. Monthly meetings were thereafter held alternately in Edinburgh and Glasgow and the *Scottish Naturalist* was adopted as the official organ of the club. On the outbreak of war in 1939 meetings were suspended, although the club remained in

being with the Rev. Edward T. Vernon and Miss Elsie Macdonald as Interim Chairman and Secretary, but when George Waterston was invalided home from Germany in 1943 he immediately began to establish and maintain contact with many members who were on service.

Full activity was resumed after the cessation of hostilities. Professor V. C. Wynne-Edwards had come to the Natural History Department in Aberdeen and did much to revive interest in the north, with the subsequent formation of the Aberdeen branch of the club, but the first notable post-war occurrence was a conference held in Edinburgh in 1947 jointly between the B.O.U. and the S.O.C. This was the first occasion on which ornithologists had been able to meet together after the war and was attended by 46 members from 14 different countries in addition to those from the British Isles, presided over by Norman B. Kinnear. This meeting was so successful that it became the pattern for the S.O.C. "Conference" held annually in October. No one who was present is likely to forget the first of these, held in Aberdeen in 1948 in the lecture theatre of the Natural History Department, or the afternoon tea party at Culterty, Newburgh, to which all the members were invited by Dr and Mrs Edgar Smith. It would be pleasant to think that it was from this S.O.C. tea party that the idea of an Aberdeen University Field Station at Culterty first germinated in Dr Smith's mind.

George Waterston continued to act as Honorary Secretary, but as the club's membership increased so did the secretarial duties, and when in 1955 he was offered an appointment as part-time Scottish Representative of the Royal Society for the Protection of Birds the Council of the S.O.C. resolved to employ him as part-time Club Secretary. This arrangement lasted for five years, office accommodation being provided free of all charges by the National Trust for Scotland, but it soon became apparent that efficient organisation of bird protection in Scotland needed more than half of even a man of George's energies, and also a more spacious office; furthermore the N.T.S. was itself becoming pressed for office space. The club was therefore faced with the problem of finding both a new office and a new secretary. The latter was the easier to solve as George now had a wife, Irene, who was not only a competent secretary and ornithologist but was also looking for a part-time job. As the solution to the former, George himself put forward a proposal that it would be in the interests of both the R.S.P.B. and the S.O.C. for both organisations to have offices under the same roof and, further, stated that he thought there was a good possibility of obtaining a grant from a charitable organisation

for this purpose. The proposal received the wholehearted support of the Council, and particularly of the then President, Sir Charles G. Connell, whose enthusiasm and personal interest did much to bring the project to fruition.

The whole idea aroused great interest in Scottish natural history circles, so much so that in a very short time the offer of a substantial sum of money was received from an anonymous donor. Several houses in Edinburgh were viewed, among them 21 Regent Terrace, which was very suitable for conversion to offices with living quarters above, and finally on Monday 26th October 1959 The Scottish Centre for Ornithology and Bird Protection was officially opened by the Rt. Hon. the Earl of Wemyss and March. Here are the offices of the club, reference and lending libraries, and more recently the S.O.C. Bird Bookshop. The Fair Isle Bird Observatory Trust also has its headquarters here, and from another suite of offices the affairs of the R.S.P.B. in Scotland are administered by George and his assistant Michael Everett. A Scottish Branch of the R.S.P.B. formerly existed (from 1924 to 1927) but nothing on the present scale was done to organise bird protection north of the Border before the appointment of a salaried Scottish Representative.

Publication of the *Scottish Naturalist* was suspended in December 1939 and resumed in April 1948 under the editorship of Professor Wynne-Edwards, but the need for somewhere to publish local bird notes was made apparent by the appearance in 1950 of the *Edinburgh Bird Bulletin* edited by D. G. Andrew, followed in 1952 by J. A. Gibson's *Glasgow and West of Scotland Bird Bulletin.* The *Scottish Naturalist* remained the only national journal, but its light began to flicker in 1955—being finally extinguished in 1964—and in 1958 *Scottish Birds* was launched as the journal of the Scottish Ornithologists' Club, edited by Professor M. F. M. Meiklejohn until the end of 1961 and thereafter by Andrew T. Macmillan, the present editor; the two local bulletins merged into the club's journal.

Although it is inevitable with the passage of time and the vast increase in membership that some of the early pioneering spirit has disappeared, the club's primary function remains exactly as declared in 1937 by the founder President, Miss Baxter, "to provide a common meeting ground for all those interested in ornithology in Scotland," whether they be academic professionals or birdy amateurs.

In the academic field Aberdeen has led the Scottish universities in ornithological work, following the acquisition in 1957 of Culterty house and grounds at Newburgh as a field station for the Department of Natural History (Zoology). Culterty, it will be recalled, was formerly the home of Dr

and Mrs H. Edgar Smith, who kept a large waterfowl collection on the fresh and salt-water ponds in the grounds. Its situation on the Ythan estuary makes it an ideal centre for ecological studies, particularly on estuarine ducks and waders, such as are at present being undertaken together with population studies of Rooks in the Ythan valley and, further afield, of Fulmars on Eynhallow, Orkney, work which has continued unbroken since 1950. A fuller description of the research at Culterty is given by Dunnet *et al.* (1965).

Aberdeen University has also been associated with the Nature Conservancy in a longterm research project on Scottish Red Grouse which has been described by Jenkins *et al.* (1964). This began in 1956 as an enquiry financed by the Scottish Landowners' Federation and organised in his department by Professor Wynne-Edwards. At the end of the initial three-year period the work was considered of such importance that the Nature Conservancy agreed to finance it as a separate research unit, now known as the Unit of Grouse and Moorland Ecology, with headquarters at Blackhall, Banchory, and still directed by Professor Wynne-Edwards, with David Jenkins as Principal Scientific Officer. Dr Jenkins has recently been appointed Director of Research of the Nature Conservancy, Scotland, and is succeeded at Blackhall by Dr Adam Watson.

It is outwith the scope of this review to do more than mention the setting-up of the Nature Conservancy in 1949, but attention may be drawn to Dr W. J. Eggeling's account (1964) of the Conservancy's work, with particular reference to ornithology in Scotland. Birdwatchers are now adopting a broader approach to their subject and regarding the living bird in relation to its habitat and to other animals; in other words, as Dr Eggeling puts it, "More and more the intelligent birdwatcher is becoming an ecologist." Moreover, the birdwatcher is rapidly appreciating the need to be a conservationist too, and the formation in 1964 of the Scottish Wildlife Trust was welcomed by all. With Sir Charles Connell as Chairman, the Trust performs a similar function to the County Naturalists' Trusts in England, and is working in close association with the Nature Conservancy, the S.O.C. and the National Trust for Scotland. The need for this sort of movement has been made all the more urgent by human pressures on land use, not least of these being the tourist industry, and the stage has now been reached when the birdwatchers, as distinct from the shooters, are catered for as a recognised section of the Scottish tourist traffic, culminating in a single nest becoming the major tourist attraction in the Scottish Highlands—the Osprey's nest on Speyside, visited, under supervision of the R.S.P.B., by over

20,000 people in a season.

Vivat, crescat, floreat Ornithologia (Hartert 1922)!

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It is impracticable to quote the source of every piece of information used, but much has been gleaned from the *Scottish Naturalist* and the *Annals of Scottish Natural History* (1871-1964) and also Mullens and Swann (1917). Sir Landsborough Thomson kindly sent me notes on the Mac Gillivray Society, and George Waterston on the history of the S.O.C.

The division of Scotland into Faunal Areas on the basis of river basins and watersheds was originally worked out by Dr F. Buchanan White (1871); the boundaries, somewhat modified from his original description, are shown on the map in Baxter and Rintoul's *Birds of Scotland.*

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The Scottish bird observatories

W. J. EGGELING

The conception and genesis of the Scottish bird observatories was due to the imagination, organising ability and ingenuity of one man—George Waterston. It was he who was behind the establishment in 1934 of the Isle of May Bird Observatory—the first cooperatively manned migration study centre in Britain—and it was he again who was responsible for the founding of the Fair Isle Bird Observatory in 1948. These are still the only observatories in Scotland; they set a pattern which has been copied time and again, elsewhere.

To understand both the background against which the May observatory came into being, and the source of George Waterston's inspiration, it is necessary to go back to the investigation initiated by a Special Committee of the British Association for the Advancement of Science, appointed in 1880 as the result of preliminary work by J. A. Harvie-Brown and J. Cordeaux. Their suggestion was that, with the cooperation of lightkeepers, information of value to students of bird migration might be obtained from the chain of lighthouses around the British coast. The concept proved workable, organised observations were made from 1879 onwards, and the results were published regularly in a series of annual reports (British Association Migration Committee 1879-1904). Intimately concerned with this project and personally much attracted to migration problems was Dr William Eagle Clarke of the Royal Scottish Museum. So much was this the case that subsequent to the survey he spent over a year at

lighthouses and lightships, and on remote islands, concentrating on those places where migration was known either to be observable on a large scale or to be of more than usual interest.

It was as a result of acquaintance with Eagle Clarke and the stimulus of his exciting ornithological experiences on Fair Isle, Sule Skerry, the Flannans and St Kilda that the Misses E. V. Baxter and L. J. Rintoul, later to become famous as the authors of *The Birds of Scotland* (Baxter & Rintoul 1953), conceived the notion of a long-term study of migration on the Isle of May. Both had watched birds since childhood and they had already much experience behind them when, still in their twenties, they embarked in 1907 on the first of their annual spring and autumn pilgrimages to that island which were to continue, interrupted only by war, until 1933. This was the period of the collector—"what's hit's history; what's missed, mystery"—so they were armed not only with pencil, notebook and binoculars but also with shotgun, cartridges and the tools of the taxidermist. They were pioneers and they did a first-class job (Eggeling 1964).

In a notable paper, published in the *Ibis* in 1918 (Baxter & Rintoul 1918) 'the good ladies'—as they were afterwards to be referred to affectionately by so many—recorded their observations on the effect of easterly winds on autumn migration. They deduced that the direction of the wind has a great influence on the routes birds follow—and therefore on the species which reach our shores—and that deviation from the direct route is largely due to drift. The first of these conclusions was almost revolutionary, since there was then a general acceptance of Eagle Clarke's belief that migration was affected not so much by wind direction as by the general weather situation. Their second conclusion was the earliest expression of the concept of migrational drift.

The Isle of May Observatory

Just as Eagle Clarke by his enthusiasm had influenced Miss Baxter and Miss Rintoul, so these two in their turn, by their discoveries on the May, inspired George Waterston and a group of schoolboy companions, operating first as the Inverleith Field Club and later as the Midlothian Ornithological Club, to follow after them. The story of the early days of the I.F.C. and M.O.C., and of the start of the May observatory, has been sketched elsewhere (Eggeling 1960) but is worth repeating. As described by H. F. D. Elder, the first Honorary Secretary of the observatoy: "In the spring of 1929 George Waterston asked six of us who were interested in birds to meet at his house in Inverleith Terrace. We were all either still at, or had just left, the Edinburgh Academy, our average age being, I suppose, about eighteen. At that

meeting we agreed to start a club which would meet once a month at Inverleith Terrace to discuss birds*. Many names were proposed for the club but it was finally decided that we should call ourselves the Inverleith Field Club, after the area in which we held our meetings."

"From the beginning, the I.F.C. was as much a social club as a bird club. The New Year, spring, summer and autumn weekends were the highlights of the year, when we either camped out or, in winter, stayed at some hotel. Although ornithology was the order of the daytime, the sing-songs and so on in the evening were strong attractions of these weekends."

"By 1932-33, although a number of us had become more immersed than ever in the study of birds, others had found alternative hobbies and, whilst still retaining a general interest in ornithology, were not prepared to devote so much time to it as we were. Thus, by mutual agreement, certain of us started in March 1933 a second club, which we called the Midlothian Ornithological Club, with its sole object the study of birds; social attractions were to take a very secondary place. The M.O.C. was and still is a private and very personal club, membership being by invitation only. Unlike most clubs. its members pay no entrance fee, and there is no annual subscription."

"Some of the best places for birds in the Edinburgh area are the reservoirs and the coast, so it was natural that we should concentrate on such places, where during spring and autumn unusual birds might be seen. This led us to a particular interest in migration. The work of Miss Baxter and Miss Rintoul on the Isle of May was of course well known to us—our own first visits to it were those of Waterston and Elder in September 1932 and of a larger party the following autumn."

"About this time an article by W. B. Alexander appeared in *British Birds* describing the bird observatory on Heligoland, and R. M. Lockley was writing in *The Countryman* about his bird trap on Skokholm. We knew W.B. He had helped us already in many ways and when we suggested that it might be profitable for us to start an observatory on the Isle of May he was full of enthusiasm for the idea and promised to assist us in any way he could. Soon afterwards he visited Edinburgh to talk to the Royal Physical Society about Heligoland and he ended his lecture by explaining

*The original members included A. G. S. Bryson (now Honorary Treasurer of the British Ornithologists' Union), H. F. D. Elder, G. Waterston (now Scottish Representative of the Royal Society for the Protection of Birds, and an Honorary President of the Scottish Ornithologists' Club) and J. H. B. Munro (who from its inception has been the Honorary Treasurer of the May observatory).

what we had in mind. The reaction of the meeting was most encouraging: Dr Stephen, Keeper of the Natural History Department of the Royal Scottish Museum, volunteered his help, and Professor James Ritchie spoke strongly in favour of what was proposed."

"The stage was now set for detailed planning. There were two main hurdles to surmount: we needed permission to establish an observatory on the island, and funds to build a trap and furnish living quarters. Mr J. Glencorse Wakelin, Secretary of the Northern Lighthouse Board, was appoached and we remember with gratitude his kindness in obtaining permission for us to do what we wanted. Funds had next to be found. We had estimated that we would require at least £50 to buy materials to build the trap and to furnish the small coastguard house on the island which the Commissioners said we could use. We were greatly heartened when W.B.A. guaranteed us £25, if we were unable to raise the full sum necessary. As it transpired, we did not have to avail ourselves of this generous offer. An appeal circular was sent out to people in Scotland and beyond who were known by us to be interested in birds, and this met with an unexpectedly gratifying response. We raised £83 altogether, of which the M.O.C. themselves contributed £5, 11s, and we were now all set to go ahead."

"Materials were assembled and on 28th September 1934 W. B. Alexander, R. M. Lockley, E. V. Watson (who was later to describe the mosses of the island) and H. F. D. Elder landed on the Isle of May to start the observatory. R. M. Lockley had already assisted us to plan the trap and we were much pleased when he agreed to come north and help us build it. That first party can be proud of their work, for the Low Trap has stood till the present day without any major rebuilding. The observatory was a success from the start, the trapping garden functioning splendidly. In the spring of 1938 a second trap (the Top Trap) was erected in the sunk garden beside the main lighthouse, but it had only been in use for a few months when we suffered a crushing blow. During the autumn the international situation became acute, the island was taken over by the Admiralty, the observatory had to be closed down in September and it was not until after the war that we were allowed back. On 13th April 1946 an M.O.C. party returned to the island expecting to find little trace of the traps, but to our great delight all that they needed was repair."

"In pre-war days boat-hire was cheap and no great drain on our pockets and we had managed to keep the station running by charging observers 1/- a night to cover the maintenance of our headquarters. Now, however, costs had risen

steeply and without some form of subsidy it would clearly be an expensive business for observers to visit the island. The M.O.C. believed, however, that the Isle of May Observatory had proved its value for the study of bird migration, and felt that a special effort was justified to ensure its continuation. The club therefore approached the four Scottish Universities, suggesting that the observatory deserved their support and proposing that in future it should be run by a Joint Committee composed of representatives from each University, the M.O.C. and the Commissioners of Northern Lighthouses. The Universities and the Commissioners fell in with this proposal, the Universities agreed to make individual contributions towards the cost of running the observatory, and a Committee was nominated. Because we felt that all aspects of the island's natural history should be studied, not just the birds in isolation, the observatory was at this time renamed the Isle of May Bird Observatory and Field Station. When the observatory re-opened in 1946 the Commissioners allowed us to move our headquarters from the old coastguard house or Lookout to the much more comfortable and commodious Low Light, where it has been based ever since."

The Low Light is a comfortable residence with accommodation for six observers. It has a small and a large bedroom, a living-cum-dining room, a kitchen-cum-pantry, a bathroom and a store; bedding, cooking utensils, crockery, fuel, etc., are provided. Observers take their own food and do their own cooking. The present daily charge is 5s a person, and the boat trip from Pittenweem costs 15s each for the double journey.

The observatory is normally open from mid March to early November and is available for the use of any student of natural history. Full records are kept of all work done, and accounts of it are published. The most important daily task is to complete a census of the amount of bird movement taking place. During the migration seasons in particular, trapping occupies a lot of time. Continuing studies of the breeding birds, of the other animal populations, and of the plants of the island are another important aspect of the work of the station.

In 1956 the Commissioners of Northern Lighthouses entered into a 99-year agreement with the Nature Conservancy which resulted in the Isle of May becoming a National Nature Reserve. Although the Conservancy has ultimate responsibility for the management of the reserve the position of the observatory is fully safeguarded and it continues to be administered by the Bird Observatory and Field Station Committee. In addition to supervising the running of the

station the Committee act also as agents for the Conservancy in the management of the reserve.

The Fair Isle Observatory

The first warden of the Fair Isle Bird Observatory was Kenneth Williamson. As he has recounted in *Fair Isle and its Birds* (Williamson 1965), he and his wife went there in the spring of 1948 charged with the task of organising a hostel and research centre for the study of bird migration. In his own words: "We were not the first to find George Waterston's enthusiasm infectious, and the idea presented a challenge. But the story of the Fair Isle Bird Observatory does not begin here, nor do I regard myself in any true sense as its first director." With Fair Isle, as with the Isle of May, it was the pioneer work of Dr Eagle Clarke and his associates that inspired the conception of the observatory. Forty years earlier that great Scottish naturalist "had thought deeply about migration problems as he wandered through the tiny fields surrounding the white-washed crofts. He trained an islander, Jerome Wilson of Springfield, to hunt and work with him and . . . occasionally too he had the company of a kindred spirit, when the yacht *Sapphire* dropped anchor off Klingers Geo and Mary, Duchess of Bedford, and her maid-servant climbed the steep cliff path and installed themselves at the Pund."

Eagle Clarke's work culminated in 1912 with his *Studies in Bird Migration* (Clarke 1912), but he continued to be a frequent visitor to Fair Isle until 1921 when, in Williamson's words, "he felt he was getting too old for this strenuous game and he made a last visit to his fabulous bird isle in the company of a younger and more active man, Rear-Admiral James Hutton Stenhouse. They bothied in the Duchess's old cottage at Pund. George Stout of Field, who became to Stenhouse what Wilson had been to Clarke, said of this visit, 'They lived on bad food and good whisky for a fortnight!' During the next decade Stenhouse may be said to have wardened Fair Isle. In 1929 he too felt the advancing years and began to look for a successor; he found an eager one in George Waterston."

"George was not able to go to Fair Isle until the autumn of 1935, when he and A. G. S. Bryson stopped the northbound steamer off the South Harbour and were rowed ashore in an island boat. George made annual visits until 1939, by which time his great ambition was to establish at the isle an observatory for the trapping, ringing and study of migrant birds similar to the one which he and his friends had already started on the Isle of May."

"The war must have scotched thousands of ambitions, but at

least one burned more brightly throughout those barren years. George was captured in Crete in June 1941 and was a P.O.W. in Germany for the next two and a half years, during much of which he was a sick man. But he had ample time and leisure to think of Fair Isle and what ought to be done there to reap the best possible harvest from its great ornithological potentialities. He fired a fellow-prisoner, Ian Pitman, an Edinburgh lawyer, with his enthusiasm and ideas, and their plans gradually took shape. If George ever had misgivings as to the practicability of establishing a field research station in such an isolated corner of the British Isles, they probably disappeared for ever during the voyage when he was invalided home via Gothenburg in 1943, in an exchange of wounded officers arranged by the Swiss Red Cross. The liner was escorted northwards through Norwegian waters, and then headed west: at dawn there was a shout 'Land ahead!' and everyone who could rushed on deck for a first sight of the old country. To one man the experience was something more than just that—it was an omen, a promise of things to come. For the land was Sheep Craig, with Fair Isle beyond bathed in the soft light of an October morning."

"George Waterston bought Fair Isle from the then proprietor, Robert Bruce of Sumburgh, in 1948, and the bird observatory was launched as a public Trust with Sir Arthur Duncan as chairman, Ian Pitman as treasurer, and George as secretary. Grants of £3000 from the Pilgrim Trust and £1000 for scientific equipment from the Nature Conservancy, together with many private donations and the annual subscriptions of the 'Friends of Fair Isle,' helped to put the venture on its feet."

Kenneth Williamson planned and supervised the conversion of the former naval headquarters at North Haven into hostel and laboratory, and had charge of its scientific programme until late in 1956. Peter Davis, who previously had been warden of the bird observatories on Lundy and Skokholm, then took over until 1963, when he was succeeded by Roy Dennis, the present warden.

In 1954 the National Trust for Scotland acquired Fair Isle from George Waterston, but the operations of the observatory, which continues under the management of the Fair Isle Bird Observatory Trust, were not affected by the sale. In 1963 an agreement between the National Trust for Scotland and the Nature Conservancy underlined the exceptional natural history importance of Fair Isle and recognised it to have the same scientific status as a National Nature Reserve.

The Fair Isle Observatory hostel, open between 1st April and 30th November, can accommodate up to fourteen visitors at a time. The sleeping quarters are mainly single rooms,

but two have two beds and one has three; there is a large commonroom, a reference library and a laboratory. Meals are provided but visitors look after their own bedrooms and wash up after meals. The charge for board and accommodation is 25s a day for adults and 21s a day for persons under 21. Transport between Fair Isle and Shetland is by the island's mail boat *Good Shepherd* which runs twice a week in summer (May to September) and once a week in winter (October to April). The return fare is 21s 6d.

The present and the future

There has always been a friendly rivalry between the two Scottish bird observatories. Fair Isle is undoubtedly the better known nowadays, partly because it has a permanent warden, provides board accommodation and can hold more visitors, partly because of the glamour of its remoteness, partly because of the great number of bird rarities recorded from it. Nevertheless for observing migration the May takes pride of place, for a comparison by Dr David Lack of migration at Fair Isle, the May and Spurn Point in Yorkshire has shown (Lack 1960) that in providing opportunity to see the arrival of typical drift migrants—the night migrant chats, warblers and flycatchers—the May is most favoured of the three. This holds also for other types of migrants, except the vagrant rarities (Eggeling 1964).

Fair Isle (1890 acres) is a relatively large island, with extensive tracts of hill and moorland, high sea cliffs and stacks, and an inhabited village area with a considerable acreage of field and pasture. The May (140 acres) is small by comparison, and lacks many of Fair Isle's habitats, but it has the very great advantage for birdwatching that it can easily be covered thoroughly several times daily, so that day-to-day changes in the bird population can be assessed far more easily and accurately. Moreover, its natural history has been documented over a much longer period than that of Fair Isle, enabling fluctuations in its plant and breeding bird populations to be seen as part of a record extending back well over a century. The continuing study of these changes is a major objective of the field station's programme.

In regard to publications emanating from the two observatories, there can be no doubt at all of the pre-eminence of Fair Isle. In particular this has been due to the wide-ranging interests of the resident wardens, such as Kenneth Williamson's work on many different aspectes of migration and his species studies on the Oystercatcher, Fulmar, and Great and Arctic Skuas. The observatory has been responsible also for a number of valuable papers from persons who arrived as casual visitors to the island but became intrigued with some particular aspect of the observatory's work and then either

assisted directly with studies in the field or undertook to analyse data that had been collected. If Fair Isle has been a better training ground than the Isle of May for ringers and students of bird migration it is because a resident warden is always on the spot to guide and instruct them. Nevertheless there are many who claim that the May serves an equally valuable purpose in another way—by encouraging self-reliance, individual initiative and general resourcefulness. Perhaps it is fairest to say that the two observatories are complementary and that the work of neither should be viewed in isolation from that of the score or more other observatories which are now in operation—following the Scottish lead—around the coast of Great Britain and Ireland.

This is not the place to enlarge in detail on the activities of bird observatories or on their especial contribution to ornithology. A general appraisal was made by Kenneth Williamson in a paper submitted to the Twelfth International Ornithological Congress at Helsinki in 1958 (Williamson 1960) which considers the work of the British bird observatories as a whole—but especially that on Fair Isle and the Isle of May—as it relates to field work, migration theory, field taxonomy and the laboratory examination of trapped birds. Although now slightly out of date and in need of amplification this paper still gives a good picture of the scope of study and accomplishments of the coastal observatories.

As yet there are no recognised inland observatories or migration observation points in Scotland, although sporadic records from a variety of places inland suggest that continuous or regular observations there—and especially perhaps both in the higher passes and in the lower straths and valleys which traverse the mainland—would add materially to our knowledge of cross-country seasonal movement, particularly if they could be combined with the radar observations to which, ideally, for maximum profit, all observatory recording ought now to be linked.

Equally, there can be no doubt that further recording from places like North Rona and St Kilda (from where a considerable amount of information is already available as a result of recent observations by the Nature Conservancy) and from Lewis and the Uists could fill gaps in our picture of migration up, down and across the west coast of Scotland. Although difficulties of access and accommodation make this at present impractical for most of the outlying islands, even a 3-5 year period of observation covering the migration seasons at one of these centres would be well worth while, so that no opportunity which might make this possible should be let slip. Again—and this needs only the cooperative effort of a small group of enthusiasts, based locally, to fulfil the

particular requirement—there is wide scope for observing in detail on the coasts of East Lothian and eastern Fife (especially perhaps at Fife Ness) the autumn arrival of all those drift migrants from the continent that reach the Firth of Forth without making a landfall on the Isle of May, but which alight instead on the mainland shore either north or south of it. Here is a challenge for a modern successor to the I.F.C. and M.O.C.—to a fresh alphabetic combination making new Scottish ornithological history.

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Bird ringing in Scotland

A. LANDSBOROUGH THOMSON

It is usual to date scientific bird-ringing from 1899, when Mortensen in Denmark was the first to use rings with an adequate address and individual numbers. The method was thereafter adopted in other countries, Germany and Hungary being early in the field, but it was not until 1909 that there were important developments in the British Isles. In various countries there had been pioneers who used cruder methods, both before and after Mortensen's lead, and the first enterprise of the kind seems to have been an English one starting in 1891—the ringing of young Woodcock on the Northumberland estates by Lord William Percy. His rings bore only 'N' and the year; the ducal initial proved not ineffective as an address, in the case of a bird shot as game, and the date sufficed where species, age and place were constant.

Probably the first ringed bird ever to be recovered in Scotland was one of these Woodcock, an 'N 1903' bird reported from Angus in November of the same year (Percy 1909). The first from abroad seems to have been a Starling ringed as young in Denmark in 1904 and recovered at Biel, Prestonkirk, East Lothian, early in March 1906 (Mortensen 1907).

Ringing in Scotland began with two pioneer undertakings in which inadequate methods were used. The first was by an

Englishman. J. H. Gurney, best known as a Norfolk naturalist but also making a special study of the Gannet at its Scottish breeding places. He wrote a book on the species; and his personal book-plate bears a Gannet *volant*, with the Bass Rock behind (reproduced in *British Birds* 16: 243). In 1904 he got the principal lightkeeper on the Bass Rock, John Laidlaw, to ring 40 young and 52 adult Gannets there (Gurney 1904). His rings were inscribed simply '1904 BASS ROCK,' which in fact gave most of the data required in such a limited enterprise. It was probably also adequate as an address for the lighthouse, but fell short in not being obviously so. Two local recoveries shortly afterwards were the only result (Gurney 1913, p. 424 footnote).

In the winter of 1906-07, as recorded by Harvie-Brown (1907), Richard Tomlinson ringed 71 trapped Starlings at Musselburgh, Midlothian, where he was living in retirement. The rings were serially numbered from '1' upwards but, it seems, bore no address; this precluded recoveries from being notified except in the press or by people aware of the enterprise. So far as known, none came to light, except that one can infer from the note that 42 of the birds 'repeated,' two of them twice, during the trapping period. Later Tomlinson joined my scheme.

The year 1909 saw the simultaneous and independent launching of two major ringing schemes in the British Isles. Neither promoter knew of the other's plans until arrangements were far advanced, and both schemes were announced in the same issue of *British Birds* (vol. 3, no. 1). One scheme was launched in association with that journal by its editor, H. F. Witherby, and eventually developed into the British national scheme, of which more will be said later in a Scottish context. The other was initiated by myself, as the 'Aberdeen University Bird-Migration Inquiry,' and with its history this paper is largely concerned. The account is necessarily a personal reminiscence, so a somewhat egocentric narrative may perhaps be excused.

As a youth in September 1908, I was fortunate in being able to visit Rossitten and Heligoland. On the latter there was at that time no resident ornithologist, but at the former—in what was then East Prussia—there was the famous Vogelwarte of the Deutsche Ornithologische Gesellschaft. The exhibits of the ringing work centred on this observatory fired my imagination; notably there were the recoveries of Hooded Crows netted on autumn migration at Rossitten itself, and of White Storks ringed as nestlings over a wider area. From the Director, Dr J. Thienemann, I learnt much about the methods and received specimen rings. Thus I came home resolved to start a ringing scheme in Scotland.

That I was, from the following year, able to operate such a scheme in the University of Aberdeen from the lowly station of a first-year undergraduate was due to the support of my father, Professor (later Sir) J. Arthur Thomson, in the Regius Chair of Natural History (incidentally, this had been MacGillivray's chair; and it is now occupied by the current President of the British Ornithologists' Union). This circumstance gave me official cover, a working corner in the Department, and a ready source of wise advice. It also secured a grant from the Carnegie Trustees for working expenses; these were trivial by present standards, even although rings were issued without charge.

After some experimental beginnings, the seven sizes of aluminium rings were made by a small firm in Halifax; but how this came about is now forgotten. The four larger sizes had clasps on the Rossitten pattern—two unequal ends projected outwards from the incomplete circle; the longer was folded over the shorter and eventually the three thicknesses could be pressed together with pliers. These sizes also had their edges turned outwards as flanges. The rings carried a serial number and the address 'ABERDEEN UNIVERSITY' (the second word contracted to 'UNIV.' on the smallest size). This was both short and obviously adequate; it also implied a scientific purpose that invited report. Witherby often expressed his envy.

A base having been secured and equipment provided, the next step was to deploy a field force. Happily the nucleus of this existed in the MacGillivray Society, a private natural history club, predominantly ornithological, which had been formed by some of us in Aberdeen as schoolboys and had taken in a slightly older group in Edinburgh, with later a few others elsewhere. This club thus had a part in the beginnings of Scottish ringing not unlike that played. as recounted elsewhere in this issue, by the Inverleith Bird (later Midlothian Ornithological) Club of a subsequent generation in the origins of Scottish observatories. This nucleus was quickly joined by others, including two young women in Fife who were destined to become leaders in Scottish ornithology, Evelyn Baxter and Leonora Rintoul.

The inception of the scheme was widely noticed in the daily press, and this brought further offers of help; eventually about two hundred ringers cooperated. Not all of these were in Scotland, a few being in England or Ireland. Correspondingly, Witherby was of course free to operate in Scotland; to use an idiom of a later era, no Tartan Curtain separated the two schemes.

It was inevitable that publicity should also elicit some less helpful reactions, especially from the more irascible

types of habitual objector. One semi-literate correspondent from Middlesbrough concluded a vituperative tirade with the exhortation: "Ring yourself and shut up!" On a different plane were the apprehensions of some bird lovers about possible harm to the birds. On this aspect I had a sympathetic letter from Lewis Bonhote, on behalf of the Royal Society for the Protection of Birds, and was able to satisfy him that it was well under control.

These were exciting days. Ringing had introduced a new dimension into bird study. My own personal experience was mainly with Lewis Ramsay and Arthur Davidson, two MacGillivray Society members who lost their lives a few years later. First it was the chicks and nestlings. Then in the autumn it was catching birds on the seashore by dazzling them with bicycle lamps—until the coastguards stopped us! And when winter came we tried out various methods of trapping birds in our gardens. These things, now familiar to many, were then quite novel in our country.

In the Department there was the further interest of seeing the ringing schedules come in—and then the thrill of the first recoveries. The earliest report from abroad was of a Wigeon caught in a decoy in the Netherlands on 3rd September 1909; it had been ringed as one of a brood of ducklings in Sutherland that summer. The method was working well; letters addressed to the University were duly passed to the Department by the administrative office. Sometimes, however, reports reached us through the press or the police; occasionally they were addressed to the Lord Provost of the City—once as "Senor Alcalde d'Alberdeen." The well known ornithologist of Oporto, W. C. Tait, was assiduous in bringing Portuguese recoveries to our notice.

Some early recoveries of particular note were published in two papers, the first of which was primarily a general discussion of the marking method—its history, its application, and the hopes that were entertained for its results (Thomson 1911a). These early records included Aberdeenshire Lapwings from Ireland and Portugal, a Song Thrush from Portugal, a Guillemot from Sweden, Scottish-wintering Starlings from Arctic Norway in summer, and Swallows returning to the same nesting place in the following year (Thomson 1911b). These were the high spots

A comprehensive list was given in a First Interim Report, running through the *Scottish Naturalist* in seven instalments (Thomson 1912-13). This sorely tried the patience of the editors, as it followed the thoroughness of the German model of that time in giving full particulars of every recovery, however trivial. It did, however, serve the purpose of presenting an initial complete sample of the data that the method

would produce. A Second Interim Report covered the results for 1912-14 (Thomson 1915); this was compressed by another hand from the material that I had put together before going on war service. By this time the scheme was fading out, although my sister (Maribel Thomson, herself a zoologist) kept the headquarters work going on a diminishing scale, and dealt with the reports of recoveries that continued to come in after ringing had virtually ceased. The last record was in fact as late as 1924, an Aberdeenshire Lapwing recovered in Ireland in the twelfth year of its life.

After the war, a final report was published in the *Ibis* (Thomson 1921). This recorded that 27,802 birds had been ringed under the scheme, which was about a third of the total ringed for *British Birds* in the same effective period. The largest species totals were: Song Thrush 3770, Lapwing 3142, Blackbird 2641, Starling 1900, Common Tern 1352, Robin 1206, Swallow 1198, Black-headed Gull 1150, House Sparrow 1041, and Greenfinch 1021. The report also recorded that 879 ringed birds had been recovered (two others were recovered too late for inclusion—Thomson 1924), and it then presented analyses of the data for eight species; of these the Lapwing yielded the most valuable results, with 63 recoveries, mostly from a distance. Brief summaries of the data for a further 34 species followed, and 11 others were mentioned as having yielded one or two recoveries of no significance. The report ended with conclusions both about migration and about the ringing method. It may be added that the data for some species have since been put to further use, combined for analysis with those of the other scheme (at the Tring headquarters of which all the recovery cards have now been deposited).

From 1919 onwards, bird-ringing in Scotland has been virtually the Scottish aspect of ringing under what has become the British national scheme. To round off the personal reminiscence: my own part in this was at first to prepare occasional analytical papers for *British Birds;* but when Witherby handed over the scheme to the British Trust for Ornithology in 1937 one of his conditions was that I should be chairman of the directing committee—a position held until 1965. The scheme has a headquarters staff at Tring whose salaries are mainly provided by the Nature Conservancy; and its rings now bear the address 'BRIT. MUSEUM LONDON SW7,' a shorter version of the original 'BRITISH MUSEUM NAT. HIST. LONDON.'

Meanwhile, however, there was a purely Scottish enterprise, or series of enterprises, for ringing Red Grouse; and in this work the University of Aberdeen has again been a focal point. The beginnings are slightly obscure, but it was

apparently from 1932 (Anon. 1932) and under the sponsorship of the Scottish Landowners' Federation that Professor James Ritchie, the new incumbent in the Natural History Department, directed a scheme in which rings marked 'ABERDEEN UNIVERSITY' were used. In 1936 Ritchie moved to the Chair of Natural History at Edinburgh; but he retained the direction of what came to be called 'The Grouse Migration Enquiry,' and rings marked 'EDINBURGH UNIVERSITY' were brought into use. Some conclusions were given in a report published in the *Field* in 1938 (anonymously, but apparently emanating from the Federation). At that time 130 estates all over Scotland, and 21 elsewhere, were taking part in the ringing. The work continued until war intervened in 1939.

Ringing of Red Grouse was resumed in 1956 under a scheme once more based on the University of Aberdeen and sponsored by the Scottish Landowners' Federation; the work was, and remains, under the general supervision of Professor V. C. Wynne-Edwards and the immediate direction of Dr David Jenkins (succeeded within the last few months by Dr Adam Watson), with field headquarters first in Glen Esk (Angus) and now at Banchory (Kincardineshire). The project has an intensive side, comprising continuous population and behaviour studies on particular estates and with ringing as merely one of its various methods; in 1959 this was taken over by the Nature Conservancy as a Unit of Grouse and Moorland Ecology based on the University.

The extensive side of the project was the ringing of Red Grouse all over Scotland. This continued under the sponsorship of the Federation until it was wound up, apart from recoveries still to come, in 1962. In all 13,336 rings were used and the recoveries (1246 to the end of 1964) are summarised in one published paper (Jenkins, Watson & Miller 1963) and another now in the press. At first No. 3 rings of the British national scheme were used; but from 1958 onwards special rings marked 'Inform ABERDEEN UNIVERSITY' have taken their place. The latter are still being used in the intensive programme in Kincardineshire, as are also coloured plastic back-tabs on birds caught in autumn (D. Jenkins *in litt.*).

Finally, something may be said (with the help of Robert Spencer) about the Scottish activities of the British national scheme at the present time. At the close of 1963 this scheme had 70 ringers in Scotland (Spencer 1964). In proportion to the population this is rather less, but not strikingly less, than the number in England and Wales. The main concentrations of Scottish ringers are, as of old, in Midlothian and Aberdeenshire; Shetland comes next. The chief centres of ringing work are the bird observatories on Fair Isle and on the Isle of May, the subject of another paper in this issue.

The University of Aberdeen is again well to the fore, with long-term intensive studies of such species as Starling, Rook, Fulmar, Eider and Shelduck; a key centre for ringing has been its wildfowl research station at Culterty on the estuary of the Ythan. It was near that same estuary that so many of our own birds were ringed in 1909-14; and it was on it too that the late Betty Garden more recently ringed so many ducks on behalf of the Wildfowl Trust, providing a valuable northern component in a project heavily overweighted towards the south.

The Midlothian Ornithological Club has over the years been responsible for a vast amount of ringing of tern species at colonies on the Firth of Forth. And in the last couple of years a North Solway Ringing Group, based on Dumfriesshire has been notably active in ringing in the southwest.

In Scotland as a whole, however, ringers tend to be widely scattered; and the lack of personal contact tells against recruitment, as well as slowing down the spread of new techniques. On the other hand, the numbers of Scottish ringers are reinforced nearly every year by visiting parties from England, whose objective is usually the great seabird breeding stations; and twice, recently, parties from Northern Ireland have done good work on Ailsa Craig. Also in recent years, as the result of a special drive to ring Sand Martins in large numbers, English ringers have come north in search of further colonies of that species.

Passerine migrants and seabird chicks have naturally bulked largely in Scottish ringing, but neither of these categories is peculiar to the country. There are, of course, a few species that are not available for ringing elsewhere in the British Isles; for most of them the numbers ringed have been too small to produce recovery data worthy of analysis, but two exceptions may be mentioned. Hen Harrier chicks have been ringed mainly in Orkney (through the cooperation of E. Balfour, the representative of the R.S.P.B.), and it has been shown that at least in the first year of life, some remain there during the winter while others become distributed over the mainland of Scotland (Thomson 1958). Several thousands of Great Skua chicks have been ringed in Shetland, and there are well over a hundred recovery records; the localities of these range from the coast of New England to far inland in western Russia, and from well above the Arctic Circle in W. Greenland to the coast of North Africa (Thomson 1966). It seems not inappropriate that this most recently published analysis of British ringing data should relate to a species that many members of this year's International Ornithological Congress will be seeing at its breeding grounds, often for the first time, during the S.O.C.

Bird-Islands Study Cruise round Scotland.

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Scottish bird photographers

C. K. MYLNE

(Plates 13-24)

The aim of this paper is to review generally the photography of Scottish birds and to concentrate particularly on the work of those who are active today. To define a Scottish bird photographer is impossible. We shall include many 'aliens' who have worked in Scotland, but we have deliberately selected for publication only pictures of typical Scottish species taken by photographers now living in Scotland. All are active in the field today, with two exceptions, Charles Kirk, one of the pioneers, whose early photographs are as good as many being taken today, and Ian Thomson, who produced consistently fine pictures of many Scottish species in the old style of bird portrait. The rest have been picked as a representative selection of styles, subjects and

PLATE 13. Common Gull, "Kilchoan", 1912.

Photograph by Charles Kirk

PLATE 14. Cock Wheatear, Isle of Mull, June 1965.
Photograph by William S. Paton

PLATE 15. Common Sandpiper, Isle of Mull, June 1965.
Photograph by William S. Paton

PLATE 16. Hedge Sparrow, Berwickshire, May 1964. *Photograph by Sidney J. Clarke*

PLATE 17. Black-headed Gull, Perthshire, May 1964. *Photograph by Nigel G. Charles*

PLATE 18. Hooded Crow, South Uist, 1964.

Photograph by David Stephen

PLATE 19. Golden Eagle; adult arriving home with a twig, Argyll, May 1952.
Photograph by Charles E. Palmar

PLATE 20. Oystercatchers, Hilbre Island, Cheshire, October 1959. *Photograph by J. Edelsten*

PLATE 21. Immature Gannet, Ailsa Craig, 1964. *Photograph by David Stephen*

PLATE 22. Storm Petrel, nesting on the floor of a tunnel in a prehistoric ruin, Shetland, August 1964.
Photograph by Dennis Coulls

PLATE 25. Female Eider, Hascosay, Shetland, June 1953. *Photograph by Ian M. Thomson*

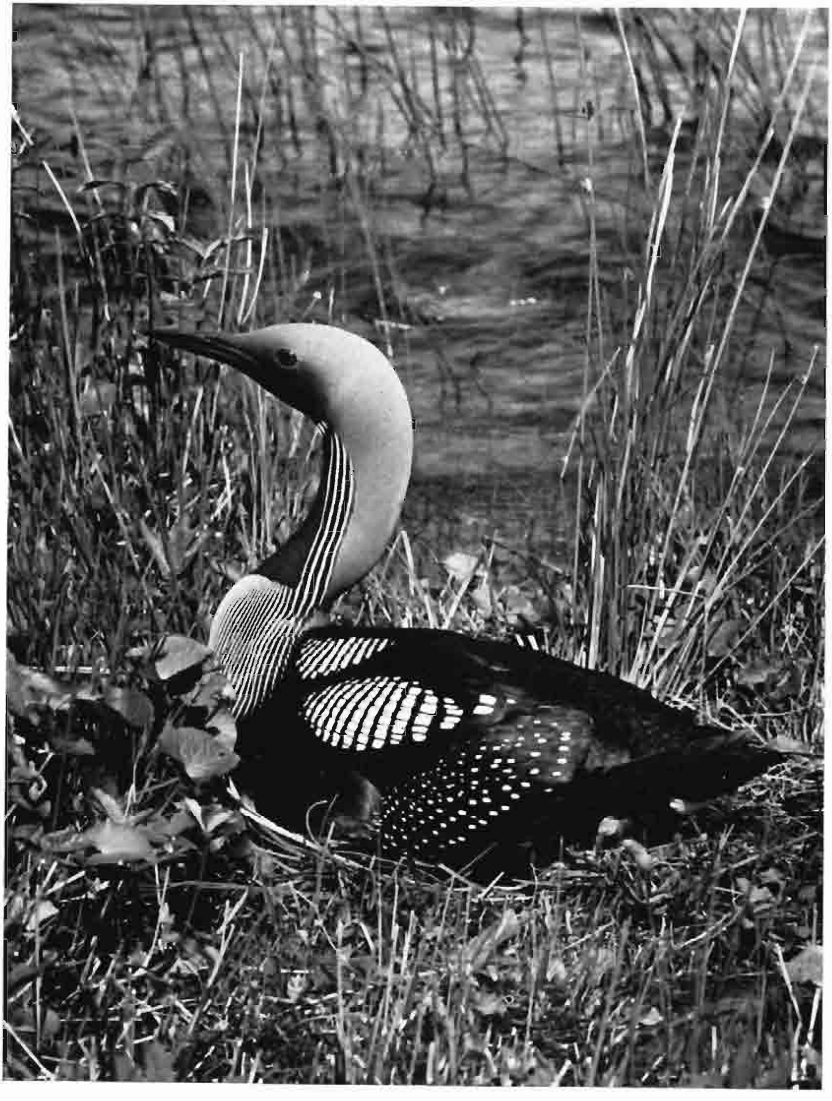

PLATE 24. Black-throated Diver, Argyll, May 1952.
Photograph by Charles E. Palmar

species which will, we hope, show that bird photography in Scotland is in the hands of an active and vigorous band of enthusiasts. We have made no attempt to be comprehensive and hope therefore that no apology is needed to the many whose work could well have been included.

Nature photography has been revolutionised by the invention of fast emulsions for black-and-white film, and of colour materials of reasonable speed with a fine enough grain to stand considerable enlargement by projection on a screen or printing on paper. The miniature negative can now produce top-grade results and the single-lens reflex camera makes the use of the now comparatively inexpensive telephoto lenses quite straightforward. As a result there are thousands of people who can, and hundreds who do, take bird photographs. Standards however have risen too and the art of bird photography is still as demanding as ever. Many would still argue that for a true bird photographer a larger format than 35mm is still essential. Others disprove this by their results. The best recent exposition of the case for miniature bird photography is by a Scot, the late V. D. van Someren, in the final chapter of his book *A Bird Watcher in Kenya* (Oliver & Boyd 1958). His illustrations, as well as some of those shown here, prove that the small format can produce excellent results in black-and-white photography, but, as all serious workers will emphasise, the greatest care is needed at every stage. To produce exhibition prints from 35mm negatives is an art in itself. Black-and-white photography therefore perhaps more than ever before demands that the photographer should do his own darkroom work if he wishes to achieve high quality enlargements.

Colour is a different story. To take good transparencies is now within the reach of everyone who can afford the equipment and who is prepared to learn the camera techniques. Trade processing is standard and many colour emulsions cannot be processed at home. For colour therefore the definition of bird photographer has changed and throws far more emphasis on knowledge of the subject and the field techniques used. It is a hobby now open to almost any owner of good equipment, and yet the number of really competent bird photographers remains comparatively small. We do not pretend to be able to cover them all, but will be delighted if this article stimulates a few more to prove themselves in public.

Scotland has long been the happy hunting-ground of nature photographers, and it is revealing as well as gratifying to see how many of the great names of bird photography have chosen to come north of the border to do some

of their best work. Any list is bound to be arbitrary and to omit many who could equally well claim to have found the challenge of Scottish birds their springboard to success, but certain names must be mentioned. In the many many books on the subject certain pictures will always stand out as classics of their kind. A glance through the pages of the compilation by Eric Hosking and Harold Lowes on *Masterpieces of Bird Photography* (Collins 1947) will show how often the stimulus to produce such classics has been provided by Scottish species, most often in the Highland setting.

In the 1890s the Kearton brothers, Richard and Cherry, started the whole process which put Britain in the lead in nature photography. At first, when equipment was almost impossibly difficult, they realised the advantages of situations like those offered by the Gannet colonies of the Bass Rock and Ailsa Craig. The Keartons pioneered bird photography in the Hebrides, in Orkney and in Shetland. They voted Noss in 1900 "a perfect sea-fowl paradise," and they took splendid action shots of skuas knocking people's hats off on Hermaness. At Muckle Flugga it is interesting to note how they recorded "a few fulmar petrels flying round the cliffs" as an exciting new species. It seems surprising with so many common species to start on how the early pioneers launched straight into the most challenging subjects Scotland could offer. One of the Keartons' earliest books, *With Nature and a Camera* (Cassell 1898), put St Kilda on the photographic map and stimulated the steady stream of ornithologists and photographers who have come under its spell. Oliver Pike was one of the first to follow in their footsteps, realising its potentialities for his 'bioscope.' In *Nature and my Ciné Camera* (Focal Press 1946) he describes his visits to St Kilda in graphic detail. In 1908 he tackled a Fulmar cliff, running incredible risks with the help of the islanders, heaving bulky equipment to the most difficult places and nearly losing the lot when the weather changed for the worse. In 1910 he achieved the almost impossible by climbing the sheer 600 ft cliffs of Stac Lee to film the Gannets with camera equipment which most of us now would hesitate to carry on the flat. It is as much a tribute to the cragsmen of St Kilda as to this intrepid photographer from Middlesex.

Another pioneer was R. B. Lodge from Lincolnshire who, in 1907, was one of the first to work on the Golden Eagle. Recently an enquiry at the B.B.C. Natural History Unit in Bristol disclosed that there were a hundred feet of ciné film on the Golden Eagle for every one on House Sparrows. As all nature photography is a challenge it is perhaps not surprising that the most difficult subjects of all appeal to the experts. In 1909 H. B. Macpherson, one of our first Scottish

bird photographers, published his book *The Home-Life of a Golden Eagle* (Witherby 1909) and set the ball rolling. It makes exciting reading and he communicates the thrill of achievement in his story of how he obtained what was perhaps the first photograph ever taken of an eagle at the nest. After concealing his camera at the eyrie and watching the bird return, he stalked back unseen to the point only a few yards from the sitting bird to press the bulb. In stretching to reach it he nearly overbalanced, but the exposure was made just before the bird flew off. Since then a host of others have followed—A. J. Rooker Roberts in 1913 with his classic picture of the pair at the nest, and notably Arthur Brook in 1924-26. He illustrated H. A. Gilbert's book *The Secrets of the Eagle and Other Rare Birds* (Arrowsmith 1925).

Amongst the eagle hunters have been some of our earliest and best Scottish photographers. Seton Gordon is probably the best known. There is half a lifetime's experience in his *Days with the Golden Eagle* (Williams & Norgate 1927). His great knowledge of Highland natural history from his homes in Aviemore and then in Skye, and his many illustrated books and articles, have earned him an international reputation—and the C.B.E. in 1939. More recently C. E. Palmar, since 1949 Curator of Natural History at the Art Galleries and Museum at Kelvingrove, Glasgow, has pursued an ambition to make a complete photographic life history on colour film of the Golden Eagle. This work led him, like Seton Gordon, to do extensive fieldwork on the species, over 14 consecutive years, and he joined forces with Leslie Brown and Adam Watson to work on the census which in 1955 concluded that there were between 250 and 300 breeding pairs in Scotland.

From the start Palmar has insisted on doing his own darkroom work and has therefore achieved the high standard of print production which won him his A.R.P.S. in 1948. He took the first picture of a wild bird to be published in *Picture Post* before the war, and in 1954 his eagle photographs were published in the *National Geographic Magazine*. The flight picture (pl. 19) is selected not just because it is different from the many eagle portraits taken at the nest; but because, by pressing the button as the bird swept up to the nest with talons lowered for the landing and carrying a stick in its massive bill, he has managed to convey something of the thrill of being in a hide at close quarters at such a moment. It is one of those pictures which tell everything—the setting, the nest site, the size of the bird, the power of its flight, with the protruding 'thumbs' and upswept primaries. The slight blur on the feather detail of the back, wings and tail may not please the purist

but it does convey a wonderful sense of movement in the subject which the still photographer seldom has the chance to achieve. Perhaps it is not surprising that having mastered the art of taking such excellent portraits as this and the Black-throated Diver (pl. 24) Charles Palmar should have moved on to ciné work, his film "Highland Heronry" winning joint first prize in the 1963 B.B.C. film competition.

Both J. E. Ruxton, a Scot who worked as a bank manager mostly in Northumberland, and the late Ian M. Thomson, a Harley Street dentist, spent precious holiday weeks every year in the Highlands specialising on their favourite species —as often as not the divers—and both eventually settled in Scotland. Ruxton, with an avowedly aesthetic approach, concentrated on woodland birds, several of which have been portrayed in this journal (*Scot. Birds* 1: 381, 447). Thomson's Eider Duck (pl. 23) is typical of his best work, and although an easy species he captures the character of the bird to perfection. His book *Birds from the Hide* (Black 1933) covers many other Scottish species.

Apart from the challenge of new and rare species and the excuse for a Highland holiday, there are other factors in Scotland that appeal to bird photographers. The countryside has remained relatively unspoiled in many parts of the Highlands and provides a feature that is becoming increasingly rare in Britain—a wild and natural background. The knowledge of local people often saves days of labour, and the helpfulness of many who work on the land and know their wildlife has been repeatedly acknowledged. The open landscape and freedom from disturbance have attracted many to the Northern Isles. One of the early visitors to Shetland was Ralph Chislett as can be gleaned from the title of his book *Northward Ho!—For Birds* (Country Life 1933). Other famous Yorkshiremen came north too, like Tom Fowler and Harold Lowes who were there in 1933 to photograph the Whimbrel, which was not to be found on their native moors; and W. W. Nicholas and G. K. Yeates who also worked extensively in Scotland. Walter Higham from Lancashire, John Markham and Eric Hosking from London, G. B. Keary from Manchester, Stuart Smith from Leeds, and H. G. Wagstaff from Coventry have all done outstanding work in Scotland. The same species tend to crop up again and again—the divers, the predators, the Scottish specialities. John Markham's avowed favourites were Dotterel and Greenshank, both also brilliantly covered by Eric Hosking. Stuart Smith concentrated first on the Crested Tit, Keary on the Capercaillie, C. W. R. Knight on the birds of prey. H. Willford from the Isle of Wight did some of his best work in the Northern Isles, and in recent years Harold Auger of Lincoln has done some exceptional work on Shetland species.

Photography has played a major part in bringing nature before the public and in creating an appreciation of the value and the aesthetic appeal of wildlife. The conservation movement in Britain has made striking headway since nature was well illustrated. Just how much public opinion has been changed, and how effective this visual education has been, can be gauged from looking back at the publications of 50, or worse still, 100 years ago. Standing out like a pointer to the future was the remarkable periodical *Wild Life* which first appeared in 1913 under the editorship of Douglas English with a striking photograph of a Scottish wildcat on the cover. Until 1918 it provided the market and therefore the stimulus for many nature photographers, though its contributors would have gasped at the brilliance and technical perfection of the coloured equivalents of today, such as *Animals* and now *Birds*. They were however in a better position to see the first impact of photography, and the editorial of Vol. 1 No. 1 claims full credit for the beginning of the revolution in nature study for the photographers. "It is not too much to say that our knowledge of British Birds has doubled within the past decade and that this duplication of knowledge has been due not to the ornithological societies, not to the museums, least of all to the collectors, but to the invaluable work accomplished by a small band of nature photographers since in the early nineties Lodge, King and the Keartons pointed out the way."

In the same volume (pp. 322-324) was an early example of the use of photography to establish a doubtful bird record, that of an aberrant Gannet on the Bass Rock. Here is the beginning of the new trend towards a more scientific attitude towards fieldwork, a major step away from the era of collecting. "There is no doubt," writes Riley Fortune, the author of the article, "that the fact that this gannet was a genuine variety could have been proved in the usual way; but the policy of the writer, in common with his fellow members of the Zoological Photographic Club, is to depict truthfully wildlife by the aid of the camera and to discourage by every means in their power the slaughter of rare and exceptional birds and beasts, a slaughter apparently condoned and encouraged by many of the self-elected authorities. It would not have been difficult to secure this bird and to have thus satisfied the sceptics, but its life was in our judgement a thing of greater moment than the acceptance or otherwise of a record, and we are content to leave it to the new school of ornithologists to decide whether records can be properly established without a gun and a museum label." The illustrations of a paired Gannet with a dark head and neck and rich patterning on the back sitting next to its pure white mate

are undoubtedly of far greater interest now than the bird's skin would have been in the Royal Scottish Museum.

The earliest Scottish bird photographer who really made good use of his work was Charles Kirk, who ran a taxidermist's business in Sauchiehall Street, Glasgow. He trained at Rowland Ward's in London, and much of his taxidermy was based on photographs taken in the field. Like the Keartons his earliest known photograph is of a Song Thrush's nest; it is dated 1894. It forms the frontispiece of the first of a series of 6d booklets entitled *Wild Birds at Home* (Gowans 1906). Other pictures of nests must be amongst the earliest recorded, a Lapwing's in 1897 and a Mallard's in 1898. A flashlight picture of a Barn Owl, taken before 1906, and flying shots of Gannets, Kittiwakes and terns show how quickly he developed his techniques beyond such static subjects as nests. Ailsa Craig was a favourite haunt and he visited it annually for 17 years. His format ranged from half-plate down to 3¼" square, the latter being used for stereoscopic photographs, of which he was particularly fond. His stereoscope and a selection of his prints were presented to the Kelvingrove Museum by the late David Wotherspoon, his chief taxidermist and later his partner. Among Kirk's outstanding work are series on Dippers and Gannets. I am grateful to Charles Palmar both for the details of his work and also for the print from his negative of a Common Gull (pl. 13). This picture, dated 1912, compares favourably with many taken today with all the advantages of modern equipment. There is no doubt about the pictorial effect of such a portrait, where the bird is dominant but the nest-site still a vital part of the picture, with the background subdued by being thrown out of focus.

The rest of our illustrations are by contemporary photographers. Two, Dennis Coutts and W. S. Paton, are professionals running their own photographic businesses. Dennis Coutts started as a press photographer but returned to his native Shetland Isles in 1959, exchanging assignments like the Bulganin and Kruschev visit or trips to Balmoral for the hunt after rare visitors to Shetland such as the recent Snowy Owls or a vagrant Osprey or Woodchat Shrike. His 5" x 4" press camera has given way to a 35mm Pentax with Novoflex lenses of 16" and 25" focal length which with a 2x converter give him magnification factors up to sixteen ("widely used") and even twenty-five. Steadiness means everything with such long lenses and like many others Coutts finds the use of his vehicle as a hide a useful way of achieving this. His photograph of the Storm Petrel (pl. 22) is unique, and was taken in the tunnel of a prehistoric ruin in Shetland where the birds were nesting in something slightly easier to work in than the usual burrow. Even so there was only one

suitable nest and much crawling and squatting was entailed in setting up camera and two flash heads at 5 ft range. This particular nest had more nest material than any other found, and one small chick. After leaving his equipment for an hour Coutts returned to find the adult bird in attendance and he was able to take two exposures before it scuttled into the wall of the tunnel. As with another striking picture of a Peregrine Falcon and chick, Dennis Coutts is prepared to admit that he has had a good deal of beginner's luck with the birds. His photographic expertise is, however, clearly derived from long experience.

William S. Paton has a more conventional approach, seeking the bird portrait rather than the ornithologically interesting picture that has appealed to Coutts. His results are no less striking, and in the last six years he has covered over 50 species of birds in Scotland, mostly at or around the nest. With a choice of six cameras he still does most of his bird work with an old field camera which he bought for 10/- and adapted to take an 8" Ektar lens and a Daz shutter. This is really following in the footsteps of the old masters, and like so many others (including the author) Paton acknowledges his debt to Eric Hosking. He gained his election as an Associate of the Royal Photographic Society from his first full season's work on birds. He has worked mostly in Ayrshire, where he lives, but has a preference for islands, especially Horse Island and Mull. Both the pictures selected (pls. 14, 15) were taken on Mull. The prints are technically flawless and show exceptionally fine feather texture and foliage detail where it is required. In both the bird is in its typical setting in a completely natural posture.

Two of our remaining contributors, David Stephen and Nigel Charles, are full-time naturalists in quite different spheres. David Stephen is well known for his books and writings on Scottish natural history, many of them illustrated with his own photographs. The Hooded Crow (pl. 18) is the sort of bird he knows and writes about superbly well and it is pleasing to find that he can photograph it superbly too. A notoriously difficult species has been caught from a most interesting angle, emphasising the treeptop situation and the massive nest. In contrast, his young Gannet (pl. 21) is an unconventional portrait that breaks many of the rules yet commands attention. David Stephen, who started writing at the age of 19, was twenty years in local government before he retired to devote himself full-time to wildlife.

Nigel Charles is a Senior Scientific Officer with the Nature Conservancy in Edinburgh. For many years he has specialised on grebes, and his aim is to cover every aspect of the lives

of the British breeding species. His studies of Great Crested Grebe displays and of Black-necked Grebes at the nest are unsurpassed and will it is hoped appear in print in their own context before too long. Charles is a perfectionist even when the subject, like the Black-headed Gull (pl. 17), is incidental to his main purpose and was taken from a hide at a grebe's nest. As most of his subjects are long-range, he tends to work in 35mm, using long-focus lenses, up to the 600mm Kilfitt, on an Exacta camera.

John Edelsten breaks our rule in that he is an Englishman. However, as a Customs and Excise surveyor living in Banffshire, and already vice chairman of the Aberdeen branch of the S.O.C. after only three years in Scotland, he would seem to have some claim to be considered in this paper. His aim is the exhibition print, and with little spare time to devote to his hobby he just manages to keep up with the requirements of the Nature Photographers' Society. The superb picture of a characteristic group of Oystercatchers at the water's edge (pl. 20) was accepted for the Royal Photographic Society's exhibition in 1964 and was taken with a ¼-plate reflex camera using a 21" Homocentric lens.

Sidney Clarke, at 22, is the youngest of our contributors; but he made the selection of his charming study of the humble Dunnock (pl. 16) more difficult than most by providing so many other first-rate prints. He started bird photography at the age of 14 on a simple snapshot camera, then acquired his first single-lens reflex miniature at 15, and was doing his own darkroom work at 16, so it is not surprising that his work shows the benefits of long experience. He now favours black-and-white and works with an old Gandolfi 5" x 4" camera using 120 size roll-film. He has achieved the honour of being admitted to the Zoological Photographic Club, an organisation to which many have acknowledged their indebtedness for the stimulus of open competition and the benefits of learning from the work of others. It was as a result of the Z.P.C. Exhibition of nature photography in London in 1912 that *Wild Life*, the first popular magazine incorporating bird photography, was produced. A great many chemicals have flowed through the developing tanks since then and there is no Scottish species left which has not been adequately portrayed by the camera. Yet the fraternity of bird photographers is still limited by the enormous demands of time and effort which the art imposes on its devotees. It is perhaps surprising how few have been Scotsmen, but I would hazard the opinion that the present generation of Scottish bird photographers is producing work that will stand comparison with that from any other country—as will our birds and the landscape in which they are found.

Hill birds of the Cairngorms

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Introduction

This general survey of the Cairngorm hill birds and their habitats starts with the high-arctic ground on the summits and moves down to finish at the upper edge of the forests. The area covered is between Rothiemurchus in the north and Braemar in the south, and between Glen Feshie in the west and Inchrory in the east.

The Cairngorms have two main attractions for a naturalist. One is that they include the biggest area above 3000 ft in Britain, supporting a largely arctic flora and fauna. This is remarkably like much of the country in the high-arctic and cannot be seen elsewhere in temperate Europe; one has to go north to Iceland, Scandinavia or the arctic to find it again. The other attraction is the great variety of habitat in a small area. The valleys round the Cairngorms have farms and villages up to 1200 ft. Nearby there are forests of pine and birch with juniper scrub, including some of the finest old pines in Britain, yet the tree line is very low at about 2000 ft or less. Beyond there are heather moors and bogs on hill slopes and open glens, stretching up to the dwarf arctic-alpine vegetation at 2500 ft. There is even more variety higher up, with cliffs, corries, lakes and plateaux, and finally the highest summits at 4200-4300 ft where the ground is almost devoid of plants and snow fields lie all the year round. In some places one can go from one extreme to the other in a walk of only six miles.

The reasons for these rapid changes of habitat are the big temperature drop of 4°F per 1000 ft of altitude, the frequency and severity of gales on these hills, and the low summer temperatures. July temperatures even in the valleys are below those north of the Arctic Circle in Lapland, and at 4200 ft on Ben MacDhui are like those in high-arctic Canada (Baird 1957). Being in the centre of Scotland the Cairngorms get colder and snowier winters and drier sunnier weather than the mild, maritime and rain-drenched hills that make up most of the Highlands. This is why they provide the best skiing grounds and the biggest variety of snow and ice climbs in Britain, but thaws may occur in any winter month with winds from the Atlantic. The maximum snow depth is usually in February-March at 2000 ft, and above 3500 ft

usually in April but sometimes May. Snow may fall in any summer month on the higher ground, but in the uncommon periods of fine calm weather the summits may be warmer than the valleys.

Most of the Cairngorms belong to several private landowners who use their hill land for hunting red deer. Apart from some heather burning on the lower slopes and grazing by a few stray sheep, the high ground of the Cairngorms has remained a natural habitat. Many sheep have been grazed in summer in the last two years but mainly on the lower hills and moors. Most of the area is in a National Nature Reserve, which gives the Nature Conservancy control of development and opportunities for research.

The arctic-alpine zone

A walker going up the hills can easily know when he reaches this zone by its dwarf plants, many of them arctic species, and also by seeing the fairly uniform heather moor change to a diverse mixture of grasses, lichens and heaths. This zone usually starts at about 2500 ft but this varies from 2000 ft to 3000 ft according to shelter and aspect. The vegetation is mainly heathy, but is grassy where the snow lies long. There are many boulders and frost-heaved gravel beds, and vegetation decreases rapidly with height till at 4200 ft the summits are barren wastes of stone and sand, with few plants other than some lichens and mosses.

Ptarmigan. Ptarmigan are the commonest birds in the arctic-alpine zone. Except possibly for voles, which are sometimes abundant on grassy places up to 3250 ft but scarce higher up, Ptarmigan are the commonest resident vertebrates. Red deer do not graze in this zone in winter, and although many may be seen there in summer most grazing is done in the glens below.

Ptarmigan food in the Cairngorms consists mainly of crowberry leaves, blaeberry stems and leaves, heather tips and some dwarf willow (Watson 1965a). They live wherever crowberry or blaeberry are abundant, especially where boulders give good shelter or cover. The highest breeding Ptarmigan live at 4100-4150 ft on Ben MacDhui, on patches of dwarf willow among boulders, and the lowest at 2000 ft on exposed ridges. They are not on the summits at 4200-4300 ft, nor on completely barren stone fields. They do not live on continuous grassland except where there are occasional islands of screes or stony moraines with some heathy vegetation. Cliffs are occupied as well as vegetated hill slopes, screes and flat ground. No Ptarmigan stay above 3500 ft in heavy winter snow, and in severe winters they may all be below 3000 ft for weeks on end, feeding largely on heather.

But they do not desert even their local hill in snowy periods, far less the whole Cairngorms.

The cocks defend their territories and pair with the hens in the early morning in autumn and winter, but all day long after February or March. In autumn and winter they do this only on fine mornings when the ground is largely snow-free, and on most winter days the weather is so bad that they are in flocks. On calm mornings in February or March the air is filled with the continuous croaking of the cocks, and in every direction there are Ptarmigan chasing each other or fluttering up and down in song flights. Summer on these hills is largely silent and lacks this vigorous outburst of life, although the cocks still challenge each other in the early hours after dawn. The cocks have favourite lookouts on prominent mounds, boulders or cliff turrets where many droppings collect in spring and where the vegetation is often different from the poorer soil nearby.

In snowy weather the Ptarmigan feed in flocks wherever the continual winds have drifted the snow off the vegetation, sometimes scratching the snow with their feet to expose the plants. They roost in snow hollows or holes, but there is no danger of them being buried because they choose exposed places where falling snow quickly drifts away. However, they do not sit right out in the open, and nearly always use some small local shelter, such as behind a stone. Many climbers, fighting their way apprehensively in gathering darkness in a blizzard, have envied the Ptarmigan preparing to spend a comfortable night on the exposed summits.

A population study in the Cairngorms showed that breeding stocks rose to a peak in the early 1950s and 1960s, and decreased in the mid 1950s after summers of poor breeding (Watson 1965b). They did not breed any worse in summers after the winter and spring food supply had been greatly reduced by deep snow. However, breeding was late and poor after springs when the new growth of the vegetation was late, as Siivonen (1957) also found in Finland with other game birds. Breeding success was not related to the rainfall and temperature in summer. Summer snowstorms lasting a day or two and with less than six inches of snow had no effect even if they occurred repeatedly every few weeks throughout the summer as in 1965. However the great snowstorm of June 1953 was of winter severity, and lasted three days. Many Ptarmigan and Dotterel deserted their eggs, which were found cold after the snow melted, and most Ptarmigan and Dotterel were in flocks for the rest of the summer. Such severe summer snowstorms have occurred only twice (in 1942 and 1953) in the last 20 years (Nethersole-Thompson 1966). In any case breeding might have been as bad without

the snowstorms, as it was in many other years without snow. Similar catastrophic breeding occurred in 1955 with fine sunny weather; and conversely the birds bred well in 1948 in spite of several snowstorms, heavy rain and low temperatures.

How do Ptarmigan and Dotterel chicks survive in some bad summers with occasional or even frequent snowstorms? I have sometimes ween amazed to see Dotterel and Ptarmigan chicks at the critical age of 2-5 days running about vigorously the day after a 12-inch snowfall. However, these snowfalls are usually accompanied by drifting, and unless they are of winter severity, which is exceptional, they do not cover the boulders. The large spaces under and among the boulders are usually completely free of snow, and the soil there is not frozen. Many insects are active there, even during the winter on mild days, and midges and other Diptera crowd into these places after summer snowstorms. Since Ptarmigan and Dotterel broods are very often found on ground with boulders, and Snow Buntings regularly hunt these places, food shortage is probably seldom serious after most summer snowstorms.

Ptarmigan breed over most of the mainland Highlands above 2000-2500 ft, and on some of the islands. In parts of the northwest Highlands they breed down to 1000 ft, and even to 600 ft on one coastal hill near Cape Wrath, where the winter temperatures are like southern England but where the arctic-alpine vegetation grows at very low altitudes because of severe winds. However, they are generally scarcer in the west, where the peaks are sharp with little high ground and the vegetation is largely mossy and grassy due to high rainfall. The Cairngorms and neighbouring Lochnagar and other hills near Braemar are their stronghold. Here there are vast areas of continuous high ground and a heathy vegetation supplying abundant food. The breeding population of the Cairngorms has been roughly estimated at 1300 in a low year and 5000 in a high year, with up to 13,000 in a peak autumn (Watson 1965a). One of the surprising things about Ptarmigan is that they reach much higher densities in the Cairngorms-Braemar area than have been recorded in the arctic.

Snow Bunting. Apart from Ptarmigan, Peregrine and Dunlin, Snow Buntings are the only circumpolar high-arctic birds breeding in the Cairngorms. However, they are very much scarcer than Ptarmigan and do not breed on most hills. Many thousands move into Scotland from Scandinavia and southeast Greenland every October and stay till March. Flocks of scores may be seen on any winter day in the hills or glens, feeding on seeds of rush, sedge or grass, and some-

times they concentrate in hundreds. Most of them have departed by late March. A few small flocks are occasionally seen in April in some years but have nearly all moved north by the third week, leaving only a very few individuals to breed.

In May and June in the Cairngorms the cocks sing loudly from large boulders or crags where many droppings accumulate, and they often launch off from these places in far-ranging song flights. The song is sweet, unlike the jangling songs of other buntings, and has a far-carrying and ventriloquial quality. Desmond Nethersole-Thompson, who has lived in the pine forest of Rothiemurchus below the Cairngorms for thirty years, has a monograph on the Snow Bunting in press. The Cairngorms are the Scottish stronghold of the Snow Bunting. They bred on several hills in Sutherland, Ross and elsewhere at the end of last century, but a brood on Ben Nevis is the only record in the last thirty years apart from the Cairngorms. In the best years such as 1947 the Cairngorms have had three pairs and seven or eight unmated cocks (Nethersole-Thompson 1966), and four pairs in one corrie in 1909 (Gordon 1915), but in other years only an odd pair or even just unmated cocks. There are only two fairly regular breeding areas, both in boulder-strewn ground above 3500 ft near large summer snowfields, but unmated cocks or breeding pairs occasionally live on other hills. The snowfields may be important, because they are often littered with dead or comatose insects that get stranded there and provide a ready and easily picked-up source of food. These are most abundant on warm days. Many are arctic species such as arctic weevils and beetles, but others are lowland ones such as pine weevils, flying wood ants and other species which presumably get carried from the pine forests far below by currents of warm air. Meadow Pipits, Snow Buntings and Wheatears feed there frequently and take these insects to their young. A major insect food of the Snow Bunting is the cranefly *Tipula* sp., which is found mainly off the snow and is sometimes very common.

Snow Buntings often rear two broods in Scotland, but only one in the high-arctic. Nethersole-Thompson has done a detailed study of the behaviour and breeding of his few birds, which often had distinctive plumage and which he came to know very well as individuals. He has also tried to find if the Scottish birds are a distinct Scottish stock hanging on as a relic of glacial times, like the Ptarmigan, or simply occasional arctic birds that stay to breed. The second explanation is the more likely. Iceland cocks have dark rumps and Norwegian and Greenland cocks white rumps. Both kinds occur in the Scottish breeding stock, and the proportion of dark-rump-

ed to white-rumped changes from year to year. This suggests that the proportion staying behind in Scotland from the Iceland or Scandinavian stocks varies. The other possibility is that there is a distinct Scottish stock which is very variable because it is so small. This is unlikely, because no breeding hens have been recorded in some years, and in other years not even unmated cocks.

Snowy Owl. This is the third high-arctic bird of the Cairngorms but has not yet been recorded breeding. The first record in the Cairngorm hills was an adult male on the Ben MacDhui plateau in summer 1952 (Van den Bos, Watson & Watson 1952). It ranged all over the plateau as far as Cairngorm but its favourite haunts were in the fine piece of high-arctic country northeast of Ben MacDhui. What was perhaps the same bird spent the following summer there also and was seen in one of these years on a cliff turret of Sgoran Dubh (Nethersole-Thompson *in litt.*). It was using certain prominent boulders as perching places where it sat motionless for hours on end, and remains of prey found there showed that it had fed on a mountain hare and on several grouse-like birds, probably Ptarmigan (Tewnion 1954). The Snowy Owl's food in the arctic is mainly small mammals, especially lemmings, but voles and other small rodents are scarce on the grasslands of the MacDhui plateau.

An adult male again frequented this area in summer 1963 (Gribble 1964) and in summer 1965. There is no doubt that breeding has not occurred. Breeding males in the arctic give themselves away by calling loudly, following the observer and often attacking him. This behaviour starts as soon as the observer enters the bird's large territory, and intensifies the nearer he gets to the nest. By contrast the adult cocks in Scotland have been silent, although the 1965 bird angrily scolded Brock Nethersole-Thompson at one place. However, a few Snowy Owls breed in the central highlands of Iceland, living mainly on Ptarmigan in this rodent-free area, so it is not completely without reason to expect that a pair may nest on Ben MacDhui in some year of high Ptarmigan numbers. Incidentally, the years when a Snowy Owl was seen were all years of Ptarmigan abundance, and none was seen in the low Ptarmigan years 1956-58.

Dotterel. The Dotterel is an arctic-alpine bird which has not colonised most of the New World, Greenland, Icelaned, and Spitsbergen. Its main breeding distribution is on tundra near or at sea level in the far north of Scandinavia, Russia and Siberia north to Novaya Zemlya and east to Mongolia and Alaska. However there are many isolated outposts on mountains in Lapland, south Scandinavia, U.S.S.R., Austria, Poland, Czechoslovakia, the Appenines, Rumania, Scotland,

occasionally north England, and now the Dutch polders. It is not certain if the Dotterel is by origin a mountain bird, and only a recent colonist in the arctic, or vice versa (Voous 1960). Dotterel are summer birds in the Cairngorms, leaving the hills in August to migrate to North Africa and the Middle East, and returning again in early or mid May when the Cairngorm winter is past. They are much commoner than Snow Buntings but much scarcer than Ptarmigan, reaching densities of a pair per 200-400 acres on suitable habitat (Nethersole-Thompson 1951). They breed regularly on a few hills in Ross-shire, west Inverness-shire, Perthshire, and on the Monadh Liath hills west of the Spey valley; on some of the Grampian hills west and south of the Cairngorms they are locally quite common. They breed on most hills in the Cairngorms, with up to 5 or 6 pairs on some hills and more in occasional peak years. They arrive in flocks and up to 40 have been seen together in May about the time when they come back (Watson 1955). They again form mixed flocks of old and young in August just before leaving. Occasional birds, especially cocks, sometimes live for several weeks on areas where no breeding has been recorded, and sometimes visit such places briefly on migration.

Dotterel occupy mossy or grassy ground on rounded summits, plateaux, gentle slopes and ridges. A few nest on fairly barren stony ground with patches of moss, lichens and grass, but none occupies the very barren screes of the Snow Bunting or the boulder-strewn heaths of the Ptarmigan. They breed from 3200 ft to 4000 ft, but on nearby hills in the Grampians many nests are found between 2700 ft and 3000 ft, with extremes of 2500 ft and 3700 ft. In the Grampians some of the Dotterel are also on mossy-grassy ground with peat hags. Their food is mostly insects and spiders.

Dotterel are unusual in that the hen is bigger and more brightly coloured, does much of the courting, and leaves the cock to do nearly all the incubation and rearing of the chicks. Nethersole-Thompson has made a detailed study of the Dotterel, which we hope to see published in the next few years. He concentrated on studying the behaviour of well known individuals. Dotterel can easily be approached within 30 yards even when they are not nesting. Their Gaelic name is *An t-amadan mointeach*, or fool of the moss; and the 'daft dotterel' is an expression from lowland Scotland. Some of Nethersole-Thompson's earlier observations can be read in Witherby *et al.* (1938-41) and in Bannerman (1961). Unmated hens chase the cocks in the flocks and make advertisement flights with a special call. Later the cock may chase the hen and court it, and both take part in symbolic nest scraping.

The cock does all or nearly all the incubation of eggs and

also shuffles away from a dog or man with injury flight and other distraction displays. When the cocks are brooding, the hens live in small groups and sometimes spar and display on communal display grounds. A hen Dotterel sometimes mates with two cocks in succession, leaving each with a clutch, but some hens do brood. Hens also sometimes rejoin cocks and chicks towards the end of the fledging period, whereupon the cock may try to drive the hen away.

Dotterel usually lay in late May or early June and hatch the chicks in late June. The time of breeding varies with the snow cover. After the very snowy winter of 1951 the Ben MacDhui plateau was still under deep firm snow in the last week of June. There was a pair of Dotterel on every large snow-free area, frequently taking off in display flights over the snow. They were fully a month late in breeding. Nethersole-Thompson in his Snow Bunting book shows the dates when he found first eggs of Dotterel, Snow Bunting and Ptarmigan. The Dotterel and Ptarmigan varied more from year to year than the Snow Bunting, possibly because they nest on open ground and not in sheltered holes under boulders like the Snow Bunting.

Dotterel usually lay three eggs, like Oystercatchers and unlike most other waders, which lay four. As they rear only one brood, a 50 : 50 ratio of young and old in August means very good breeding. In occasional years of severe summer snowstorms, such as 1953, the Dotterel desert their nests or lose all their young, and then go into flocks for the rest of the summer, but most summer snowstorms do not affect them. The fully grown young are remarkably unlike the adults in plumage, having a generally creamy ground colour with heavy blackish marks on the wings and back. The eye stripe and crescent on the breast, so prominent in the adult hen, are paler in the adult cock and indistinct in the full grown young.

Other birds in the arctic-alpine zone. The other species breeding on the high ground are mostly arctic in distribution, but do breed down to sea level in Britain and other parts of their range in the temperate zone. Those of mainly arctic distribution are the Golden Plover, Dunlin, Wheatear and Meadow Pipit. The only other regular breeder in the arctic-alpine zone is the Ring Ouzel, which has a northern European distribution. The abundance of these birds varies on different hills. The differences are due to the habitat selection of the birds, with more Golden Plovers and Meadow Pipits on grassy hills and more Wheatears, Ring Ouzels and Ptarmigan on stony hills. One of the surprising things about the Scottish hills is the absence of breeding Ringed Plovers, although they breed at low densities over vast areas of

similar terrain in Iceland, northern Scandinavia and arctic Canada.

Golden Plover. Golden Plovers breed on stretches of continuous mossy grassland, with peat bogs or peat hags, sometimes in the same area as Dotterel; but Dotterel do not breed below 3200 ft in the Cairngorms, whereas Golden Plovers breed on moors near sea level. Unlike Dotterel, Golden Plovers rarely occur on fairly barren stony areas with occasional patches of grass and moss, and seldom breed on continuous grassland without peat. They commonly nest up to 3500 ft on suitable areas, and occasionally up to 3700 ft on Beinn a' Bhuird and Ben A'an, whereas many Dotterel in the Cairngorms are above 3500 ft. The highest grasslands at 3800-4000 ft are occupied by Dotterel, and Golden Plovers have not been found breeding there, although pairs have been seen occasionally. The most extensive areas for plovers are on the fairly grassy and peaty western hills of Carn Ban-Moine Mhor and the similar eastern hills between Yellow Moss and Ben A'an, but higher populations occur on the continuous peaty grasslands of the Grampians further south. Below 3000 ft the Golden Plover breeds not only on grasslands, which are now much more peaty and comprise a different plant community from the higher grasslands, but also extensively on heathery ground, even where it is open as a result of burning. The even slopes of heather on the hillsides are largely unvisited by Golden Plovers, but they occur on flat or gently sloping areas, especially among peat hags or bogs but sometimes on largely dry flat moorland. Hence there is often a gap on well drained slopes from 2000-2500 ft where few or no plovers occur (Nethersole-Thompson 1957a), but they occur at these altitudes wherever there are peat bogs.

Golden Plovers are away from the hills in winter, but are early back in spring. On the first day of thaw in early March, after weeks of heavy snow, it is common to see a single plover paying a fleeting visit to snowy wastes at 2000-3000 ft, and this may be seen even in January or February on the moors at 2000 ft. The entire population returns in March or April as soon as there are scattered patches of completely snow-free thawed-out grass, even if 98% of the ground is buried in deep snow. Sometimes they start song flights with slow-beating wings on the day they return, with a greater intensity than at any time later. The song is a series of quick, mournful, piping calls going down, up and then down again in pitch. A single mournful piping note is given on the ground; this and the song carry fully half a mile on a quiet day. This single call, the croaking ground call of cock Ptarmigan, and the song of the Meadow Pipit are the commonest sounds heard by the ornithologist camping on the Cairngorms in summer. Nethersole-Thompson has done a de-

tailed study of the Golden Plover's spectacular courtship and aggressive behaviour (summarised in Witherby *et al.* 1938-41, and in Bannerman 1961). Although they are usually in pairs, communal displays are also frequent.

The Cairngorm Golden Plovers do not lay till early May, and after severe winters not till after mid May. Some of them appear to be non-breeders, staying in small groups and not pairing up; these have little or no black on the face, throat or belly. Most young are fully grown in mid July, and young and old then gather into flocks or 20 or more, reaching 50 or even 100 on hills with large areas of suitable habitat. Some of the birds move upwards on to the highest grasslands, which become deserted by Dotterel in August, and may be seen in flocks even at 3800-4100 ft where none has yet been found breeding. The arctic-alpine Golden Plovers remain in flocks on high grasslands at over 2500 ft into October and even into November if the weather is mild, and they are occasionally seen on the most barren ground; I once saw four near the cairn on Ben MacDhui on 15th October, although there was some fresh snow on the ground. Yet breeding places on the lower moors and valley are deserted in August, coinciding with the appearance of flocks on lowland farms and estuaries.

Some of the high-altitude birds are strongly marked with black and white on the head and neck like typical 'northern' birds *Charadrius apricarius altifrons;* many are intermediate and very few males look like the illustrations of 'southern' birds *Charadrius a. apricarius* in Witherby *et al.* (1938-41). These 'northern' birds and intermediates often occur on lower moors, but may be more frequent at high altitudes (Wynne-Edwards 1957, Gordon 1957, Nethersole-Thompson 1957b, Hewson 1957, Tewnion 1957, Watson 1957a).

Dunlin. Dunlin are much scarcer than Golden Plovers or Dotterel, except on a few areas in the west Cairngorms, but on the few areas where they occur they are commoner than Dotterel. Small groups of pairs are concentrated on grassy areas with peat hags and boggy ground in the west and southwest Cairngorms, and on the Yellow Moss of Derry. Isolated pairs also nest on some of the slopes and ridges of the higher hills on the west Cairngorms up to over 3500 ft, and in 1962 and 1963 a pair nested on a ridge at 3600 ft on the Ben MacDhui plateau (Nethersole-Thompson *in litt.*).

In the west Cairngorms Nethersole-Thompson occasionally found a Dunlin nesting on the same slope as a Dotterel, and once within five yards of each other. The distribution of Dunlin in Scotland is very unusual. Many nest locally on bogs at sea level and on mountain bogs, but there are very few in between. On Speyside, Nethersole-Thompson found

that an odd pair or two occasionally nest at two lochs in the valley floor and on a few boggy foothills near the edge of Abernethy Forest. No other nesting places were found in this large area, although there are quite large nesting groups not far away in the Cairngorms and high Grampians. Similarly on Deeside there are several bogs in the valleys around 1500 ft with a pair of breeding Dunlin, and no others till one reaches the peaty bogs of the arctic-alpine zone. Outside the Cairngorms proper many pairs also breed on the grassy peat mosses on the Glen Clunie-Glen Ey hills south and southwest of Braemar.

The best time to look for Dunlin is soon after they return in May, when they are usually heard long before they are seen. The song is a long trill, at a distance sounding like a whistle with a rattle in it, and it can be heard easily half a mile away. Nethersole-Thompson has twice watched Dunlin with greyish-white napes, large black patches on the belly, and other features resembling the northern race, which breeds in Scandinavia. One of these was a very tame bird near the Wells of Dee on Braeriach in June 1941.

Passerines. Wheatears are common on dry stony ground and along dry cliffs; and Meadow Pipits are common on both heath and grassland, especially where the vegetation is fairly continuous and not broken up by many screes. Both breed up to 4000 ft and occasionally 4100 ft (I have seen newly fledged Meadow Pipits still with a lot of down being fed at 4200 ft on Braeriach) but they are commoner below 3500 ft. Meadow Pipits reach highest densities below 2500 ft on the well vegetated heathy lower slopes, whereas Wheatears are scarcer there than higher up, except where there are patches with many boulders. Both species return between early April and early May, according to the weather and snow cover, but in the arctic-alpine zone the bulk of the population does not usually return till late April and early May. In most years they are back at 2500 ft 10-14 days before they come at 3500 ft, but in years when a rapid thaw and summer temperatures reach all altitudes they may colonise all the ground simultaneously. By contrast, in the very snowy year 1951 they did not return at 3500 ft till late May. They show an intense burst of territorial behaviour and singing in the first few days.

Both lay in late May like most other Cairngorm birds, and most young fledge in late June. The birds then flock together, and in July-August often move up to higher, more barren ground, especially in fine warm periods, when hundreds of Meadow Pipits and scores of Wheatears may be seen around the highest summits at 4200-4300 ft hawking for insects, in places where few or none bred earlier on. They

often concentrate on the remaining snow patches. On one day in mid August I saw over 150 Meadow Pipits and 20 Wheatears picking up stranded insects just northeast of the Ben MacDhui summit on a snow patch barely 100 yards long and 30 yards wide. Most Wheatears move away before late August and only an occasional bird is seen in September, but most pipits do not leave till mid September and some not till October if there is no snow. Many pipits also move down into the pine forests in August, so that nearly all are either above 3000 ft (sometimes all above 4000 ft) or in the forests.

Apart from Snow Buntings, Ring Ouzels are the scarcest passerine in the arctic-alpine zone. They occur only on or near cliffs or among very large boulders on steep slopes, and are usually absent from the highest cliffs above 3500 ft, although Perry (1948) saw one cock singing at 4000 ft at the Wells of Dee, and I have seen a newly fledged brood at 4000 ft on Cairn Toul. Below 2500 ft it is much commoner, nesting on cliffs, steep screes, rocky gorges and among juniper scrub. Its piping song is sometimes mistaken for a Snow Bunting's but is much more monotonous; one corrie has both species close together. Ring Ouzels, Meadow Pipits and Wheatears nesting below 2000 ft have young by the end of May in a mild spring, and the earliest nesting pipits may have fledged young by then, but in the arctic-alpine zone it is usually mid June before all three hatch their young. At 3800-4100 ft the young do not fledge till early July. After the breeding season Ring Ouzels gather into flocks and may move away from the stones, especially to places with many berries. They leave the arctic-alpine zone in late September and return in late April and early May, but the first ones are back in the glens below in mid April.

Heather moors

Red Grouse. The ground below the arctic-alpine zone is mostly well drained moor covered mainly by heather. On flat ground there are peat bogs with some cotton grass, and there are extensive grasslands on well drained valley floors and occasionally on patches of good soil on the slopes.

Apart from Meadow Pipits, Red Grouse are the commonest breeding birds below the arctic-alpine zone, and on many hills near Braemar are commoner than pipits. Grouse are certainly the commonest bird of the Cairngorm heather moors in terms of numbers plus weight, just as Ptarmigan are in the arctic-alpine zone. The edge of the arctic-alpine zone is where Red Grouse and Ptarmigan are separated. On some hills this is a sharp contour line along the hillside and the territories of the two species are entirely separate. On most hills, however, patches of long heather occur up to 3000 ft in sheltered places, and patches of arctic-alpine vegetation

down to 2000 ft in exposed places or on screes. Thus although the two species overlap in altitude they do not overlap in habitat. In July and August, when there is hardly any territorial behaviour by grouse or Ptarmigan, grouse families often move up to the lower part of the arctic-alpine zone and in August-September flocks sometimes go as high as 3300 ft. In winter hardly any grouse are in the arctic-alpine zone, and in heavy snow the birds on the heather moors just below this zone move down several hundred feet. However, in the worst winters such as 1951 they completely deserted the upper valleys and moved several miles to the lower valleys and near the pine woods, whereas Ptarmigan held on in the 2000-2500 ft zone.

Counts of Red Grouse in the Cairngorms show breeding stocks varying from one to five pairs per 100 acres in different years. This density is the same as that of Ptarmigan higher up (Watson 1965b) if the total acreage of ground is included, but in fact large grassy areas on the high plateaux are unoccupied by Ptarmigan, whereas nearly all ground below 2500 ft is suitable habitat for grouse, since arctic-alpine vegetation comes below this level only on very exposed ridges or screes. Hence Ptarmigan densities on the best habitat in the Cairgorms are much higher than the highest grouse densities lower down. It should be said that these grouse stocks are very low by grouse-moor standards. Although most of the ground below 2500 ft is heathery and thus supplies plenty of food, cover is poor because of large fires burned there in spring. These commonly cover 50-100 acres, whereas high grouse stocks are usually on moors with fires of 10 acres or less. Ptarmigan and grouse both reach similar densities at Cairnwell, Carn an Tuirc and Lochnagar near Braemar, and both are much commoner there than in the Cairngorms; they may reach an average density of a pair per 4-5 acres, which is very high by grouse-moor standards, although these places are run primarily as deer forests.

The reason why population densities of grouse vary so much on different moors is a major problem facing the Unit of Grouse and Moorland Ecology. Stocks tend to be higher where there is more heather (Jenkins, Watson & Miller 1964). However one moor east of the Cairngorms has had much higher stocks on average over a period of years than a nearby moor below Lochnagar where the amount of heather has been similar. In this case the low stocks occur on a moor over granite, and the high stocks over the mineral-rich diorite. Heather on the diorite is richer in phosphorus and nitrogen, so the higher grouse stocks may be due to food of better quality.

Therre are also examples of this in the Cairngorms. Most hills are granite and rarely support as much as a pair of grouse per 20 acres, and often only a pair per 50-100 acres. However some hills on the richer schists, for instance on the Yellow Moss, Meall an Lundain, Feith na Sgor and Glen Geldie, support higher densities of up to a pair per 10 acres in some years. The keepers have tried grouse shooting on all the hills but it is only on some of the schist hills that it is worthwhile and still done annually. Yet the schist hills are no more heathery than the granite hills, and in some cases, such as Yellow Moss, are less heathery.

Predators. Golden Eagles are the commonest bird predators in the arctic-alpine zone, but do most of their hunting on the heather moors. A few eyries are at 3000 ft but nearly all are below 2500 ft. Most are below 2000 ft, including many in pine trees at 1500-2000 ft. About one fourth of the hunting ground of eagles in this region is in the arctic-alpine zone (Brown & Watson 1964), and out of 17 pairs in the Cairngorms-Braemar area only one does not have arctic-alpine ground in its hunting range. Ptarmigan are an important food for some pairs, and eagles hunt all over the Cairngorms and regularly fly over the highest summits, even in the dead of winter when Ptarmigan and hares have entirely deserted these places. There are also favourite eagle perching places at high altitudes, including one on a summit rock at 3700 ft with a marvellous view over most of Scotland.

The food of the Cairngorm eagles is mainly live Red Grouse, Ptarmigan, mountain hares and rabbits, and red deer carrion. They take a great variety of other prey, from moles and water voles to fox cubs and deer calves, but these extras make up a small part of the total diet. In autumn Nethersole-Thompson has seen eagles chasing geese on passage, and in the goose season as many as five eagles sometimes hunt the ground above Loch Einch, which is one of the main routes followed by geese over the hills.

The number of adult pairs on the Dee side of the Cairngorms has been very steady since 1944, with about one pair per 16 sq. miles (Watson 1957b); there was one extra pair around 1950 and another pair vanished in the late 1950s. Breeding success has also been very steady, with about 0.8 young reared per pair per year. This steady breeding was surprising in view of the big fluctuations in their food supply from year to year, with fluctuations in the numbers of grouse and Ptarmigan, myxomatosis in rabbits, and some years with many hundreds of dead deer and others with only a few scores. The eagles evidently had so much ground that these changes in food had no effect (Brown & Watson 1964).

These high eagle densities are typical of a large area of

deer-forest country in upper Deeside to the east and in north-west Angus and north Perthshire to the south and southwest. Deer stalkers in this area have left the eagles alone during this period although the birds were often persecuted in earlier decades, as in most of the Highlands. Unfortunately the eagles on the Spey side of the Cairngorms have had a sorrier story of persecution lasting into the post-war years, with frequent changes of mate in different years, often known to be due to shooting, and territories often lacking one or both birds in summer. From 1932 to 1946 Nethersole-Thompson (*in litt.*) found that only 0.5 young were reared per pair per year. This is similar to what Sandeman (1957) found in 1950-56 in Perthshire, where eagles were also frequently shot, trapped or poisoned. Eagles are still generally shot and trapped on grouse moors on every side of the Cairngorms. Most of the Cairngorm eaglets disappear in September-October, and this coincides with the appearance of many young eagles on the grouse moors, where few or no eagles breed successfully. Hence there seems to be a big export of young from the Cairngorms every year.

Peregrines, Kestrels and Merlins all breed below 2500 ft and occasionally hunt in the arctic-alpine zone, but are seen there much less frequently than eagles. The Peregrine is the most frequently seen of the three on the highest ground above 3500 ft. Kestrels hunt regularly up to 3200 ft and occasionally higher, especially in years and places in which voles are locally abundant. Their pellets show that small rodents and beetles are the main prey. The Cairngorm Peregrines live mainly on grouse, plovers, and sometimes Ptarmigan, and the Merlin hunts for pipits and Wheatears. However all three falcons hunt mainly on the moors below the arctic-alpine zone, and also breed there. Four pairs of Peregrines breed among the lower Cairngorm foothills at the edge of the forests in the Spey and Dee valleys, but only one pair breeds in the high massif itself. At least five or six pairs of Merlins are known on the Dee side of the Cairngorms, all in glens or on low hills below 2000 ft. Kestrels are commoner still but the exact number is not known.

Ravens may also be seen flying over the highest ground in winter, though living mostly on the lower hills. None breeds in the Cairngorms although a few pairs do so nearby in the side glens of the Dee and Spey valleys. This absence is remarkable, considering the widespread distribution of Ravens in most mountain areas in Britain. It might be due to competition from eagles but might also be due to lack of abundant food in summer on the higher hills. Deer carrion in this area occurs mostly in winter and spring, with hardly any in summer; moreover the amount of sheep carrion is

negligible because most of the Cairngorms are not used for sheep grazing. Ravens breed commonly on most hill-sheep areas in western Britain, but there ample carrion is available, even in summer, because of the heavy mortality of sheep and lambs (Brown & Watson 1964). However, some Ravens appear every year in the Cairngorms in September and stay till January-February feeding largely on the intestines and other remains of shot red deer and on deer that have died naturally. During the stalking season Ravens sometimes appear within 10 minutes of shots being fired, and may come down to feed on the discarded gralloch within 20 minutes of the stalkers leaving.

I know of no record of a Short-eared Owl breeding in the Cairngorms, but in May 1960 Nethersole-Thompson watched a male displaying above the forest southeast of Loch Morlich. A few breed nearby on the hills east of Invercauld and on the Glen Ey-Glen Clunie hills up to 1800 ft where voles are more common than in the Cairngorms, and occasionally hunt there in summer up to 3000 ft. An occasional bird is seen on the Cairngorms in autumn in Glen Einich, Glen Dee or Glen Derry. Similarly, no Hen Harrier has been found breeding in the Cairngorms, although a pair nested in 1936 on one of the foothills of Abernethy and a pair occasionally nests in Rothiemurchus and lower Glen Feshie. In autumn occasional birds on the move hunt the lower slopes of the Lairig Ghru and Glen Einich and one was seen in September on the Yellow Moss at 2800 ft. By contrast the grouse moors not far away to the east of Braemar and north of the Cairngorms are visited every autumn by many juvenile and sometimes adult harriers, which stay there till March if not shot or trapped, living mainly on grouse and small rodents. The general absence of breeding harriers from the Cairngorms, and the complete absence of a breeding record from the Mar side of the hills, cannot be due to persecution by keepers. On the Mar side, birds of prey have been left alone since at least 1945, yet the harriers continually try to colonise grouse moors not far to the east where they are persecuted worse than eagles or Peregrines. Their absence from the Cairngorms must be due to something else, possibly a deficient food supply or inhospitable climate.

No Buzzards were known in the Cairngorms before 1940, except a pair that nested in Inschriach forest in the 1920s (Nethersole-Thompson *in litt.*) but two pairs now breed in the main Dee valley near Braemar and occasionally hunt the lower hills up to 2500 ft. On Speyside Buzzards now nest also in Rothiemurchus Forest and at Pityoulish and occasionally soar above the high ground at over 3000 ft on either side of the Lairig Ghru (Nethersole-Thompson *in litt.*). Gor-

don (1912) noticed that no Buzzards or Ravens nested in the Cairngorms area and wondered if this was because eagles do not allow the species to nest near them. Ratcliffe (1962) gave some evidence of antagonism between eagles and Peregrines or Ravens, and Brock Nethersole-Thompson once watched a mid-air fight between an eagle and a Peregrine in May 1961 near a Peregrine nesting place. There are still no Buzzards in the central high mass of the Cairngorms, but this could also be due to lack of rabbits there.

Other species breeding on heather moors. Cuckoos are common in valleys and on lower slopes up to 2000 ft, arriving at the beginning of May. Most are in open parts of the pine forest but many live up to a mile from the nearest trees on open moors. Nearly all Cuckoos on the moors are reared by Meadow Pipits. Many Skylarks breed on the grassy valley bottoms up to 1500 ft and some up to 2200 ft, but some have been recorded singing higher up in summer, for instance at 2800 ft on Yellow Moss, at 3000 ft on the Moine Mhor, and even at 3500 ft on Glas Maol south of Braemar. Occasional pairs of Whinchats and Twites nest in the open treeless glens up to 1500 ft, but both are uncommon. Twites are occasionally seen higher, including one at 2700 ft in Glen Geusachan in March and one with a flock of Snow Buntings in Glen Dee in January. Occasional pairs of Pied Wagtails breed at bothies, ruined houses or inhabited cottages up to 1600 ft, and a pair breeds at the Cairnwell skilift station at 2100 ft.

Curlews and Greenshanks live mainly on the moors and valleys below the tree line at 2000 ft. Most glens have one or two pairs of each. Nethersole-Thompson (1951) gave a full description of the Greenshank's behaviour, breeding and habitat from a detailed study in the Spey valley. In recent years he has noticed fewer Greenshanks in central Strathspey and there are fewer on the Dee side of the hills than in the late 1940s. Snipe are common in boggy gaps in the pine forest and on boggy valleys and hillsides but do not breed above 2000 ft. In spring they return one to two weeks later than Golden Plovers, but an occasional bird stays in winter, frequenting boggy flushes in the forest till frost and snow cover all these places. Lapwings have bred up to 2700 ft on the isolated hill of Morven east of the Cairngorms for many years and a pair sometimes breeds up to 2800 ft on the Yellow Moss east of Glen Derry and on Carn Ban Mor in the west Cairngorms. A few also breed on valleys on boggy ground at and below 2000 ft. The highest Oystercatchers breed on treeless valley bottoms at 1500-1600 ft.

Occasional visitors. In July and up to mid August, many flocks of Rooks and some of Starlings appear on the valley floors and moors up to 2000 ft, sometimes almost reaching

the edge of the arctic-alpine zone at 2400 ft. Hundreds of Rooks are sometimes seen feeding on grassland up to ten miles from the nearest rookery. On the Dee side of the hills the only rookery above Ballater is a small one at Invercauld, and the numbers of adult Rooks in these flocks are far greater than in this rookery. In recent years Chaffinches have been seen at the skilift station on Cairngorm at 2500 ft, feeding on crumbs and scraps of waste food, although this place is fully a mile from the nearest pine trees.

Streams and lochs

Common Sandpipers breed along the main streams and by lochs at 1500-2400 ft, and one pair (occasionally two) breeds 3000 ft up at Loch Etchachan, and at 2850 ft at Loch nan Cnapan (Perry 1948). Nethersole-Thompson found a pair nesting at a tarn at over 3500 ft in 1961 west of Loch Etchachan. Dippers have a similar distribution, except that they also live on smaller streams and regularly visit the Pools of Dee at 2700 ft or even the Wells of Dee at 4000 ft. They are very hardy and stay all winter in the hills up to 2000 ft, even when the streams are almost completely covered in ice and snow. It is common to see a Dipper flashing in and out of small holes in the snow over the streams, and even giving snatches of song. Occasional pairs of Grey Wagtails live in summer along the larger streams up to 2000 ft, and Nethersole-Thompson once found a nest at 2500 ft.

There are regular colonies of Common Gulls in the arctic-alpine zone at 2850 ft at lochs in the west Cairngorms and at 2950 ft at Loch nan Eun on Lochnagar. A few Black-headed Gulls bred in 1958 at one west Cairngorm loch, and they nest regularly at small lochs at 2000 ft south of Carn a' Mhaim and at 1700 ft near the tree line in upper Glen Derry. Both species may be seen visiting the highest plateaux in summer, where they pick up ground beetles and catch moths in mid air.

A few Mallard and Teal breed up to 2000 ft near most moorland lochs and ponds in boggy ground, and occasionally near quiet-flowing parts of the larger streams. An occasional pair of Wigeon and Redshank also nests among ponds on boggy ground in the glens up to 1600 ft, and I once saw a pair of Moorhens with young at this altitude near Loch Builg.

A few Goosanders breed in holes in trees or rocks up to 1700 ft along streams, and feed in pairs on the streams but sometimes communally on pools up to 2000 ft. Each pair lives along part of a major stream such as the Einich or Derry, but the nest may be up a small side stream. Some glens have only one pair but others two or three. They are persecuted

everywhere, and the broods are often shot by keepers and stalkers when they move down to the larger rivers. In spite of this the number returning each spring is fairly constant.

The scrub zone

Hardly any of the scrub zone above the tree line now exists, owing to burning and grazing. Tiny patches of dwarf birch still grow on some wet bogs, dwarf willow on bogs and on rocky stream banks, and juniper here and there on dry ground. West of Morven near Ballater, extensive stands of 2-3 ft juniper growing up to 2000 ft, with scattered bushes much higher, show what this zone might have been like. It has variety, shelter, colour and many breeding Willow Warblers, Meadow Pipits and Ring Ouzels.

The tree line

The tree line of the pine forest is 1800-1850 ft in Glen Derry, 2000 ft at Creag Clunie and Glen Quoich, and 2100 ft at Creag Fhiachlach, with occasional trees higher up; the birch-juniper woods on Morrone go up to 2150 ft. On cliff ledges and rocky gorges of streams, many 6-10 ft pines, larches, birches, aspens and especially rowans grow up to 2250 ft, isolated trees to 2500 ft, occasional scrubby trees a foot high up to 3000 ft, and in two cases up to 3400 ft for a pine and 3500 ft for a larch. This tree line is not appreciably lower than in prehistoric times. Roots of pine (sometimes with birch and juniper also) are abundant in nearly all peat bogs up to 2000 ft, but most bogs above 2200 ft have none. Two cases at 2500 ft and one at almost 2700 ft refer to only a few roots in very sheltered places where the arctic-alpine vegetation at present does not go below 3000 ft. Probably these were isolated trees such as still occur above the normal tree line. Unfortunately the present forests are small remnants owing to burning and to severe browsing of young trees by red deer, and most of the once-forested ground below 2000 ft is a treeless heather moor.

Near the edge of the pines, woodland birds are sometimes seen out on the nearby hill. Capercaillies are often on the moor edge in summer and autumn, and Black Grouse and Woodpigeons even more, sometimes up to 2300 ft on hillside bogs and berry patches a mile from the nearest trees. Flocks of Bullfinches are often in long heather in winter up to ¼ mile from the trees. Occasional Wrens breed on sheltered stream banks or rocky gorges up to 2000 ft and up to two miles from the nearest woods, but there are far more in the woods. Similarly most Woodcock breed in the woods but some nest up to ¼ mile from the trees. A few Starlings breed in holes in trees in the old pine forest up to 1700 ft in places,

and may be seen occasionally on the nearby moors up to 2200 ft. In June 1964 Nethersole-Thompson watched a Starling which spent the night on a scree ridge at about 3700 ft. Willow Warblers breed in scrub or long heather up to a mile from the woods. Tewnion (1953) once saw one singing among a few birches on crags at 2000 ft in Glen Geusachan, two miles from the nearest wood, and Nethersole-Thompson has heard cocks singing in the few straggling trees under Creag an Leth Choin in the Lairig Ghru.

Crows breed up to the tree line but often occur in the treeless glens and lower hills, and occasionally fly up to the arctic-alpine zone. They take many grouse eggs and some Ptarmigan eggs, but feed mainly on insects in summer. They do not regularly hunt the high ground on the Dee side of the Cairngorms but in recent years have increasingly hunted the Spey side. These Crows are a mixture of Hooded, Carrion and every kind of intermediate. They leave the upper valleys in winter, moving to the lower valleys and woods below 1500 ft where they have large communal roosts, one, for instance, near the Linn of Dee.

Migrants

Many birds move over the Cairngorms on migration. Grey Lag Geese regularly and Pink-footed Geese occasionally fly over in flocks of up to 100 through passes such as the Lairig Ghru, Lairig an Laoigh and Glen Einich, but may go right over the highest ground in fine weather. On exceptional days in autumn a continual succession of Greylag flocks moves south, numbering 500-1000 birds in a single afternoon. They occasionally land on Loch Builg and Loch Einich, along with small flocks of Whooper Swans. Occasional Goldeneye and Mallard stop briefly on Loch Etchachan and other high lochs. Gordon (1951) once saw a small flock of Teal on the Pools of Dee, and in June 1950 Nethersole-Thompson heard Teal and Oystercatchers flying through the Lairig Ghru at night from a camp on the plateau above. A few Lesser Black-backed Gulls sometimes cross over the hills through the passes at 3000 ft.

More unusual birds seen only once include two drake Gadwall at Loch Builg in October, a White-fronted Goose flying west at Derry Lodge in October, a Jack Snipe shot at 2100 ft near there in October, a Black-throated Diver on Loch Etchachan in June (V. C. Wynne-Edwards *in litt.*), a Sand Martin there in July, and a Rook flying south at 2400 ft at Cairnwell in late April. Nethersole-Thompson once saw a Curlew which spent several days on boggy ground near Lochan Buidhe at 3500 ft on Ben MacDhui, and Gordon (1921) found a Lapwing dead near the top of Ben MacDhui

after the winter, presumably a bird that had been overcome on migration.

Scores or even hundreds of Swifts may often be seen over the highest tops during some days in summer, and flocks of Swallows and House Martins sometimes fly south over the Cairngorms in autumn, generally through the passes. Brock Nethersole-Thompson watched a Swallow over a tarn at 3700 ft in June 1964. Other birds have occasionally been seen in the arctic-alpine ground just after the first big thaw in March, such as an odd Robin, Greenfinch, Yellowhammer and Bullfinch, and Gordon (1951) once found a Robin in April at the Pools of Dee, lying dead on very deep snow. The bodies of a Robin and a Bullfinch, both of the British race, were picked up on a snowfield at 3700 ft on Braeriach in June 1941 (Nethersole-Thompson *in litt.*).

The main migrants are Fieldfares and Redwings. Flocks of hundreds are common on the moors and hills every autumn and many can be heard passing over at night. Most of those that come to ground occur below 3500 ft but some stop briefly right up to the summits. Most move on after a day or two, often to be replaced by further arrivals. They quickly eat any berries left by Ptarmigan, Red Grouse and Ring Ouzels, and their droppings are deeply dyed and full of berry pips, but they also eat many insects while on the hills. A few Skylarks also fly south over the hills at this time, and flocks of up to 10 Pied Wagtails.

Natural hazards and human pressures

The hill birds are in no danger of extermination by natural predators. Although foxes and eagles are commoner than on preserved grouse moors further down Deeside or in Angus, grouse and Ptarmigan maintain as high breeding stocks on some hills near Braemar as anywhere in Scotland, and predation on Ptarmigan does not appreciably reduce the birds' production of young. None of the Snow Buntings that Nethersole-Thompson knew so well disappeared in summer.

Human pressures are more serious. Although egg collectors may have been a nuisance to the occasional ornithologist doing a detailed study it is very unlikely that they have had a lasting effect on any of the Cairngorm hill birds. On average, only about one pair of eagles in ten is robbed on the Dee side of the Cairngorms (Watson 1957b), an insignificant number considering the big surplus of young reared. Egg collecting is even more uncommon and negligible with Ptarmigan, and Nethersole-Thompson considers it had no effect on Snow Bunting and Dotterel populations. Eagles on the Spey side of the Cairngorms have suffered heavier egg robbing in the last few years but the number of pairs has not

gone down during these years, nor is it likely to do so considering the surplus produced in districts nearby. Some of the stalkers in the Cairngorms dislike egg collectors. One day I saw a collector being hounded down the glen by the stalker and warned in no uncertain terms of what would happen to him if he ever dared to show his face again, all because he was seen lifting the eggs of the only local pair of Oystercatchers!

Shooters are no threat to the hill birds, and probably never have been. Ptarmigan were often shot in the past, but Ptarmigan shooting is no longer fashionable and shooters have become lazier. Few or no Ptarmigan are shot in most years now and the population could stand much heavier exploitation.

I have known of only five cases where an eagle was kept so long off its nest that the eggs became cold and did not hatch; three involved men cutting trees, one an artist unwittingly painting a scene near the eyrie, and one an ornithologist who should have known better. These hazards are of no major importance, and they have not increased, although more walkers and climbers visit the Cairngorms every year. Fortunately nearly all eagle eyries are in pines well off roads or tracks, or in broken cliffs of no interest to rock climbers. Birdwatchers are not a serious threat to the eagle but may become so if they increase at the present rate for another twenty years. The main danger will be chilling of the eggs on cold days, due to people hanging about too long near the nest. The worst that could conceivably happen is that continual disturbance might eliminate a few pairs, especially on the Spey side of the hills, but this would have no noticeable effect on the eagle stock of Scotland.

Snow Buntings, Dotterel and other hill birds are in no danger from climbers and walkers, because these birds pay little attention to people walking past and because walkers seldom stop long when they see them. Moreover, Snow Buntings in the arctic breed close together in village buildings or in nearby rubbish tips and become very tame. The wintering flocks in Scotland also become tame wherever they see people every day. Flocks of tame Snow Buntings occur every year at the cafés and car parks near skilifts, and are often given pieces of food by the skiers. After the breeding season Scottish birds are often seen around the summit cairns, where they find crumbs left by walkers, and they often pay no attention to a man 10 yards away. Moreover the Scottish breeding birds are so scarce that very few people will ever exert the energy needed to find them.

Dotterel may be in more danger, simply because they are so unwilling to move away, and also because some of the best

Dotterel areas are very near present and possible future skilifts. The most disturbing news from 1965 was of a group of birdwatchers throwing stones at Dotterel so that they could get better photographs, and there have been cases in past years and recently where photographers have kept Dotterel off chipping eggs for hours. On grassy ground their nests are not difficult to find and broods even easier. However, Dotterel stocks fluctuate from year to year as they have done for decades, and have not shown a sustained decline over recent years. Breeding success is still good on hills in the Grampians visited every summer by many walkers and a few birdwatchers, but no evidence on breeding success is available for the last few years from the Cairngorms or any other area frequented by large numbers of birdwatchers and walkers from skilifts. Such evidence should be obtained before birdwatchers are stopped from going there, but the tiny hooligan minority should meantime be warned to behave more responsibly.

There is good evidence that Ptarmigan are unaffected by the enormous increase in the number of skiers and walkers near skilifts (Watson 1965a). Their breeding stocks have remained as high as on nearby undisturbed hills, and the birds become tame and pay little attention to people. I once thought that walkers might disturb and scatter broods on windy days, but in fact few people walk far, let alone on windy days, and breeding success has been no worse than on undisturbed places nearby.

Loose untrained dogs may kill nesting Ptarmigan and Dotterel and their chicks, but fortunately they seldom find them. Moreover, loose dogs run about almost daily near the Cairnwell skilift in summer and on Cairngorm, yet Ptarmigan have bred no worse there than on other hills, and there has been no reduction in the adult stock during the summer. In recent years Crows have taken to visiting the arctic-alpine ground on the Spey side and have eaten some Dotterel and Ptarmigan eggs (Nethersole-Thompson in Bannerman 1963). However, Ptarmigan stocks have remained as high on the Spey side as on the Dee side, where Crows are still rare visitors to the high hills. Hence there is no evidence as yet of any important damage by tourists to the hill birds, and considerable evidence against this.

However the main threat may be indirect, affecting the birds by way of damage to the vegetation. The Cairnwell skilift is a tribute to those who built it, because damage was slight and the ground has already almost completely recovered. However the T-bar tow there has exposed much bare peat which will take longer to recover. Most of the damage at Cairngorm was caused during the building of the lifts,

tows, roads and chalets, and unfortunately there has been little or no recovery. The areas near the skilift station are bare of vegetation owing to trampling by summer visitors, and some vegetation between there and the nearby summits also has been partly killed. Nevertheless all this bare gravel and trampled vegetation, while undoubtedly an eyesore, has affected only a minute part of Cairngorm or Cairnwell and so has not yet affected the hill birds. Further increases might be prevented by making good tracks for people to come downhill along the line of the skilifts, and lines of prominent cairns to other places commonly visited in summer. The line of cairns recently put up on the Cairngorm-Ben Mac Dhui route to prevent people getting lost will have a long-term effect to the good by channelling the increasing numbers of walkers. The more serious damage from building roads and lifts could probably be repaired by planting pioneer species of plants but this might take some years.

The Cairngorms-Upper Deeside-Upper Angus area is the only part of Britain where the breeding success of Golden Eagle and Peregrine has not declined (Watson unpublished, Ratcliffe 1965), possibly because they feed largely on moorland prey there and rarely come in contact with animals from farms. Nevertheless in 1964 an eagle which had been on the lower Cairngorms for at least six months contained small amounts of insecticide residues (Watson & Morgan 1964). An unhatched Ptarmigan egg that I found in 1965 on Ben Mac Dhui, where there are only a few stray sheep, had no residues (N. W. Moore *in litt.*). Hence the effects of toxic insecticides in the Cairngorms are not yet proven and probably unimportant.

To sum up, my view is that the outlook for these hill birds is good; but I would be the first to admit that a close watch needs to be kept and hard evidence found in the next few years, just in case there is trouble. These years will see a great increase of tourists, following massive building of hotels near Aviemore. Looking at the hill birds could become a big attraction for many of these people, and the Nature Conservancy, the Scottish Ornithologists' Club and the Royal Society for the Protection of Birds must try to find ways to permit this without jeopardising the same opportunities for future generations.

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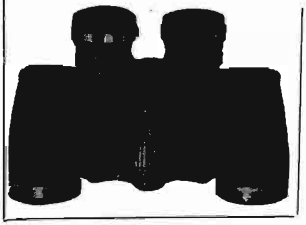

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