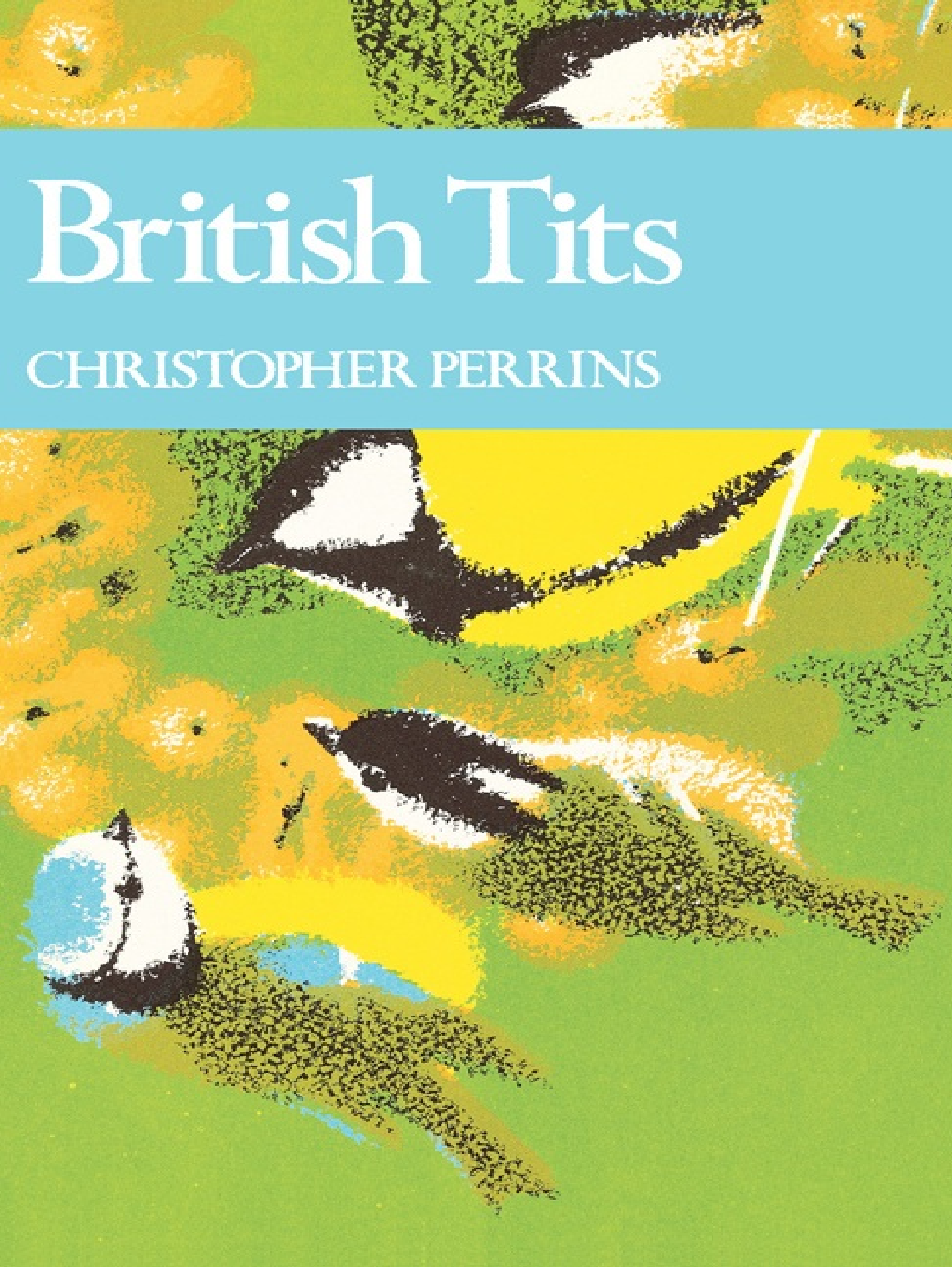
# British Tits

CHRISTOPHER PERRINS



C. M. Perrins

# Editors



The aim of this series is to interest the general reader in the wild life of Britain by recapturing the enquiring spirit of the old naturalists. The Editors believe that the natural pride of the British public the native fauna and flora, to which must be added concern for their conservation, is best fostered by maintaining a high standard of accuracy combined with clarity of exposition in presenting the result of modern scientific research.

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# EDITOR'S PREFACE

AFTER the Robin, the Blue Tit is probably the best-loved British bird. It is so small, so beautiful and s easy to observe. In the suburbs and even in many urban areas tits will appear, often in only a fe minutes, if half a coconut, a bag of peanuts or a lump of suet is hung near a window. While it feed the bird's acrobatics are a delight to watch, and have often cheered bedridden patients or elderl people unable to leave their homes. If a sparrow learns how to share the tit's food, it is looked upon a an unwelcome intruder: we resent it consuming expensive items willingly provided for what w consider to be more attractive species.

A suitable nesting box erected in almost any suburban garden is likely to be occupied during th first spring that it is available by a Great Tit. When the eggs hatch the adults will be seen makin repeated visits to the box, many times in an hour, to bring food to the young. They will often b observed to be carrying caterpillars, and this soon convinces the gardener that they are his allie consuming the pests which would otherwise destroy his vegetables or defoliate his trees and shrubs.

The tit's habit of pecking the top of milk bottles and drinking the cream may annoy th housewife, but it also convinces her of the bird's cleverness. If she will not tolerate this mino inconvenience, she may persuade the milkman to put covers over the bottles he delivers.

Thus tits are birds which are particularly easy to observe at close quarters, when they are gues in our gardens. Nevertheless most of us know very little about their lives and habits, particularly abo the majority of the birds which generally remain within their natural habitat – deciduous woodland the case of the Blue and Great Tits we so commonly entertain.

Dr Christopher Perrins, the author of this book, has studied tits for many years, particularly Wytham Wood near Oxford. He has himself made many interesting and important discoveries abou their behaviour and biology. His ability to communicate this information to specialist and non specialist readers alike make him an ideal choice as a writer in the New Naturalist series. As well a incorporating his own work, he also gives full recognition to the work of many other ornithologists, Britain and in other parts of Europe, and in Asia, where the species found in Britain also occur. He ha thus produced a factual and authoritative account which should be of value and interest both to seriou ornithologists and to those who wish to know something more about the charming birds they see s often in their gardens.

Seven different birds are here described in detail. These include six (Coal Tit, Great Tit, Blue Ti Crested Tit, Marsh Tit, Willow Tit) which all authorities recognize as members of this group. D Perrins has also included the Long-tailed Tit, which purists consider only a distant relation. W believe that this inclusion is justified, particularly by the way in which comparisons between the tru tits and the Long-tailed Tit are developed.

Dr Perrins shows us what is known about tits, and he also draws attention to many gaps in ou knowledge. We hope that this will stimulate readers to make their own observations so as to increas further our understanding of some of the most attractive members of our natural wildlife.

# AUTHOR'S PREFACE

PERHAPS this book should have been written many years ago; so much has been published on th European tits that it is difficult to synthesize it now. These small birds are so amenable to study th the journals are full of observations on them. Curiously, apart from a small work in 1846, [405] no on until recently has tried to write a book covering all the British species.

It has been, therefore, quite impossible to try to include all that has been published about the birds. I have tried to cover the main topics, though doubtless others would have selected differentl Further, I have tried to keep the references from filling all the pages. The system of numbers shou enable the reader to find the references that he wants to follow up, but at times he may have to look the references in the paper to which I refer.

Most of the topics covered are inter-related and it is not always easy to decide where to p certain pieces of information. As a result I have allowed myself a certain amount of repetition in ord that each chapter may be taken more or less on its own without the cross-referencing that wou otherwise be required.

In particular, I have given a broad outline of the behaviour and life cycles of the tits in chapter Although much of this material is presented in greater detail later, it seemed important to put th outline here, before chapters 2–8 on the individual species. In these I have concentrated on featur peculiar to the separate species. The reader who is more interested in the general biology of the bir than the detailed differences between the species might like to pass over these chapters, though might still find chapter 8, on the Long-tailed Tit, worthy of examination.

So many people have contributed to the vast array of literature that this book could best perha be regarded as the outcome of an enormous piece of teamwork; the only advantage that the othe have had is that they cannot be held responsible for the end product! One of the most pleasing aspec of working on tit populations has been the contact with other ornithologists, both in Britain an abroad. While we have disagreed (and still do!) about some of the basic factors which affect the bir at different stages of their lives, it has been a great pleasure to me to meet other workers in this fie and discuss our work. In addition I owe a great amount to some of them for generously supplying m with their data for certain analyses.

Some of these debts cannot pass unnoted. My greatest debt is to the late Director of the Edwa Grey Institute, Dr David Lack, F.R.S. David Lack was responsible for starting the study in Wytha Woods near Oxford and always took a keen interest in the studies of those who kept it going; h encouragement and friendly, helpful criticism are sorely missed. Outside Oxford, our closest contac have been with the Dutch workers, especially the late Dr H. N. Kluijver, father of all curre population studies of tits, having published a major work on them a quarter of a century ago[190] and I J. H. van Balen. In Germany Dr H. Löhrl's studies have been of great value to us.

Many others have kindly read and criticized earlier drafts of this book. Since some of these hav done the key work in certain parts of the field they have in that sense provided the data also. I a particularly indebted to Dr D. Chitty, Dr E. K. Dunn, Dr M. C. Garnett, Dr A. J. Gaston, Dr J. A. Gibb Dr. J. R. Krebs, Dr T. Royama, Dr D. W. Snow, Miss V. A. Wood and the late Dr M. I. Webber for their comments. Our main study area in Wytham Woods near Oxford has also been used by othe ecologists. In particular a group of entomologists from the Hope Department, led by Prof. G. Varley and the late Dr G. R. Gradwell have studied the insects of the oak trees, a major food suppl for the tits.

To my wife, Mary, I owe a great deal for her help and tolerance. Not only has she done some o the field work for me, but she has put up with irregular and unpredictable (though usually late!) r appearances from field work. She has also been of inestimable help in putting this book togethe typing drafts, drawing diagrams and sorting references.

It is also a pleasure to be able to thank Miss Dorothy Vincent and Mr A. S. Cheke for help wi checking the references and Miss Margaret Norris for assistance in typing the final versions.

This book was largely incubated while I was on sabbatical leave in Darwin, Australia – a countr free from tits where, consequently, I did not feel compelled to rush out and carry on with field wo instead of writing. Though there were many other ornithological delights, the air-conditione laboratory of the Wildlife Division of the CSIRO proved attractive enough in the middle of the day get the bulk of the writing done. I owe a great debt for the hospitality given by my hosts Dr H. J. Frit Dr M. G. Ridpath and all the many Australians who helped us during our stay.

Lastly, but by no means least, all those who have studied the tits owe a great debt of gratitude the birds themselves for the determined and imperturbable way in which they accept our presence a get on with their daily lives despite our interference.

# CHAPTER 1

## INTRODUCTION

‘Nor will it easier be – nay, not a whit –
To keep from your domain the greedy Tit.
Small is the naughty Fowl, yet it can wreak
No small Destruction with its claws and beak.
For, when Paper from afar it spies,
Straightway through open Window in it flies,
Its frequent blows the sheet do quickly tear
Still sodden, and make Havoc everywhere …
To Gin and Snare it grows too soon inured,
And Carelessness is by Experience cured.
The Lime untouched, always the naughty Tit,
So keen its zest, to Paper straight will flit.’

The above is a translation, by Professor Eric Laughton, of a poem by Father Jean Imberdis, S. entitled ‘Papyrus’; it was written in 1693 – almost three hundred years ago.

These lines perhaps epitomize the first of the two main reasons for this book: the clo association of the tits with man. In most parts of Britain they occur commonly around houses and t ease with which some species have adapted to garden life, in spite of their forest origins, together wi their general tameness and approachability have made them familiar to us all. They provi considerable enjoyment – and education – to adults as well as children. In winter they visit bird tabl in large numbers (often such tables are erected specifically for the tits) and in summer they free accept the nesting-boxes man puts up for them.

In this sense they may be regarded as ‘popular’ birds; in addition they cause no real nuisanc Perhaps neither Father Imberdis nor the harassed milkman – trying to prevent tits opening bottles o his float the moment that his back is turned – would share this view, but nevertheless the damage th do is usually minor, of relatively infrequent occurrence and far outweighed by the enjoyment an interest that they bring – to say nothing of the possible good arising from their insectivorous habits.

The second main reason for this book is that the abundance and approachability of the tits h made them ideal subjects for detailed scientific study. As a result, the biology of some of the tits mu be better known than that of almost any other species of wild animal. In addition to the intensive – an often long-term – studies, much has been learned about these birds by more casual observation; t general public, as well as bird-watchers, have often provided useful information in response to appea for records about certain aspects of these familiar birds.

The more we know, the more intricate the adaptations of these birds are found to be. The scienti is trained to be wary of using the word ‘intelligence’ in relation to the behaviour of wild animals bu notwithstanding this, one sometimes wonders at the ‘comprehension’ of these small birds; some bir are able to solve complicated puzzles in order to get food. If they are not intelligent, then they hav been well equipped by Nature – through evolution – to respond correctly to a wide variety situations, some of which they are not likely to meet, even in a similar form, in the wild.

In an imaginative vein, we may perhaps even regard Father Imberdis as one of the first observe

of tit behaviour, for we now know that there is a biological basis underlying his seemingly casu complaint (see here). As we shall see, the habit of paper-tearing is not a random one. It occurs mo frequently in the late autumn of years when the numbers of tits are high and natural foods are shor often at such times there are wide-scale movements of Continental tits, some of which enter Brita for the winter; most frequently the offender is a Blue Tit. It could be, therefore, that Father Imberdis poem provides us with evidence that these conditions held in the autumn of 1692 or 1693.

## RELATIONSHIPS AND RANGES

It is, perhaps, necessary to put this small group of birds in perspective in relation to other birds. Her and throughout this book, I use the classification adopted by Snow[346] for the Family Paridae Volume 12 of *Check-List of Birds of the World*. The Paridae are a family of Passerine birds of the su order Oscines or song-birds. The passerines are usually held to be, from an evolutionary viewpoint, relatively recent order of birds. Within this huge order (over half the living birds) and within the su order Oscines, the relationships of the families are not always clear. The Paridae have sometimes bee held to be closely related to the Crows (Corvidae), a group held to be among the most 'advance birds of all. Currently they have been moved closer to the Old World Flycatchers (Muscicapidae), very large family of mostly smallish birds with largely insectivorous diets.

The prefix or suffix 'tit' has been applied to several groups of birds, for example shrike-tit, ti lark and wren-tit. Many of these groups are not at all closely related and, according to the *Short Oxford English Dictionary*[274], the word seems to have been used originally merely to deno something small. The birds to be discussed in this book were originally called 'titmice', a name th subsequently became shortened to 'tit'. Even within Europe four groups of birds, not all of which a closely related, are still known as tits. These are:

1. The true tits (Family Paridae, sub-family Parinae)
2. Long-tailed Tit (Family Paridae, sub-family Aegithalinae)
3. Penduline Tit (Family Paridae, sub-family Remizinae)
4. Bearded Tit (*Panurus biarmicus*)

As can be seen from this list the true tits, the Long-tailed Tit and the Penduline Tit are considered belong to separate sub-families though they all belong to the same Family.

The Bearded Tit, however, is now considered to belong to the sub-family Paradoxornithinae the huge family Muscicapidae – the Old World Flycatchers. If so, it lives in an area well beyond th inhabited by most of its relatives, namely the Oriental region. Whatever the case, it is unlikely that is closely related to the true tits and there has been an attempt in recent years to recognize this changing its English name from Bearded Tit to Reedling – a name that aptly describes its almost tot restriction to reed-beds. It will not be considered in this book.

The Bearded Tit is not alone in being well beyond the range of its closest relatives. Both th Long-tailed and Penduline Tits are represented in Europe by a single species only; the other membe of their sub-families occur some distance away in Asia or Africa respectively. Possibly even Long tailed and Penduline Tits are no more closely related to the true tits than are some other birds. F

example some taxonomists have put the Tree-creepers (Certhiidae) and the Nuthatches (Sittida between the true tits and these other tits[389]. Others[242] have suggested that the Aegithalidae are a offshoot of the Babblers (Timaliidae) and that the Remizidae may have evolved from th Flowerpeckers (Dicaeidae). If this is so, then neither group should be considered with the Parida however the Long-tailed Tit would be more closely related to the Bearded Tit under this classificatio than is the case with the one used here. The exact taxonomic positions of these families have not y been settled and it is not my purpose here to try to do so, even were a final decision possible at th present time – which it is not.

The tits are found in most wooded areas of the northern hemisphere and of Africa, but not South America, Madagascar or Australia (fig. 1). While they are generally confined to well-woode areas, they will at times be found in quite sparsely shrubby habitats.

Fifty-eight species are currently recognized and of these about three-quarters (42) are true ti (Parinae). The true tits occur throughout the range listed above for the whole family. Some have very extensive distribution; for example the Great Tit occurs from Ireland to Japan and from th northern Siberian forests to Iran and south-east Asia. Three other British species (Coal, Marsh an Willow Tits) also reach Japan, though their ranges are more restricted in Asia.

The Aegithalinae are represented by only eight species. Six of these occur in the Palaearctic an two in the United States and Central America. Amongst these the European Long-tailed Tit *Aegithal caudatus*, besides being the only one of its sub-family in Europe, has the widest distributio elsewhere, being found over a large area of Asia; as with some of the true tits it breeds from th British Isles to Japan. Four other species of *Aegithalos* – with more restricted ranges – are found in th Himalayas and China. The sixth Old World species, *Psaltria exilis*, is confined to Java. The two Ne World species are the bush-tits of the Genus *Psaltiparus*. Again taxonomic difficulties arise since n all taxonomists agree that these are closely related to *Aegithalos*. All that need be said here is that the two groups are not closely related, they show remarkable convergences since the two genera hav many characteristics of behaviour (including nesting habits) in common.

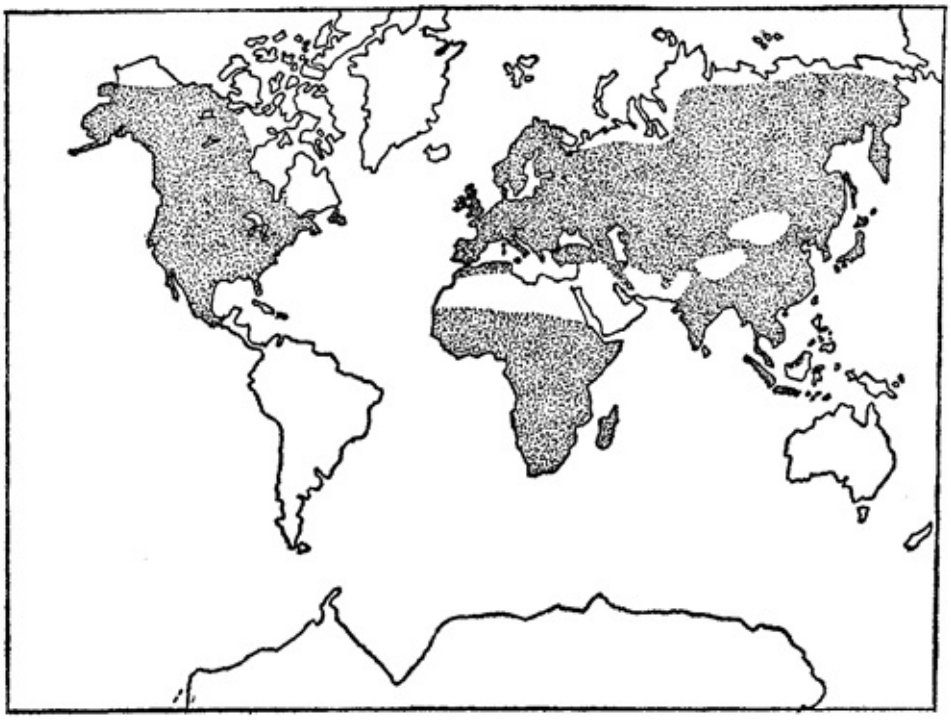

FIG. 1. An approximate world distribution of the tits, family Paridae.

Another small group of eight species form the Remizinae. Again the only European species, th Penduline Tit *Remiz pendulinus*, has a wide range in the Palaearctic while the remaining six O World species all occur in Africa south of the Sahara. The eighth species, the Verdin *Auripar flaviceps*, occurs in open rather scrubby country on the edge of deserts southwards from south-weste United States into Mexico. Once again there has been some doubt as to its relationship with oth members of this family. It is also an exception in that its eggs are greenish, not white with reddi spots as in all the other tits[132].

## EUROPEAN SPECIES

Ten or eleven species of Paridae occur in Europe (depending on where one draws the easte boundary), of which I shall discuss the seven British ones in detail. These are:

| **English Name** | **Latin Name** |
|---|---|
| Coal Tit | *Parus ater* |
| Great Tit | *Parus major* |
| Blue Tit | *Parus caeruleus* |
| Crested Tit | *Parus cristatus* |
| Marsh Tit | *Parus palustris* |
| Willow Tit | *Parus montanus* |
| Long-tailed Tit | *Aegithalos caudatus* |

The Willow Tit is not now considered to be conspecific with the American Black-cappe Chickadee *Parus atricapillus*, as was once thought[346]. Since this Latin name was first applied to th American species, by the laws of nomenclature it must remain applied to that species and so th Willow Tit must take the more recent name of *P. montanus*. Nevertheless many older works refer the Willow Tit as *P. atricapillus*.

In addition to these seven species, three or four others occur in Europe:

| | |
|---|---|
| Azure Tit | *Parus cyanus* |
| Siberian Tit | *Parus cinctus* |
| Sombre Tit | *Parus lugubris* |
| Penduline Tit | *Remiz pendulinus* |

The first of these is an eastern species whose range extends westwards as far as eastern Poland, hen just getting into Europe. The Siberian Tit is a bird of the northern spruce forests and the Sombre T occurs in Europe only in the Balkans Peninsula. The Penduline Tit is more widespread through centr and southern Europe and appears to be spreading northwards; again, as in the previous list, the la species is not so closely related as the others. These species have been less well studied than the othe and I shall only refer to them on occasions.

## APPEARANCE AND BEHAVIOUR

A few tits are drab, but many are strongly coloured or patterned. The true tits in particular tend to hav striking head patterns, often with dark caps; these head patterns may be exaggerated by the presen of a crest. In colour the tits tend to be predominantly browns, greys or blacks above with yello white, buff or brown underparts, though there are exceptions to this – the Blue and Azure Tits, fo example, are a striking blue on the upper surfaces. In size most of the tits are small and, althoug weights of birds vary markedly around the year (chapter 11), few weigh more than about 20 grams the weight of a Great Tit; for comparison a House Sparrow, *Passer domesticus*, weighs about 30. notable exception is the relatively very large Sultan Tit, *Melanochlora sultanea*, from eastern Asi This striking bird is a glossy blue-black above, bright yellow below and has a large yellow crest; must be more than twice the weight of a Great Tit. The majority of birds in the tit family, howeve weigh in the range of 8 to 15 grams. The Long-tailed Tit and some of the bush-tits may weigh as litt as 5 or 6 grams – a factor which can cause problems for them during cold weather (chapter 8).

As a group tits are extremely agile, most of them being able to hang on to the slender outer twig of trees in their search for food. A combination of light weight, shortish legs and a strong grip enable them to do this. Obviously the heavier the bird the harder it is for it to hang from a twig witho causing the branch to bend and sway too much for ease of feeding; shortish legs prevent the birds fro having too much movement and swinging out too far. Even the Great Tit is really too heavy and long legged to be able to search for food effectively on the smaller branches; consequently it feeds on th ground a great deal. It is of interest to compare the tits with the finches. Here again the smalle shorter-legged birds such as the Redpoll are much better than the larger long-legged ones at graspin the small twigs in their search for seeds. Most of the tits, though not the Great Tit, are smaller than th Redpoll and even more agile under such circumstances. Associated with the strong legs are feet with powerful grip. These are used a great deal during feeding; all but the Long-tailed Tit frequently ho seeds or insects under their feet while hammering at them with the beak. Several species have als been shown to have considerable dexterity with their feet; when set 'intelligence' tests (which mar tits are good at) they use their feet, in combination with their beaks, to pull up lengths of string order to reach food (see here).

The British tits do not migrate in the strict sense in order to avoid harsh conditions in winte though some of those that live in the high latitudes of Russia are known to move considerab distances in winter. Great Tits ringed in northern areas of Russia have been recovered as far south a the Crimea and Portugal – distances of up to 2000 kilometres. It is not known whether northe Russian birds migrate regularly every year or whether they move only under conditions of particul hardship. Birds from populations in north-western Europe may show such 'irruptive' movements an at times of food shortage the birds may cover long distances in search of food. However, at least som of the Great Tits that breed north of the Arctic Circle remain there during the winter and i Scandinavia several species are known to store food for the winter (chapter 12).

In winter the birds may cease to defend territories and wander over larger areas in search of foo When food is scarce, tits may leave the woods during the day and visit nearby urban areas, joinin resident garden birds and taking food from bird tables. It is at this time that they most common come into contact with man. The food put out for them helps maintain their numbers durin particularly hard weather. Some of the birds that come into urban areas from woodland may spend th winter there, but at least some are 'commuters' in that they come from woodland as much as two o three miles away, but return there in the evening to roost.

When not defending territories, tits are gregarious, spending much of their day foraging in flock Often these flocks seem to form round a party of Long-tailed Tits (which almost always occur in sma

parties of six to eight or more outside the breeding season). Other species of small birds may join th flocks, amongst the most common additions being Goldcrest, *Regulus regulus*. The flocks are forme in late summer and maintained throughout the winter, breaking up each evening and reforming eac morning. As warmer weather comes in early spring the birds tend to leave the flocks and set up the breeding territories. In some cases, at least, the birds seem to pair up while in the flock and so the pa take up the territory together.

## BREEDING BIOLOGY AND LIFE HISTORY

The breeding biology of the tits has been intensively studied; this is, of course, especially true for th Great and Blue Tits but a number of studies, albeit with smaller samples, have been made of the oth *Parus* species and of the Long-tailed Tit. Later I devote a full chapter to a detailed description of th nesting cycle (chapter 13). However, since within the genus *Parus* the nesting behaviour of th different species is often closely similar, I have included this brief description here as a prelude to th series of chapters on the individual species. If the reader bears this general outline in mind, it wi save continual repetition of the basic details. This description applies basically to the *Parus* speci and much less to the Long-tailed Tit whose nesting behaviour receives fuller attention in the specie chapter than that of the other tits.

One of the most characteristic features of the tit family is their nesting habit. All species nest holes (the Long-tailed and Penduline Tits are a partial exception to this in that they make a purse-lik nest, with a small side entrance, in a tree or shrub; however, living inside the nest bears clos similarity to living in a hole in a tree). The holes chosen are often in a hollow tree or stump, but ma be in the ground; they may be enlarged or accepted as they are. In two species – the Crested an Willow Tits – the birds excavate the complete nest-hole in a rotten stump. Man's familiarity with th tits comes partly as a result of the nesting habits since several species not only nest close to man, the walls of his house or in his garden, but also nowadays in nest-boxes specially provided for them.

The nest itself is usually built of moss and lined with hair or feathers. It can be quite a larg structure if the interior of the nest-site happens to be large. Usually the female alone builds the nes She may well also choose the site since she often roosts in it for some weeks prior to nesting.

The eggs of all species are white covered with a variable amount of light pink or reddish spot This is a common colour for eggs in nests in dark places such as holes, other colours in such sit being usually pure white or pale blue. The reason for this is not fully understood, but is probab connected with the need for the bird itself to be able to see the eggs in order to look after them; egg of darker colour would be difficult to see in such a site.[211]

The tits are noted for the large numbers of eggs that they lay. In temperate areas of the wor some species lay very large clutches. Blue Tits, for example, commonly lay 12 eggs in woodland Britain. This species has the largest clutches but all the other European tits have 6–10 eggs in the clutch. Probably no other nidicolous species (those which bring all the food to the young in the nes lay so many eggs as the Blue Tit; most lay in the region of 3–6 eggs. Clutches of all species of birds the tropics tend to be smaller than those of closely related species in temperate areas[213] but there to the clutches of tropical tits are large when compared with those of most other species.

In all species so far studied the eggs are incubated by the female alone, the male only visiting th box occasionally, usually to bring the female food while she is sitting. The incubation period is abo 12–13 days – on the long side for such small birds, but typical for hole-nesting species.[215] Tits a

monogamous and both parents feed the young; the male usually brings most of the food during th first few days as the female has to brood the tiny young in order to keep them warm and hence is n free to collect food for them; this is particularly noticeable when the weather is cold. Later, when th young are larger, the female may bring most of the food.

With such a large brood the parents have to bring food very frequently and some species ma make feeding visits at rates as fast as one per minute over considerable periods. The young are in th nest for at least fifteen days in some of the smaller species, longer in the larger ones. As with th incubation period, this is a slightly longer period than that recorded for many small birds; again lon nestling periods are often associated with the habit of nesting in holes.[215] Thus Blackbirds which hav more exposed nests than tits, have fewer young, raise them faster and have a larger number of broods

Most of the tits (few of those outside Europe and North America have been studied) have only single brood during a season. The nestling period is timed to coincide with a good food supply for th young which may be very abundant but present for only a very short time. When food is plentif some species may have a second brood.

The young are looked after by the parents for a few days after leaving the nest. Within a week fledging, many of the family parties have broken up and, soon after, the juveniles are to be foun wandering around in small parties. At this time the adults have started to moult and do not seem associate with the young. The young themselves commence their moult a little later than the adul and in the true tits, at least, do not have a complete moult at this time, retaining the juvenile win feathers and sometimes most of the tail feathers. These are not shed until the next moult when th birds are just a little over one year old and have survived their first breeding season.

## LONGEVITY

Like many small birds, the tits are short-lived. In Britain one can say that roughly half of the adul die per year. Therefore, as can be readily calculated, in order that the population remains stabl approximately one young bird per brood must survive to breed. Ringing studies have shown that this indeed what happens; only one out of every ten eggs laid produces a bird that lives long enough breed. Obviously there are many differences between different years but this gives an indication of th average situation (see here).

## ABUNDANCE

Most people regard the tits as extremely numerous. However to some extent this is misleading and i in part, a result of seeing so many at well-stocked bird tables. In Europe the Blue and Great Tits a abundant birds, often reaching breeding densities as high as one pair to every one or two acres woodland (0.4–0.8 pairs per hectare). None the less this is not the situation for other species nor is the case in other parts of the world. Coal Tits and Marsh Tits may breed at densities of one pair pe eight or ten acres but many other species are even less common than this. The abundance of tits western Europe is therefore largely a result of the commonness of just two species.

Moreover more species of tits occur together in any one place in western Europe than in almo any other part of the world. In many areas of woodland in southern Britain and in western Europe on may find five, or occasionally six, species of *Parus* breeding, together with the Long-tailed Tit; many other areas normally only two or three species are found breeding together. In North Americ

and Africa there are often only two common species in any one area. Further, since these are not s abundant as the Great and Blue Tits, tits in these countries form a much less significant part of th total avifauna than is the case in Britain.

## MOULT

Moult involves the bird in replacing its old feathers with new ones. It is discussed in greater deta later (see here), but is mentioned here because of one feature that is important to those who mak studies of the birds.

All European tits undergo an extensive moult just after the end of the breeding season. Howeve with the exception of the juvenile Long-tailed Tits which replace all their feathers, the juveniles onl replace their body feathers, retaining most of the wing feathers and, often, many of their tail feathers

The importance of this seemingly trivial difference to the biologist lies in the fact that in th three species, Coal, Great and Blue Tit, some of the covert feathers of the juveniles are different fro those of the adult. Hence birds in their first year (strictly speaking their first 13–14 months) of li retain a small number of juvenile feathers. These birds are easily recognized throughout this perio which includes their first breeding season and this has made it possible for the biologist to know th age of many of the birds in his study population. Unfortunately, the plumage of both young and o Marsh, Willow and Crested Tits are too similar for such a technique to be used with them.

## STUDIES OF TITS

Tits have been, perhaps, more intensively studied than any other group of wild birds. The reasons fo this lie in a combination of the characteristics mentioned in this chapter. Many of these birds ar relatively common, resident and nest willingly in nesting-boxes. Hence the biologist can obtain larger series of data for these birds than for almost any other species. It is hardly surprising therefo that many people have made studies of them or that several long-term population studies now exist.

The first person to collect comprehensive long-term records for the tits was H. Wolda, a Dutc ornithologist who started a study in 1912. While he did not himself publish many of his findings, h maintained a valuable set of records from that year and these have been of considerable value to oth workers.

Tollenaar[382] produced the first important paper on the breeding biology of tits, using Wolda information. Subsequently a major series of studies have sprung up. These have been carried out fro the Dutch Institute for Ecological Research, initially under the direction of Dr H. Kluijver and latter by Dr J. H. van Balen. Records now exist in Holland from Wolda's initial study in 1912 up to th present day, almost without a break. Although at one point the study area had to be changed, these da are among the longest series existing for any bird anywhere in the world. Currently the main stud area is at the Hoge Veluwe, an extensive area of pinewoods on sandy soil; other smaller but parall censuses are made in a series of other forest habitats, including both pinewoods and broad-leave woods.

After the second world war, Dr David Lack visited Dr Kluijver in Holland and discussed h classic studies with him. While there, Lack realized the enormous potential of the tits for some of th studies that he was trying to carry out in England. As a result a second group of people started workin on the tits at the Edward Grey Institute of Field Ornithology, in Oxford. This study started in 1947 an

has continued ever since. Some interesting differences between the Dutch and British populatio have emerged from these parallel studies (the populations in the two countries are from differe subspecies and the local ecology of the woodlands is also subtly different). The workers in Oxfo have benefited considerably from the generous cooperation of Dr Kluijver and his colleagues.

The studies at Oxford have included a series of years of observations in many different woodla types, undertaken with the help of amateurs. In addition, members of the Institute have carried o studies in the oak-woods of the Forest of Dean (Gloucestershire), in the pinewoods of the Norfo Brecklands and in garden habitats around Oxford.

The main areas of study for members of the Institute, however, have been in Wytham Wood These woods lie only some three miles to the west of Oxford and are owned by the University so th work can be carried out there fairly conveniently and largely free from disturbance. Wytham Wood are about 800 acres (320 ha.) in extent. They are mainly of mixed deciduous woodland, though the are some plantations of conifers. Within the Wytham estate lies a small area of woodland calle Marley. This is relatively isolated from the other woodland areas, being surrounded on about thre quarters of its edge by farmland. Because of its relatively isolated nature, Marley Wood was chosen a the basic census area for the Oxford tit studies. Although there are now nest-boxes over most of th estate, Marley remains the area with the longest series of records. The reader will meet freque mention of both Marley and Wytham in this book. We have been fortunate to be able to work in a ecological reserve where many other people were studying other aspects of the environment. particular, Prof. G. C. Varley and the late Dr G. R. Gradwell and their team have made a long-ter study of the caterpillars on the oaks. As we shall see these are a very important part of the tits' sprin food and we have been exceedingly lucky to have access to Varley and Gradwell's help an information.

While the studies mentioned above are the two longest intensive ones, they are by no means th only studies of tits and workers in many European countries have provided much valuab information. Mention must be made of German studies, many of them by Dr Lörhl and his co-worker and of other European studies by Prof. J. Hublé and Dr A. A. Dhondt in Belgium and by Dr S. Hafto and Dr L. von Haartman in Scandinavia. In Britain there is also another series of long-term records. 1945, two years before the Oxford study commenced, Dr Bruce Campbell started a recording syste for the birds breeding in nest-boxes in an oakwood called Nagshead in the Forest of Dea Gloucestershire. While not such an intensive study, weekly visits have been made to the nest-box and records of breeding numbers and breeding success have been kept for almost thirty years. Th study was started in an attempt to study the effects on the caterpillar populations of encouragi insectivorous birds to nest. It has been continued largely because of the interest aroused by the lar numbers of Pied Flycatchers, *Ficedula hypoleuca*, that breed in the boxes there. Much of the recordi work has been done by students and staff from the near-by Forestry School and the area has recent become a reserve of the Royal Society for the Protection of Birds.[51]

Taken together, these studies have revealed a great deal of information about several of th species of tits. However, the biologists who have studied these birds hope that the information th they have gathered and analysed provides something more than this. From these studies gener biological principles emerge which we hope apply not only to other birds but also to other groups animals as well. If the reader feels that this is the case, our studies will have been the mo worthwhile.

# CHAPTER 2

## THE COAL TIT – *Parus ater*

THE Coal Tit is the only European tit with a black cap and a large white patch on the nape. The gloss black of the top of the head extends backwards to the sides of the nape and down the sides of the fa to the level of the eye, below which is a striking white cheek. The chin, throat and upper breast a also black and are joined to the back of the cap by a black collar.

The rest of the underparts are buff, paler towards the centre and without a black line down th middle of the belly. The upperparts, wings and tail are olive grey though the rump is more rufous. Th greater, lesser and median wing coverts have large white tips giving the closed wing two white bars; very close quarters these may be seen as two rows of large white spots. It is not possible to distingui the sexes in the field or in the hand. Occasionally, the underparts appear greyish or blackis apparently as a result of the buff tips of these feathers having been abraded away, leaving the greyis black bases visible[4, 32].

The juveniles are generally duller than the adults with a sooty grey, instead of a glossy blac head and yellow, instead of white, cheeks; the tips to the coverts are also yellow instead of white. Th young tits undergo their first moult in late summer when they acquire a plumage similar to that adults, but they retain most of the main wing coverts and the feathers of the bastard wing (see here also they may retain most of their juvenile tail feathers. Hence they can be distinguished from th adults and, although this is not so easy as in the case of Blue and Great Tits, it is usually possible see a break between the faded yellow tips of the juvenile primary coverts and the whiter ones of th first year plumage.[366]

Many of the calls of the Coal Tit are rather similar to those of the Great Tit in form, thoug higher and thinner. The normal ‘tsee-tsee-tsee’ call of these tits is thin and can sound rather more lik a Goldcrest than is the case with the other species. The song is also like that of the Great Tit in for though again much higher and thinner; it is a double note, repeated several times: ‘teachoo-teacho teachoo’. There are a number of different song types and individual males may have as many as six these. The repertoire of an individual is, in part, acquired as a result of learning from its neighbour local groups tend to have similar songs[369].

Five of the seven species discussed in this book have very extensive ranges; the Coal Tit is one these, its range extending over most of the Palaearctic (fig. 2). In Europe, the range of the Coal T extends from Scandinavia southwards through southern Europe into North Africa and south-eastward through the Balkans as far as Iran.

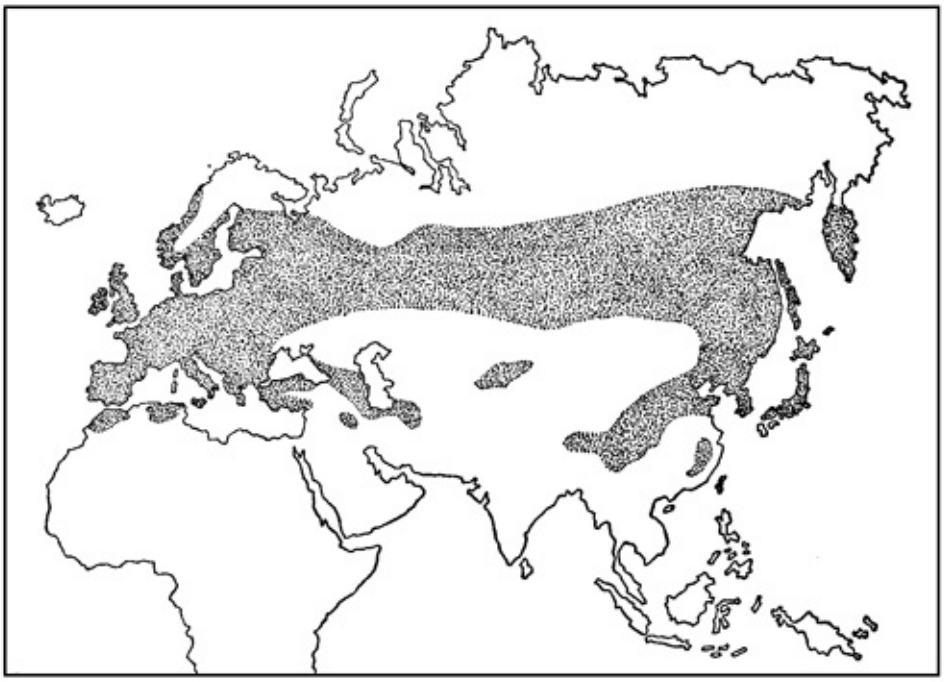

FIG. 2. The world distribution of the Coal Tit, *Parus ater*. Although this species is most widespread in coniferous forests many, especially of the more southerly populations, live in broad-leaved woodland.

Several subspecies are recognized throughout this range. In the western part *P. a. atlas* and *P. ledouci* occur in north-west Africa while *P. a. ater* is found throughout western Europe except th British Isles. This bird is greyer on the back than the British Coal Tit which is recognized as a separa race *P. a. britannicus*; the British bird tends to be browner on the back, with a hint of green in th mantle. The Coal Tits in Ireland often have a tinge of yellow in their cheeks and in the nape patc there has been much discussion as to their status, and some authors have considered them to be separate race *P. a. hibernicus*. However, the differences are small and not always present[411]. Th situation is further complicated by there being some variation within Ireland itself. The birds of th north and east tend to resemble the British form more closely than do those of the south and west. the latter areas the beak tends to be stouter than in the British form, a character associated with livi in the broad-leaved woods that it frequents there.

The Continental race is frequently recorded in Britain, especially in the south-eastern corner[15 312]. It comes particularly in years when the beech crops fail and is usually the first tit species to arri in these irruptions[68, 408]. Movements on the Continent may be extensive and are discussed further chapter 12.

Within Britain, the Coal Tit is widespread though not quite so widespread as the Great Tit an Blue Tit. It does not occur as a breeding species in many of the outer islands, including Orkne Shetland and the Outer Hebrides, though a few have bred in Stornoway since 1966 (fig. 3). Elsewhe it is widespread and numerous, though it is seldom as abundant as the Great and Blue Tits.

The Coal Tit is widely, and correctly, held to be a bird of conifers, but this is by no means a adequate description of its habitat either within Britain or elsewhere. It is true that the Coal Tit ofte nests at higher densities in conifer than in broad-leaved deciduous woods, but it is very definite present, often in some numbers, in most types of woodland habitats.

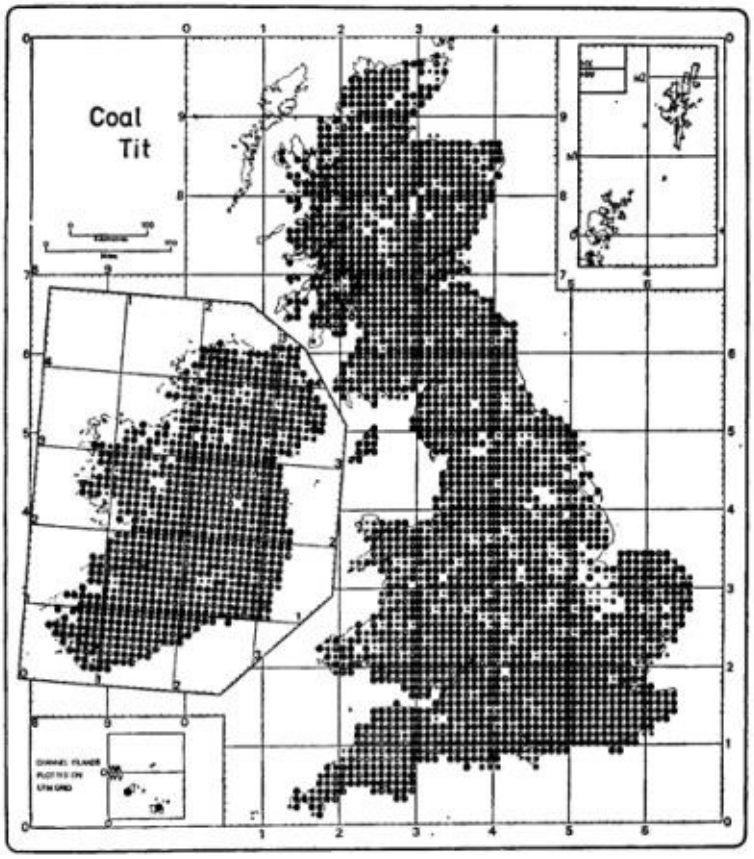


FIG. 3. The British distribution of the Coal Tit. The map shows the breeding distribution of the birds plotted on a 10 km grid, the largest dots denoting proved breeding (from Sharrock 1976)

It is the commonest species of breeding tit in southern conifer plantations and must hav benefited considerably from the recent forestry practice of planting conifers. In the rich, old pinewoods of the Spey Valley only the Coal and Crested Tits occur in any numbers. In winter also th Coal Tit is the most abundant species in conifer, though some Great and Blue Tits move into thes woods for the winter.

Although the Coal Tit is much scarcer as a breeding bird than either Great or Blue Tits in mo deciduous woodland in southern Britain, it is relatively more abundant in such woods farther north. is as common as or commoner than either of these other two species in the sessile oakwoods of th north and west and in the birchwoods of Ross and Sutherland. In the hill woods of these northern are it is even commoner than in the lowlands and may outnumber both Great and Blue Tits together[20 410].

The British Coal Tit is generally believed to be largely sedentary but there must be a certa amount of local movement. For example, it seems even more abundant in the northern hill woods winter than in summer and is said to be commoner in Herefordshire in winter than in summer, s inferring some level of movement[131]. In Westmorland many are reported to leave the spruce ar pinewoods in the spring and go to hardwoods where there are better nesting sites[406]. This is likely happen particularly where the plantations are young and clean (i.e. without holes) and the ground to waterlogged for nesting.

Detailed information on breeding densities are difficult to obtain because the birds do not alwa use nest-boxes. However, they tend to confirm this species' preference for conifer. In Marley Woo an area of about twenty-seven hectares, there are usually only either one or two pairs of Coal Ti giving a breeding density of about one pair to every fifteen hectares or less, no more than one-fifth the density found in the Breckland pines where they nest at densities of about 0.1–0.5 pairs (averag 0.3 pairs) per hectare in Scots Pine, *Pinus sylvestris*,[77, 376]. Figure 4 shows the fluctuations in breedi

density in pinewoods in East Anglia. Densities are slightly lower in Corsican Pine *P. nigra* than Scots; the latter has a slightly richer insect fauna. Densities as high as a pair per hectare have be recorded in certain areas of conifer.

Looking beyond Britain, we again find that the Coal Tit is by no means wholly a bird coniferous woodlands. It is relatively common in oakwoods in North Africa and Iran, though it ma once have preferred the now largely extinct cedar forests. In Czechoslovakia it occurs in t beechwoods, but not the spruce at 1300m and it is also found in the Italian beechwoods at Latium [384]. Several workers have noted that the Coal Tit occupies a wider range of habitats in the south tha in the north of its range[23, 94] (chapter 9).

However, in other parts of Europe the Coal Tits seem to be more closely confined to conifer tha is the case with the British birds. Not only this, but they seem to show stronger preferences f sprucewoods than for pine. This is true both in the summer and in winter. Indeed some breedi densities in spruce are much higher than those in pines. One report gives a breeding density of average about a pair per hectare, roughly three times the normal level reached in pines in Britain[230].

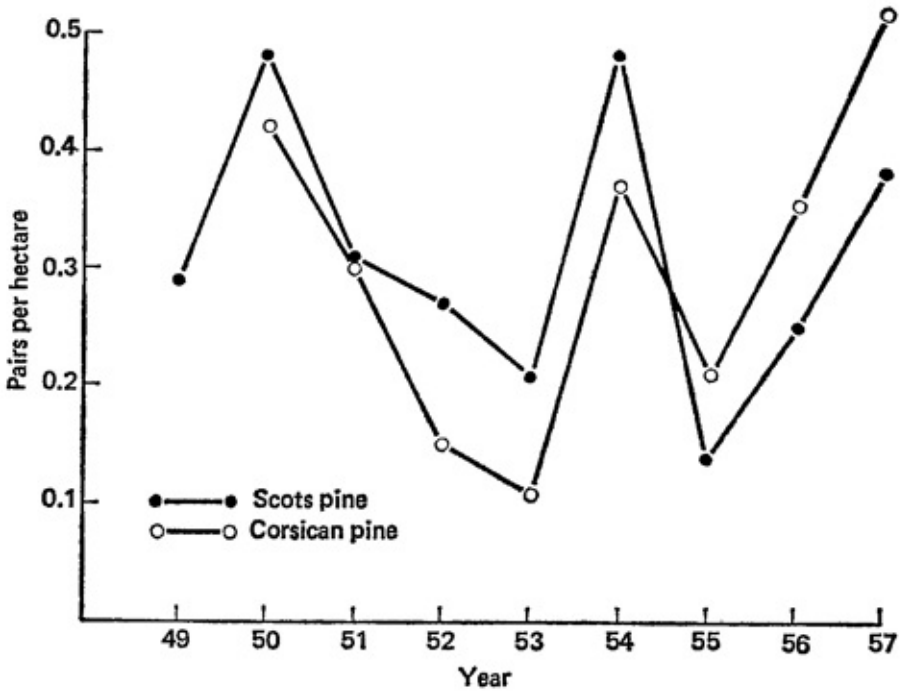


FIG. 4. Annual fluctuations in breeding density of Coal Tit, *Parus ater*, in Breckland pine plantations (from Lack 1966).

Studies that have been made of the feeding of Coal Tits tend to confirm that it is better adapted feed in conifers than many of the other species. It has a narrower, more slender bill, like that of oth coniferous birds, and takes smaller food[28, 341]. In addition, in mixed woodland containing both conif and broad-leaved trees, it spends far more of its time in the conifers than any of the other tits[119, 15] Figure 5 shows the range of places where Coal Tits were recorded feeding in Wytham.

Within its range, the bill shape varies quite markedly, being relatively thinner in those area where it frequents conifers, stouter where it occurs in broad-leaved woods. The bill shape is believe to be associated with the leaf structure in these different areas, a finer beak being required for probi into clusters of pine needles. The British Coal Tits possess a slightly stouter beak than those on t Continent and it seems likely that they are, or were, evolving a bill more suitable for broad-leave woods. After Britain was isolated from the Continent and after the last glaciation when it becam habitable for woodland birds once more, conifers disappeared from most of the country, especially t south, and were replaced by broad-leaved woodlands. Hence, if Coal Tits were to continue to exist

Britain, they had to live in the latter habitat. The slightly stouter beak and their greater readine (compared with their Continental cousins) to live in hardwood forests may be indications that th were slowly evolving the characteristics of a broad-leaved forest species. The recent spread coniferous woodlands, as a result of forestry, has enabled them to re-occupy their 'primaeval' habita

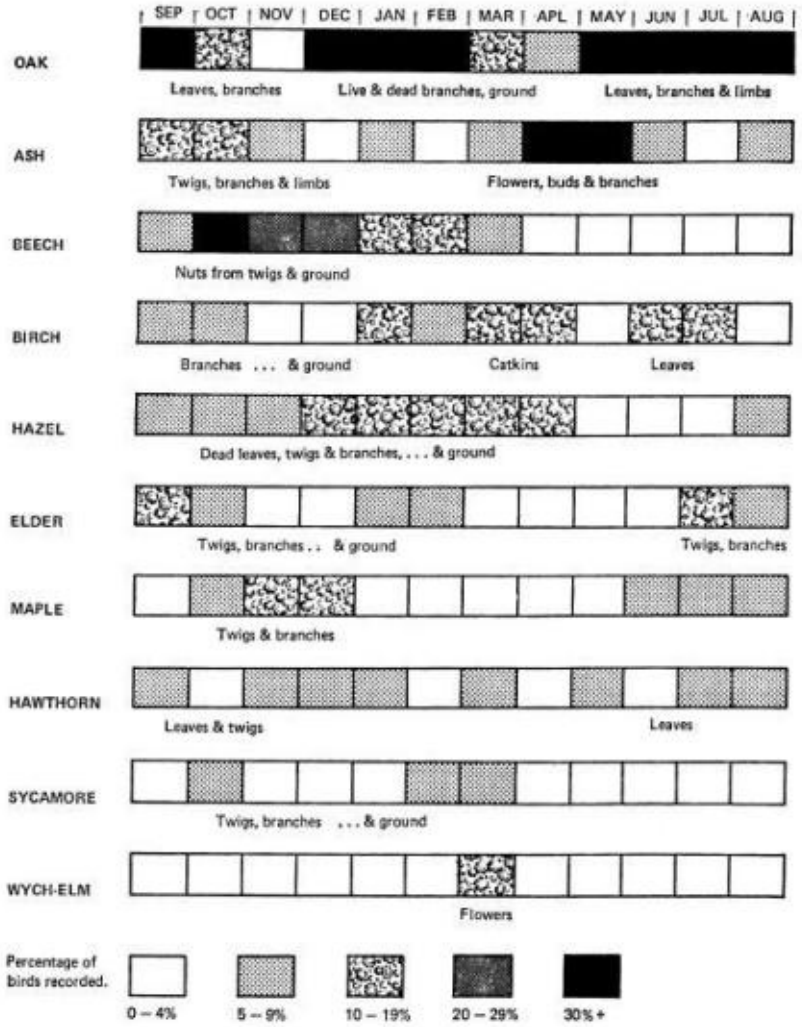


FIG. 5. The main feeding sites of Coal Tits in Marley Wood, Oxford, showing the proportion of time spent in each tree species in each month. In winter Coal Tits fed primarily in oaks (conifers, to which they are primarily adapted, are absent from Marley Wood). Early in the winter they fed from the leaves, then later mostly from live and dead branches and limbs. The proportion which fed on beechmast from October to February was higher than in Great or Blue Tits. When beechmast was over, Coal Tits fed mainly in ash. They fed in ash more often than the other tits all winter, but especially in April and May. The main sources of food were the flowers, buds and branches. Other food-sources included: (a) twigs and branches generally, September-January; (b) the ground, January-March; (c) elm flowers in March; and (d) birch catkins in March-April (from Gibb 1954a).

The planting of conifers seems to have had a considerable effect on the Coal Tit. As mentioned, breeds there in higher densities than in broad-leaved woodland and appears to have expanded its rang in Britain as a result of such forestry; in particular its range has spread northwards in Scotland as result of re-afforestation, though here presumably it was common before the forests were removed 205, 278. On the Continent also the planting of conifers must have benefited the Coal Tits, though the were always extensive areas of conifer there at higher altitudes; hence the birds there had less need become adapted to hardwoods than was the case with those in Britain. The new plantations hav merely enabled them to spread in the lowlands.

Unlike the British Coal Tits, the Continental Coal Tits may show considerable movements autumn, especially when some of the seed crops, on which they are dependent in winter, fail. In suc cases, as with the Great and Blue Tits, the Continental Coal Tits move widely and may enter Britain

284. Many of the birds moving in such irruptions come from eastern Europe325. However, if the foo supply is plentiful they will remain in very cold areas for the winter.

Like the other tits, the breeding season varies in relation to the earliness or lateness of the sprin but laying normally commences in early to mid-April in southern Britain. Of the three commo species (Coal, Blue and Great Tits) the Coal Tit is the earliest to lay, usually starting a few days ahea of the Blue Tit. Breeding starts, on average, about five days earlier in Scots Pine than in adjace Corsican Pine; the food supply is lower in the latter habitat, but it is not known whether this is t cause of the difference129. At high altitudes laying may start before the snow has gone.

The nest-site is variable. While the Coal Tit will readily accept nesting boxes, it tends to pref those with a very small entrance; it may even select boxes with a narrow vertical slit as an entrance preference to those with a normal circular hole. When there is competition for a site, the Coal Tit easily defeated by both Great and Blue Tits and, perhaps for this reason, selects sites with entranc too small or too difficult for these species. In the absence of nesting boxes, the Coal Tit may nest the ground, often using a mouse-hole for this purpose. Where there is a choice, the Coal Tit usual seems to prefer a nest-box situated on a conifer to one on a deciduous tree. In Wytham, it may qui often nest in the only box on a conifer in an area of broad-leaved trees.

The nest itself is built largely of moss. The cup is lined with fur or hair which it may take from dead animal such as the Field Vole *Microtus agrestis*36. The Coal Tit only rarely uses feathers in t lining and this, together with the very small size of the cup, helps to identify the species; it resembl a tiny Great Tit nest.

The Coal Tit lays a clutch of about ten eggs in Britain and seems less variable in this than sever of the other species. There is little seasonal decline in clutch-size during the early part of the seaso though those started in the second half of May tend to be a little smaller (by about one egg214 Genuine second broods are fairly regular in this species; particularly in conifer (where about 11 have second broods): they have also been recorded in deciduous woodland though they are much le common there. Based on the very small sample in Wytham, second broods are much smalle averaging about seven eggs. At high altitudes on the Continent, where breeding starts late, there ma be no second broods.

The food of the Coal Tit varies like that of the other tits, being primarily insects in the summ and a mixture of seeds and insects in the winter. Those in oakwoods take more insects in their wint diets than either Blue or Great Tits28.

In Scandinavia it is well known that these birds store the seeds of spruce and other trees for u later in the winter145. The Coal Tit stores food more regularly than the other tits in southern Britai apart from this species, only the Marsh Tit is known to store food so regularly. Birds may be watche removing large quantities of peanuts from bird tables and flying off to hide them. In the wild, th also store large quantities of insects.

The Coal Tits seem to survive quite well in snow-covered areas of conifer, especially if it is n too cold. At such times, although the branches are covered with snow, it seems to be relatively eas for this small bird to feed from the under surfaces of the branches which are free from snow. addition, they may roost among the needles, often using the same site for long periods. They also roo in old nests of other birds and in hollows made by Treecreepers.

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