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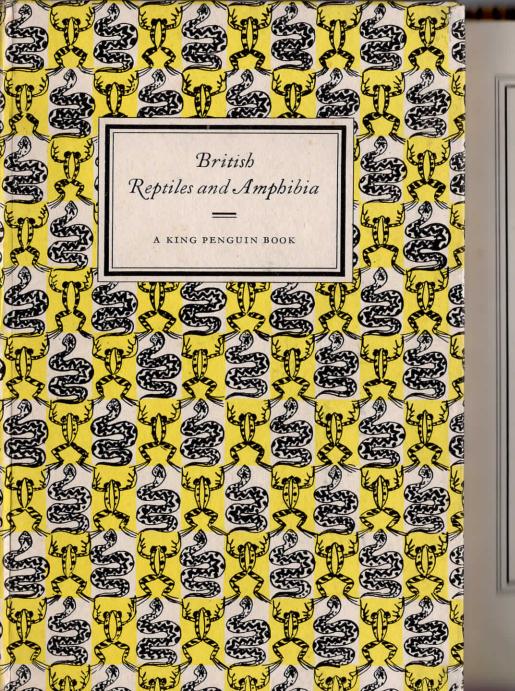
Dear Caroline,

Thank you, Yes the post sent to Temple Quay House does include additional material of two books:

- 1. In Search of Heathland by Lee Chadwick; and
- 2. A King Penguin book, 'British Reptiles and Amphibia', illustrated by Paxton Chadwick

I am not needing these books to be returned and I would like them to be added to my deadline 5 submission please. I have attempted to give an idea of the relevant content by here attaching scanned pages from In Search of Heathland but these are only a small representation of the weighty research that has been done into the flora and fauna, much of which is rare, to be found on the heathland that SPR are proposing to dig their trenches across -- and we understand possibly numerous further projects to follow. I also attach a poster showing just a few of Paxton Chadwick's illustrations of reptiles, moths and butterflies, again found in this fragile landscape. These are only a tiny representation of the work he produced from this habitat, many of which are held at the Natural History Museum.

Regards, Bridget Chadwick



British Reptiles and Amphibia

BY MALCOLM SMITH

ILLUSTRATED BY
PAXTON CHADWICK

PENGUIN BOOKS















Paxton Chadwick painted many of these from local specimens Their habitat is now endangered by SPR's proposed works



'In Search of Heathland' is Lee Chadwick's seminal book on our precious area We must protect this unique habitat and landscape

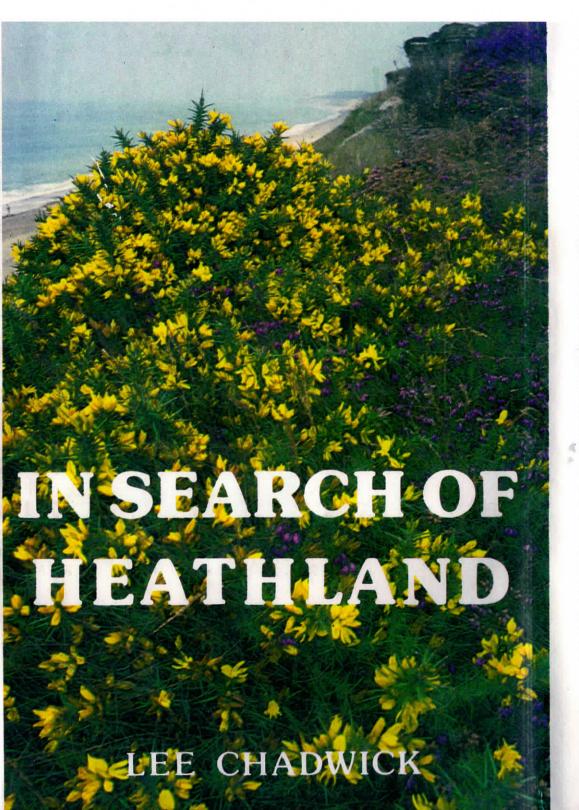
The books are out of print can be found secondhand

in depth all aspects of one of the most book points the way in which the nonbest loved but also one of the most rapidly dis

Illustrated with long pull-out sections in full colour as well black and white drawings and photographs by several artists.

"This book is not only an account of the wild plants and animals of heathland with its many geographical variations but also captures its spirit in a way that will refresh experienced naturalists as well as

Dr Michael Brian, ecologist at Furzebrook Station



IN SEARCH OF HEATHLAND

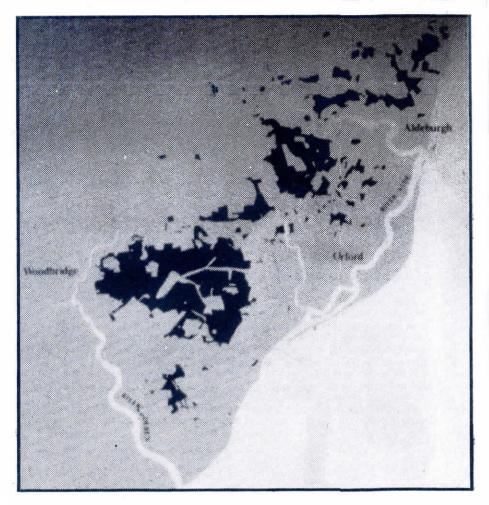
LEE CHADWICK

In the late 1930s, Lee Chadwick and her husband, naturalist and artist Paxton Chadwick, made their studio home on one of the Sandling heaths on the Crag soils of Suffolk's Heritage Coast. This piece of relic heath forms the study area for the central section of the book. Here, field observations are made and recorded of many aspects of heathland ecology. As well as descriptions of the typical flowering plants, mosses, lichen and fungi, there are records and accounts of the insect and mammal populations of lowland heaths, including heathland species of bees and wasps, grasshoppers and allied insects, butterflies and moths, small mammals and reptiles. The various roles of soil, climate and certain biotic factors, such as the presence of the rabbit, in determining the pattern of the heath and the interrelation of its plant and animal communities is examined. All this is described with the immediacy of facts observed in everyday life.

The author emphasises the relationship throughout the ages of people with heathland, in work and recreation. She looks at the origins of heathland and its connection with neolithic farming practices, at heath dwellers in literature and life, at shepherds and sheepwalks, at famous travellers to the Sandling heaths, at types of commons and their management, at the history of struggle for common rights in the face of enclosure of heaths and commonland, and at heaths as meeting places and for social gatherings.

continued on back flap

THE SUFFOLK



1881

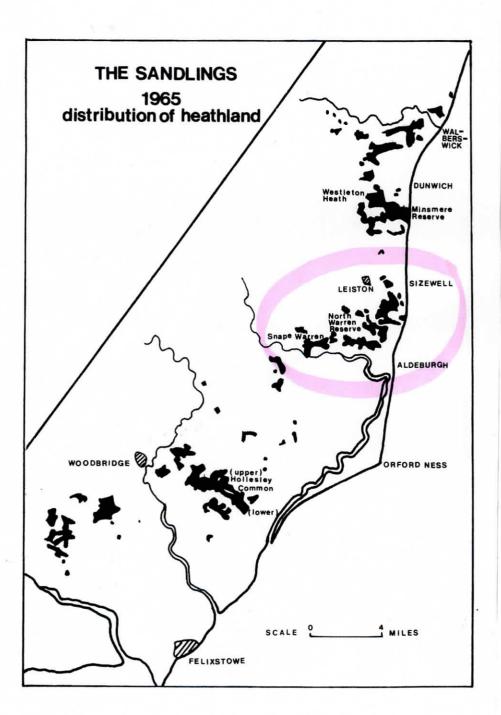
THE LOSS OF HEATHLAND

SANDLINGS



1981

OVER THE LAST HUNDRED YEARS



FOREWORD

While moors owe their creation to mist and rain sweeping across hill country, heaths are the product of arid sands, wind-blown from beaches or spread long ago by glacier, torrent and wave. The plants and creatures of heathlands have learned to survive the special difficulties imposed by a harsh environment and have developed communities unique in character on this account, varying here and there as they reflect differences in local climate, aspect and land treatment over the centuries.

This book tells their story in fascinating breadth and detail, bringing under review a wealth of history, physical and human and describing the ways of life pursued by a diversity of plants, insects, reptiles, birds and other inhabitants of our remaining oases of heather, gorse and bracken. A long and patient study of East Anglia's still fairly rich heritage of heaths is the basis from which excursions for the appraisal of samples elsewhere in England are undertaken.

Something of the enchantment found by Jean Henri Fabre in his classic entomological researches conducted in the south of France a century ago is revived here for the delight of naturalists and it is clear that this is where the author's enthusiasm finds most heartfelt expression. At the same time, the ultimate fate of this unique feature of the English countryside must depend on establishing an enlightened concept of heathland as an amenity exploited and enjoyed by people of many persuasions through the ages and in our time. Lee Chadwick's book brings together all the threads of interest, as in a tapestry, so that we may view the whole scene in perspective in a way never attempted before with such success.

E. A. ELLIS

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cross between a Welsh and Shetland pony, she came to us with laminitis, an inflamation of the hoofs that can be aggravated by too rich grass and we were advised to keep her on as nearly bare ground as possible. Hence the hard grazing the piece of heath received when for a period of some ten years pony and rabbits had the enclosure to themselves, producing a strange hummocky lunar landscape, lichen and moss covered, with short thin grass and some bare earth. Today the result is an area of open heath approaching more nearly the sheep-grazed Sandling heaths of former times and for this reason providing an interesting study area.

Since the death of the pony some ten years ago, rabbits though reduced have been the all important animals here as elsewhere on the Sandling heaths, their activities helping to determine the pattern of vegetation and having an effect on what ecologists have called plant sociology—the relationships between plants in the heathland ecology.

PLANTS OF OPEN GRAZED HEATH

With the death of the pony and consequent decrease in grazing, the very free seeding bell heather made a rapid recovery. This is a plant that is vulnerable to grazing and stands up to it less well than some other members of the heather family. C. H. Gimingham found in experiments in Scotland that with mild grazing the growth of heather or ling Calluna vulgaris was enhanced but bell heather Erica cinerea with its more open branching tended gradually to die out. When grazing was further increased the ling too was damaged and under really heavy grazing, grasses took over. This was the position here at the height of pony and rabbit grazing.

The study area of the heath slopes south, is very well drained and sandy with little humus and near the sea—a situation that exactly suits bell heather which is found in similar situations in the Faroes, West Norway and north-west France. To conserve moisture the dark green leaves, arranged in whorls of three round the stem, are permanently so rolled back as to cover the hairy underside except for a small slit. At an early stage, the young plants resist dry conditions better than *Calluna vulgaris* seedlings by sending down a tap root for moisture. On a southern slope like this where summer heat is intense and grazing slight, bell heather can become the dominant plant as is happening here.

A diary entry for August 7th 1968 recorded three years after the

EIGHT HEATHLAND GRASSES—1, PURPLE MOOR-GRASS MOLINIA CAERULEA. 2, BROWN BENT AGROSTIS CANINA. 3. HEATH-GRASS SIEGLINGIA DECUMBENS. 4. SHEEP'S-FESCUE FESTUCA OVINA. 5. WAVY HAIR-GRASS DESCHAMPSIA FLEXUOSA. 6. EARLY HAIR-GRASS AIRA PRAECOX. 7. COMMON BENT AGROSTIS TENUIS. 8. BRISTLE BENT AGROSTIS SETACEA.



death of the pony and some twelve years after the arrival of myxomatosis:

The purple bell heather spreading with mosses and much lichen. Besides bents and sheep's fescue Agrostis/Festuca and early hairgrass Aira praecox, sheep's sorrel Rumex acetosella tinges the whole surface red where it occurs over large areas along with moss and lichen on almost bare soil. In June among the red of sorrel everywhere there are white pools of heath bedstraw Galium saxatile in the hollows.

Today, the bell heather has spread spectacularly from north to south of the slope and will soon extend over the whole enclosure under slight rabbit grazing.

The woody evergreen shrubs of bell heather can grow up to eighteen inches but here their low prostrate growth is encouraged where the plants are nibbled into compact growth by rabbits. The bell-like flower heads are a mass of crimson-purple bloom from July onwards, turning a bronzed rust in autumn. These old flower heads seem to hang on all the winter, still showing even when the heath is clothed in snow in February. The plants are less resistant to winter cold, however, than heather according to P. Bannister (1965). And this was evident during the harsh winter of 1978–79 with consequent late flowering.

In the study area, heather Calluna vulgaris is absent except for one elderly bush that is dying and collapsing in the centre but regenerating on the cropped verges where the heather is short, closely packed and dome-shaped. This is because each time a long leading shoot is nibbled back by a rabbit, the structure of the plant enables it to replace this shoot with two or more new ones from a stack of short side shoots and axil buds. This cropped heather appears young and vigorous because all the plant's energy goes into the production of young shoots rather than into wood.

MOSS AND LICHEN-A MINIATURE LANDSCAPE

When the bell heather is not in bloom, from a distance the heath has a look of tawny uniformity but a close-up view reveals a varied and intricate ground layer pattern mainly of moss, lichen and fungi with some sparse grass—a miniature landscape less than half an inch in height.

Carpeting the area between the heather community are a variety of heathland mosses: "Variety upon variety, dark green and pale green;

mosses like little fir-trees, like plush, like malachite stars, like nothing on earth except moss," as Thomas Hardy described them.

The hair mosses are specially characteristic of dry acid heathland and two varieties at least grow on this particular sunny strip of coastal heath: Polytrichum juniperinum and Polytrichum piliferum. These are the mosses "like little fir-trees", dark bluish-green in colour with cushions of stiffly upright little stems each with its spirals of minute leaves. On patches of bare ground, carpeting it "like plush" is another moss with the Latin name (these mosses have no other) of Ceratodon purpureus with purplish-red stems to its spore capsules and spreading triangular leaves. Very widespread, also, are the loose tufts of the brilliant yellow-green Dicranum scoparium growing through and between the low spreading clumps of bell heather. Here, too, but less frequent is a graceful moss with the long awkward name of Pseudoscleropodium purum, common on chalk grassland but also found on heaths. Its light green leaves so closely overlap the stem as to give a high silvery sheen to the whole plant whose stems intertwine in a loose weft-like form.

A typical heathland moss—a variety, ericetorum, of Hypnum cupressiforme now renamed Hypnum jutlandicum—grows in pale whitish green wefts elsewhere on the common, but here rather surprisingly only in the decaying centre of the solitary heather bush Calluna vulgaris where the shady conditions of this mini-climate are similar to woodland. The leaves of its very regularly branched stems are curved typically to one side.

Moss spores (the equivalent of seeds in flowering plants) are contained in beautifully designed spore capsules, held aloft on delicate wiry stems and colouring as the spores ripen to orange, brown and deep red. Hardy's "malachite stars" were probably the starry red-gold rosettes that the male plants of some heathland mosses (like *Polytrichum juniperinum*) bear on their stem tips.

Both mosses and lichen can absorb water and dissolved food material over any part of the body. They have no true root and are only anchored to the ground by thread-like rhizoids.

The lichens on the close grazed heath of the study area are nearly all species of *Cladonia*, fruit bearing lichens with a tough outer rind growing directly from a "platform" in elongated stalks and strands. Their whitish green colouring picks out their presence among the deeper greens of the mosses. Particularly widespread are the delicate sponge-like masses of *Cladonia impexa*. *Impexa* means "combed out" and suggests the intricate branch growth, divided and subdivided at

KEY TO PLANTS AND INSECTS OF LOWLAND HEATH AND BOG

PLANTS 1 Hare's-tail Cottongrass 2 Common Cottongrass 3 Bog Asphodel 4 Common Butterwort 5 Marsh Gentian 6 Round-leaved Sundew 8 Heath Spotted orchid 9 Bog Pimpernel 10 Bog Moss 11 Soft Rush 13 Cross-leaved Heath 14 Lousewort 15 Western Gorse 16 Tormentil 17 Gorse

20 Bell Heather 21 Petty Whin 22 Bilberry 25 Sheep's Sorrel 26 Heath Bedstraw 28 Dwarf Gorse 29 (Fungus) 32 Bracken

34 Heather 35 Horse-hair toadstool 36 Heath Dog-violet

37 (Moss) 38 (Moss) 39 (Lichen) 40 (Lichen) 41 (Lichen)

42 Heath Milkwort

46 Dodder

48 Trailing St John's-Worl

49 Biting Stonecrop 50 Sheep's-bit

51 Harebell 54 Burnet Rose

55 Broom

INSECTS 7 Keeled Orthetrum Dragonfly 12 Bog Bush-cricket

18 Gorse Shield Bug in autumn 19 Green Hairstreak Butterfly

23 Fox Moth Larva in October 24 Small Copper Butterfly

27 Green Tiger Beetle

30 Bumblebee Queen

31 Fox Moth

33 Silver-studded Blue Butterfly

43 Emperor Moth larva in July 44 Emperor Moth

45 Heather Beetle

47 Oil Beetle swollen with eggs

52 Cinnabar Moth

53 Mottled Grasshopper

56 Small Heath Butterfly

Eriophorum vaginatum Eriophorum angustifolium Narthecium ossifragum Pinguicula vulgaris Gentiana pneumonanthe Drosera rotundifolia Dactylorhiza maculata Anagallis tenella Sphagnum sp. Juncus effusus Erica tetralix

Pedicularis sylvatica Ulex gallii Potentilla erecta Ulex europaeus Erica cinerea Genista anglica Vaccinium myrtillus Rumex acetosella Galium saxatile Ulex minor Mycena epipterygia

Pteridium aquilinum Calluna vulgaris Marasmius androsaceus Viola canina

Hypnum jutlandicum Polytrichum juniperinum

Cladonia impexa Cladonia floerkeana Cladonia coccifera Polygala serpyllifolia Cuscuta epithymum

Hypericum humifusum Sedum acre

Jasione montana Campanula rotundifolia Rosa pimpinellifolia Sarothamnus scoparius

Orthetrum coerulescens (male) WS 60mm Metrioptera brachyptera (female) BL 19mm excluding ovipositor

Piezodorus lituratus BL 13mm Callophrys rubi WS 30mm Macrothylacia rubi

Lycaena phlaeas (female) WS 30mm Cicindela campestris BL 15mm

Bombus lucorum BL 22mm

Macrothylacia rubi (male) WS 48mm Plebejus argus (male) WS 27mm

Saturnia pavonia

Saturnia pavonia (male) WS 57mm Lochmaea suturalis BL 6mm

Meloë proscarabaeus (female) BL 36mm Tyria jacobaeae (female) WS 38mm

Myrmeleotettix maculatus (male) BL 15mm Coenonympha pamphilus (female) WS 33mm





mouth as pick and shovel to carry sand to the entrance, always moving backwards so that the tail appears first out of the hole. (This observation was made by Henry J. Boreham (1951) who watched the operation in a sandhill at Bury St Edmunds, Suffolk.)

A female field digger-wasp *Mellinus arvensis* was caught at the entrance to its burrow in a sandy mound near a rabbit hole in the study area. Viewed under a microscope she was of handsome appearance—shiny black with a yellow line each side of the face, yellow collar, two yellow spots on the black segments of her black and yellow abdomen, and black and yellow legs to match. She fills the cells leading off from her burrow each with four to five blow-flies, hover-flies etc which she part paralyses then, with the prey tucked upside down under her legs, flies back to the nest.

Other wasps that burrow in sandy soil specialise in different prey. The sand tailed-digger Cerceris arenaria for instance only stores weevils, while the black-banded spider wasp Anoplius viaticus scrapes in bare sand with long black spiny legs in search of spiders, including the fat-bodied wolf spider Trochosa terricola that occurs on Leiston Common. She paralyses the spider without killing it, drags it to a suitable site then excavates a nest hole, filling each cell with a spider on which she will lay one egg. When all is completed she covers the entrance with heather litter, rabbit pellets or whatever is to hand.

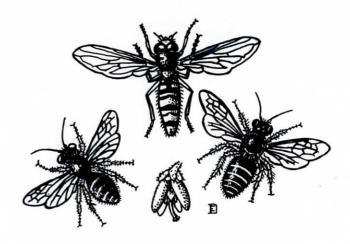
Rare in East Anglia and not recorded in the study area, though widespread in the south, is an interesting wasp known as the heath potter wasp *Eumenes coarctata*. It constructs a pitcher-shaped nest of clay attached to the stem of heather or other woody plant. The pot consists of a single cell which is provisioned with sufficient small caterpillars (Lepidoptera) to serve as food for one larva.

BEES AND OTHER POLLINATORS ON A HEATHER BUSH

The solitary bees, like the solitary wasps, differ from their social relatives in that there is no worker caste and each female works on her own to provide home and food for her young. However, unlike the wasps the bees are not predatory and the larvae are not carnivorous. The young feed entirely on honey and pollen—a mixture known as pollen loaf. The need to collect this food makes these solitary wild bees of great value as pollinators particularly since some of them appear early in the spring before other species are about.

One afternoon, on Leiston Common in August of 1979, a single tall clump of mature heather Calluna vulgaris growing among a carpet of

bell heather *Erica cinerea* was watched for visiting bees. Working the flowers in large numbers were small bees with head and thorax covered thickly with brown hairs, some paler than others. One of the latter was identified as a male *Colletes succinctus*, sometimes called by the English translation—"girdled colletes". It is confined to heather *Calluna* and *Erica* and can be seen swarming on heathland in late summer searching the flowers for nectar with its short divided tongue, the retaining hairs on the hind legs of the females bulging with pollen.



A HOVER-FLY, EPISYRPHUS BALTEATUS BL 11·5 mm MINING BEES. ANDRENA FUSCIPES, MALE BL 9 mm COLLETES SUCCINCTUS, MALE BL 10 mm

The female makes its nest in sandy soil in a straight shaft to a depth of some 25cms. This burrow is water-proofed with a thin membranous pellicle resembling cellophane produced from certain glands, then the cells are made one above the other, each filled with pollen moistened with honey on which is laid one egg.

Although the female Colletes succinctus intends her burrow solely for her own offspring, there is a little inquiline bee Epeolus cruciger that thwarts her purpose by watching an opportunity to slip inside the burrow and lay her egg in the loaf provided. This interloper's grub destroys the host's egg and then grows fat on the food in the larder.

The other solitary bees swarming on the clump of heather in

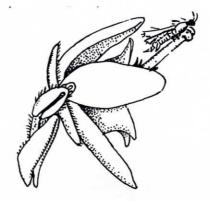
considerable numbers were small mining bees Andrena fuscipes, which visit heather flowers for nectar and pollen. Certain composite flowers like ragwort Senecio jacobaea also help sometimes to provide this provender which the females use to stock the many branched burrows they dig in the bare soil nearby. In this case also there is an unwanted intruder, a long waisted homeless bee Nomada rufipes.

On the particular afternoon in question, other insects visiting the heather bush included honey bees *Apis mellifera* workers, male and worker bumblebees *Bombus lucorum* and *B. pascuorum*, and a species of ichneumon wasp. Also sipping the heather nectar in the August sunshine were black and yellow hover-flies of wasp-like appearance. It was possible to identify three species: *Episyrphus balteatus*, a male and female of *Metasyrphus corollae*, and a male and female *Melanostoma mellinum*.

Heather is obviously an important food plant for a variety of insects but the benefits are by no means one sided. A Danish biologist O. Hagerup (1950) studied the importance of bees and other insects in the pollination of both heather or ling, and bell heather. Wind pollination is very important for both plants as one can see from the fine clouds of powdery pollen released from the masses of closely packed flowers but it would be impossible in many climates to rely on wind alone.

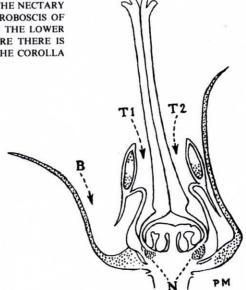
The structural features of the flowers of Calluna present a problem to some larger insects and Hagerup noticed that remarkably little pollen was seen on these insects that visited heather alone. This he thought was because when the heather flower is open the stigma protrudes so far out that the length of the style makes it difficult for larger insects to put their heads into the flower and reach the anthers which are confined to a very small space in the bell-shaped corolla.

However, there are minute insects about 1mm in length that provide extremely effective pollination. These are the heather thrips *Thaeniothrips ericae*, that perform all their life functions inside a heather bell—eating, copulating and egg laying. Being so small they can easily crawl into the narrow tube formed by the stamens where most of the nectary is hidden. To do this they cannot avoid touching the anthers and getting covered with pollen which gets shaken off onto the sticky stigma, particularly when the females struggle to open closely locked wings before flying off in search of a male.



THRIPS TAENIOTHRIPS ERICAE
POLLINATING A HEATHER
CALLUNA FLOWER. ×12.

LONGITUDINAL SECTION OF THE FLOWER SHOWING NECTARY (N). THE THRIPS FORCES ITS WAY DOWN TO THE NECTARY AT TI AND T2 WHILE THE PROBOSCIS OF A BEE IS INSERTED AT B ON THE LOWER SIDE OF THE FLOWER WHERE THERE IS GREATER SPACE BETWEEN THE COROLLA AND THE STAMENS. ×15.



A SHORT LIST OF SOLITARY BEES ON HEATHLAND

PLANTS VISITED FOR NECTAR/POLLEN FOR LARVAE

Colletes succinctus (Colletidae) Epeolus cruciger (Anthophoridae) Andrena barbilabris (Andrenidae) Sphecodes pellucidus (Halictidae) Andrena fuscipes (Andrenidae)

Nomada rufipes (Anthophoridae) Andrena argentata (Andrenidae) Panurgus banksianus (Andrenidae) Panurgus calcaratus (Andrenidae) Lasioglossum prasinum (Halictidae) Dasypoda altercator (=hirtipes) (Melittidae)

Heliophilus bimaculata (Anthophoridae) Heather bloom Calluna and Erica
Inquiline of Colletes succinctus
Mainly yellow Compositae flowers
Inquiline of Andrena barbilabris
Swarms over heather Calluna and Erica
which it visits for nectar and pollen.
Occasionally visits yellow Compositae flowers
Inquiline of Andrena fuscipes
Visits Calluna and Erica blooms
Visits yellow Compositae
Visits yellow Compositae
Visits Erica and Calluna
Sometimes swarms locally on heaths.
Mainly visits yellow Compositae flowers

Swarms locally on heaths, forming large, compact colonies. Visits heather bloom Calluna and Erica

SOLITARY WASPS ON HEATHLAND

Astata boops (Sphecidae)
Psen equestris (Sphecidae)
Omalus panzeri (Chrysididae)
Tachysphex pompiliformis
(Sphecidae)
Ammophila sabulosa (Sphecidae)

Crabro cribrarius (Sphecidae) Crabro peltarius (Sphecidae) Crossocerus wesmaeli (Sphecidae) Oxybelus uniglumis (Sphecidae) Diodontus minutus (Sphecidae) Mellinus arvensis (Sphecidae) Cerceris rybyensis (Sphecidae)

Cerceris arenaria (Sphecidae)
Methocha ichneumonides
(Tiphiidae)
Myrmosa atra (Tiphiidae)
Pompilus cinereus (=plumbeus)
(Pompilidae)
Anoplius viaticus (=fuscus)
(Pompilidae)

PREY ON WHICH LARVAE FEED

Mostly immature bugs i.e. Pentatomidae Plant bugs—small Cicadoidea Inquiline of *Psen* species Immature grasshoppers (Acrididae)

Caterpillars of moths including the larger, naked larvae of Noctuidae Medium-size flies (Diptera)
Diptera
Small Diptera
Diptera
Winged aphids
Diptera
Small solitary bees i.e. Halictus, Andrena, Lasioglossum
Certain weevils i.e. Otiorrhynchus species
Tiger beetle larvae, Cicindela species

Various small wasps and perhaps bees Spiders

Spiders

Note: All the above bees and wasps lay their eggs in cells at the end of burrows dug in sandy heathland soils. The inquilines (Latin inquilinus=lodger) do not dig their own burrows but lay their eggs in the cells of other species.

GRASSHOPPERS OF THE STUDY AREA

Walking in early July over the springy turf between the springy clumps of young bell heather *Erica cinerea*, one's every footfall sends up spurts of minute leaping creatures—frog-hoppers in their myriads. Numerous, too, on sunny days are the leaping grasshoppers, at this time of the year still at various stages of development. With patience, it is possible to slip a glass tube over them as they momentarily come to rest and then one can see that they are mostly the mottled grasshopper *Myrmeleotettix maculatus*, the smallest of the common British species and typical grasshopper of drier heaths and moors. In early July of 1979 there were so many on this acre of open Sandlings heath that it was soon possible to catch three nymphs and one fully developed adult. The latter's fawn wings fully covered its abdomen but the growth of the immature wings in the three nymphs was at various stages corresponding to the number of moults they had undergone.

Under the microscope, the elegant herringbone pattern could be clearly seen on the swollen hind femur of the legs marking the lines of attachment of their strong jumping muscles. The colour combinations are astonishingly beautiful and varied. Even more astonishing was the way, in the four samples caught, the colouring of each resembled its own particular background, even though all were found at no great distance from each other. The nymph caught among the new sprouts of the rabbit-nibbled fringe of an old clump of ling Calluna vulgaris echoed exactly its vivid green and purplish red, with the black spotted pattern of the abdomen making it hard to see among the black twigs and peaty soil. Another found in an area of grey lichen and moss was whitish green and buff while the adult caught in short turf had head and pronotum mottled grass green and straw colour!

Certainly one would need to catch many more of these grass-hoppers to ascertain whether this experience was general and not just coincidence but a leading authority on grasshoppers, D. R. Ragge (1965) found by experiment that the nymphs of the mottled grasshopper were able to alter their black pigment in a way that made them less conspicuous. However, in *Grasshoppers, Crickets and Cockroaches of the British Isles* he states that modern opinion tends toward the view that in most cases British grasshopper colouration is governed by genetic factors and not influenced by environment. Though much more work needs to be done on the subject, it is

ADDERS, SLOWWORMS, LIZARDS

The Indian summer of August—September 1979 was memorable for the opportunity to watch adders every day for nearly three weeks during a period when the small heath butterflies were swarming everywhere over the heath, visiting the bell heather flowers for nectar and chasing each other in spiralling flight. It was in mid-August while watching the butterflies that I found a cast skin of an adder *Vipera berus* some two feet in length lying on a mound of bell heather *Erica cinerea* far from public footpaths on the fringe of the open heath study area. Most adders migrate in Spring from their winter quarters on dry heath to wetter land but some stay throughout the summer so the find was not surprising. What did surprise me was the sight that followed later.

The heather came late into bloom after a cold spring and was still in full flower on August 20th when, again in search of insects visiting the bell heather, I saw on precisely the same mound near a patch of twisted dead heather wood, two adders facing each other, vertically coiled with heads and upper parts raised, looking astonishingly golden against the vivid purple heather and green heath grasses. As I paused in some wonder at the sight about a metre away, the smaller of the two with the darker zigzag markings uncoiled and slid with perfect economy of movement under the heather. The larger remained still for a full minute, and then followed suit. This larger adder was beautifully fresh in appearance, the zigzag markings of a rich nut brown on the greenish yellow body. (According to E. N. Arnold of the Natural History Museum, Department of Ecology, it was almost certainly a female.)

The following day at noon, the adders were in the same place, coiled this time flat against the ground, a complicated pattern of broken circles and zigzags making a perfect camouflage against the blackened twigs of heather. I approached them this time as before, (but now clad in wellington boots!) quietly from the north pausing about the same distance away. As before, the smaller, possibly a male, slipped immediately away below but this time the heavier female stayed lazily where she was in the hot sun, and was still there three minutes later when I left.

The next day in mid-morning the adders were in the same place, this time intertwined coil upon coil, in sleep. The female who was nearest to me merely showed she was aware of my presence by pushing her head further under her companion making it possible to compare their colour differences. After five minutes, there was no change in position and when I left they were both sleeping in full view in the sunlight, with white-tailed bumblebees working the heather around them. Two hours later when the sun had gone behind the clouds, the smaller darker adder was there alone and, by now very alert and awake, it slithered immediately under the heather.

Every day, except during rain of which there was very little, the adders were seen and photographed in the identical spot on the bell heather mound. Most days only the larger female remained long enough to photograph and during the last week she alone was seen. On one occasion she was sunning herself as late as 4 p.m. but she grew increasingly wary. After the first week in September, she disappeared entirely from the spot and was not seen on any succeeding day that month.

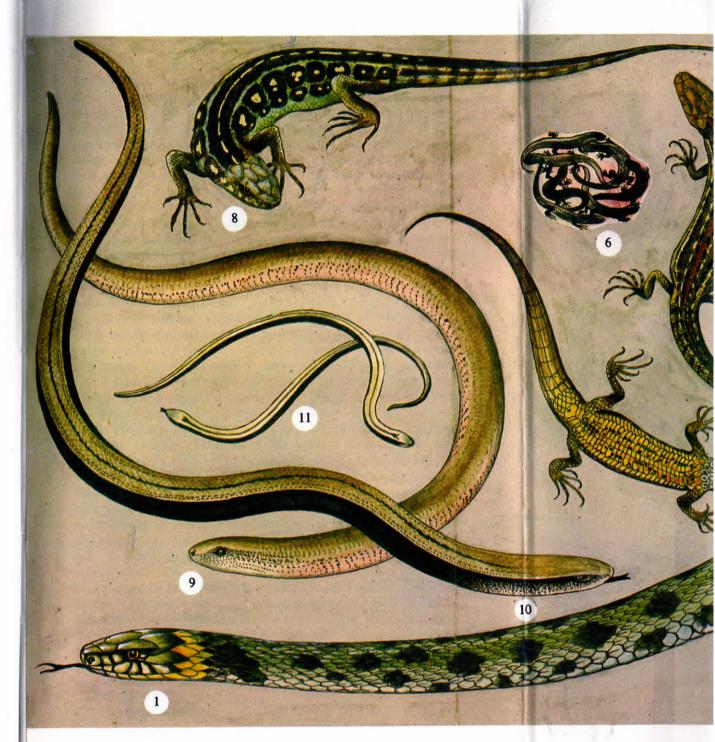
Adders Vipera berus are the most typical reptiles of dry heaths. In Britain they mate in April and May and the young are born in early September. Malcolm Smith (1951) says that pregnant females in July and August may bask all day, choosing the most exposed places in which to lie and returning to the same spot day after day for weeks at a time. I met the same female ten days later (September 16th) some twenty metres north of the usual site on the open heath. We looked at each other for some few seconds then she wound her way over crushed bracken to a bramble and gorse thicket under which she disappeared. Perhaps she had given birth and under the shelter of the bushes would use a rabbit hole in which to hibernate in company with others. I did not investigate further. Adders are not aggressive if left alone and not frightened, but left alone is the operative phrase for their bite is notoriously poisonous. They use this venom to kill their favourite food—common lizards, slowworms, frogs and baby mice.

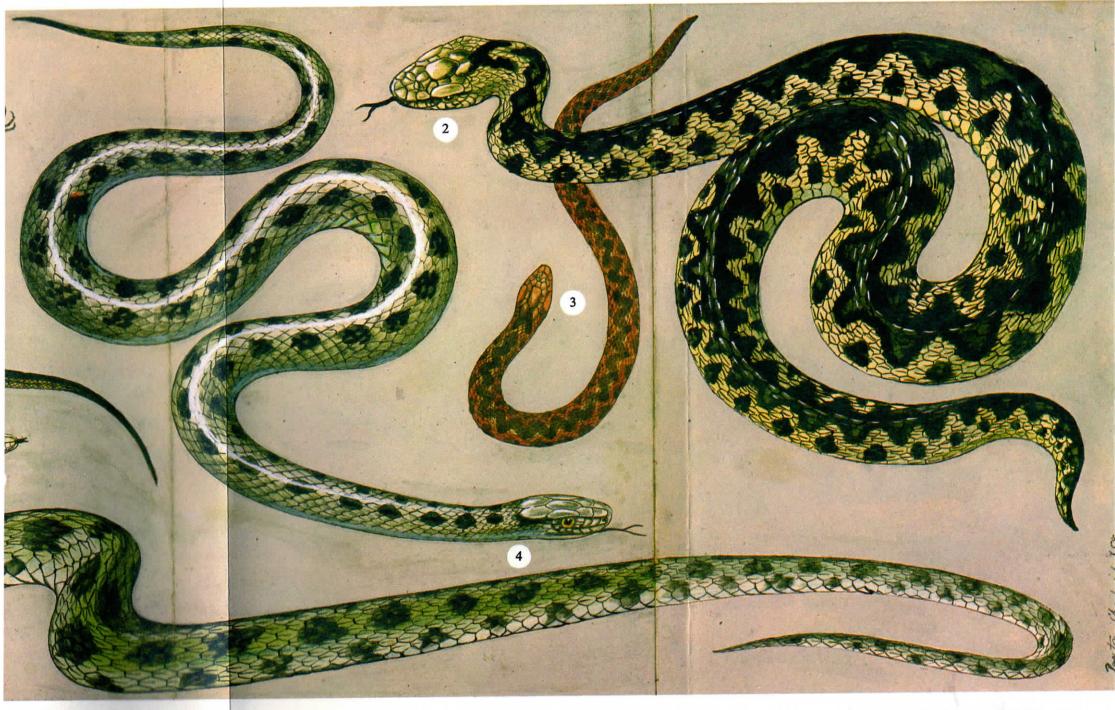
Slowworms Anguis fragilis occur in the low undergrowth between the heath and garden wall where they glide with astonishing ease. These neat shiny harmless creatures with their very smooth scales are, of course, not snakes but a sort of legless lizard. They burrow in light soil and come up to the surface at dusk to forage for their favourite small white slugs, insects and larvae. Their young are born in a bag out of which they break by a stabbing movement of the head. A large slowworm kept by children on Leiston Common under conditions advised by the Natural History Museum, lived healthily for two years before being released.

The hot sandy soil of the common is well liked by lizards but only the viviparous lizard *Lacerta vivipara* has been seen, and that only ecasionally when sunning itself on garden walls. The belly of the ale is deep orange spotted with black, that of the female altogether aler. As the name implies, the young are born alive, the newly born eing almost black in colour.

KEY A TO REPTILES FOUND ON HEATHLAND

- 1 Grass Snake Natrix natrix: fully grown male 3ft=914mm., females larger. Habitat where ponds and ditches are plentiful in hedgerows, open woodland and some heaths near ponds.
- Adder or Viper Vipera berus: male.
 Young female adder.
- A fully grown female adder is larger than average male which can attain 2ft=609mm. Frequents undergrowth on heaths. Zigzag not always clearly defined and ground colour variable in both male and female.
- 4 Smooth Snake Coronella austriaca: in England seldom exceeds 2ft=609mm. Prefers dry southern heaths and open woodland.
- 5 Viviparous or common lizard Lacerta vivipara: male.
- 6 Young common lizard at birth.
- 7 Underside of Lacerta vivipara.
- Grown male common lizard 6in=150mm., female often larger, with tail more than half of total. Heaths, banks, walls, etc.
- 8 Sand Lizard Lacerta agilis: about 8in=200mm., tail forming more than half. Sandy heaths and dunes with heather.
- 9 Slowworm Anguis fragilis: male.
- 10 Female slowworm.
- 1 Young slowworm.
- Well grown adult measures 15in=380mm., tail forming more than one half. Dry country of heaths and hedgerows, etc.





what was once a single line railway running over Crown Walks via Thorpeness Halt to Aldeburgh and back to Leiston and Saxmundham. Where the material came from to build the track is not known. Local pits of crag or marl may have been used or, less likely, material may have been transported by sea. But whatever was used, plants are found along this tract that are more often found on chalk or limestone than on acid heaths. These include the carline thistle *Carlina vulgaris*, particularly striking in winter with its stiff structure and attractive colouring of straw and yellow gold; and the greater knapweed *Centaurea scabiosa*, both plants of chalk and limestone.

The bare trodden sand and grit on the surface of the old line on parts is red with mossy stonecrop *Crassula tillaea*, a tiny annual with minute oval leaves and thread-like stems that turn red in the sun as described by McClintock and Fitter (1967). Two rare little clovers grow on the Walks. One of these is suffocated clover *Trifolium suffocatum* which carries its flowers almost on the ground so that they appear "suffocated" by the taller leaves. The other is clustered clover *Trifolium glomeratum*, a prostrate, hairless little annual with small pinkish-purple round unstalked heads clustering along the stem. Both are described as very local in dry, bare and grassy places.

Another interesting small annual of dry barren places found along the track is fern grass *Catapodium rigidum*, little more than two inches high with narrow purplish leaves and one-sided rigid flowering heads with stiff fern-like ascending branches. Other plants of the barer patches include little mouse-ear *Cerastium semidecandrum*, small



COMMON WHITLOW GRASS EROPHILA VERNA

cudweed Filago minima, and small cat's tail grass Phleum bertolonii. In early March sunshine on the bare sand the short-lived common whitlow grass Erophila verna is already opening deeply cleft white petals raised only an inch or two above the ground on single leafless stems, later bearing the distinctive flat, roundish seed-pods on slender stalks. So called ephemerals like the whitlow grass manage to dodge most of the summer drought by completing their life cycles early in the year.

Plants of dry heaths and windswept places are equipped with a variety of devices to prevent excessive loss of water vapour. The leaves of the heather family for instance are small with a thick cuticle permanently rolled so that the underside where the breathing pores are placed is almost entirely enclosed. In this enclosed space, moist air is trapped and the leaf surface is shaded from sun and wind. Some plants like gorse and broom reduce the actual surface of their leaves into needles so that there is less area for evaporation. Other plants, particularly on windswept coastal heaths and dunes, protect themselves against the drying out action of sun and wind by growing in rosette form, their leaves pressed close against the soil so that only the upper surface is exposed. The rosette keeps the soil immediately round the stem cool while the leaves themselves are in contact with any moisture held in the soil.

A RETROSPECTIVE LOOK AT SOME BIRDS OF THE SANDLING HEATHS

Times change and today naturalists shoot with the camera rather than with the gun but Fergus Menteith Ogilvie (1861-1918) youngest son of Alexander and Margaret Ogilvie of Sizewell Hall, Leiston, Suffolk, was described by his publisher Henry Balfour as a "sportsman naturalist of the best type". Claude B. Ticehurst (1932) in History of the Birds of Suffolk selects him as one of nine former distinguished Suffolk ornithologists and refers to his posthumus publication Field observations of British Birds as full of original observations. Bird studies on the heaths and commons that lie along the coast between Aldeburgh and Dunwich in the neighbourhood of Sizewell common where Ogilvie lived as a boy form the basis of the book. Historically it is of considerable interest in giving a clear picture of these Sandling heaths at the beginning of this century and the end of the last, showing how vegetation changes since that time are reflected in changes in bird population. Height of heather, availability of gorse, extent of grazed open heath, presence of rabbit holes-all these are factors that along with other considerations of climate and human pressure can affect the numbers of certain typical heathland birds.

At a time when sheep were still grazing the Walks of all these heaths and commercial forestry had hardly begun, F. M. Ogilvie was writing:

... Much of the land in the vicinity of the coast, consists of

rough, heathy moorlands, intermixed with arable and marsh lands.

On some of these commons, gorse and bracken predominate; others are almost entirely covered with heather and little else, and are more suggestive of a Yorkshire grouse-moor than a Suffolk Partridge-ground. In size they vary from patches of a few acres to large areas some miles in width or length. The surface is flat or gently undulating, but in some cases, e.g. the Dunwich or Westleton "Walks", the ground becomes much more irregular and hilly.

Of trees there are none, and with the exception of a few stray thorn-bushes, there is nothing to be seen over the wide expanse of greater elevation except a bramble or a furze, which may reach a height of six or eight feet.

Much of the land fringing the moor was at one time broken up by the plough and brought under cultivation. The soil however was so poor consisting only of light sand and innumerable stones, that the experiment, in many cases proved far from successful, and much of the reclaimed land was allowed to fall back into its primitive condition.

In some cases this became quickly reclothed with furze and heather, and hardly recognisable from the surrounding common, except, perhaps for the remains of old banks which marked the boundaries of former fields; in others again, the reclaimed patches have remained naked and stony wastes, bare of any vegetation, except coarse grass or an occasional bracken. This condition is accounted for by the continual scouring of the light sandy soils by winds, and consequent removal of any seeds lying on the surface.

Here and there a patch of this kind 40 to 50 acres in extent may be found in the centre of the big commons, remaining but little altered since the plough was last over it.

In other parts of Norfolk and Suffolk, these lands are called brecks . . . the moorlands I am dealing with here possess an avifauna very similar to [this] Breck region. The birds of a region such as this are characteristic and well defined and in some cases restricted to the common-lands. For since there are no woods or trees or hedgerows, a vast number of the passerine birds, warblers and so forth are absent. As there is no water, wading and aquatic birds are missing and as there is no grain, the game birds are not found here in any quantity, except on the edge of the moor, where the arable land meets the heathery waste.

Ogilvie then divides the characteristic breeding birds of these heaths and commons into those that breed on the ground, under the ground in burrows (wheatear and stock dove), or content themselves with low bushes: Of the passerine birds

Larks, buntings and pipits breed in abundance. The moorlands are the stronghold of our three British Chats—the Wheatear, Stonechat and Whin-chat . . . It is here that the rare and generally retiring Dartford Warbler can be observed. Nightjars are numerous and form a very characteristic feature of the bird life.

Of the more unusual raptors attracted by rabbits, he reports that in winter peregrine falcons are sometimes plentiful, while on rare occasions a white-tailed eagle puts in an appearance.* Rough-legged buzzards and hen-harriers, as they do today, visited in winter and the kestrel then as now could be seen all the year round hovering over the heaths, head to wind, scanning the ground below for its varied prey—small birds, short-tailed voles, long-tailed field mice, beetles, earthworms, lizards.

Ogilvie writes with affection of another resident of the furze commons and heaths which he terms "that charming little bird the Stonechat Saxicola torquata". Though fewer in number, the stonechat is still a familiar companion on the coastal commons between Thorpeness and Minsmere and in the cold winter weather of 1978 on the benthills above the shore, a pair was behaving exactly as Ogilvie describes them in the equally severe winter of 1894/5 when apparently the ground was frozen hard for eight weeks. He describes how

... a walk along the Bentlings fringing the coast would reveal five or six pairs, serenely happy in their wintry surroundings; full of life and movement, boldly following the intruder from bush to bush flirting their short tails over their backs, and scolding incessantly, until they have driven him out of their compound.

He had a theory that stonechats (which nest under gorse bushes or in heather)

. . . loved the poor commons best i.e. those on which there are poor rights and which are in consequence, rather closely cropped by the common holders for litter and kindling and so forth.

(Sizewell and Aldringham are both quoted as "poor commons".)
This observation seems not unconnected with David Lack's findings (1933) when examining changes in bird distribution during

^{*}It did several times in the severe weather of January 1982.



WHINCHAT

the early stages of forestry plantation on Breckland heaths. He found that birds seemed to be very much affected by the height of vegetation, more so than by its nature. Stonechats and whinchats, absent in very bare heaths, were equally common in vegetation of a similar

height whether bracken or young pines, using the top as perches to sing and to make aerial flights after food, but when that vegetation grew beyond a certain height the chats decreased and disappeared.

The changes since the beginning of this century in the Sandling heaths are perhaps most strongly underlined by the status of one of the most specialised heathland birds—the stone curlew. F. M. Ogilvie writes of the stone curlew or Norfolk plover as he often calls it:

They are essentially birds of the Steppe—like the Bustard frequenting open treeless wastes. To my mind one of the most interesting British Birds and unhappily one of those species that is in danger of extinction at no uncertain date. On my own part of Suffolk between Aldeburgh and Dunwich in 1908 they were increasing but only because they had been strictly protected, birds and eggs alike.

In his diary for 1898 he was recording Norfolk plover as unusually numerous at Sizewell with flocks of 15–18 seen several nights on the "Black Heth" and in 1908, he was still recording "Norfolk plover unusually numerous with flocks of 15–20 at Scotts Hall and several sited at Sizewell on the Broom Cover and Crown Farm Common."

Just after the last war, autumn assemblies of sixty to seventy stone curlews in a gravel pit at Minsmere were noted by H. E Axell but with the encroachment of scrub, agriculture and forestry onto the "open treeless wastes" the stone curlew has all but disappeared from the Sandling heaths. However, in 1978 the Rare Birds Panel estimated four pairs breeding in the coastal belt of Suffolk.

The type of low scrub heath favoured by the Dartford warbler is very different from the natural habitat of stone curlews but it also has disappeared entirely from these heaths for at least a half century. In his collection of local heathland birds, once housed in his museum still standing at Sizewell but now in Ipswich Museum, Ogilvie includes three male Dartford warblers, two taken on Westleton Walks and one on Sizewell Common June 13 1890. (The last record for Dartford warblers breeding in the area was 1927.)

The news is perhaps a little better concerning two other interesting birds in the Ogilvie collection—the red-backed shrike and the great grey shrike. The coastal belt between Aldeburgh and Dunwich was until recently one of the best localities for the red-backed shrike with twenty-seven pairs recorded in 1977-78 and fourteen pairs estimated for the following year. (British Birds: Vol 73 No. 1) but even here the birds have been doing badly of late. Recent cold wet springs may be the cause of the reduced breeding success of this summer visitor from dry continental climates which in Britain is on the north west fringe of its range. This may have been the reason for the disappearance of a pair that had for several years been our very close neighbours on Leiston Common, rearing young in a bramble tangle on the edge of the close-cropped heath of the study area, secluded from view by the garden wall. Dung beetles are the commonest item in this butcherbird's larder, together with bumblebees, wasps, cinnabar moths' larvae, shrews, field mice and occasional fledglings of linnet, vellowhammers and partridges—all items that in a good season this dry sunny heath supplies in abundance.

The great grey shrike is a regular winter visitor to these coastal heaths and on December 15th 1979, a male landed on a dead balsam poplar a few feet from the house. Here it remained a full five minutes turning its head this way and that giving a fine display of its contrasting black, grey and white plumage, with long black and white tail fanned in classical shrike manner.

While linnets, yellowhammers and meadow pipits continue as in F. M. Ogilvie's time to be the most frequent residents of the commons, the pine plantations have introduced the green woodpecker as a constant visitor to the heaths for food, its yaffling call a sharp reminder of its presence. With crimson head and yellow-green mantle gleaming in the sun, it comes in search of ants in the short grass or scales the telegraph pole to probe the cracks for insects with its long tongue.

IMMATURE CUCKOO

In the immediate neighbourhood of the study area of Leiston Common, increase in garden bushes has attracted other birds, some less typical of heathland such as the willow warbler and the chaffinch: blue, coal, long-tailed and great tit; common and lesser whitethroat; hedge sparrow, redpoll and spotted fly-catcher. As in Ogilvie's time, the wet common and marshes, now with a small reservoir and

drainage stream, attract various ducks, water-rail, moorhen and coot as well as reed and sedge warblers. Either the nests of the sedge warblers or those of the meadow pipits on the dry heath act as host for the egg of the cuckoo that visits us each spring, waking the common early with its persistent call.

A young cuckoo in its rufous stage imprisoned itself in the fruit cage on the edge of the heathland study area. While disentangling it from the net, close examination was possible of the red-brown barred mantle and striped whitish fawn underparts. Ogilvie found these immature cuckoos fed mainly on hairy caterpillars with some small beetles. The stomachs of two he caught in Suffolk in September and October were crammed full of the heads and empty skins of the yellow and black downy larvae of the buff-tip moth *Phalera bucephala*. This is a moth with silvery grey and violet colouring and rounded buff tip that frequently comes to light on Leiston Common, causing astonishment by its similarity in repose to the broken twig of silver birch.

NIGHTJARS OF THE SANDLING HEATHS

One of the most positive developments in the last half of this century has been the protection afforded to the Sandling heathlands by the nature conservation movement, with designation of these important coastal heaths as Sites of Special Scientific Interest and part of the Suffolk Heritage Coast.

One of the breeding birds to benefit from this development has been the European nightjar or fern owl *Caprimulgus europaeus* that Ogilvie referred to as being a characteristic feature of the bird-life of the heaths at the end of the last century when one of their favourite haunts were the commons around his childhood home at Sizewell. Nightjars, though in decline, still breed on most of the Sandling heaths but it is on two nature reserves that their requirements have been specially studied.

When nearly ten years ago an agreement was arrived at with the Home Office for some fifty acres of Hollesley Heath to be managed as a local nature reserve by the Suffolk Trust for Nature Conservation, the land was described as an area of mature Sandlings pinewood bordered on the south and east by formerly open heathland showing various stages in succession to birch and pine scrub. The intention was to create zones of all representative types of vegetation from bare ground to climax woodland, with the proportion of two-third open

